An Coimisiún um
Rialáil Cumarsáide
Commission for
Communications Regulation

Non-Confidential Submissions to Document 20/109 and 20/109A

Submission to Consultation

Reference: ComReg 21/134s

Date: 17/12/2021

An Coimisiún um Rialáil Cumarsáide
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Submissions Received from Respondents

Document No	
Date	

Consultation	20/109 and 20/109A

1 Introduction

1 The Commission for Communications Regulation ("ComReg") is the statutory body responsible for the regulation of the electronic communications (telecommunications, radiocommunication and broadcasting networks), postal and premium rate sectors in Ireland in accordance with European Union ("EU") and Irish Law.

2 ComReg also manages the radio frequency spectrum ("radio spectrum" or "spectrum") and the national numbering resource, among other responsibilities. Radio Spectrum is a valuable national resource underpinning important economic social and communications activities.

3 In November 2020, the Commission for Communications Regulation ('ComReg') issued a preliminary consultation regarding the review of the fixed radio links licensing regime ('ComReg Document 20/109[1] and ComReg Document 20/109A[2]).

4 In Document 20/109, ComReg invited submissions from interested parties on the matters discussed in the Fixed Links Bands Review. ComReg received nineteen submissions to Document 20/109.

5 As outlined in Next Steps of Document 20/109, ComReg indicated that it would publish all non-confidential submissions received and may invite comments on same to facilitate extensive consideration on all matters raised.

6 All nineteen non-confidential submissions to Documents 20/109 and 20/109A are now contained below in the following order:

1. Digitalforge;
2. Eircom Limited and Meteor Mobile Communication Limited (trading as 'eir' and 'open eir') ("Eir");
3. EOBO Ltd ("BBNet");
4. ESB Networks DAC ("ESBN");
5. Eutelsat S.A ("Eutelsat");
6. Inmarsat Ventures SE ("Inmarsat");
7. JS Whizzy Internet Limited ("Whizzy Internet");

[1] https://www.comreg.ie/publication/review-of-the-fixed-radio-links-licensing-regime
[2] https://www.comreg.ie/publication/consultants-report-fixed-links-bands-review

8. Kerry Broadband Ltd (“Kerry Broadband”);
9. Lackabeha Services Ltd (“Airwave Internet”);
10. Lighthouse Networks Ltd (“Lightnet”);
11. Orion Digital Services Ltd (“Orion”);
12. Regional Telecom Ltd (“Regional Telecom”);
13. Siklu Communication Ltd (“Siklu”);
14. Space Exploration Technologies Corp (“Space X”);
15. Three Ireland (Hutchison) Limited (“Three”);
16. Viasat Inc (“Viasat”);
17. Virgin Media Ireland Ltd (“Virgin”);
18. Vodafone Ireland Ltd (“Vodafone”); and
19. Wireless Connect Ltd (“Wireless Connect”).

1: Digitalforge

Review of the Fixed Radio Links Licensing Regime

FAO: Mr. Martin O Donoghue, Commission for Communications Regulation

Non-Confidential: Full Public Release Please

Disclaimer:

DigitalForge has compiled the information submitted in good faith and have exercised all due care in so far as possible with the constraints of meeting the deadline of 7th of December 2020. As an SME ISP we would advocate for longer consultations with more notice given the complexity of the subject matter, the resource constraints that smaller operators have to cope with. We would respectfully ask that ComReg review the 4 week consultation period practice to match the best practices outlined in DPER Public Consultation Guidelines, at the following location:
https://www.gov.ie/en/publication/e9b052-consultation-principles-and-guidance/

THE IMPORTANCE OF FIXED LINKS LICENSING REGIME TO RURAL IRELAND

We are pleased to make this submission in response to Comreg 20/109. The review of the Fixed radio links licensing regime presents an opportunity for ComReg to Assist the Fixed Wireless Access Operators deliver even more high speed broadband to businesses and residences across all of Ireland. Particularly in areas where the population density is low. The support of network diversity provided by independent locally owned and operated companies is in Ireland's national economic interest and national security interest. ComRegs Liberalisation of the 5.8GHz band in ComReg's *Expanding Opportunities in the Radiocommunications Market: Fixed Wireless Access (FWA) - Consultation Paper 02/19*, combined with the availability of lower cost license exempt equipment in the 5 /5.8GHz, has transformed ICT landscape in rural Ireland, sowing the seeds of what would become an industry of approximately 50 local independent self-sustaining FWA operators serving over **100,000** connected subscribers in their local communities with high-quality high-speed broadband. According to Wireless Coverage Ltd's report authored by Mr. David Burns and commissioned by 28 ISPs for the 2019 NBP Mapping consultation in 2019 28 ISPs in the FWA industry have achieved the following coverage and market penetration:

Number of sites by 28 FWA ISPs	**1,465**
NGA Premises Passed by 28 FWA ISPs	**689,781**
Non NGA premises Passed by 28 FWA ISPs	**1,456,470**
Number of Premises Connected to 27 FWA ISPs	**91,894***

Source Wireless Coverage Ltd. Report 30 September 2019 in response to the NBP mapping exercise

Fixed wireless operators welcome the clear recognition that the charts provide that Fixed Wireless operators are and continue to invest in high capacity links across Ireland.

Fixed wireless operators would welcome further liberalization of spectrum to facilitate deployment of further independent broadband infrastructure in rural Ireland. The importance of the independent FWA industry in Ireland cannot be overstated, and the Covid-19 pandemic has shown us the FWA industry were the ones connecting and carrying rural Ireland through the pandemic, while heavily subsidised entities have been surveying the country for what they might one day connect. At the time of submission, no homes or businesses have been connected by the NBP. It is essential that ComReg use all powers and resources available to help maintain the diversity of infrastructure deployed in rural Ireland. It is regrettable that this consultation did not take place prior to

the signing of the NBP contract in late 2019. As regulatory and policy measures and are preferable to subsidised interventions because they can reduce the need, the scale and hence the cost of Government subsidised interventions generally.

The FWA industry's existing broadband infrastructure and contribution to rural Ireland, despite being ignored and discounted by recent Irish Governments for the purposes of ensuring a ubiquitous provision of FTTH throughout the State, has a vital role to play in Ireland's future in providing real competition for internet access in Ireland particularly because of their focus in rural parts of Ireland typically underserved by larger ISPs whos' focus on more profitable urban markets. Supporting measures that reduce the costs and burden on independent fixed wireless operators expanding and upgrading their deployments in rural Ireland can help us provide the much needed redundancy to the Irish Government's NBP approach of placing all eggs in one publicly funded, private equity infrastructure basket. The FWA industry can and currently does provide much needed connectivity to rural Ireland, and this is important to maintain in the event of the NBP running into further delays or difficulties which seems to be a recurring theme when it comes to the management of the NBP procurement & rollout program to date.

We welcome the opportunity to comment on:

• The design of a licensing framework that best provides for the effective management and efficient usage of the Fixed Links band identified in this consultation and the responses.

•A new hopefully Improved fee schedule for Fixed Links that facilitates the greatest number of use cases, in order to ultimately promote greater use of the spectrum that are identified in this consultation and the responses; Preliminary Consultation of Fixed Links Bands Review ComReg 20/109

• Review the technical conditions and guidelines for the deployment Fixed Links in the bands identified and consult on any proposed changes; and Advise and consult on new regulations to replace S.I. 370 of 2009

Table of Contents

2.1 The Fixed Link Licensing Regime

Comments further in the document.

Individual Link Licence fees

Comments further in the document.

2.2 Current Individual Fixed Link Bands

It is worth noting the level of existing FWA broadband Infrastructure in the country which is already at or in the process of being upgraded to NGA status. This is a testament to the commitment, investment of so many market operators have made and continue to make in rural Ireland. It is imperative that ComReg supports competition and infrastructure diversity when considering changes to the licensing regime.

2.3 Other spectrum management matters which are related to the Fixed Link Bands

WAS/RLAN above 5 GHz

In relation to Paragraph 52

> *52 "ComReg will continue to monitor and input into the discussions of this matter at the EC and ECC. Upon the adoption and publication of any future EC and/or ECC Decision, ComReg will consider the appropriate the implementation of those decisions"*

We would advocate that an exemption exist for Fixed Wireless Access operators in a similar manner for the 5.8GHz Spectrum to allow operators use the 5925-6425 MHz band at an EIRP similar to that specified in the 5.8GHz Band for the purpose of providing Broadband access in rural areas. It would be a pity not to fully realise the potential of expanding the spectrum available to Fixed wireless operators so that the DAE 2025 objectives of a minimum speed of 100Mb/s per subscriber can be by giving existing operators access to more spectrum. We welcome that ComReg is closely monitoring the progress at the ECC and we would advocate that interested parties that may need to operate CBTC Secure Communications Train Based Control systems in Ireland be contacted to see if they are In fact using that spectrum for CBTC. If in fact that they are not using that spectrum it would be most helpful to the Fixed Wireless Access industry for ComReg to liberalise that spectrum on a License Exempt basis in a similar manner to the 5.8GHz Band.

We would welcome ComReg making available the 5925-6425 MHz on a provisional license exempt or light license basis pending full and formal adoption of a decision at the ECC.

3.1 Existing Use Cases

As a FWA operator we would like to comment on paragraph 68

> *68 For the purposes of this review, ComReg requested information on the use of Fixed Links in the Licence Exempt Bands in the Licensee RFI 74 . A total of 15 respondents to the RFI stated their use of licence exempt Fixed Links 75 . Separate ComReg data indicates that ComReg's RFI data did not capture the majority of licence exempt Fixed Links, due to a number of FWA operators with a large number of Licence Exempt FWA Fixed Links 76 failing to respond. ComReg therefore places limited weight on trends in this data as representing trends for all licence exempt Fixed Links. Bearing this in mind, ComReg notes the use of Fixed Links among these 15 users has increased in recent years with most of the licence exempt Fixed Links deployed for FWA in the 5 GHz band. Data gathered separately by ComReg on broadband subscriptions delivered by FWA corroborate this finding and indicates that the number of Fixed Links in the Licence Exempt Bands used for the provision of FWA for 2.4 GHz and 5 GHz bands has increased from Q1 2020.*

We do agree with both DotEcom and ComReg's observation that the scale of the deployment of license exempt fixed links are underestimated in this report. While we agree that it is likely due to a lack of response from FWA ISPs, it should be noted, that the Covid-19 pandemic and lockdowns aside, FWA operators are focused primarily on the need to connect the unconnected, or to upgrade the connected. We Regret the Inability of many FWA operators to submit this vital information to ComReg. For our part and we believe those of our peers particularly during the pandemic when so many of our subscribers are working from home, our priority has had to be the continued delivery of reliable service to the customer and therefore engagement with and responding to consultations was unfortunately lower down on the priority list. The constraints on resources of smaller operators like ourselves means responding meaningfully and accurately to a consultation in a period of just 4 weeks is exceptionally difficult. We have no doubt that this would have impacted on the other FWA operators' ability to collect information about license exempt links as requested earlier in the year. We would welcome a review of the consultation period length and encourage ComReg to perhaps publish the intention to hold a consultation well in advance (similar to the way that this consultation was flagged in advance because of the engagement during the request for information on deployed links made to operators earlier in the year).

If we consider that just 28 of FWA ISPs have built and deployed at least 1465 sites around Ireland to serve their local communities it would stand to reason there would be multiples of that figure in P-P links and P-MP links also.

It is noteworthy that the charts in paragraphs 56 and 57 show the value and importance of the FWA industry in Ireland. and that the FWA sector as market operators are investing and expanding as clearly demonstrated in the purchase of licenses and the increased number of FWA ISPs purchasing licenses.

It is striking to see the chart associated with paragraph 58 that FWA Operators are increasing investment and real deployment in Fixed Links in all bands (apart from 38GHz).

3.2 The use of Fixed Links in Ireland in an International context

We would advocate that ComReg monitor the use of light licensed schemes such as public safety spectrum allocations in the US and if possible allow for the application on a light licensed or license exempt basis, for the purposes of Deploying Fixed Wireless Access broadband in Rural Ireland. This request would be contingent on lower cost equipment being readily available to facilitate the rapid deployment of such networks, so that consumers would experience the benefits of such liberalisation without delay. An example where this could be readily achieved is in the 4.9GHz band where FCC has designated in the US that this is a public Safety band and that there is equipment available to meet that specification that is similar to other equipment operating in the 5.4 /5.8GHz. So it would be easy for FWA operators to Purchase and Deploy equipment to operate in the 4.9GHz band due to the fact that it is operating similar equipment already on its network. The availability or prospect of low cost equipment to operate in a particular band would be one of the most important factors to consider when liberalising spectrum access eg similar spectrum utilisation in other major jusrisdictions.

3.3 & 3.4 Other potential use cases for Fixed Links

A-Q1

The advent of newer 60GHz technologies means that a large-scale deployment of FWA networks are possible in Cities and Towns, and this can lead to future competition for access networks and increased choices for consumers. The Cambium Cnwave product line has the feature set, throughput performance (multi-Gigabit connectivity) and a compact formfactor allowing operators to disrupt the urban and suburban market. Further it can afford businesses and high end consumers who have need for redundancy of internet access / WAN access a possibility to connect over diverse infrastructures instead of relying on One Wholesale Operator infrastructure and pseudo diversity over said single wholesale operator infrastructure.

4.1 Spectrum availability and channel arrangements

A-Q2

As a FWA operator which consistently strives to have at least 20% over capacity on our network and which often need to deploy over 1Gb/s to a given site in order to maintain an over capacity of 20% above peak demand, therefore, we agree with the ITU /CEPT recommendation & endorse DotEcom's, and ComReg's view that 112MHz channels should be made available in those bands in so far as they do not restrict existing operators who have more narrow channel licenses already purchased. We would advocate a co-operative approach where ComReg could work with license holders to ensure that narrow channels are migrated from the middle of the band to the one of the edges of the band so that fragmentation is minimised.

Perhaps it would be worth considering that for a software channel change that ComReg would make that a condition of renewing a license for operators who have equipment that can be easily re-configured to a different channel. Perhaps this could be available with a nominal low-cost fee. And for a quicker turnaround perhaps a fair compensation model can be agreed between the operators. This would be difficult to implement and would require buy in and co-operation from all operators. However, it is important that Operators co-operate with each other to maximise the use of spectrum and the availability of high-speed broadband services to end consumers in Ireland. That said, if an operator wants an operator who's equipment is constrained to a given channel then it would be incumbent on the operator requesting the larger channel to pay for a replacement equipment and install cost, so that would allow the operator with the smaller allocation move off the channel without affecting its own services to its customers.

4.2 Block Licences

A-Q3

Individual Licenses are preferred for small to medium FWA ISPs like our own as it lowers the barriers for expanding and improving our infrastructure footprint. National block licenses are typically out of the financial reach of smaller operators, as previously demonstrated by the Auction of the 3.6GHz spectrum which resulted in the retiring of low cost local site licenses which were taken up by a number of small to medium FWA operators and then in the auction of the released spectrum to the highest bidder with MNOs getting the bulk of the spectrum and only 1 FWA operator, Imagine being successful in acquiring some spectrum. It is therefore of paramount importance that individual links can be purchased at a reasonable cost to facilitate the expansion of services from localised FWA providers. Promoting spectrum availability for SME operators will reduce the ability of larger operators to sit on and not deploy national block licenses. Spectrum availability for smaller operators can help ensure their survival

and growth and would enable genuine choice and competition with real infrastructure diversity choices for consumers across Ireland. Comreg facilitating ideas such as this would be helpful in ComReg fulfilling its obligations under A1.1.2 Promotion of Competition.

It is our view that Block licences should only be considered if and only if there is sufficiently significant part of the spectrum made available for individual link licenses. While one can understand the value in reducing paperwork for larger wider deployed networks. It is our view that larger networks already enjoy favourable access to spectrum by virtue of their scale and spending power. It therefore also important to consider the positive competition implications for maintaining a low barrier of entry for Fixed Wireless Operators in any given licensed band.

It is our preference to have individual licensed links with licenses assigned in as automated manner as possible to reduce the burden on ComReg and the operators seeking to deploy a link. The low-cost license regime is pivotal to allow smaller fixed wireless operators compete with the larger ISPs and MNOs.

4.3 Application and licensing process

A-Q4

We would advocate the use of automation and models built in on the licensing platform that could guide the License applicant to self-validate the application (link budgets availability characteristics) We would strongly advocate for the ability for a license applicant to pre-emptively select additional lower preference link channels and/or bands in the application procedure so that in the event of the first chosen channel and/or band is not available the operator can get a license grant in one brief exchange with ComReg without an iterative process back and forth between ComReg and the operator until the operator manages to be fortunate enough to select an available channel on a given band. Automating this in so far as possible and building in intelligence into the license application system would reduce the burden on both ComReg and the Operators.

Alternatively as an interim measure, or to address difficulties in automating the frequency allocation process, perhaps ComReg could instigate a process of advising on the suitability and/or availability of the requested channel v's nearby or similar channels which might be licensed to meet the link budget requirements. This may have the ancillary benefit of improving the efficiency of spectrum deployment.

4.4 Fixed radio links Guidelines

A-Q5

As a FWA operator, we welcome both DotEcom's and ComReg's views as outlined in paragraph 117. That network and technological progress is not impeded by lack of guidelines for a new technique or technology that has not been referred to in the guidelines. The requirement that such deployment to be notified in advance to ComReg is right and reasonable. And we endorse it wholeheartedly.

As an operator who is expanding its backhaul continuously we would endorse ComReg's view as outlined in paragraph 118 that relaxing of minimum distance of links as long as the purpose of which is for aggregating multiple links / frequencies to increase capacity and redundancy between sites. As long as the capacity / redundancy / availability could not be achieved with a higher capacity link.

4.5 Pricing

A-Q6

Independent SME FWA ISPs are price conscious, the success of the 80GHz band and the number of links deployed in that shows (at least empirically that lower cost licenses encourages more deployment in that band) we would advocate lowering the cost of licenses where bands are not that heavily used. It is important that ComReg is mindful that there is generally a downward trend in cost per Mb/s being charged to consumers, coupled with an upward trend in bandwidth capacity demands per customer, consequentially the demands on our backhaul licensed links are increasing while the profit an individual link would be de-creasing. Accordingly we would advocate that licenses taken out in the same company between two identical endpoints should receive a discount on second and subsequent licenses. This would be fairer on an expanding operator who is transitioning from one vendor to another and cannot combine the two frequencies into one antenna system. Lowering the barriers / costs associated with giving subscribers more bandwidth is a good thing and would help encourage even further investment in infrastructure by the operators (not to financially disincentivise them)

The current de-lineation of costs according to high usage path / congested area vs normal usage paths / areas, is very coarse and it is probable that in the Dublin area there are certain areas with an underinvestment in wireless links due to the cost of the deployment, having a granular approach with accurate models would help reduce the costs of deploying in less deployed areas in and around Dublin City. We would advocate an incremental process for a gradual increase costs licenses on a given band as the number of channels allocated in that band increases. This could also serve as an indicator of how busy a band actually is on a given path.

4.6 1.4 GHz band

A-Q7

It would be our preference assuming reasonable cost equipment is available for deploying links with 1.4GHz that this be assigned for FWA networks on a locally licensed basis (subject to availability of cost effective equipment being available in this band.

A-Q8

The Licensing model should such that it be made available on lower cost local licenses to assist local operators provide choice and more bandwidth to customers in their locality. If ComReg believes a national / regional block licensing model is needed, we would advocate strongly (subject to reasonable cost equipment being available by manufacturers) that a section of the band be reserved for local operators. This would improve competition and diversity of infrastructure in rural Ireland.

4.7 13 GHz and 15 GHz bands

A-Q9

It is understandable that 13GHz / 15Ghz have applications restricted when there is no availability of channel space. However there no logic to the regulator effectively holding back channels in this spectrum that have been since released or not renewed by the license holder of that channel. We would advocate a traffic light system that would inform users that a band in a given area is full and that license applications are not being accepted at this time. Further it might be worth ComReg considering the tidying up of these two bands(by moving smaller channel allocations to the edge of the bands (on renewal in so far as it is possible) as opposed to fragmenting and impeding potential for larger contiguous channel allocations in the band.

4.8 26 GHz band

A-Q10

We would advocate that the licensing model should such that it be made available on lower cost local licenses to assist local operators provide choice and more bandwidth to customers in their locality. If ComReg believes a national / regional block licensing model is needed, we would advocate strongly (subject to reasonable cost equipment being available from manufacturers) that a section of the band be reserved for local operators. This would improve competition and diversity of infrastructure in rural Ireland.

4.9 D-bands and W-bands

A-Q11

FWA operators like ourselves would be interested in deploying equipment in this band once it becomes available. However given the frequency range it is likely that as per DotEcom's and ComReg's view that it would be for ultra high capacity links in urban environments (due to inherent range limitations) of these bands. That said we can only fully comment when the specifications and limits on EIRP and the capability of equipment designed to operate in that band are known.

4.10 Licence exempt / light licensing

A-Q12

License exempt spectrum has allowed independent FWA operators deliver high speed internet access to rural Ireland where fixed line and MNOs that have historically focused on urban / suburban areas and consequentially failed to deliver high speed broadband in a timely manner to rural communities.

5.4GHz and 5.8GHz Bands have been key and remain key to delivering FWA broadband in Ireland in the past and as their sites and access requirements have grown where a site has been fed by one or two 5.4GHz / 5.8GHz fixed links, it has been and is common practice to re-invest in the site and replace the lower cost 5.4 GHz/ 5.8GHz backhaul links with links operating in other bands such as

- license exempt bands such as 17GHz, 24GHz
- if the link is sufficiently short distance the License Exempt 60GHz band.
- light licensed bands such as 80GHz
- licensed Bands such as 13GHz,15GHz and 18GHz

The migration away from 5.4GHz/ 5.8GHz backhaul links allows for re-deployment and more flexibility in delivering service on more sectors on a given site allowing for greater coverage.

This strategy is not unique to our company and is indeed replicated by our other colleagues in the FWA sector.

We agree with DotEcom's recommendation regarding not to close bands that have been previously open and in use.

5.4 GHz License Exempt band

The value of this band to us is increasing from a P-MP perspective and decreasing from P-P perspective primarily. The value of deploying a 5.4GHz sector is far greater to an FWA ISP when compared a P-P link in the 5.4GHz band

5.8 GHz License Exempt band

In a similar way to the 5.4GHz band the value of this band to us is increasing from a P-MP perspective and decreasing from P-P perspective primarily. The value of deploying a 5.8GHz sector is far greater to an FWA ISP when compared a P-P link in the 5.8GHz We would advocate an increase the max EIRP in rural areas in line with (Ofcom in UK) to 36 dBm which would increase the range of rural base stations by up to 41%

The advent and availability of beamforming Mu-MIMO sectors, and high quality beam efficient scalar horn antennas from manufacturers such as RF-Elements with tight beam focus means that despite the very wide large scale deployment of License exempt links generally across the country, ISPs like our selves can manage the spectrum and adequately limit interference effects to / from other equipment operators. Thankfully we co-operate with and enjoy the co-operation of other neighbouring FWA Wireless networks and the rollout of these technologies means that interference incidents are fewer and farther between. Further the developments of Mu-MIMO and beaming forming equipment from manufacturers such has Cambium PMP and ePMP means that customers can enjoy improved service now and in the future.

17GHz License Exempt band

We note ComReg's observation in Paragraph 145 notwithstanding CEPT Report 44 stating that this band is of little use. We have extensively deployed 17GHz links and will continue to do so over the coming years. We consider this band vital for low cost high speed backhaul to our sites. And provides redundancy for Licensed links at a low cost. This band allows us to deliver higher bandwidth to our customers at a lower cost.

We are pleased to see ComReg's recognition in paragraph 146 of availability of equipment for 17GHz band and that it is currently deployed in so many of our networks.

It is our experience that we have yet to encounter any interference on these links in our Rural based deployments. And therefore, agree that a light licensing framework is not required for this band. We follow and advocate for the practice of deploying large gain antennas with reduced input power to minimise interference with our neighbouring ISPs.

We would welcome widening the band from the current 200MHz if at all possible. We would invite ComReg to consider extending the spectrum allocation of this band as much as possible or at the very least 50MHz to accommodate higher capacity symmetric links.

24GHz License Exempt band

We have extensively deployed 24GHz links and will continue to do so over the coming years. We consider this band vital for low cost high speed backhaul to our sites. And

provides redundancy for Licensed links at a low cost. This band allows us to deliver higher bandwidth to our customers at a lower cost.

It is our experience that we have yet to encounter any interference on these links in our Rural based deployments. And therefore, agree that a light licensing framework is not required for this band. We follow and advocate for the practice of deploying large gain antennas with reduced input power to minimise interference with our neighbouring ISPs.

We would welcome widening the band from the current allocation of 250MHz if at all possible. We would invite ComReg to consider extending the spectrum allocation of this band as much as possible.

60GHz License Exempt band

60GHz will become increasingly important both in short range P-P and P-MP applications. We note DotEcom's observation in 5.2.2 that it has not enjoyed extensive use prior to June 2019. We would like to point out the main reason we see for this is that products operating in the 60GHz band have only relatively recently being made available at a relatively reasonable cost. With 802.11ay and 802.11ad links being available from companies such as Cambium, Ubnt, Ignitenet, Radwin, and MikroTik. 60GHz use in our network has increased dramatically in the past 18 months and will likely continue with the release of new products such as the Cambium CnWave product lines with 7.5Gb/s FDX multigigabit connectivity.

66-71GHz Priority Reservation for 5G

It is our opinion that this be released under a general authorisation and subject to technology neutral performance characteristics, such as n x 1Gb/s, or x Gbps /GHz increasing the spectrum availability here has exciting prospects for advanced wireless service capabilities in urban and suburban locations. As noted by RSPG18-005 FINAL the distance from the Oxygen Absorption peak in this frequency range allows for increased cell radius or P-P link range. We would advocate for a technology neutral general authorisation for this portion of the band.

With products such as Cnwave from Cambium one can create a multigigabit Wireless Fabric which is a game changer in providing low cost high capacity access services in Housing Estates, Business and Industrial parks. This can allow businesses a real choice in infrastructure so as not to be reliant on one wholesale overground pole deployed wired ISP infrastructure which as the electrical power network and the incumbent historical experience has shown on an all too regular basis is regularly significantly impacted by storm related outages

Interference Management, Registration vs Light Licensing

We wholeheartedly endorse ComReg's position as set out in paragraphs 148 and 149, we do agree that the current general authorisation framework for the bands is working quite well and that the FWA industry is able to manage link performance and any incidence of interference in the bands quite well. We would ask that ComReg inform the DCCAE and their advisors Analysys Mason that Interference is not a significant issue that is affecting FWA networks to any great extent. Not least because Analysys Mason felt unable to qualify every FWA network for NGA status in the recent NBP Mapping exercise which meant that the Intervention area as defined by the DCCAE and its advisors threatens to overbuild all FWA operators' infrastructure as currently deployed NGA capable infrastructure at significant cost to the Irish and European tax payer.

Other Opportunities for License Exempt Bands.

FWA operators such as our selves would welcome the expansion of License exempt and Light licensed spectrum available to allow us deliver even more services to subscribers in Rural Ireland. We would advocate that if equipment is available that is capable of delivering high speed broadband in other bands that ComReg consider facilitating the opening of spectrum for this purpose in bands such as 4.9GHz where there is equipment readily available internationally and proven in other jurisdictions, and that could be deployed rapidly to increase the bandwidth available and allow FWA operators to scale even further. If a general authorisation basis is not considered possible perhaps a light licensed model would be considered instead. We would welcome ComReg facilitating a conversation between FWA operators and other users of the 4.9GHz band such as radio astronomers etc.

The wide availability (internationally) of equipment designed to operate in the FCC allocated Bands for Public Safety 4940-4990 MHz and 5850-5925 MHz would mean that FWA operators could rapidly take advantage of these bands to provide additional bandwidth to more customers. ComReg facilitating ideas such as this would be helpful in and in no way contravene ComReg fulfilling its obligations under A1.1.2 Promotion of Competition.

Conclusion

This initiative very welcome and could not come soon enough as far as we are concerned. We would like to thank ComReg, in particular Martin O'Donoghue and Donnacha Hennessy who have worked extensively on this initiative and for their patience in dealing with our queries and assisting us in granting extensions to submit information during the initial RFI and we look forward to further engagement with them

on this important initiative. Finally, we would like to thank DotEcom for their excellent report which was very informative and clearly showed interesting trends in Infrastructure investment by the FWA Sector in Rural Ireland.

Ends.

2: Eircom Limited and Meteor Mobile Communication Limited (trading as ‘eir’ and ‘open eir’) (“Eir”);

eir

Response to ComReg Consultation:

Review of the Fixed Radio Links Licensing Regime

ComReg Document 20/109

07 December 2020

DOCUMENT CONTROL

Document name	eir response to ComReg 20/109
Document Owner	eir
Status	Non-Confidential

The comments submitted in response to this consultation document are those of Eircom Limited and Meteor Mobile Communications Limited (trading as 'eir' and 'open eir'), collectively referred to as 'eir Group' or 'eir'.

Response to consultation

eir welcomes the opportunity to contribute to ComReg's Fixed Links Review and looks forward to further consultation on this important topic.

Q.1 ComReg seeks the views of interested parties on the existing and potential use cases identified above and whether there are other use cases that should be considered in determining an appropriate licensing framework. In the case of other potential use cases please provide supporting material for your answers.

1. eir notes the preliminary views of ComReg set out in paragraph 79 and considers the list of potential use cases to be reasonable.

2. Whilst the roll-out of fibre introduces an additional option for mobile backhaul this may not always be economical. The deployment of radio fixed links can be more flexible and timely. Fibre will be an effective substitute for some existing fixed links, however in the face of requirements for increased bandwidth, for example channel sizes of 112 MH, the demand for radio spectrum to support fixed links is unlikely to lessen.

3. In our view the continued use of point to point (P2P) fixed radio links for mobile backhaul and fixed network backhaul will be substantial drivers of demand for fixed link licences in the coming years.

Q.2 ComReg seeks views of interested parties regarding the current and future channel arrangements for all the Fixed Link Bands in ComReg's Guidelines document 09/89R2, and any other channel arrangements recommended or being considered by the CEPT and/or ITU. Please provide evidence and reasoning for your views.

4. As noted in our response to question 1, eir sees growing demand for higher bandwidth radio fixed links to support higher capacity mobile services including 5G. As such eir welcomes ComReg's intention to update the Guidelines to reflect new arrangements arising from ITU `/ CEPT updates.

5. The 13GHz and 15GHz bands are heavily utilised so it may not be appropriate to permit 112MHz channels in these bands or, subject to further study, only permit larger channels in uncongested geographies.

Q.3 ComReg seeks the views of interested parties on block licensing one or more of the frequency bands listed above, and/or any other relevant frequency bands. Please provide supporting material that informs your position.

6. eir considers ComReg's initiative to issue block licences in the 26GHz band to have been a successful innovation that may be advanced as new bands are made available. We agree that block licences could be considered further in respect of the 32 GHz, 80 GHz, 92-114.25 GHz, and 130 – 174 GHz bands.

7. With regard to the 32 GHz band eir does not believe it would be appropriate to consider the 32 GHz band as replacement for the 26 GHz band in 2028. There is not a natural migration path for fixed links between these bands as investment in new equipment would be required.

8. With regard to the 80GHz band eir tends to agree with ComReg's view that the use of block licences should only be considered outside of the Dublin area.

9. The D and W bands could also be candidates for block licensing. However as we note below it is too early to reach any clear view on the future use of these bands.

Q.4 ComReg seeks the views of interested parties on the measures that could be taken to improve the turnaround times for fixed links licence applications and would assist licensees in their network planning. Please provide supporting evidence for your answers.

10. eir agrees with ComReg's view that making more information available on already licensed fixed links will assist applicants in narrowing down options that are more likely to succeed. This in turn should improve the efficiency of the application process with fewer repeat applications. Another process improvement would be for ComReg to offer a suggested alternative clear channel when applications are rejected on the basis of the risk of interference to other operators. An interactive approach would make for a more efficient process and reduce the number of applications ultimately reducing the workload on ComReg.

11. Regarding the turnaround time for the processing of applications it is our experience that applications take on average 3 weeks to be processed by ComReg. This is despite the fact that eir has provided fairly accurate forecasts of application volumes for 2020. Thus whilst we would agree that forecasting could assist ComReg in planning its resources, recent experience suggests that more resources should be deployed by ComReg to improve the turnaround times to shorter than 10 days.

Q.5 ComReg welcomes the views of interested parties regarding the matters discussed in DotEcon's report and ComReg's preliminary views regarding the Guidelines document and the technical parameters therein. Respondents should provide appropriate supporting information when expressing any views.

12. eir agrees that the Guidelines should be regularly reviewed and updated to ensure they are kept abreast of technological developments.

Q.6 ComReg also welcomes views on any further technical matters regarding the deployment of Fixed Radio Links a respondent may deem relevant. Again, Respondents should provide appropriate supporting information when expressing any views.

13. eir has no matters to raise at this time.

Q.6 ComReg seeks views from interested parties on:

- **specific aspects of the guidelines that should be reviewed (i.e. is there any aspect of the guidelines that may inhibit certain uses or technologies outlined above);**
- **information that ComReg could provide in order to ensure better coordination of frequencies and encourage the efficient use of the spectrum more generally;**
- **the structure of the fee schedule (e.g. views on the likely value differences across bands, bands likely to be more or less valuable, congestion charging).**
- **any pricing methodologies that would be suitable for some or all of the Fixed Link Bands (taking account of demand and supply considerations as may apply to each).**

Where appropriate, please provide supporting material with your response.

14. Fixed radio links are important enablers to support the provision of high quality network services. The current Covid crisis has accentuated the importance of communications service to society. As such input costs, such as radio licence fees should be kept at the minimum necessary to facilitate efficient administration. From our experience the current fee structure seems to work well in this regard. eir agrees with the view of Dotecon that it cannot be expected to calculate the opportunity cost of each fixed link. eir notes that ComReg intends to undertake a review of the fixed links pricing schedule after the initial consultation with further inputs from Dotecon. eir believes there is merit in retaining the relatively straightforward approach to pricing under the current regime.

Q7. ComReg seeks the views of interested parties on the current and potential future use of the 1.4 GHz Band and whether all of this band should be included in an award for wireless broadband in the future.

15. The ecosystem for this band remains under-developed and as such we do not believe there is merit in developing an award process in the next few years.

Q8. To the extent that respondents are of the view that the 1.4 GHz Band should be awarded for wireless broadband, ComReg seeks the views of respondents on when those rights of use should be assigned. Where appropriate, please provide supporting material with your response. Respondents should note that views on the award of the 1.4 GHz band for WBB will form input to ComReg's separate consultation process to consider same, which would commence following the award of spectrum in the MBSA2.

16. Please see our response to question 7.

Q9. ComReg seeks the view of interested parties on the potential re-opening of the 13 GHz and 15 GHz bands in the Congested Area. Please provide supporting information with your response.

17. eir believes it would be appropriate to re-open the 13 Ghz and 15 Ghz bands in the congested area.

Q10. ComReg seeks views from interested parties on the current use of the 26 GHz Band for Fixed Links. Respondents should note that any views in relation to the future use of the band for other technologies and uses (e.g. wireless broadband-ECS/5G) will be considered separately as part of ComReg's 26 GHz Study due to be published in Q4/2020.

18. eir considers ComReg's initiative to issue block licences in the 26GHz band to be a successful innovation and an appropriate use of the band in the near to medium term for at least the term of the existing block licences. We look forward to engagement on ComReg's separate 26GHz study.

Q11. ComReg seeks the views of interested parties on the potential future use of the D-band and W-band and the equipment availability for those bands. Please provide supporting information with your response.

19. eir agrees with the view of Dotecon that these bands should not be made "*available until there is a clear need for the spectrum and suitable equipment is available*".

Q12. ComReg seeks the views of interested parties on the current and future use of the 5.8 GHz, 17 GHz, 24 GHz and 60 GHz licence-exempt bands, and the requirement to implement a Light Licensing framework to address interference issues in the licence-exempt bands. Please provide evidence in support of your views.

20. eir does not utilise licence exempt bands for fixed radio links and therefore has no view on the potential changes.

3: EOBO Ltd (“BBNet”)

BBNET

SUBMISSION TO COMREG 20/109

Review of the Fixed Radio Links Licensing Regime

FAO: Mr. Martin O Donoghue, Commission for Communications Regulation

Non-Confidential: Full Public Release Please

Disclaimer:

BBnet has compiled the information submitted in good faith and have exercised all due care in so far as possible with the constraints of meeting the deadline of 7th of December 2020. As an SME ISP we would advocate for longer consultations with more notice given the complexity of the subject matter, the resource constraints that smaller operators have to cope with. We would respectfully ask that ComReg review the 4 week consultation period practice to match the best practices outlined in DPER Public Consultation Guidelines, at the following location: https://www.gov.ie/en/publication/e9b052-consultation-principles-and-guidance/

THE IMPORTANCE OF FIXED LINKS LICENSING REGIME TO RURAL IRELAND

We are pleased to make this submission in response to Comreg 20/109. The review of the Fixed radio links licensing regime presents an opportunity for ComReg to Assist the Fixed Wireless Access Operators deliver even more high-speed broadband to businesses and residences across all of Ireland. Particularly in areas where the population density is low. The support of network diversity provided by independent locally owned and operated companies is in Ireland's national economic interest and national security interest. ComReg's Liberalisation of the 5.8GHz band in ComReg's *Expanding Opportunities in the Radiocommunications Market: Fixed Wireless Access (FWA) - Consultation Paper 02/19*, combined with the availability of lower cost license exempt equipment in the 5 /5.8GHz, has transformed ICT landscape in rural Ireland, sowing the seeds of what would become an industry of approximately 50 local independent self-sustaining FWA operators serving over **100,000** connected subscribers in their local communities with high-quality high-speed broadband. According to Wireless Coverage Ltd's report authored by Mr. David Burns and commissioned by 28 ISPs for the 2019 NBP Mapping consultation in 2019 28 ISPs in the FWA industry have achieved the following coverage and market penetration:

Number of sites by 28 FWA ISPs	**1,465**
NGA Premises Passed by 28 FWA ISPs	**689,781**
Non NGA premises Passed by 28 FWA ISPs	**1,456,470**
Number of Premises Connected to 27 FWA ISPs	**91,894***

Source Wireless Coverage Ltd. Report 30 September 2019 in response to the NBP mapping exercise

Fixed wireless operators welcome the clear recognition that the charts provide that Fixed Wireless operators are and continue to invest in high capacity links across Ireland.

Fixed wireless operators would welcome further liberalization of spectrum to facilitate deployment of further independent broadband infrastructure in rural Ireland. The importance of the independent FWA industry in Ireland cannot be overstated, and the Covid-19 pandemic has shown us the FWA industry were the ones connecting and carrying rural Ireland through the pandemic, while heavily subsidised entities have been surveying the country for what they might one day connect. At the time of submission, no homes or businesses have been connected by the NBP. It is essential that ComReg use all powers and resources available to help maintain the diversity of infrastructure deployed in rural Ireland. It is regrettable that this consultation did not take place prior to

the signing of the NBP contract in late 2019. As regulatory and policy measures and are preferable to subsidised interventions because they can reduce the need, the scale and hence the cost of Government subsidised interventions generally.

The FWA industry's existing broadband infrastructure and contribution to rural Ireland, despite being ignored and discounted by recent Irish Governments for the purposes of ensuring a ubiquitous provision of FTTH throughout the State, has a vital role to play in Ireland's future in providing real competition for internet access in Ireland particularly because of their focus in rural parts of Ireland typically underserved by larger ISPs whos' focus on more profitable urban markets. Supporting measures that reduce the costs and burden on independent fixed wireless operators expanding and upgrading their deployments in rural Ireland can help us provide the much needed redundancy to the Irish Government's NBP approach of placing all eggs in one publicly funded, private equity infrastructure basket. The FWA industry can and currently does provide much needed connectivity to rural Ireland, and this is important to maintain in the event of the NBP running into further delays or difficulties which seems to be a recurring theme when it comes to the management of the NBP procurement & rollout program to date.

We welcome the opportunity to comment on:

• The design of a licensing framework that best provides for the effective management and efficient usage of the Fixed Links band identified in this consultation and the responses.

•A new hopefully Improved fee schedule for Fixed Links that facilitates the greatest number of use cases, in order to ultimately promote greater use of the spectrum that are identified in this consultation and the responses; Preliminary Consultation of Fixed Links Bands Review ComReg 20/109

• Review the technical conditions and guidelines for the deployment Fixed Links in the bands identified and consult on any proposed changes; and Advise and consult on new regulations to replace S.I. 370 of 2009

Table of Contents

2.1 The Fixed Link Licensing Regime

Comments further in the document.

Individual Link Licence fees

Comments further in the document.

2.2 Current Individual Fixed Link Bands

It is worth noting the level of existing FWA broadband Infrastructure in the country which is already at or in the process of being upgraded to NGA status. This is a testament to the commitment, investment of so many market operators have made and continue to make in rural Ireland. It is imperative that ComReg supports competition and infrastructure diversity when considering changes to the licensing regime.

2.3 Other spectrum management matters which are related to the Fixed Link Bands

WAS/RLAN above 5 GHz

In relation to Paragraph 52

> *52 "ComReg will continue to monitor and input into the discussions of this matter at the EC and ECC. Upon the adoption and publication of any future EC and/or ECC Decision, ComReg will consider the appropriate the implementation of those decisions"*

We would advocate that an exemption exist for Fixed Wireless Access operators in a similar manner for the 5.8GHz Spectrum to allow operators use the 5925-6425 MHz band at an EIRP similar to that specified in the 5.8GHz Band for the purpose of providing Broadband access in rural areas. It would be a pity not to fully realise the potential of expanding the spectrum available to Fixed wireless operators so that the DAE 2025 objectives of a minimum speed of 100Mb/s per subscriber can be by giving existing operators access to more spectrum. We welcome that ComReg is closely monitoring the progress at the ECC and we would advocate that interested parties that may need to operate CBTC Secure Communications Train Based Control systems in Ireland be contacted to see if they are In fact using that spectrum for CBTC. If in fact that they are not using that spectrum it would be most helpful to the Fixed Wireless Access industry for ComReg to liberalise that spectrum on a License Exempt basis in a similar manner to the 5.8GHz Band.

We would welcome ComReg making available the 5925-6425 MHz on a provisional license exempt or light license basis pending full and formal adoption of a decision at the ECC.

3.1 Existing Use Cases

As a FWA operator we would like to comment on paragraph 68

> *68 For the purposes of this review, ComReg requested information on the use of Fixed Links in the Licence Exempt Bands in the Licensee RFI 74 . A total of 15 respondents to the RFI stated their use of licence exempt Fixed Links 75 . Separate ComReg data indicates that ComReg's RFI data did not capture the majority of licence exempt Fixed Links, due to a number of FWA operators with a large number of Licence Exempt FWA Fixed Links 76 failing to respond. ComReg therefore places limited weight on trends in this data as representing trends for all licence exempt Fixed Links. Bearing this in mind, ComReg notes the use of Fixed Links among these 15 users has increased in recent years with most of the licence exempt Fixed Links deployed for FWA in the 5 GHz band. Data gathered separately by ComReg on broadband subscriptions delivered by FWA corroborate this finding and indicates that the number of Fixed Links in the Licence Exempt Bands used for the provision of FWA for 2.4 GHz and 5 GHz bands has increased from Q1 2020.*

We do agree with both DotEcom and ComReg's observation that the scale of the deployment of license exempt fixed links are underestimated in this report. While we agree that it is likely due to a lack of response from FWA ISPs, it should be noted, that the Covid-19 pandemic and lockdowns aside, FWA operators are focused primarily on the need to connect the unconnected, or to upgrade the connected. We Regret the Inability of many FWA operators to submit this vital information to ComReg. For our part and we believe those of our peers particularly during the pandemic when so many of our subscribers are working from home, our priority has had to be the continued delivery of reliable service to the customer and therefore engagement with and responding to consultations was unfortunately lower down on the priority list. The constraints on resources of smaller operators like us means responding meaningfully and accurately to a consultation in a period of just 4 weeks is exceptionally difficult. We have no doubt that this would have impacted on the other FWA operators' ability to collect information about license exempt links as requested earlier in the year. We would welcome a review of the consultation period length and encourage ComReg to perhaps publish the intention to hold a consultation well in advance (similar to the way that this consultation was flagged in advance because of the engagement during the request for information on deployed links made to operators earlier in the year).

If we consider that just 28 of FWA ISPs have built and deployed at least 1465 sites around Ireland to serve their local communities it would stand to reason there would be multiples of that figure in P-P links and P-MP links also.

It is noteworthy that the charts in paragraphs 56 and 57 show the value and importance of the FWA industry in Ireland. and that the FWA sector as market operators are investing and expanding as clearly demonstrated in the purchase of licenses and the increased number of FWA ISPs purchasing licenses.

It is striking to see the chart associated with paragraph 58 that FWA Operators are increasing investment and real deployment in Fixed Links in all bands (apart from 38GHz).

3.2 The use of Fixed Links in Ireland in an International context

We would advocate that ComReg monitor the use of light licensed schemes such as public safety spectrum allocations in the US and if possible allow for the application on a light licensed or license exempt basis, for the purposes of Deploying Fixed Wireless Access broadband in Rural Ireland. This request would be contingent on lower cost equipment being readily available to facilitate the rapid deployment of such networks, so that consumers would experience the benefits of such liberalisation without delay. An example where this could be readily achieved is in the 4.9GHz band where FCC has designated in the US that this is a public Safety band and that there is equipment available to meet that specification that is similar to other equipment operating in the 5.4 /5.8GHz. So it would be easy for FWA operators to Purchase and Deploy equipment to operate in the 4.9GHz band due to the fact that it is operating similar equipment already on its network. The availability or prospect of low-cost equipment to operate in a particular band would be one of the most important factors to consider when liberalising spectrum access e.g. similar spectrum utilisation in other major jurisdictions.

3.3 & 3.4 Other potential use cases for Fixed Links

A-Q1

The advent of newer 60GHz technologies such as Terragraph from Facebook means that a large-scale deployment of FWA networks are possible in Cities and Towns, and this can lead to future competition for access networks and increased choices for consumers. The Terragraph offerings from RADWIN, Cambium & Siklu offer multi-Gigabit throughput performance in a compact formfactor allowing operators to disrupt the urban and suburban market. Further it can afford businesses and high end consumers who have need for redundancy of internet access / WAN access a possibility to connect over diverse infrastructures instead of relying on One Wholesale Operator infrastructure and pseudo diversity over said single wholesale operator infrastructure.

4.1 Spectrum availability and channel arrangements

A-Q2

As a FWA operator which consistently strives to have at least 20% over capacity on our network and which often need to deploy over 1Gb/s to a given site in order to maintain an over capacity of 20% above peak demand, therefore, we agree with the ITU /CEPT recommendation & endorse DotEcom's, and ComReg's view that 112MHz channels should be made available in those bands in so far as they do not restrict existing operators who have more narrow channel licenses already purchased. We would advocate a co-operative approach where ComReg could work with license holders to ensure that narrow channels are migrated from the middle of the band to the one of the edges of the band so that fragmentation is minimised.

Perhaps it would be worth considering that for a software channel change that ComReg would make that a condition of renewing a license for operators who have equipment that can be easily re-configured to a different channel. Perhaps this could be available with a nominal low-cost fee. And for a quicker turnaround perhaps a fair compensation model can be agreed between the operators. This would be difficult to implement and would require buy in and co-operation from all operators. However, it is important that Operators co-operate with each other to maximise the use of spectrum and the availability of high-speed broadband services to end consumers in Ireland. That said, if an operator wants an operator who's equipment is constrained to a given channel then it would be incumbent on the operator requesting the larger channel to pay for a replacement equipment and install cost, so that would allow the operator with the smaller allocation move off the channel without affecting its own services to its customers.

4.2 Block Licences

A-Q3

Individual Licenses are preferred for small to medium FWA ISPs like our own as it lowers the barriers for expanding and improving our infrastructure footprint. National block licenses are typically out of the financial reach of smaller operators, as previously demonstrated by the Auction of the 3.6GHz spectrum which resulted in the retiring of low cost local site licenses which were taken up by a number of small to medium FWA operators and then in the auction of the released spectrum to the highest bidder with MNOs getting the bulk of the spectrum and only 1 FWA operator, Imagine being successful in acquiring some spectrum. It is therefore of paramount importance that individual links can be purchased at a reasonable cost to facilitate the expansion of services from localised FWA providers. Promoting spectrum availability for SME operators will reduce the ability of larger operators to sit on and not deploy national block licenses. Spectrum availability for smaller operators can help ensure their survival

and growth and would enable genuine choice and competition with real infrastructure diversity choices for consumers across Ireland. Comreg facilitating ideas such as this would be helpful in ComReg fulfilling its obligations under A1.1.2 Promotion of Competition.

It is our view that Block licences should only be considered if and only if there is sufficiently significant part of the spectrum made available for individual link licenses. While one can understand the value in reducing paperwork for larger wider deployed networks. It is our view that larger networks already enjoy favourable access to spectrum by virtue of their scale and spending power. It therefore also important to consider the positive competition implications for maintaining a low barrier of entry for Fixed Wireless Operators in any given licensed band.

It is our preference to have individual licensed links with licenses assigned in as automated manner as possible to reduce the burden on ComReg and the operators seeking to deploy a link. The low-cost license regime is pivotal to allow smaller fixed wireless operators compete with the larger ISPs and MNOs.

4.3 Application and licensing process

A-Q4

We would advocate the use of automation and models built in on the licensing platform that could guide the License applicant to self-validate the application (link budgets availability characteristics) We would strongly advocate for the ability for a license applicant to pre-emptively select additional lower preference link channels and/or bands in the application procedure so that in the event of the first chosen channel and/or band is not available the operator can get a license grant in one brief exchange with ComReg without an iterative process back and forth between ComReg and the operator until the operator manages to be fortunate enough to select an available channel on a given band. Automating this in so far as possible and building in intelligence into the license application system would reduce the burden on both ComReg and the Operators.

Alternatively as an interim measure, or to address difficulties in automating the frequency allocation process, perhaps ComReg could instigate a process of advising on the suitability and/or availability of the requested channel v's nearby or similar channels which might be licensed to meet the link budget requirements. This may have the ancillary benefit of improving the efficiency of spectrum deployment.

4.4 Fixed radio links Guidelines

A-Q5

As a FWA operator, we welcome both DotEcom's and ComReg's views as outlined in paragraph 117. That network and technological progress is not impeded by lack of guidelines for a new technique or technology that has not been referred to in the guidelines. The requirement that such deployment to be notified in advance to ComReg is right and reasonable. And we endorse it wholeheartedly.

As an operator who is expanding its backhaul continuously we would endorse ComReg's view as outlined in paragraph 118 that relaxing of minimum distance of links as long as the purpose of which is for aggregating multiple links / frequencies to increase capacity and redundancy between sites. As long as the capacity / redundancy / availability could not be achieved with a higher capacity link.

4.5 Pricing

A-Q6

Independent SME FWA ISPs are price conscious, the success of the 80GHz band and the number of links deployed in that shows (at least empirically that lower cost licenses encourages more deployment in that band) we would advocate lowering the cost of licenses where bands are not that heavily used. It is important that ComReg is mindful that there is generally a downward trend in cost per Mb/s being charged to consumers, coupled with an upward trend in bandwidth capacity demands per customer, consequentially the demands on our backhaul licensed links are increasing while the profit an individual link would be de-creasing. Accordingly we would advocate that licenses taken out in the same company between two identical endpoints should receive a discount on second and subsequent licenses. This would be fairer on an expanding operator who is transitioning from one vendor to another and cannot combine the two frequencies into one antenna system. Lowering the barriers / costs associated with giving subscribers more bandwidth is a good thing and would help encourage even further investment in infrastructure by the operators (not to financially disincentivise them)

The current de-lineation of costs according to high usage path / congested area vs normal usage paths / areas, is very coarse and it is probable that in the Dublin area there are certain areas with an underinvestment in wireless links due to the cost of the deployment, having a granular approach with accurate models would help reduce the costs of deploying in less deployed areas in and around Dublin City. We would advocate an incremental process for a gradual increase costs licenses on a given band as the number of channels allocated in that band increases. This could also serve as an indicator of how busy a band actually is on a given path.

4.6 1.4 GHz band

A-Q7

It would be our preference assuming reasonable cost equipment is available for deploying links with 1.4GHz that this be assigned for FWA networks on a locally licensed basis (subject to availability of cost effective equipment being available in this band.

A-Q8

The Licensing model should such that it be made available on lower cost local licenses to assist local operators provide choice and more bandwidth to customers in their locality. If ComReg believes a national / regional block licensing model is needed, we would advocate strongly (subject to reasonable cost equipment being available by manufacturers) that a section of the band be reserved for local operators. This would improve competition and diversity of infrastructure in rural Ireland.

4.7 13 GHz and 15 GHz bands

A-Q9

It is understandable that 13GHz / 15Ghz have applications restricted when there is no availability of channel space. However there no logic to the regulator effectively holding back channels in this spectrum that have been since released or not renewed by the license holder of that channel. We would advocate a traffic light system that would inform users that a band in a given area is full and that license applications are not being accepted at this time. Further it might be worth ComReg considering the tidying up of these two bands(by moving smaller channel allocations to the edge of the bands (on renewal in so far as it is possible) as opposed to fragmenting and impeding potential for larger contiguous channel allocations in the band.

4.8 26 GHz band

A-Q10

We would advocate that the licensing model should such that it be made available on lower cost local licenses to assist local operators provide choice and more bandwidth to customers in their locality. If ComReg believes a national / regional block licensing model is needed, we would advocate strongly (subject to reasonable cost equipment being available from manufacturers) that a section of the band be reserved for local operators. This would improve competition and diversity of infrastructure in rural Ireland.

4.9 D-bands and W-bands

A-Q11

FWA operators like ourselves would be interested in deploying equipment in this band once it becomes available. However, given the frequency range it is likely that as per DotEcom's and ComReg's view that it would be for ultra-high capacity links in urban environments (due to inherent range limitations) of these bands. That said we can only fully comment when the specifications and limits on EIRP and the capability of equipment designed to operate in that band are known.

4.10 Licence exempt / light licensing

A-Q12

License exempt spectrum has allowed independent FWA operators deliver high speed internet access to rural Ireland where fixed line and MNOs that have historically focused on urban / suburban areas and consequentially failed to deliver high speed broadband in a timely manner to rural communities.

5.4GHz and 5.8GHz Bands have been key and remain key to delivering FWA broadband in Ireland in the past and as their sites and access requirements have grown where a site has been fed by one or two 5.4GHz / 5.8GHz fixed links, it has been and is common practice to re-invest in the site and replace the lower cost 5.4 GHz/ 5.8GHz backhaul links with links operating in other bands such as

- license exempt bands such as 17GHz, 24GHz
- if the link is sufficiently short distance the License Exempt 60GHz band.
- light licensed bands such as 80GHz
- licensed Bands such as 13GHz,15GHz and 18GHz

The migration away from 5.4GHz/ 5.8GHz backhaul links allows for re-deployment and more flexibility in delivering service on more sectors on a given site allowing for greater coverage.

This strategy is not unique to our company and is indeed replicated by our other colleagues in the FWA sector.

We agree with DotEcom's recommendation regarding not to close bands that have been previously open and in use.

5.4 GHz License Exempt band

The value of this band to us is increasing from a P-MP perspective and decreasing from P-P perspective primarily. The value of deploying a 5.4GHz sector is far greater to an FWA ISP when compared a P-P link in the 5.4GHz band

5.8 GHz License Exempt band

In a similar way to the 5.4GHz band the value of this band to us is increasing from a P-MP perspective and decreasing from P-P perspective primarily. The value of deploying a 5.8GHz sector is far greater to an FWA ISP when compared a P-P link in the 5.8GHz We would advocate an increase the max EIRP in rural areas in line with (Ofcom in UK) to 36 dBm which would increase the range of rural base stations by up to 41%

The advent and availability of beamforming Mu-MIMO sectors, and high quality beam efficient scalar horn antennas from manufacturers such as RF-Elements with tight beam focus means that despite the very wide large scale deployment of License exempt links generally across the country, ISPs like our selves can manage the spectrum and adequately limit interference effects to / from other equipment operators. Thankfully we co-operate with and enjoy the co-operation of other neighbouring FWA Wireless networks, and the rollout of these technologies means that interference incidents are fewer and farther between. Further the developments of MU-MIMO and Bi-Directional Beaming Forming equipment from manufacturers such as RADWIN & Cambium means that customers can enjoy improved service now and in the future.

17GHz License Exempt band

We note ComReg's observation in Paragraph 145 notwithstanding CEPT Report 44 stating that this band is of little use. We have extensively deployed 17GHz links and will continue to do so over the coming years. We consider this band vital for low cost high speed backhaul to our sites. And provides redundancy for Licensed links at a low cost. This band allows us to deliver higher bandwidth to our customers at a lower cost.

We are pleased to see ComReg's recognition in paragraph 146 of availability of equipment for 17GHz band and that it is currently deployed in so many of our networks.

It is our experience that we have yet to encounter any interference on these links in our Rural based deployments. And therefore, agree that a light licensing framework is not required for this band. We follow and advocate for the practice of deploying large gain antennas with reduced input power to minimise interference with our neighbouring ISPs.

We would welcome widening the band from the current 200MHz if possible. We would invite ComReg to consider extending the spectrum allocation of this band as much as possible or at the very least 50MHz to accommodate higher capacity symmetric links.

24GHz License Exempt band

We have extensively deployed 24GHz links and will continue to do so over the coming years. We consider this band vital for low cost high speed backhaul to our sites. And

provides redundancy for Licensed links at a low cost. This band allows us to deliver higher bandwidth to our customers at a lower cost.

It is our experience that we have yet to encounter any interference on these links in our Rural based deployments. And therefore, agree that a light licensing framework is not required for this band. We follow and advocate for the practice of deploying large gain antennas with reduced input power to minimise interference with our neighbouring ISPs.

We would welcome widening the band from the current allocation of 250MHz if at all possible. We would invite ComReg to consider extending the spectrum allocation of this band as much as possible.

60GHz License Exempt band

60GHz will become increasingly important both in short range P-P and P-MP applications. We note DotEcom's observation in 5.2.2 that it has not enjoyed extensive use prior to June 2019. We would like to point out the main reason we see for this is that products operating in the 60GHz band have only relatively recently being made available at a relatively reasonable cost. With 802.11ay and 802.11ad links being available from companies such as RADWIN, Cambium, Ubnt, Ignitenet and MikroTik. 60GHz use in our network has increased dramatically in the past 18 months and will likely continue with the release of Terragraph related technogies from RADWIN, Cambium & Siklu.

66-71GHz Priority Reservation for 5G

It is our opinion that this be released under a general authorisation and subject to technology neutral performance characteristics, such as n x 1Gb/s, or x Gbps /GHz increasing the spectrum availability here has exciting prospects for advanced wireless service capabilities in urban and suburban locations. As noted by RSPG18-005 FINAL the distance from the Oxygen Absorption peak in this frequency range allows for increased cell radius or P-P link range. We would advocate for a technology neutral general authorisation for this portion of the band.

With Terragraph related products from RADWIN, Cambium & Siklu one can create a multigigabit Wireless Fabric which is a game changer in providing low cost high capacity access services in Housing Estates, Business and Industrial parks. This can allow businesses a real choice in infrastructure so as not to be reliant on one wholesale overground pole deployed wired ISP infrastructure which as the electrical power network and the incumbent historical experience has shown on an all too regular basis is regularly significantly impacted by storm related outages

Interference Management, Registration vs Light Licensing

We wholeheartedly endorse ComReg's position as set out in paragraphs 148 and 149, we do agree that the current general authorisation framework for the bands is working quite well and that the FWA industry is able to manage link performance and any incidence of interference in the bands quite well. We would ask that ComReg inform the DCCAE and their advisors Analysys Mason that Interference is not a significant issue that is affecting FWA networks to any great extent. Not least because Analysys Mason felt unable to qualify every FWA network for NGA status in the recent NBP Mapping exercise which meant that the Intervention area as defined by the DCCAE and its advisors threatens to overbuild all FWA operators' infrastructure as currently deployed NGA capable infrastructure at significant cost to the Irish and European tax payer.

Other Opportunities for License Exempt Bands.

FWA operators such as ourselves would welcome the expansion of License exempt and Light licensed spectrum available to allow us deliver even more services to subscribers in Rural Ireland. We would advocate that if equipment is available that is capable of delivering high speed broadband in other bands that ComReg consider facilitating the opening of spectrum for this purpose in bands such as 4.9GHz where there is equipment readily available internationally and proven in other jurisdictions, and that could be deployed rapidly to increase the bandwidth available and allow FWA operators to scale even further. If a general authorisation basis is not considered possible perhaps a light licensed model would be considered instead. We would welcome ComReg facilitating a conversation between FWA operators and other users of the 4.9GHz band such as radio astronomers etc.

The wide availability (internationally) of equipment designed to operate in the FCC allocated Bands for Public Safety 4940-4990 MHz and 5850-5925 MHz would mean that FWA operators could rapidly take advantage of these bands to provide additional bandwidth to more customers. ComReg facilitating ideas such as this would be helpful in and in no way contravene ComReg fulfilling its obligations under A1.1.2 Promotion of Competition.

Conclusion

This initiative very welcome and could not come soon enough as far as we are concerned. We would like to thank ComReg, in particular Martin O'Donoghue and Donnacha Hennessy who have worked extensively on this initiative and for their patience in dealing with our queries and assisting us in granting extensions to submit information during the initial RFI and we look forward to further engagement with them on this important initiative. Finally, we would like to thank DotEcom for their excellent

report which was very informative and clearly showed interesting trends in Infrastructure investment by the FWA Sector in Rural Ireland.

Ends.

4: ESB Networks DAC (“ESBN”)

Energy for generations

Networks Telecoms, ESB Networks

ESB Networks' response to ComReg's Consultation on the Review of the Fixed Radio Links Licensing Regime (20/109)

07/12/2020

1. INTRODUCTION

ESB Networks (ESBN) welcomes the opportunity to respond to the Commission for Communications Regulation (ComReg) consultation on its Review of the Fixed Radio Links Licensing Regime (ComReg Document 20/109).

Radio spectrum is a hugely important natural resource, enabling both critical and non-critical services to be deployed and made available to the benefit of all citizens and Ireland Inc. It is a key enabler for the provision of wireless services which in turn generates significant economic, technological, social, environmental and safety benefits. In that regard, ESBN are encouraged by ComReg's ambition to adapt its fixed radio links licensing regime to better accommodate the needs of the wide range of all users.

2. ESBN Response

Q1: ComReg seeks the views of interested parties on the existing and potential use cases identified above and whether there are other use cases that should be considered in determining an appropriate licensing framework. In the case of other potential use cases please provide supporting material for your answers.

A1: ESBN agrees with ComReg and DotEcon on the list of use cases as presented. ESBN has no further use cases to add. There may be more networks deployed over time and expansion of existing networks. Fixed links will be used for the same purposes, but with more of them utilised.

Q2. ComReg seeks views of interested parties regarding the current and future channel arrangements for all the Fixed Link Bands in ComReg's Guidelines document 09/89R2, and any other channel arrangements recommended or being considered by the CEPT and/or ITU. Please provide evidence and reasoning for your views.

A2: ESBN have mostly 28MHz and 40MHz channels in operation which is providing sufficient capacity for our network requirements. ESBN currently has no plans for wider channels such as 112MHz, but this may be an option going forward in future. ESBN will consider using 56 MHz channels in the near term, however ESBN does not expect there to be a massive increase in throughput requirements which would drive its own requirements for higher channel sizes.

ESBN welcomes ComReg's proposal to facilitate wider channel bandwidths, however ESBN believes that this should not be done at the expense of other users in already congested bands (e.g. 13 GHz and 15 GHz). To enable more efficient usage of spectrum, ESBN encourages ComReg to allow wider channel bandwidths in new and/or currently uncongested spectrum bands. Users of standard channel bandwidths (e.g. 28 MHz) would be greatly affected should ComReg allow 112 MHz channels in congested bands, as one link could be licensed as opposed to four separate 28 MHz licences. This would put great pressure on congested bands, particularly where licensees have little suitable alternatives (e.g. if 13 GHz and 15 GHz were congested, suitable alternative channels may not be available in nearest bands, link lengths unsuitable and/or loading and space on transmit sites could be problematic if licensees are pushed undesirably to lower frequency bands).

Q3. ComReg seeks the views of interested parties on block licensing one or more of the frequency bands listed above, and/or any other relevant frequency bands. Please provide supporting material that informs your position.

A3: ESBN agrees with block licensing for a number of reasons. Block licensing allows a licensee plan and deploy links more efficiently and cost effectively. Having assurance on availability of channels in areas of interest speeds up the planning, licence application and approval process. It also allows a licensee procure equipment in larger volumes at more cost-effective prices rather than piecemeal fashion whilst planning and applying for individual licences. There are direct benefits to block licensees and ComReg should facilitate this, particularly to address the need for larger channel sizes as addressed in Question 3.

There are also benefits to licensees who do not have block licences from the award of block licences to others. When licensees get block licences, this alleviates pressure on already congested bands for their new links, and equally these licensees may see merit in switching equipment and replacing licences in the congested individual bands with spectrum in their blocks. This creates more channel availability for those licensees interested in acquiring channels on a link by link basis.

ComReg should consider permitting block licensing in lower frequency bands also (such as 6 GHz, 7 GHz and/or 8 GHz). In doing so, ComReg would allow all fixed links users to efficiently plan and deploy radio links in a more cost effective manner whilst also simplifying the need for a range of spares from a wide range of bands. ESBN will be taking on a radio replacement programme in the coming years that will require changing out trunk equipment over time. ComReg would be providing users with significant efficiencies should block licensing in lower bands be facilitated.

Given the direct benefits for those with block licences, and the consequential benefit of more channels available to others, ESBN strongly encourages ComReg to provide more block licences.

Q4: ComReg seeks the views of interested parties on the measures that could be taken to improve the turnaround times for fixed links licence applications and would assist licensees in their network planning. Please provide supporting evidence for your answers.

A4: ESBN have found the new function on the eLicensing platform helpful and has made the applications process for new licences much smoother and transparent. ESBN believes that facilitating larger channels sizes and issuing more block licences would reduce the number of licences applied for and in turn improve the turnaround times.

ESBN would encourage ComReg to allow for expediting of applications in instances where waiting for the processing of a licence application and award of a licence would cause logistical or financial issues for the applicant. ComReg could facilitate this in a number of ways, for example allowing a licence applicant to declare a particular link “high priority” in its application (for up to 10% of link applications) to allow ComReg review these more urgently.

Q5: ComReg welcomes the views of interested parties regarding the matters discussed in DotEcon’s report and ComReg’s preliminary views regarding the Guidelines document and the technical parameters therein. Respondents should provide appropriate supporting information when expressing any views.

A5: ESBN encourages ComReg to review and update the Guidelines in line with developments in technology and the market.

Q6: ComReg also welcomes views on any further technical matters regarding the deployment of Fixed Radio Links a respondent may deem relevant. Again, Respondents should provide appropriate supporting information when expressing any views.

A6: ESBN utilises XPIC where possible and ComReg has adopted a pragmatic process to make more efficient use of the available spectrum. ESBN commends ComReg for adopting this approach which has created more efficient use of spectrum and availability of channels. ESBN also commends ComReg for embracing and being proactive with the facilitation of new technologies and techniques (e.g. ACM, awarding of spectrum specifically for Smart Grid). ComReg should continue to engage with industry and users to understand what technologies and techniques are becoming available and continue to implement at the right time with the appropriate associated conditions.

Q6? ComReg seeks views from interested parties on:
• specific aspects of the guidelines that should be reviewed (i.e. is there any aspect of the guidelines that may inhibit certain uses or technologies outlined above);
• information that ComReg could provide in order to ensure better coordination of frequencies and encourage the efficient use of the spectrum more generally;
• the structure of the fee schedule (e.g. views on the likely value differences across bands, bands likely to be more or less valuable, congestion charging).
• any pricing methodologies that would be suitable for some or all of the Fixed Link Bands (taking account of demand and supply considerations as may apply to each).
Where appropriate, please provide supporting material with your response.

A6.1: Please see answer to Question 6 above. ESBN believes that ComReg and Ofcom should work together to ease the complexity of licence application for cross border links. The current regime causes logistical issues for applicants and is disjointed. An agreement or process which allows for a single application and single point of contact would greatly simply the process as opposed to making submissions separately to each regulator.

Q7: ComReg seeks the views of interested parties on the current and potential future use of the 1.4 GHz Band and whether all of this band should be included in an award for wireless broadband in the future.

A7:ESBN believes that neither the 1.4 GHz spectrum band nor extension bands should be included in any Proposed Award in the medium term. ESBN believes that the 1.4 GHz Centre Band has the potential to provide additional capacity for mobile networks, with ESBN contesting that this will not be a reality in the near future. ESBN therefore encourages ComReg to consider the release of 1.4 GHz Centre Band in the future, and for the 1.4 GHz Extension Bands not to be changed from current usage in the long term.

ESBN believes that ComReg should only consider the release of the 1.4 GHz Centre Band in the future, and should leave the extension bands for usage for fixed point to point links. The Centre Band allows for 55 MHz of TDD spectrum be released, which has great potential to deliver supplementary downlink capabilities for mobile networks. There are only 3 MNO's in Ireland who can effectively make use of this spectrum in the future, where 55 MHz of spectrum should be sufficient to meet such demand. Other spectrum being released by ComReg is of far more interest and use to MNOs that the 1.4 GHz extension band.

ESBN encourages ComReg to preserve the vital fixed link services in the 1.4 GHz Extension Bands in the long term. [✂[redacted]

[redacted]✂]

ComReg should make clear its long term plans for the 1.4 GHz Extension Bands soonest. Should ComReg decide that the 1.4 GHz Extension Bands will be released in the future, ESBN encourages ComReg to give as much visibility as possible to users as well as providing suitable low frequency alternative(s) which users can utilise. ESBN also believes that in the instance where users of 1.4 GHz fixed links cannot reuse their equipment in alternative bands being made available, a reimbursement fund should be made available for fixed link users for recompense. Should the band be unavailable, this would require those with prospective new link applications in the band redesigning licence applications and perhaps having to run lengthy procurement exercises to select vendors of alternative equipment.

Q8: To the extent that respondents are of the view that the 1.4 GHz Band should be awarded for wireless broadband, ComReg seeks the views of respondents on when those rights of use should be assigned.
Where appropriate, please provide supporting material with your response.

Respondents should note that views on the award of the 1.4 GHz band for WBB will form input to ComReg's separate consultation process to consider same, which would commence following the award of spectrum in the MBSA2.

A8: Please see response to Q7. ESBN believes it is necessary to preserve the 1.4 GHz Extension Bands indefinitely.

Q9: ComReg seeks the view of interested parties on the potential re-opening of the 13 GHz and 15 GHz bands in the Congested Area. Please provide supporting information with your response.

A9: ESBN currently have no planned licences in any of the congested areas however welcomes the re-opening of the 13 & 15GHz bands as this opens some options for new sites. Making available more spectrum, particularly in already popular spectrum bands, can only be positive for users of fixed links and for ComReg.

Q10: ComReg seeks views from interested parties on the current use of the 26 GHz Band for Fixed Links. Respondents should note that any views in relation to the future use of the band for other technologies and uses (e.g. wireless broadband-ECS/5G) will be considered separately as part of ComReg's 26 GHz Study due to be published in Q4/2020.

A10: ESBN agree that there is no immediate need to make any decisions on the future of Fixed Links in the band, and ComReg should wait until the 5G situation is clearer.

Q.11 ComReg seeks the views of interested parties on the potential future use of the D-band and W-band and the equipment availability for those bands. Please provide supporting information with your response.

A11: ESBN agrees that releasing this spectrum for ultra high capacity links would be a good outcome, but ComReg should do so when equipment is more readily available.

Q12: ComReg seeks the views of interested parties on the current and future use of the 5.8 GHz, 17 GHz, 24 GHz and 60 GHz licence-exempt bands, and the requirement to implement a Light Licensing framework to address interference issues in the licence-exempt bands. Please provide evidence in support of your views.

A12: ESBN is not a user of licence exempt bands, and therefore has no experience or opinions to add on this matter.

ENDS

5: Eutelsat S.A (“Eutelsat”)

Paris, 7th December 2020

Memorandum for: **Commission for Communications Regulation**
Mr. Martin O Donoghue
marketframeworkconsult@comreg.ie
Commission for Communications Regulation
One Dockland Central, Guild Street,
Dublin, D01 E4X0
Ireland

Subject: **Submissions to ComReg 20/109**

Eutelsat S.A. ("Eutelsat") is pleased to submit these comments in response to the recently published public consultation on the Review of the Fixed Radio Links Licensing Regime by the Communications Authority of Ireland, Commission for Communications Regulation ("ComReg"). Eutelsat supports the ComReg in its review of the Fixed Radio Links Licensing Regime.

Satellite-enabled services enrich the daily life of millions of people around the globe, providing an invisible but resilient overlay for terrestrial networks, which helps to provide more reliable and accessible electronic communications and contributes to bridging the digital divide.

After reviewing the public consultation on the Review of the Fixed Radio Links Licensing Regime, Eutelsat offers the following comments for the ComReg to consider when reviewing the licensing regime for fixed radio links.

Question 1:	**Existing and potential use cases identified for determining an appropriate licensing framework**

Eutelsat is a leading satellite operator and service provider. Ka-band frequencies, in the following frequency ranges: 27.5 - 30 GHz (Earth-to-space) and 17.3 - 20.2 GHz (space-to-Earth), are of particular interest for the operation of Fixed Satellite Services (FSS) in the Republic of Ireland.

We understand that 17.3 - 17.7 GHz, 19.7 - 20.2 GHz and 29.5 - 30.0 GHz are allocated to FSS and not to fixed services. Other parts of the Ka band, 17.7 - 19.7 GHz and 27.5 - 29.5 GHz, are allocated to fixed radio links and some limited satellite usage such as earth station downlinks for educational institutions and terminals for satellite services.

The frequency range 17.7 - 19.7 GHz is necessary for the provision of broadband connectivity, as the operation of satellite ground network across Ireland requires greater satellite downlink capacity than currently allowed in the Republic of Ireland in the range 19.7 - 20.2 GHz. Satellite broadband

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connectivity would provide more Irish households which are beyond the range of terrestrial broadband networks with faster and better-quality broadband.

Moreover, Eutelsat believes that the use of FSS in 17.7 - 19.7 GHz would not cause interference to fixed links. The issue of interference has been addressed by the European Communications Committee (ECC) in a separate study.[1] Furthermore, ERC decision (00)07 determined that national administrations should enable the deployment of fixed stations, coordinated FSS earth stations and uncoordinated FSS earth stations in the band 17.7 - 19.7 GHz and exempt uncoordinated FSS earth stations in the same band from individual licensing, to allow their free circulation and use.[2] Additionally, decision (00)07 provides a list of mitigation techniques for satellite operators to avoid interference with fixed stations. Decision (00)07 has been implemented by 30 CEPT Member States.[3] Furthermore, based on the decision, many CEPT Member States permit the use by satellite networks of frequencies in 17.7 - 19.7 GHz without a frequency licence.

Eutelsat notes that ComReg intends to publish a consultation in Q2 2021 on the frequency bands that should be allocated for fixed-satellite services in Ireland. Considering the above, Eutelsat urges ComReg to defer decisions to be taken under this consultation on fixed links in the Ka band until the consultation on FSS comes to a conclusion, in order to get a global picture of the Ka band and ensure fixed services and FSS share the band appropriately.

Finally, to develop an effective licensing framework for both fixed services and FSS, Eutelsat kindly requests ComReg to consider allocating frequency range 17.7 - 19.7 GHz to fixed services and FSS on a co-primary basis, considering that the latter will not cause any frequency interference to the former.

Question 6:	**ComReg seeks views from interested parties on:** **Information that ComReg could provide in order to ensure better coordination of frequencies and encourage the efficient use of the spectrum more generally**

In order to promote effective use of spectrum, Eutelsat kindly asks ComReg to consider allocation of 17.7 - 19.7 GHz to both fixed services and FSS. Joint use of spectrum guarantees that spectrum resources are properly utilised and shared between operators of different services. Moreover, as provided in answer to question 1, the majority of CEPT Member States have implemented ERC decision (00)07 and enable the deployment of fixed stations, coordinated FSS earth stations and uncoordinated FSS earth stations in the band 17.7 - 19.7 GHz.

[1] ECC Report 152 on the on the use of the frequency bands 27.5-30.0 GHz and 17.3-20.2 GHz by satellite networks.
[2] ERC/DEC (00)07.
[3] Page 25 of the ECC Report 152.

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Furthermore, as discussed in answer to question 1, allowing operation in the 17.7 - 19.7 GHz band for FSS does not cause frequency interference to fixed services. Additionally, ERC decision (00)07 provides mitigation techniques for satellite operators to mitigate any possible interference with fixed stations.

The shared use of the Ka band for fixed services and FSS would effectively utilise the spectrum and enhance the provision of satellite services in the Republic of Ireland. Sharing spectrum would additionally ensure that communications networks of satellite operators will not be strained and that end-users in Ireland will be provided with good-quality broadband connectivity, the importance of which has been highlighted by COVID-19.

Eutelsat appreciates your kind attention in relation to this consultation response and thanks you in advance for your assistance.

Sincerely,

Mr Fabrice Barbedette

Director Regulatory Market Access

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6: Inmarsat Ventures SE (“Inmarsat”)

From: Tiffany Marshall [✂[redacted]✂]
Sent: Monday 7 December 2020 12:04
To: Market Framework Consult <marketframeworkconsult@comreg.ie>
Subject: Submissions to ComReg 20/109/Inmarsat

Submissions to ComReg 20/109
Mr. Martin O Donoghue
Commission for Communications Regulation

Dear Mr. O Donoghue:

Referring to Questions 7 and 8, we note that Comreg is seeking views on the demand for the 1.4 GHz band for wireless broadband (WBB). In this regard, Inmarsat would like to highlight that the use of the 1.4 GHz band for WBB in Ireland would require careful analysis of the compatibility with MSS operations in the adjacent band 1518-1559 MHz. If the uppermost part of the 1.4 GHz band (1492-1518 MHz) were to be used for WBB, constraints on WBB characteristics and system deployment would be needed, including restrictions on WBB operations near Irish ports and airports where Inmarsat's MSS services are very heavily used by ships and aircraft. If Comreg identifies some demand for WBB in the 1.4 GHz band in Ireland, we suggest that use be initially limited to the core band (1452-1492 MHz), which is an approach already undertaken by a number of European countries, including the Netherlands and Germany. As far as Inmarsat is aware, 3GPP equipment is currently available only for this core part of the 1.4 GHz band. Use of core band for WBB would avoid the need for any significant restrictions on WBB systems or MSS systems and should therefore be preferred. In any case, if Comreg does decide to proceed with the introduction of WBB in the 1.4 GHz band, a public consultation would be necessary to ensure that the adjacent band compatibility issues are fully addressed.

Thank you for the opportunity to comment.

Kind regards,

TIFFANY MARSHALL
Regulatory and Market Access
Inmarsat, 99 City Road, London EC1Y 1AX, United Kingdom
[✂[redacted]✂]

7: JS Whizzy Internet Limited (“Whizzy Internet”);

SUBMISSION TO COMREG 20/109

Review of the Fixed Radio Links Licensing Regime

FAO: Mr. Martin O Donoghue, Commission for Communications Regulation

Non-Confidential: Full Public Release Please

Disclaimer:

has compiled the information submitted in good faith and have exercised all due care in so far as possible with the constraints of meeting the deadline of 7th of December 2020. As an SME ISP we would advocate for longer consultations with more notice given the complexity of the subject matter, the resource constraints that smaller operators have to cope with. We would respectfully ask that ComReg review the 4 week consultation period practice to match the best practices outlined in DPER Public Consultation Guidelines, at the following location: https://www.gov.ie/en/publication/e9b052-consultation-principles-and-guidance/

THE IMPORTANCE OF FIXED LINKS LICENSING REGIME TO RURAL IRELAND

We are pleased to make this submission in response to Comreg 20/109. The review of the Fixed radio links licensing regime presents an opportunity for ComReg to Assist the Fixed Wireless Access Operators deliver even more high speed broadband to businesses and residences across all of Ireland. Particularly in areas where the population density is low. The support of network diversity provided by independent locally owned and operated companies is in Ireland's national economic interest and national security interest. ComRegs Liberalisation of the 5.8GHz band in ComReg's *Expanding Opportunities in the Radiocommunications Market: Fixed Wireless Access (FWA) - Consultation Paper 02/19*, combined with the availability of lower cost license exempt equipment in the 5 /5.8GHz, has transformed ICT landscape in rural Ireland, sowing the seeds of what would become an industry of approximately 50 local independent self-sustaining FWA operators serving over **100,000** connected subscribers in their local communities with high-quality high-speed broadband. According to Wireless Coverage Ltd's report authored by Mr. David Burns and commissioned by 28 ISPs for the 2019 NBP Mapping consultation in 2019 28 ISPs in the FWA industry have achieved the following coverage and market penetration:

Number of sites by 28 FWA ISPs	**1,465**
NGA Premises Passed by 28 FWA ISPs	**689,781**
Non NGA premises Passed by 28 FWA ISPs	**1,456,470**
Number of Premises Connected to 27 FWA ISPs	**91,894***

Source Wireless Coverage Ltd. Report 30 September 2019 in response to the NBP mapping exercise

Fixed wireless operators welcome the clear recognition that the charts provide that Fixed Wireless operators are and continue to invest in high capacity links across Ireland.

Fixed wireless operators would welcome further liberalization of spectrum to facilitate deployment of further independent broadband infrastructure in rural Ireland. The importance of the independent FWA industry in Ireland cannot be overstated, and the Covid-19 pandemic has shown us the FWA industry were the ones connecting and carrying rural Ireland through the pandemic, while heavily subsidised entities have been surveying the country for what they might one day connect. At the time of submission, no homes or businesses have been connected by the NBP. It is essential that ComReg use all powers and resources available to help maintain the diversity of infrastructure deployed in rural Ireland. It is regrettable that this consultation did not take place prior to

the signing of the NBP contract in late 2019. As regulatory and policy measures and are preferable to subsidised interventions because they can reduce the need, the scale and hence the cost of Government subsidised interventions generally.

The FWA industry's existing broadband infrastructure and contribution to rural Ireland, despite being ignored and discounted by recent Irish Governments for the purposes of ensuring a ubiquitous provision of FTTH throughout the State, has a vital role to play in Ireland's future in providing real competition for internet access in Ireland particularly because of their focus in rural parts of Ireland typically underserved by larger ISPs whos' focus on more profitable urban markets. Supporting measures that reduce the costs and burden on independent fixed wireless operators expanding and upgrading their deployments in rural Ireland can help us provide the much needed redundancy to the Irish Government's NBP approach of placing all eggs in one publicly funded, private equity infrastructure basket. The FWA industry can and currently does provide much needed connectivity to rural Ireland, and this is important to maintain in the event of the NBP running into further delays or difficulties which seems to be a recurring theme when it comes to the management of the NBP procurement & rollout program to date.

We welcome the opportunity to comment on:

• The design of a licensing framework that best provides for the effective management and efficient usage of the Fixed Links band identified in this consultation and the responses.

•A new hopefully Improved fee schedule for Fixed Links that facilitates the greatest number of use cases, in order to ultimately promote greater use of the spectrum that are identified in this consultation and the responses; Preliminary Consultation of Fixed Links Bands Review ComReg 20/109

• Review the technical conditions and guidelines for the deployment Fixed Links in the bands identified and consult on any proposed changes; and Advise and consult on new regulations to replace S.I. 370 of 2009

Table of Contents

2.1 The Fixed Link Licensing Regime

Comments further in the document.

Individual Link Licence fees

Comments further in the document.

2.2 Current Individual Fixed Link Bands

It is worth noting the level of existing FWA broadband Infrastructure in the country which is already at or in the process of being upgraded to NGA status. This is a testament to the commitment, investment of so many market operators have made and continue to make in rural Ireland. It is imperative that ComReg supports competition and infrastructure diversity when considering changes to the licensing regime.

2.3 Other spectrum management matters which are related to the Fixed Link Bands

WAS/RLAN above 5 GHz

In relation to Paragraph 52

52 "ComReg will continue to monitor and input into the discussions of this matter at the EC and ECC. Upon the adoption and publication of any future EC and/or ECC Decision, ComReg will consider the appropriate the implementation of those decisions"

We would advocate that an exemption exist for Fixed Wireless Access operators in a similar manner for the 5.8GHz Spectrum to allow operators use the 5925-6425 MHz band at an EIRP similar to that specified in the 5.8GHz Band for the purpose of providing Broadband access in rural areas. It would be a pity not to fully realise the potential of expanding the spectrum available to Fixed wireless operators so that the DAE 2025 objectives of a minimum speed of 100Mb/s per subscriber can be by giving existing operators access to more spectrum. We welcome that ComReg is closely monitoring the progress at the ECC and we would advocate that interested parties that may need to operate CBTC Secure Communications Train Based Control systems in Ireland be contacted to see if they are In fact using that spectrum for CBTC. If in fact that they are not using that spectrum it would be most helpful to the Fixed Wireless Access industry for ComReg to liberalise that spectrum on a License Exempt basis in a similar manner to the 5.8GHz Band.

We would welcome ComReg making available the 5925-6425 MHz on a provisional license exempt or light license basis pending full and formal adoption of a decision at the ECC.

3.1 Existing Use Cases

As a FWA operator we would like to comment on paragraph 68

> *68 For the purposes of this review, ComReg requested information on the use of Fixed Links in the Licence Exempt Bands in the Licensee RFI 74 . A total of 15 respondents to the RFI stated their use of licence exempt Fixed Links 75 . Separate ComReg data indicates that ComReg's RFI data did not capture the majority of licence exempt Fixed Links, due to a number of FWA operators with a large number of Licence Exempt FWA Fixed Links 76 failing to respond. ComReg therefore places limited weight on trends in this data as representing trends for all licence exempt Fixed Links. Bearing this in mind, ComReg notes the use of Fixed Links among these 15 users has increased in recent years with most of the licence exempt Fixed Links deployed for FWA in the 5 GHz band. Data gathered separately by ComReg on broadband subscriptions delivered by FWA corroborate this finding and indicates that the number of Fixed Links in the Licence Exempt Bands used for the provision of FWA for 2.4 GHz and 5 GHz bands has increased from Q1 2020.*

We do agree with both DotEcom and ComReg's observation that the scale of the deployment of license exempt fixed links are underestimated in this report. While we agree that it is likely due to a lack of response from FWA ISPs, it should be noted, that the Covid-19 pandemic and lockdowns aside, FWA operators are focused primarily on the need to connect the unconnected, or to upgrade the connected. We Regret the Inability of many FWA operators to submit this vital information to ComReg. For our part and we believe those of our peers particularly during the pandemic when so many of our subscribers are working from home, our priority has had to be the continued delivery of reliable service to the customer and therefore engagement with and responding to consultations was unfortunately lower down on the priority list. The constraints on resources of smaller operators like ourselves means responding meaningfully and accurately to a consultation in a period of just 4 weeks is exceptionally difficult. We have no doubt that this would have impacted on the other FWA operators' ability to collect information about license exempt links as requested earlier in the year. We would welcome a review of the consultation period length and encourage ComReg to perhaps publish the intention to hold a consultation well in advance (similar to the way that this consultation was flagged in advance because of the engagement during the request for information on deployed links made to operators earlier in the year).

If we consider that just 28 of FWA ISPs have built and deployed at least 1465 sites around Ireland to serve their local communities it would stand to reason there would be multiples of that figure in P-P links and P-MP links also.

It is noteworthy that the charts in paragraphs 56 and 57 show the value and importance of the FWA industry in Ireland. and that the FWA sector as market operators are

investing and expanding as clearly demonstrated in the purchase of licenses and the increased number of FWA ISPs purchasing licenses.

It is striking to see the chart associated with paragraph 58 that FWA Operators are increasing investment and real deployment in Fixed Links in all bands (apart from 38GHz).

3.2 The use of Fixed Links in Ireland in an International context

We would advocate that ComReg monitor the use of light licensed schemes such as public safety spectrum allocations in the US and if possible allow for the application on a light licensed or license exempt basis, for the purposes of Deploying Fixed Wireless Access broadband in Rural Ireland. This request would be contingent on lower cost equipment being readily available to facilitate the rapid deployment of such networks, so that consumers would experience the benefits of such liberalisation without delay. An example where this could be readily achieved is in the 4.9GHz band where FCC has designated in the US that this is a public Safety band and that there is equipment available to meet that specification that is similar to other equipment operating in the 5.4 /5.8GHz. So it would be easy for FWA operators to Purchase and Deploy equipment to operate in the 4.9GHz band due to the fact that it is operating similar equipment already on its network. The availability or prospect of low cost equipment to operate in a particular band would be one of the most important factors to consider when liberalising spectrum access eg similar spectrum utilisation in other major jusrisdictions.

3.3 & 3.4 Other potential use cases for Fixed Links

A-Q1

The advent of newer 60GHz technologies means that a large-scale deployment of FWA networks are possible in Cities and Towns, and this can lead to future competition for access networks and increased choices for consumers. The Cambium Cnwave product line has the feature set, throughput performance (multi-Gigabit connectivity) and a compact formfactor allowing operators to disrupt the urban and suburban market. Further it can afford businesses and high end consumers who have need for redundancy of internet access / WAN access a possibility to connect over diverse infrastructures instead of relying on One Wholesale Operator infrastructure and pseudo diversity over said single wholesale operator infrastructure.

4.1 Spectrum availability and channel arrangements

A-Q2

As a FWA operator which consistently strives to have at least 20% over capacity on our network and which often need to deploy over 1Gb/s to a given site in order to maintain

an over capacity of 20% above peak demand, therefore, we agree with the ITU /CEPT recommendation & endorse DotEcom's, and ComReg's view that 112MHz channels should be made available in those bands in so far as they do not restrict existing operators who have more narrow channel licenses already purchased. We would advocate a co-operative approach where ComReg could work with license holders to ensure that narrow channels are migrated from the middle of the band to the one of the edges of the band so that fragmentation is minimised.

Perhaps it would be worth considering that for a software channel change that ComReg would make that a condition of renewing a license for operators who have equipment that can be easily re-configured to a different channel. Perhaps this could be available with a nominal low-cost fee. And for a quicker turnaround perhaps a fair compensation model can be agreed between the operators. This would be difficult to implement and would require buy in and co-operation from all operators. However, it is important that Operators co-operate with each other to maximise the use of spectrum and the availability of high-speed broadband services to end consumers in Ireland. That said, if an operator wants an operator who's equipment is constrained to a given channel then it would be incumbent on the operator requesting the larger channel to pay for a replacement equipment and install cost, so that would allow the operator with the smaller allocation move off the channel without affecting its own services to its customers.

4.2 Block Licences

A-Q3

Individual Licenses are preferred for small to medium FWA ISPs like our own as it lowers the barriers for expanding and improving our infrastructure footprint. National block licenses are typically out of the financial reach of smaller operators, as previously demonstrated by the Auction of the 3.6GHz spectrum which resulted in the retiring of low cost local site licenses which were taken up by a number of small to medium FWA operators and then in the auction of the released spectrum to the highest bidder with MNOs getting the bulk of the spectrum and only 1 FWA operator, Imagine being successful in acquiring some spectrum. It is therefore of paramount importance that individual links can be purchased at a reasonable cost to facilitate the expansion of services from localised FWA providers. Promoting spectrum availability for SME operators will reduce the ability of larger operators to sit on and not deploy national block licenses. Spectrum availability for smaller operators can help ensure their survival and growth and would enable genuine choice and competition with real infrastructure diversity choices for consumers across Ireland. Comreg facilitating ideas such as this would be helpful in ComReg fulfilling its obligations under A1.1.2 Promotion of Competition.

It is our view that Block licences should only be considered if and only if there is sufficiently significant part of the spectrum made available for individual link licenses. While one can understand the value in reducing paperwork for larger wider deployed networks. It is our view that larger networks already enjoy favourable access to spectrum by virtue of their scale and spending power. It therefore also important to consider the positive competition implications for maintaining a low barrier of entry for Fixed Wireless Operators in any given licensed band.

It is our preference to have individual licensed links with licenses assigned in as automated manner as possible to reduce the burden on ComReg and the operators seeking to deploy a link. The low-cost license regime is pivotal to allow smaller fixed wireless operators compete with the larger ISPs and MNOs.

4.3 Application and licensing process

A-Q4

We would advocate the use of automation and models built in on the licensing platform that could guide the License applicant to self-validate the application (link budgets availability characteristics) We would strongly advocate for the ability for a license applicant to pre-emptively select additional lower preference link channels and/or bands in the application procedure so that in the event of the first chosen channel and/or band is not available the operator can get a license grant in one brief exchange with ComReg without an iterative process back and forth between ComReg and the operator until the operator manages to be fortunate enough to select an available channel on a given band. Automating this in so far as possible and building in intelligence into the license application system would reduce the burden on both ComReg and the Operators.

Alternatively as an interim measure, or to address difficulties in automating the frequency allocation process, perhaps ComReg could instigate a process of advising on the suitability and/or availability of the requested channel v's nearby or similar channels which might be licensed to meet the link budget requirements. This may have the ancillary benefit of improving the efficiency of spectrum deployment.

4.4 Fixed radio links Guidelines

A-Q5

As a FWA operator, we welcome both DotEcom's and ComReg's views as outlined in paragraph 117. That network and technological progress is not impeded by lack of guidelines for a new technique or technology that has not been referred to in the

guidelines. The requirement that such deployment to be notified in advance to ComReg is right and reasonable. And we endorse it wholeheartedly.

As an operator who is expanding its backhaul continuously we would endorse ComReg's view as outlined in paragraph 118 that relaxing of minimum distance of links as long as the purpose of which is for aggregating multiple links / frequencies to increase capacity and redundancy between sites. As long as the capacity / redundancy / availability could not be achieved with a higher capacity link.

4.5 Pricing

A-Q6

Independent SME FWA ISPs are price conscious, the success of the 80GHz band and the number of links deployed in that shows (at least empirically that lower cost licenses encourages more deployment in that band) we would advocate lowering the cost of licenses where bands are not that heavily used. It is important that ComReg is mindful that there is generally a downward trend in cost per Mb/s being charged to consumers, coupled with an upward trend in bandwidth capacity demands per customer, consequentially the demands on our backhaul licensed links are increasing while the profit an individual link would be de-creasing. Accordingly we would advocate that licenses taken out in the same company between two identical endpoints should receive a discount on second and subsequent licenses. This would be fairer on an expanding operator who is transitioning from one vendor to another and cannot combine the two frequencies into one antenna system. Lowering the barriers / costs associated with giving subscribers more bandwidth is a good thing and would help encourage even further investment in infrastructure by the operators (not to financially disincentivise them)

The current de-lineation of costs according to high usage path / congested area vs normal usage paths / areas, is very coarse and it is probable that in the Dublin area there are certain areas with an underinvestment in wireless links due to the cost of the deployment, having a granular approach with accurate models would help reduce the costs of deploying in less deployed areas in and around Dublin City. We would advocate an incremental process for a gradual increase costs licenses on a given band as the number of channels allocated in that band increases. This could also serve as an indicator of how busy a band actually is on a given path.

4.6 1.4 GHz band

A-Q7

It would be our preference assuming reasonable cost equipment is available for deploying links with 1.4GHz that this be assigned for FWA networks on a locally

licensed basis (subject to availability of cost effective equipment being available in this band.

A-Q8

The Licensing model should such that it be made available on lower cost local licenses to assist local operators provide choice and more bandwidth to customers in their locality. If ComReg believes a national / regional block licensing model is needed, we would advocate strongly (subject to reasonable cost equipment being available by manufacturers) that a section of the band be reserved for local operators. This would improve competition and diversity of infrastructure in rural Ireland.

4.7 13 GHz and 15 GHz bands

A-Q9

It is understandable that 13GHz / 15Ghz have applications restricted when there is no availability of channel space. However there no logic to the regulator effectively holding back channels in this spectrum that have been since released or not renewed by the license holder of that channel. We would advocate a traffic light system that would inform users that a band in a given area is full and that license applications are not being accepted at this time. Further it might be worth ComReg considering the tidying up of these two bands(by moving smaller channel allocations to the edge of the bands (on renewal in so far as it is possible) as opposed to fragmenting and impeding potential for larger contiguous channel allocations in the band.

4.8 26 GHz band

A-Q10

We would advocate that the licensing model should such that it be made available on lower cost local licenses to assist local operators provide choice and more bandwidth to customers in their locality. If ComReg believes a national / regional block licensing model is needed, we would advocate strongly (subject to reasonable cost equipment being available from manufacturers) that a section of the band be reserved for local operators. This would improve competition and diversity of infrastructure in rural Ireland.

4.9 D-bands and W-bands

A-Q11

FWA operators like ourselves would be interested in deploying equipment in this band once it becomes available. However given the frequency range it is likely that as per DotEcom's and ComReg's view that it would be for ultra high capacity links in urban environments (due to inherent range limitations) of these bands. That said we can only

fully comment when the specifications and limits on EIRP and the capability of equipment designed to operate in that band are known.

4.10 Licence exempt / light licensing

A-Q12

License exempt spectrum has allowed independent FWA operators deliver high speed internet access to rural Ireland where fixed line and MNOs that have historically focused on urban / suburban areas and consequentially failed to deliver high speed broadband in a timely manner to rural communities.

5.4GHz and 5.8GHz Bands have been key and remain key to delivering FWA broadband in Ireland in the past and as their sites and access requirements have grown where a site has been fed by one or two 5.4GHz / 5.8GHz fixed links, it has been and is common practice to re-invest in the site and replace the lower cost 5.4 GHz/ 5.8GHz backhaul links with links operating in other bands such as

- license exempt bands such as 17GHz, 24GHz
- if the link is sufficiently short distance the License Exempt 60GHz band.
- light licensed bands such as 80GHz
- licensed Bands such as 13GHz,15GHz and 18GHz

The migration away from 5.4GHz/ 5.8GHz backhaul links allows for re-deployment and more flexibility in delivering service on more sectors on a given site allowing for greater coverage.

This strategy is not unique to our company and is indeed replicated by our other colleagues in the FWA sector.

We agree with DotEcom's recommendation regarding not to close bands that have been previously open and in use.

5.4 GHz License Exempt band

The value of this band to us is increasing from a P-MP perspective and decreasing from P-P perspective primarily. The value of deploying a 5.4GHz sector is far greater to an FWA ISP when compared a P-P link in the 5.4GHz band

5.8 GHz License Exempt band

In a similar way to the 5.4GHz band the value of this band to us is increasing from a P-MP perspective and decreasing from P-P perspective primarily. The value of deploying a 5.8GHz sector is far greater to an FWA ISP when compared a P-P link in the 5.8GHz

We would advocate an increase the max EIRP in rural areas in line with (Ofcom in UK) to 36 dBm which would increase the range of rural base stations by up to 41%

The advent and availability of beamforming Mu-MIMO sectors, and high quality beam efficient scalar horn antennas from manufacturers such as RF-Elements with tight beam focus means that despite the very wide large scale deployment of License exempt links generally across the country, ISPs like our selves can manage the spectrum and adequately limit interference effects to / from other equipment operators. Thankfully we co-operate with and enjoy the co-operation of other neighbouring FWA Wireless networks and the rollout of these technologies means that interference incidents are fewer and farther between. Further the developments of Mu-MIMO and beaming forming equipment from manufacturers such has Cambium PMP and ePMP means that customers can enjoy improved service now and in the future.

17GHz License Exempt band

We note ComReg's observation in Paragraph 145 notwithstanding CEPT Report 44 stating that this band is of little use. We have extensively deployed 17GHz links and will continue to do so over the coming years. We consider this band vital for low cost high speed backhaul to our sites. And provides redundancy for Licensed links at a low cost. This band allows us to deliver higher bandwidth to our customers at a lower cost.

We are pleased to see ComReg's recognition in paragraph 146 of availability of equipment for 17GHz band and that it is currently deployed in so many of our networks.

It is our experience that we have yet to encounter any interference on these links in our Rural based deployments. And therefore, agree that a light licensing framework is not required for this band. We follow and advocate for the practice of deploying large gain antennas with reduced input power to minimise interference with our neighbouring ISPs.

We would welcome widening the band from the current 200MHz if at all possible. We would invite ComReg to consider extending the spectrum allocation of this band as much as possible or at the very least 50MHz to accommodate higher capacity symmetric links.

24GHz License Exempt band

We have extensively deployed 24GHz links and will continue to do so over the coming years. We consider this band vital for low cost high speed backhaul to our sites. And provides redundancy for Licensed links at a low cost. This band allows us to deliver higher bandwidth to our customers at a lower cost.

It is our experience that we have yet to encounter any interference on these links in our Rural based deployments. And therefore, agree that a light licensing framework is not

required for this band. We follow and advocate for the practice of deploying large gain antennas with reduced input power to minimise interference with our neighbouring ISPs.

We would welcome widening the band from the current allocation of 250MHz if at all possible. We would invite ComReg to consider extending the spectrum allocation of this band as much as possible.

60GHz License Exempt band

60GHz will become increasingly important both in short range P-P and P-MP applications. We note DotEcom's observation in 5.2.2 that it has not enjoyed extensive use prior to June 2019. We would like to point out the main reason we see for this is that products operating in the 60GHz band have only relatively recently being made available at a relatively reasonable cost. With 802.11ay and 802.11ad links being available from companies such as Cambium, Ubnt, Ignitenet, Radwin, and MikroTik. 60GHz use in our network has increased dramatically in the past 18 months and will likely continue with the release of new products such as the Cambium CnWave product lines with 7.5Gb/s FDX multigigabit connectivity.

66-71GHz Priority Reservation for 5G

It is our opinion that this be released under a general authorisation and subject to technology neutral performance characteristics, such as n x 1Gb/s, or x Gbps /GHz increasing the spectrum availability here has exciting prospects for advanced wireless service capabilities in urban and suburban locations. As noted by RSPG18-005 FINAL the distance from the Oxygen Absorption peak in this frequency range allows for increased cell radius or P-P link range. We would advocate for a technology neutral general authorisation for this portion of the band.

With products such as Cnwave from Cambium one can create a multigigabit Wireless Fabric which is a game changer in providing low cost high capacity access services in Housing Estates, Business and Industrial parks. This can allow businesses a real choice in infrastructure so as not to be reliant on one wholesale overground pole deployed wired ISP infrastructure which as the electrical power network and the incumbent historical experience has shown on an all too regular basis is regularly significantly impacted by storm related outages

Interference Management, Registration vs Light Licensing

We wholeheartedly endorse ComReg's position as set out in paragraphs 148 and 149, we do agree that the current general authorisation framework for the bands is working quite well and that the FWA industry is able to manage link performance and any incidence of interference in the bands quite well. We would ask that ComReg inform

the DCCAE and their advisors Analysys Mason that Interference is not a significant issue that is affecting FWA networks to any great extent. Not least because Analysys Mason felt unable to qualify every FWA network for NGA status in the recent NBP Mapping exercise which meant that the Intervention area as defined by the DCCAE and its advisors threatens to overbuild all FWA operators' infrastructure as currently deployed NGA capable infrastructure at significant cost to the Irish and European tax payer.

Other Opportunities for License Exempt Bands.

FWA operators such as our selves would welcome the expansion of License exempt and Light licensed spectrum available to allow us deliver even more services to subscribers in Rural Ireland. We would advocate that if equipment is available that is capable of delivering high speed broadband in other bands that ComReg consider facilitating the opening of spectrum for this purpose in bands such as 4.9GHz where there is equipment readily available internationally and proven in other jurisdictions, and that could be deployed rapidly to increase the bandwidth available and allow FWA operators to scale even further. If a general authorisation basis is not considered possible perhaps a light licensed model would be considered instead. We would welcome ComReg facilitating a conversation between FWA operators and other users of the 4.9GHz band such as radio astronomers etc.

The wide availability (internationally) of equipment designed to operate in the FCC allocated Bands for Public Safety 4940-4990 MHz and 5850-5925 MHz would mean that FWA operators could rapidly take advantage of these bands to provide additional bandwidth to more customers. ComReg facilitating ideas such as this would be helpful in and in no way contravene ComReg fulfilling its obligations under A1.1.2 Promotion of Competition.

Conclusion

This initiative very welcome and could not come soon enough as far as we are concerned. We would like to thank ComReg, in particular Martin O'Donoghue and Donnacha Hennessy who have worked extensively on this initiative and for their patience in dealing with our queries and assisting us in granting extensions to submit information during the initial RFI and we look forward to further engagement with them on this important initiative. Finally, we would like to thank DotEcom for their excellent

report which was very informative and clearly showed interesting trends in Infrastructure investment by the FWA Sector in Rural Ireland.

8: Kerry Broadband Ltd ("Kerry Broadband")

KERRY BROADBAND LTD
SUBMISSION TO COMREG 20/109

Review of the Fixed Radio Links Licensing Regime

FAO: Mr. Martin O Donoghue, Commission for Communications Regulation

Non-Confidential: Full Public Release Please

Disclaimer:

Kerry Broadband Ltd has compiled the information submitted in good faith and have exercised all due care in so far as possible with the constraints of meeting the deadline of 7th of December 2020. As an SME ISP we would advocate for longer consultations with more notice given the complexity of the subject matter, the resource constraints that smaller operators have to cope with. We would respectfully ask that ComReg review the 4 week consultation period practice to match the best practices outlined in DPER Public Consultation Guidelines, at the following location: https://www.gov.ie/en/publication/e9b052-consultation-principles-and-guidance/

THE IMPORTANCE OF FIXED LINKS LICENSING REGIME TO RURAL IRELAND

We are pleased to make this submission in response to Comreg 20/109. The review of the Fixed radio links licensing regime presents an opportunity for ComReg to Assist the Fixed Wireless Access Operators deliver even more high speed broadband to businesses and residences across all of Ireland. Particularly in areas where the population density is low. The support of network diversity provided by independent locally owned and operated companies is in Ireland's national economic interest and national security interest. ComRegs Liberalisation of the 5.8GHz band in ComReg's *Expanding Opportunities in the Radiocommunications Market: Fixed Wireless Access (FWA) - Consultation Paper 02/19*, combined with the availability of lower cost license exempt equipment in the 5 /5.8GHz, has transformed ICT landscape in rural Ireland, sowing the seeds of what would become an industry of approximately 50 local independent self-sustaining FWA operators serving over **100,000** connected subscribers in their local communities with high-quality high-speed broadband. According to Wireless Coverage Ltd's report authored by Mr. David Burns and commissioned by 28 ISPs for the 2019 NBP Mapping consultation in 2019, 28 ISPs in the FWA industry have achieved the following coverage and market penetration:

Number of sites by 28 FWA ISPs	**1,465**
NGA Premises Passed by 28 FWA ISPs	**689,781**
Non NGA premises Passed by 28 FWA ISPs	**1,456,470**
Number of Premises Connected to 27 FWA ISPs	**91,894***

Source Wireless Coverage Ltd. Report 30 September 2019 in response to the NBP mapping exercise

Fixed wireless operators welcome the clear recognition that the charts provide that Fixed Wireless operators are and continue to invest in high capacity links across Ireland.

Fixed wireless operators would welcome further liberalization of spectrum to facilitate deployment of further independent broadband infrastructure in rural Ireland. The importance of the independent FWA industry in Ireland cannot be overstated, and the Covid-19 pandemic has shown us the FWA industry were the ones connecting and carrying rural Ireland through the pandemic, while heavily subsidised entities have been surveying the country for what they might one day connect. At the time of submission, no homes or businesses have been connected by the NBP. It is essential that ComReg use all powers and resources available to help maintain the diversity of infrastructure deployed in rural Ireland. It is regrettable that this consultation did not take place prior to

the signing of the NBP contract in late 2019. As regulatory and policy measures and are preferable to subsidised interventions because they can reduce the need, the scale and hence the cost of Government subsidised interventions generally.

The FWA industry's existing broadband infrastructure and contribution to rural Ireland, despite being ignored and discounted by recent Irish Governments for the purposes of ensuring a ubiquitous provision of FTTH throughout the State, has a vital role to play in Ireland's future in providing real competition for internet access in Ireland particularly because of their focus in rural parts of Ireland typically underserved by larger ISPs whos' focus on more profitable urban markets. Supporting measures that reduce the costs and burden on independent fixed wireless operators expanding and upgrading their deployments in rural Ireland can help us provide the much needed redundancy to the Irish Government's NBP approach of placing all eggs in one publicly funded, private equity infrastructure basket. The FWA industry can and currently does provide much needed connectivity to rural Ireland, and this is important to maintain in the event of the NBP running into further delays or difficulties which seems to be a recurring theme when it comes to the management of the NBP procurement & rollout program to date.

We welcome the opportunity to comment on:

• The design of a licensing framework that best provides for the effective management and efficient usage of the Fixed Links band identified in this consultation and the responses.

•A new hopefully Improved fee schedule for Fixed Links that facilitates the greatest number of use cases, in order to ultimately promote greater use of the spectrum that are identified in this consultation and the responses; Preliminary Consultation of Fixed Links Bands Review ComReg 20/109

• Review the technical conditions and guidelines for the deployment Fixed Links in the bands identified and consult on any proposed changes; and Advise and consult on new regulations to replace S.I. 370 of 2009

Table of Contents

2.1 The Fixed Link Licensing Regime

Comments further in the document.

Individual Link Licence fees

Comments further in the document.

2.2 Current Individual Fixed Link Bands

It is worth noting the level of existing FWA broadband Infrastructure in the country which is already at or in the process of being upgraded to NGA status. This is a testament to the commitment, investment of so many market operators have made and continue to make in rural Ireland. It is imperative that ComReg supports competition and infrastructure diversity when considering changes to the licensing regime.

2.3 Other spectrum management matters which are related to the Fixed Link Bands

WAS/RLAN above 5 GHz

In relation to Paragraph 52

> *52 "ComReg will continue to monitor and input into the discussions of this matter at the EC and ECC. Upon the adoption and publication of any future EC and/or ECC Decision, ComReg will consider the appropriate the implementation of those decisions"*

We would advocate that an exemption exist for Fixed Wireless Access operators in a similar manner for the 5.8GHz Spectrum to allow operators use the 5925-6425 MHz band at an EIRP similar to that specified in the 5.8GHz Band for the purpose of providing Broadband access in rural areas. It would be a pity not to fully realise the potential of expanding the spectrum available to Fixed wireless operators so that the DAE 2025 objectives of a minimum speed of 100Mb/s per subscriber can be by giving existing operators access to more spectrum. We welcome that ComReg is closely monitoring the progress at the ECC and we would advocate that interested parties that may need to operate CBTC Secure Communications Train Based Control systems in Ireland be contacted to see if they are In fact using that spectrum for CBTC. If in fact that they are not using that spectrum it would be most helpful to the Fixed Wireless Access industry for ComReg to liberalise that spectrum on a License Exempt basis in a similar manner to the 5.8GHz Band.

We would welcome ComReg making available the 5925-6425 MHz on a provisional license exempt or light license basis pending full and formal adoption of a decision at the ECC.

3.1 Existing Use Cases

As a FWA operator we would like to comment on paragraph 68

> *68 For the purposes of this review, ComReg requested information on the use of Fixed Links in the Licence Exempt Bands in the Licensee RFI 74 . A total of 15 respondents to the RFI stated their use of licence exempt Fixed Links 75 . Separate ComReg data indicates that ComReg's RFI data did not capture the majority of licence exempt Fixed Links, due to a number of FWA operators with a large number of Licence Exempt FWA Fixed Links 76 failing to respond. ComReg therefore places limited weight on trends in this data as representing trends for all licence exempt Fixed Links. Bearing this in mind, ComReg notes the use of Fixed Links among these 15 users has increased in recent years with most of the licence exempt Fixed Links deployed for FWA in the 5 GHz band. Data gathered separately by ComReg on broadband subscriptions delivered by FWA corroborate this finding and indicates that the number of Fixed Links in the Licence Exempt Bands used for the provision of FWA for 2.4 GHz and 5 GHz bands has increased from Q1 2020.*

We do agree with both DotEcom and ComReg's observation that the scale of the deployment of license exempt fixed links are underestimated in this report. While we agree that it is likely due to a lack of response from FWA ISPs, it should be noted, that the Covid-19 pandemic and lockdowns aside, FWA operators are focused primarily on the need to connect the unconnected, or to upgrade the connected. We Regret the Inability of many FWA operators to submit this vital information to ComReg. For our part and we believe those of our peers particularly during the pandemic when so many of our subscribers are working from home, our priority has had to be the continued delivery of reliable service to the customer and therefore engagement with and responding to consultations was unfortunately lower down on the priority list. The constraints on resources of smaller operators like ourselves means responding meaningfully and accurately to a consultation in a period of just 4 weeks is exceptionally difficult. We have no doubt that this would have impacted on the other FWA operators' ability to collect information about license exempt links as requested earlier in the year. We would welcome a review of the consultation period length and encourage ComReg to perhaps publish the intention to hold a consultation well in advance (similar to the way that this consultation was flagged in advance because of the engagement during the request for information on deployed links made to operators earlier in the year).

If we consider that just 28 of FWA ISPs have built and deployed at least 1465 sites around Ireland to serve their local communities it would stand to reason there would be multiples of that figure in P-P links and P-MP links also.

It is noteworthy that the charts in paragraphs 56 and 57 show the value and importance of the FWA industry in Ireland. and that the FWA sector as market operators are investing and expanding as clearly demonstrated in the purchase of licenses and the increased number of FWA ISPs purchasing licenses.

It is striking to see the chart associated with paragraph 58 that FWA Operators are increasing investment and real deployment in Fixed Links in all bands (apart from 38GHz).

3.2 The use of Fixed Links in Ireland in an International context

We would advocate that ComReg monitor the use of light licensed schemes such as public safety spectrum allocations in the US and if possible allow for the application on a light licensed or license exempt basis, for the purposes of Deploying Fixed Wireless Access broadband in Rural Ireland. This request would be contingent on lower cost equipment being readily available to facilitate the rapid deployment of such networks, so that consumers would experience the benefits of such liberalisation without delay. An example where this could be readily achieved is in the 4.9GHz band where FCC has designated in the US that this is a public Safety band and that there is equipment available to meet that specification that is similar to other equipment operating in the 5.4 /5.8GHz. So it would be easy for FWA operators to Purchase and Deploy equipment to operate in the 4.9GHz band due to the fact that it is operating similar equipment already on its network. The availability or prospect of low cost equipment to operate in a particular band would be one of the most important factors to consider when liberalising spectrum access, for example, similar spectrum utilisation in other major jurisdictions.

3.3 & 3.4 Other potential use cases for Fixed Links

A-Q1

The advent of newer 60GHz technologies means that a large-scale deployment of FWA networks are possible in Cities and Towns, and this can lead to future competition for access networks and increased choices for consumers. The Cambium Cnwave product line has the feature set, throughput performance (multi-Gigabit connectivity) and a compact formfactor allowing operators to disrupt the urban and suburban market. Further it can afford businesses and high end consumers who have need for redundancy of internet access / WAN access a possibility to connect over diverse infrastructures instead of relying on One Wholesale Operator infrastructure and pseudo diversity over said single wholesale operator infrastructure.

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Perhaps it would be worth considering that for a software channel change that ComReg would make that a condition of renewing a license for operators who have equipment that can be easily re-configured to a different channel. Perhaps this could be available with a nominal low-cost fee. And for a quicker turnaround perhaps a fair compensation model can be agreed between the operators. This would be difficult to implement and would require buy in and co-operation from all operators. However, it is important that Operators co-operate with each other to maximise the use of spectrum and the availability of high-speed broadband services to end consumers in Ireland. That said, if an operator wants an operator who's equipment is constrained to a given channel then it would be incumbent on the operator requesting the larger channel to pay for a replacement equipment and install cost, so that would allow the operator with the smaller allocation move off the channel without affecting its own services to its customers.

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and growth and would enable genuine choice and competition with real infrastructure diversity choices for consumers across Ireland. Comreg facilitating ideas such as this would be helpful in ComReg fulfilling its obligations under A1.1.2 Promotion of Competition.

It is our view that Block licences should only be considered if and only if there is sufficiently significant part of the spectrum made available for individual link licenses. While one can understand the value in reducing paperwork for larger wider deployed networks. It is our view that larger networks already enjoy favourable access to spectrum by virtue of their scale and spending power. It therefore also important to consider the positive competition implications for maintaining a low barrier of entry for Fixed Wireless Operators in any given licensed band.

It is our preference to have individual licensed links with licenses assigned in as automated manner as possible to reduce the burden on ComReg and the operators seeking to deploy a link. The low-cost license regime is pivotal to allow smaller fixed wireless operators compete with the larger ISPs and MNOs.

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Alternatively as an interim measure, or to address difficulties in automating the frequency allocation process, perhaps ComReg could instigate a process of advising on the suitability and/or availability of the requested channel v's nearby or similar channels which might be licensed to meet the link budget requirements. This may have the ancillary benefit of improving the efficiency of spectrum deployment.

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As a FWA operator, we welcome both DotEcom's and ComReg's views as outlined in paragraph 117. That network and technological progress is not impeded by lack of guidelines for a new technique or technology that has not been referred to in the guidelines. The requirement that such deployment to be notified in advance to ComReg is right and reasonable. And we endorse it wholeheartedly.

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4.5 Pricing

A-Q6

Independent SME FWA ISPs are price conscious, the success of the 80GHz band and the number of links deployed in that shows (at least empirically that lower cost licenses encourages more deployment in that band) we would advocate lowering the cost of licenses where bands are not that heavily used. It is important that ComReg is mindful that there is generally a downward trend in cost per Mb/s being charged to consumers, coupled with an upward trend in bandwidth capacity demands per customer, consequentially the demands on our backhaul licensed links are increasing while the profit an individual link would be de-creasing. Accordingly we would advocate that licenses taken out in the same company between two identical endpoints should receive a discount on second and subsequent licenses. This would be fairer on an expanding operator who is transitioning from one vendor to another and cannot combine the two frequencies into one antenna system. Lowering the barriers / costs associated with giving subscribers more bandwidth is a good thing and would help encourage even further investment in infrastructure by the operators (not to financially disincentivise them)

The current de-lineation of costs according to high usage path / congested area vs normal usage paths / areas, is very coarse and it is probable that in the Dublin area there are certain areas with an underinvestment in wireless links due to the cost of the deployment, having a granular approach with accurate models would help reduce the costs of deploying in less deployed areas in and around Dublin City. We would advocate an incremental process for a gradual increase costs licenses on a given band as the number of channels allocated in that band increases. This could also serve as an indicator of how busy a band actually is on a given path.

4.6 1.4 GHz band

A-Q7

It would be our preference assuming reasonable cost equipment is available for deploying links with 1.4GHz that this be assigned for FWA networks on a locally licensed basis (subject to availability of cost effective equipment being available in this band.

A-Q8

The Licensing model should such that it be made available on lower cost local licenses to assist local operators provide choice and more bandwidth to customers in their locality. If ComReg believes a national / regional block licensing model is needed, we would advocate strongly (subject to reasonable cost equipment being available by manufacturers) that a section of the band be reserved for local operators. This would improve competition and diversity of infrastructure in rural Ireland.

4.7 13 GHz and 15 GHz bands

A-Q9

It is understandable that 13GHz / 15Ghz have applications restricted when there is no availability of channel space. However there no logic to the regulator effectively holding back channels in this spectrum that have been since released or not renewed by the license holder of that channel. We would advocate a traffic light system that would inform users that a band in a given area is full and that license applications are not being accepted at this time. Further it might be worth ComReg considering the tidying up of these two bands(by moving smaller channel allocations to the edge of the bands (on renewal in so far as it is possible) as opposed to fragmenting and impeding potential for larger contiguous channel allocations in the band.

4.8 26 GHz band

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4.9 D-bands and W-bands

A-Q11

FWA operators like ourselves would be interested in deploying equipment in this band once it becomes available. However given the frequency range it is likely that as per DotEcom's and ComReg's view that it would be for ultra high capacity links in urban environments (due to inherent range limitations) of these bands. That said we can only fully comment when the specifications and limits on EIRP and the capability of equipment designed to operate in that band are known.

4.10 Licence exempt / light licensing

A-Q12

License exempt spectrum has allowed independent FWA operators deliver high speed internet access to rural Ireland where fixed line and MNOs that have historically focused on urban / suburban areas and consequentially failed to deliver high speed broadband in a timely manner to rural communities.

5.4GHz and 5.8GHz Bands have been key and remain key to delivering FWA broadband in Ireland in the past and as their sites and access requirements have grown where a site has been fed by one or two 5.4GHz / 5.8GHz fixed links, it has been and is common practice to re-invest in the site and replace the lower cost 5.4 GHz/ 5.8GHz backhaul links with links operating in other bands such as

- license exempt bands such as 17GHz, 24GHz
- if the link is sufficiently short distance the License Exempt 60GHz band.
- light licensed bands such as 80GHz
- licensed Bands such as 13GHz,15GHz and 18GHz

The migration away from 5.4GHz/ 5.8GHz backhaul links allows for re-deployment and more flexibility in delivering service on more sectors on a given site allowing for greater coverage.

This strategy is not unique to our company and is indeed replicated by our other colleagues in the FWA sector.

We agree with DotEcom's recommendation regarding not to close bands that have been previously open and in use.

5.4 GHz License Exempt band

The value of this band to us is increasing from a P-MP perspective and decreasing from P-P perspective primarily. The value of deploying a 5.4GHz sector is far greater to an FWA ISP when compared a P-P link in the 5.4GHz band

5.8 GHz License Exempt band

In a similar way to the 5.4GHz band the value of this band to us is increasing from a P-MP perspective and decreasing from P-P perspective primarily. The value of deploying a 5.8GHz sector is far greater to an FWA ISP when compared a P-P link in the 5.8GHz We would advocate an increase the max EIRP in rural areas in line with (Ofcom in UK) to 36 dBm which would increase the range of rural base stations by up to 41%

The advent and availability of beamforming Mu-MIMO sectors, and high quality beam efficient scalar horn antennas from manufacturers such as RF-Elements with tight beam focus means that despite the very wide large scale deployment of License exempt links generally across the country, ISPs like ourselves can manage the spectrum and adequately limit interference effects to / from other equipment operators. Thankfully we co-operate with and enjoy the co-operation of other neighbouring FWA Wireless networks and the rollout of these technologies means that interference incidents are fewer and farther between. Further the developments of Mu-MIMO and beam forming equipment from manufacturers such as Cambium PMP and ePMP means that customers can enjoy improved service now and in the future.

17GHz License Exempt band

We note ComReg's observation in Paragraph 145 notwithstanding CEPT Report 44 stating that this band is of little use. We have extensively deployed 17GHz links and will continue to do so over the coming years. We consider this band vital for low cost high speed backhaul to our sites. And provides redundancy for Licensed links at a low cost. This band allows us to deliver higher bandwidth to our customers at a lower cost.

We are pleased to see ComReg's recognition in paragraph 146 of availability of equipment for 17GHz band and that it is currently deployed in so many of our networks.

It is our experience that we have yet to encounter any interference on these links in our Rural based deployments. And therefore, agree that a light licensing framework is not required for this band. We follow and advocate for the practice of deploying large gain antennas with reduced input power to minimise interference with our neighbouring ISPs.

We would welcome widening the band from the current 200MHz if at all possible. We would invite ComReg to consider extending the spectrum allocation of this band as much as possible or at the very least 50MHz to accommodate higher capacity symmetric links.

24GHz License Exempt band

We have extensively deployed 24GHz links and will continue to do so over the coming years. We consider this band vital for low cost short range high speed backhaul to our

sites and provides redundancy for Licensed links at a low cost. This band allows us to deliver higher bandwidth to our customers at a lower cost.

It is our experience that we have yet to encounter any interference on these links in our Rural based deployments. And therefore, agree that a light licensing framework is not required for this band. We follow and advocate for the practice of deploying large gain antennas with reduced input power to minimise interference with our neighbouring ISPs.

We would welcome widening the band from the current allocation of 250MHz if at all possible. We would invite ComReg to consider extending the spectrum allocation of this band as much as possible.

60GHz License Exempt band

60GHz will become increasingly important both in short range P-P and P-MP applications. We note DotEcom's observation in 5.2.2 that it has not enjoyed extensive use prior to June 2019. We would like to point out the main reason we see for this is that products operating in the 60GHz band have only relatively recently being made available at a relatively reasonable cost. With 802.11ay and 802.11ad links being available from companies such as Cambium, Ubiquity, Ignite-net, Radwin, and MikroTik. 60GHz use in our network has increased dramatically in the past 18 months and will likely continue with the release of new products such as the Cambium CnWave product lines with 7.5Gb/s FDX multigigabit connectivity.

66-71GHz Priority Reservation for 5G

It is our opinion that this be released under a general authorisation and subject to technology neutral performance characteristics, such as n x 1Gb/s, or xGbps /GHz increasing the spectrum availability here has exciting prospects for advanced wireless service capabilities in urban and suburban locations. As noted by RSPG18-005 FINAL the distance from the Oxygen Absorption peak in this frequency range allows for increased cell radius or P-P link range. We would advocate for a technology neutral general authorisation for this portion of the band.

With products such as Cnwave from Cambium one can create a multigigabit Wireless Fabric which is a game changer in providing low cost high capacity access services in Housing Estates, Business and Industrial parks. This can allow businesses a real choice in infrastructure so as not to be reliant on one wholesale overground pole deployed wired ISP infrastructure which as the electrical power network and the incumbent historical experience has shown on an all too regular basis is regularly significantly impacted by storm related outages

Interference Management, Registration vs Light Licensing

We wholeheartedly endorse ComReg's position as set out in paragraphs 148 and 149, we do agree that the current general authorisation framework for the bands is working quite well and that the FWA industry is able to manage link performance and any incidence of interference in the bands quite well. We would ask that ComReg inform the DCCAE and their advisors Analysts Mason that Interference is not a significant issue that is affecting FWA networks to any great extent. Not least because Analysts Mason felt unable to qualify every FWA network for NGA status in the recent NBP Mapping exercise which meant that the Intervention area as defined by the DCCAE and its advisors threatens to overbuild all FWA operators' infrastructure as currently deployed NGA capable infrastructure at significant cost to the Irish and European tax payer.

Other Opportunities for License Exempt Bands.

FWA operators such as ourselves would welcome the expansion of License exempt and Light licensed spectrum available to allow us deliver even more services to subscribers in Rural Ireland. We would advocate that if equipment is available that is capable of delivering high speed broadband in other bands that ComReg consider facilitating the opening of spectrum for this purpose in bands such as 4.9GHz where there is equipment readily available internationally and proven in other jurisdictions, and that could be deployed rapidly to increase the bandwidth available and allow FWA operators to scale even further. If a general authorisation basis is not considered possible perhaps a light licensed model would be considered instead. We would welcome ComReg facilitating a conversation between FWA operators and other users of the 4.9GHz band such as radio astronomers etc.

The wide availability (internationally) of equipment designed to operate in the FCC allocated Bands for Public Safety 4940-4990 MHz and 5850-5925 MHz would mean that FWA operators could rapidly take advantage of these bands to provide additional bandwidth to more customers. ComReg facilitating ideas such as this would be helpful in and in no way contravene ComReg fulfilling its obligations under A1.1.2 Promotion of Competition.

Conclusion

This initiative very welcome and could not come soon enough as far as we are concerned. We would like to thank ComReg, in particular Martin O'Donoghue and Donnacha Hennessy who have worked extensively on this initiative and for their patience in dealing with our queries and assisting us in granting extensions to submit information during the initial RFI and we look forward to further engagement with them

on this important initiative. Finally, we would like to thank DotEcom for their excellent report which was very informative and clearly showed interesting trends in Infrastructure investment by the FWA Sector in Rural Ireland.

Ends.

9: Lackabeha Services Ltd (“Airwave Internet”)

AIRWAVE INTERNET SUBMISSION TO COMREG 20/109

Review of the Fixed Radio Links Licensing Regime

FAO: Mr. Martin O Donoghue, Commission for Communications Regulation

Non-Confidential: Full Public Release Please

Disclaimer:

Airwave Internet has compiled the information submitted in good faith and have exercised all due care in so far as possible with the constraints of meeting the deadline of 7th of December 2020. As an SME ISP we would advocate for longer consultations with more notice given the complexity of the subject matter, the resource constraints that smaller operators have to cope with. We would respectfully ask that ComReg review the 4 week consultation period practice to match the best practices outlined in DPER Public Consultation Guidelines, at the following location: https://www.gov.ie/en/publication/e9b052-consultation-principles-and-guidance/

THE IMPORTANCE OF FIXED LINKS LICENSING REGIME TO RURAL IRELAND

We are pleased to make this submission in response to Comreg 20/109. The review of the Fixed radio links licensing regime presents an opportunity for ComReg to Assist the Fixed Wireless Access Operators deliver even more high speed broadband to businesses and residences across all of Ireland. Particularly in areas where the population density is low. The support of network diversity provided by independent locally owned and operated companies is in Ireland's national economic interest and national security interest. ComRegs Liberalisation of the 5.8GHz band in ComReg's *Expanding Opportunities in the Radiocommunications Market: Fixed Wireless Access (FWA) - Consultation Paper 02/19*, combined with the availability of lower cost license exempt equipment in the 5 /5.8GHz, has transformed ICT landscape in rural Ireland, sowing the seeds of what would become an industry of approximately 50 local independent self-sustaining FWA operators serving over **100,000** connected subscribers in their local communities with high-quality high-speed broadband. According to Wireless Coverage Ltd's report authored by Mr. David Burns and commissioned by 28 ISPs for the 2019 NBP Mapping consultation in 2019 28 ISPs in the FWA industry have achieved the following coverage and market penetration:

Number of sites by 28 FWA ISPs	**1,465**
NGA Premises Passed by 28 FWA ISPs	**689,781**
Non NGA premises Passed by 28 FWA ISPs	**1,456,470**
Number of Premises Connected to 27 FWA ISPs	**91,894***

Source Wireless Coverage Ltd. Report 30 September 2019 in response to the NBP mapping exercise

Fixed wireless operators welcome the clear recognition that the charts provide that Fixed Wireless operators are and continue to invest in high capacity links across Ireland.

Fixed wireless operators would welcome further liberalization of spectrum to facilitate deployment of further independent broadband infrastructure in rural Ireland. The importance of the independent FWA industry in Ireland cannot be overstated, and the Covid-19 pandemic has shown us the FWA industry were the ones connecting and carrying rural Ireland through the pandemic, while heavily subsidised entities have been surveying the country for what they might one day connect. At the time of submission, no homes or businesses have been connected by the NBP. It is essential that ComReg use all powers and resources available to help maintain the diversity of infrastructure deployed in rural Ireland. It is regrettable that this consultation did not take place prior to

the signing of the NBP contract in late 2019. As regulatory and policy measures and are preferable to subsidised interventions because they can reduce the need, the scale and hence the cost of Government subsidised interventions generally.

The FWA industry's existing broadband infrastructure and contribution to rural Ireland, despite being ignored and discounted by recent Irish Governments for the purposes of ensuring a ubiquitous provision of FTTH throughout the State, has a vital role to play in Ireland's future in providing real competition for internet access in Ireland particularly because of their focus in rural parts of Ireland typically underserved by larger ISPs whos' focus on more profitable urban markets. Supporting measures that reduce the costs and burden on independent fixed wireless operators expanding and upgrading their deployments in rural Ireland can help us provide the much needed redundancy to the Irish Government's NBP approach of placing all eggs in one publicly funded, private equity infrastructure basket. The FWA industry can and currently does provide much needed connectivity to rural Ireland, and this is important to maintain in the event of the NBP running into further delays or difficulties which seems to be a recurring theme when it comes to the management of the NBP procurement & rollout program to date.

We welcome the opportunity to comment on:

• The design of a licensing framework that best provides for the effective management and efficient usage of the Fixed Links band identified in this consultation and the responses.

•A new hopefully Improved fee schedule for Fixed Links that facilitates the greatest number of use cases, in order to ultimately promote greater use of the spectrum that are identified in this consultation and the responses; Preliminary Consultation of Fixed Links Bands Review ComReg 20/109

• Review the technical conditions and guidelines for the deployment Fixed Links in the bands identified and consult on any proposed changes; and Advise and consult on new regulations to replace S.I. 370 of 2009

Table of Contents

2.1 The Fixed Link Licensing Regime

Comments further in the document.

Individual Link Licence fees

Comments further in the document.

2.2 Current Individual Fixed Link Bands

It is worth noting the level of existing FWA broadband Infrastructure in the country which is already at or in the process of being upgraded to NGA status. This is a testament to the commitment, investment of so many market operators have made and continue to make in rural Ireland. It is imperative that ComReg supports competition and infrastructure diversity when considering changes to the licensing regime.

2.3 Other spectrum management matters which are related to the Fixed Link Bands

WAS/RLAN above 5 GHz

In relation to Paragraph 52

> *52 "ComReg will continue to monitor and input into the discussions of this matter at the EC and ECC. Upon the adoption and publication of any future EC and/or ECC Decision, ComReg will consider the appropriate the implementation of those decisions"*

We would advocate that an exemption exist for Fixed Wireless Access operators in a similar manner for the 5.8GHz Spectrum to allow operators use the 5925-6425 MHz band at an EIRP similar to that specified in the 5.8GHz Band for the purpose of providing Broadband access in rural areas. It would be a pity not to fully realise the potential of expanding the spectrum available to Fixed wireless operators so that the DAE 2025 objectives of a minimum speed of 100Mb/s per subscriber can be by giving existing operators access to more spectrum. We welcome that ComReg is closely monitoring the progress at the ECC and we would advocate that interested parties that may need to operate CBTC Secure Communications Train Based Control systems in Ireland be contacted to see if they are In fact using that spectrum for CBTC. If in fact that they are not using that spectrum it would be most helpful to the Fixed Wireless Access industry for ComReg to liberalise that spectrum on a License Exempt basis in a similar manner to the 5.8GHz Band.

We would welcome ComReg making available the 5925-6425 MHz on a provisional license exempt or light license basis pending full and formal adoption of a decision at the ECC.

3.1 Existing Use Cases

As a FWA operator we would like to comment on paragraph 68

> *68 For the purposes of this review, ComReg requested information on the use of Fixed Links in the Licence Exempt Bands in the Licensee RFI 74 . A total of 15 respondents to the RFI stated their use of licence exempt Fixed Links 75 . Separate ComReg data indicates that ComReg's RFI data did not capture the majority of licence exempt Fixed Links, due to a number of FWA operators with a large number of Licence Exempt FWA Fixed Links 76 failing to respond. ComReg therefore places limited weight on trends in this data as representing trends for all licence exempt Fixed Links. Bearing this in mind, ComReg notes the use of Fixed Links among these 15 users has increased in recent years with most of the licence exempt Fixed Links deployed for FWA in the 5 GHz band. Data gathered separately by ComReg on broadband subscriptions delivered by FWA corroborate this finding and indicates that the number of Fixed Links in the Licence Exempt Bands used for the provision of FWA for 2.4 GHz and 5 GHz bands has increased from Q1 2020.*

We do agree with both DotEcom and ComReg's observation that the scale of the deployment of license exempt fixed links are underestimated in this report. While we agree that it is likely due to a lack of response from FWA ISPs, it should be noted, that the Covid-19 pandemic and lockdowns aside, FWA operators are focused primarily on the need to connect the unconnected, or to upgrade the connected. We Regret the Inability of many FWA operators to submit this vital information to ComReg. For our part and we believe those of our peers particularly during the pandemic when so many of our subscribers are working from home, our priority has had to be the continued delivery of reliable service to the customer and therefore engagement with and responding to consultations was unfortunately lower down on the priority list. The constraints on resources of smaller operators like ourselves means responding meaningfully and accurately to a consultation in a period of just 4 weeks is exceptionally difficult. We have no doubt that this would have impacted on the other FWA operators' ability to collect information about license exempt links as requested earlier in the year. We would welcome a review of the consultation period length and encourage ComReg to perhaps publish the intention to hold a consultation well in advance (similar to the way that this consultation was flagged in advance because of the engagement during the request for information on deployed links made to operators earlier in the year).

If we consider that just 28 of FWA ISPs have built and deployed at least 1465 sites around Ireland to serve their local communities it would stand to reason there would be multiples of that figure in P-P links and P-MP links also.

It is noteworthy that the charts in paragraphs 56 and 57 show the value and importance of the FWA industry in Ireland. and that the FWA sector as market operators are investing and expanding as clearly demonstrated in the purchase of licenses and the increased number of FWA ISPs purchasing licenses.

It is striking to see the chart associated with paragraph 58 that FWA Operators are increasing investment and real deployment in Fixed Links in all bands (apart from 38GHz).

3.2 The use of Fixed Links in Ireland in an International context

We would advocate that ComReg monitor the use of light licensed schemes such as public safety spectrum allocations in the US and if possible allow for the application on a light licensed or license exempt basis, for the purposes of Deploying Fixed Wireless Access broadband in Rural Ireland. This request would be contingent on lower cost equipment being readily available to facilitate the rapid deployment of such networks, so that consumers would experience the benefits of such liberalisation without delay. An example where this could be readily achieved is in the 4.9GHz band where FCC has designated in the US that this is a public Safety band and that there is equipment available to meet that specification that is similar to other equipment operating in the 5.4 /5.8GHz. So it would be easy for FWA operators to Purchase and Deploy equipment to operate in the 4.9GHz band due to the fact that it is operating similar equipment already on its network. The availability or prospect of low cost equipment to operate in a particular band would be one of the most important factors to consider when liberalising spectrum access eg similar spectrum utilisation in other major jusrisdictions.

3.3 & 3.4 Other potential use cases for Fixed Links

A-Q1

The advent of newer 60GHz technologies means that a large-scale deployment of FWA networks are possible in Cities and Towns, and this can lead to future competition for access networks and increased choices for consumers. The Cambium Cnwave product line has the feature set, throughput performance (multi-Gigabit connectivity) and a compact formfactor allowing operators to disrupt the urban and suburban market. Further it can afford businesses and high end consumers who have need for redundancy of internet access / WAN access a possibility to connect over diverse infrastructures instead of relying on One Wholesale Operator infrastructure and pseudo diversity over said single wholesale operator infrastructure.

4.1 Spectrum availability and channel arrangements

A-Q2

As a FWA operator which consistently strives to have at least 20% over capacity on our network and which often need to deploy over 1Gb/s to a given site in order to maintain an over capacity of 20% above peak demand, therefore, we agree with the ITU /CEPT recommendation & endorse DotEcom's, and ComReg's view that 112MHz channels should be made available in those bands in so far as they do not restrict existing operators who have more narrow channel licenses already purchased. We would advocate a co-operative approach where ComReg could work with license holders to ensure that narrow channels are migrated from the middle of the band to the one of the edges of the band so that fragmentation is minimised.

Perhaps it would be worth considering that for a software channel change that ComReg would make that a condition of renewing a license for operators who have equipment that can be easily re-configured to a different channel. Perhaps this could be available with a nominal low-cost fee. And for a quicker turnaround perhaps a fair compensation model can be agreed between the operators. This would be difficult to implement and would require buy in and co-operation from all operators. However, it is important that Operators co-operate with each other to maximise the use of spectrum and the availability of high-speed broadband services to end consumers in Ireland. That said, if an operator wants an operator who's equipment is constrained to a given channel then it would be incumbent on the operator requesting the larger channel to pay for a replacement equipment and install cost, so that would allow the operator with the smaller allocation move off the channel without affecting its own services to its customers.

4.2 Block Licences

A-Q3

Individual Licenses are preferred for small to medium FWA ISPs like our own as it lowers the barriers for expanding and improving our infrastructure footprint. National block licenses are typically out of the financial reach of smaller operators, as previously demonstrated by the Auction of the 3.6GHz spectrum which resulted in the retiring of low cost local site licenses which were taken up by a number of small to medium FWA operators and then in the auction of the released spectrum to the highest bidder with MNOs getting the bulk of the spectrum and only 1 FWA operator, Imagine being successful in acquiring some spectrum. It is therefore of paramount importance that individual links can be purchased at a reasonable cost to facilitate the expansion of services from localised FWA providers. Promoting spectrum availability for SME operators will reduce the ability of larger operators to sit on and not deploy national block licenses. Spectrum availability for smaller operators can help ensure their survival

and growth and would enable genuine choice and competition with real infrastructure diversity choices for consumers across Ireland. Comreg facilitating ideas such as this would be helpful in ComReg fulfilling its obligations under A1.1.2 Promotion of Competition.

It is our view that Block licences should only be considered if and only if there is sufficiently significant part of the spectrum made available for individual link licenses. While one can understand the value in reducing paperwork for larger wider deployed networks. It is our view that larger networks already enjoy favourable access to spectrum by virtue of their scale and spending power. It therefore also important to consider the positive competition implications for maintaining a low barrier of entry for Fixed Wireless Operators in any given licensed band.

It is our preference to have individual licensed links with licenses assigned in as automated manner as possible to reduce the burden on ComReg and the operators seeking to deploy a link. The low-cost license regime is pivotal to allow smaller fixed wireless operators compete with the larger ISPs and MNOs.

4.3 Application and licensing process

A-Q4

We would advocate the use of automation and models built in on the licensing platform that could guide the License applicant to self-validate the application (link budgets availability characteristics) We would strongly advocate for the ability for a license applicant to pre-emptively select additional lower preference link channels and/or bands in the application procedure so that in the event of the first chosen channel and/or band is not available the operator can get a license grant in one brief exchange with ComReg without an iterative process back and forth between ComReg and the operator until the operator manages to be fortunate enough to select an available channel on a given band. Automating this in so far as possible and building in intelligence into the license application system would reduce the burden on both ComReg and the Operators.

Alternatively as an interim measure, or to address difficulties in automating the frequency allocation process, perhaps ComReg could instigate a process of advising on the suitability and/or availability of the requested channel v's nearby or similar channels which might be licensed to meet the link budget requirements. This may have the ancillary benefit of improving the efficiency of spectrum deployment.

4.4 Fixed radio links Guidelines

A-Q5

As a FWA operator, we welcome both DotEcom's and ComReg's views as outlined in paragraph 117. That network and technological progress is not impeded by lack of guidelines for a new technique or technology that has not been referred to in the guidelines. The requirement that such deployment to be notified in advance to ComReg is right and reasonable. And we endorse it wholeheartedly.

As an operator who is expanding its backhaul continuously we would endorse ComReg's view as outlined in paragraph 118 that relaxing of minimum distance of links as long as the purpose of which is for aggregating multiple links / frequencies to increase capacity and redundancy between sites. As long as the capacity / redundancy / availability could not be achieved with a higher capacity link.

4.5 Pricing

A-Q6

Independent SME FWA ISPs are price conscious, the success of the 80GHz band and the number of links deployed in that shows (at least empirically that lower cost licenses encourages more deployment in that band) we would advocate lowering the cost of licenses where bands are not that heavily used. It is important that ComReg is mindful that there is generally a downward trend in cost per Mb/s being charged to consumers, coupled with an upward trend in bandwidth capacity demands per customer, consequentially the demands on our backhaul licensed links are increasing while the profit an individual link would be de-creasing. Accordingly we would advocate that licenses taken out in the same company between two identical endpoints should receive a discount on second and subsequent licenses. This would be fairer on an expanding operator who is transitioning from one vendor to another and cannot combine the two frequencies into one antenna system. Lowering the barriers / costs associated with giving subscribers more bandwidth is a good thing and would help encourage even further investment in infrastructure by the operators (not to financially disincentivise them)

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In a similar way to the 5.4GHz band the value of this band to us is increasing from a P-MP perspective and decreasing from P-P perspective primarily. The value of deploying a 5.8GHz sector is far greater to an FWA ISP when compared a P-P link in the 5.8GHz We would advocate an increase the max EIRP in rural areas in line with (Ofcom in UK) to 36 dBm which would increase the range of rural base stations by up to 41%

The advent and availability of beamforming Mu-MIMO sectors, and high quality beam efficient scalar horn antennas from manufacturers such as RF-Elements with tight beam focus means that despite the very wide large scale deployment of License exempt links generally across the country, ISPs like our selves can manage the spectrum and adequately limit interference effects to / from other equipment operators. Thankfully we co-operate with and enjoy the co-operation of other neighbouring FWA Wireless networks and the rollout of these technologies means that interference incidents are fewer and farther between. Further the developments of Mu-MIMO and beaming forming equipment from manufacturers such has Cambium PMP and ePMP means that customers can enjoy improved service now and in the future.

17GHz License Exempt band

We note ComReg's observation in Paragraph 145 notwithstanding CEPT Report 44 stating that this band is of little use. We have extensively deployed 17GHz links and will continue to do so over the coming years. We consider this band vital for low cost high speed backhaul to our sites. And provides redundancy for Licensed links at a low cost. This band allows us to deliver higher bandwidth to our customers at a lower cost.

We are pleased to see ComReg's recognition in paragraph 146 of availability of equipment for 17GHz band and that it is currently deployed in so many of our networks.

It is our experience that we have yet to encounter any interference on these links in our Rural based deployments. And therefore, agree that a light licensing framework is not required for this band. We follow and advocate for the practice of deploying large gain antennas with reduced input power to minimise interference with our neighbouring ISPs.

We would welcome widening the band from the current 200MHz if at all possible. We would invite ComReg to consider extending the spectrum allocation of this band as much as possible or at the very least 50MHz to accommodate higher capacity symmetric links.

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We have extensively deployed 24GHz links and will continue to do so over the coming years. We consider this band vital for low cost high speed backhaul to our sites. And

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We would welcome widening the band from the current allocation of 250MHz if at all possible. We would invite ComReg to consider extending the spectrum allocation of this band as much as possible.

60GHz License Exempt band

60GHz will become increasingly important both in short range P-P and P-MP applications. We note DotEcom's observation in 5.2.2 that it has not enjoyed extensive use prior to June 2019. We would like to point out the main reason we see for this is that products operating in the 60GHz band have only relatively recently being made available at a relatively reasonable cost. With 802.11ay and 802.11ad links being available from companies such as Cambium, Ubnt, Ignitenet, Radwin, and MikroTik. 60GHz use in our network has increased dramatically in the past 18 months and will likely continue with the release of new products such as the Cambium CnWave product lines with 7.5Gb/s FDX multigigabit connectivity.

66-71GHz Priority Reservation for 5G

It is our opinion that this be released under a general authorisation and subject to technology neutral performance characteristics, such as n x 1Gb/s, or x Gbps /GHz increasing the spectrum availability here has exciting prospects for advanced wireless service capabilities in urban and suburban locations. As noted by RSPG18-005 FINAL the distance from the Oxygen Absorption peak in this frequency range allows for increased cell radius or P-P link range. We would advocate for a technology neutral general authorisation for this portion of the band.

With products such as Cnwave from Cambium one can create a multigigabit Wireless Fabric which is a game changer in providing low cost high capacity access services in Housing Estates, Business and Industrial parks. This can allow businesses a real choice in infrastructure so as not to be reliant on one wholesale overground pole deployed wired ISP infrastructure which as the electrical power network and the incumbent historical experience has shown on an all too regular basis is regularly significantly impacted by storm related outages

Interference Management, Registration vs Light Licensing

We wholeheartedly endorse ComReg's position as set out in paragraphs 148 and 149, we do agree that the current general authorisation framework for the bands is working quite well and that the FWA industry is able to manage link performance and any incidence of interference in the bands quite well. We would ask that ComReg inform the DCCAE and their advisors Analysys Mason that Interference is not a significant issue that is affecting FWA networks to any great extent. Not least because Analysys Mason felt unable to qualify every FWA network for NGA status in the recent NBP Mapping exercise which meant that the Intervention area as defined by the DCCAE and its advisors threatens to overbuild all FWA operators' infrastructure as currently deployed NGA capable infrastructure at significant cost to the Irish and European tax payer.

Other Opportunities for License Exempt Bands.

FWA operators such as our selves would welcome the expansion of License exempt and Light licensed spectrum available to allow us deliver even more services to subscribers in Rural Ireland. We would advocate that if equipment is available that is capable of delivering high speed broadband in other bands that ComReg consider facilitating the opening of spectrum for this purpose in bands such as 4.9GHz where there is equipment readily available internationally and proven in other jurisdictions, and that could be deployed rapidly to increase the bandwidth available and allow FWA operators to scale even further. If a general authorisation basis is not considered possible perhaps a light licensed model would be considered instead. We would welcome ComReg facilitating a conversation between FWA operators and other users of the 4.9GHz band such as radio astronomers etc.

The wide availability (internationally) of equipment designed to operate in the FCC allocated Bands for Public Safety 4940-4990 MHz and 5850-5925 MHz would mean that FWA operators could rapidly take advantage of these bands to provide additional bandwidth to more customers. ComReg facilitating ideas such as this would be helpful in and in no way contravene ComReg fulfilling its obligations under A1.1.2 Promotion of Competition.

Conclusion

This initiative very welcome and could not come soon enough as far as we are concerned. We would like to thank ComReg, in particular Martin O'Donoghue and Donnacha Hennessy who have worked extensively on this initiative and for their patience in dealing with our queries and assisting us in granting extensions to submit information during the initial RFI and we look forward to further engagement with them

on this important initiative. Finally, we would like to thank DotEcom for their excellent report which was very informative and clearly showed interesting trends in Infrastructure investment by the FWA Sector in Rural Ireland.

10: Lighthouse Networks Ltd ("Lightnet")

LIGHTNET
SUBMISSION TO COMREG 20/109

Review of the Fixed Radio Links Licensing Regime

FAO: Mr. Martin O Donoghue, Commission for Communications Regulation

Non-Confidential: Full Public Release Please

Disclaimer:

Lightnet has compiled the information submitted in good faith and have exercised all due care in so far as possible with the constraints of meeting the deadline of 7th of December 2020. As an SME ISP we would advocate for longer consultations with more notice given the complexity of the subject matter, the resource constraints that smaller operators have to cope with. We would respectfully ask that ComReg review the 4 week consultation period practice to match the best practices outlined in DPER Public Consultation Guidelines, at the following location: https://www.gov.ie/en/publication/e9b052-consultation-principles-and-guidance/

THE IMPORTANCE OF FIXED LINKS LICENSING REGIME TO RURAL IRELAND

We are pleased to make this submission in response to Comreg 20/109. The review of the Fixed radio links licensing regime presents an opportunity for ComReg to Assist the Fixed Wireless Access Operators deliver even more high speed broadband to businesses and residences across all of Ireland. Particularly in areas where the population density is low. The support of network diversity provided by independent locally owned and operated companies is in Ireland's national economic interest and national security interest. ComRegs Liberalisation of the 5.8GHz band in ComReg's *Expanding Opportunities in the Radiocommunications Market: Fixed Wireless Access (FWA) - Consultation Paper 02/19*, combined with the availability of lower cost license exempt equipment in the 5 /5.8GHz, has transformed ICT landscape in rural Ireland, sowing the seeds of what would become an industry of approximately 50 local independent self-sustaining FWA operators serving over **100,000** connected subscribers in their local communities with high-quality high-speed broadband. According to Wireless Coverage Ltd's report authored by Mr. David Burns and commissioned by 28 ISPs for the 2019 NBP Mapping consultation in 2019 28 ISPs in the FWA industry have achieved the following coverage and market penetration:

Number of sites by 28 FWA ISPs	**1,465**
NGA Premises Passed by 28 FWA ISPs	**689,781**
Non NGA premises Passed by 28 FWA ISPs	**1,456,470**
Number of Premises Connected to 27 FWA ISPs	**91,894***

Source Wireless Coverage Ltd. Report 30 September 2019 in response to the NBP mapping exercise

Fixed wireless operators welcome the clear recognition that the charts provide that Fixed Wireless operators are and continue to invest in high capacity links across Ireland.

Fixed wireless operators would welcome further liberalization of spectrum to facilitate deployment of further independent broadband infrastructure in rural Ireland. The importance of the independent FWA industry in Ireland cannot be overstated, and the Covid-19 pandemic has shown us the FWA industry were the ones connecting and carrying rural Ireland through the pandemic, while heavily subsidised entities have been surveying the country for what they might one day connect. At the time of submission, no homes or businesses have been connected by the NBP. It is essential that ComReg

use all powers and resources available to help maintain the diversity of infrastructure deployed in rural Ireland. It is regrettable that this consultation did not take place prior to the signing of the NBP contract in late 2019. As regulatory and policy measures and are preferable to subsidised interventions because they can reduce the need, the scale and hence the cost of Government subsidised interventions generally.

The FWA industry's existing broadband infrastructure and contribution to rural Ireland, despite being ignored and discounted by recent Irish Governments for the purposes of ensuring a ubiquitous provision of FTTH throughout the State, has a vital role to play in Ireland's future in providing real competition for internet access in Ireland particularly because of their focus in rural parts of Ireland typically underserved by larger ISPs whos' focus on more profitable urban markets. Supporting measures that reduce the costs and burden on independent fixed wireless operators expanding and upgrading their deployments in rural Ireland can help us provide the much needed redundancy to the Irish Government's NBP approach of placing all eggs in one publicly funded, private equity infrastructure basket. The FWA industry can and currently does provide much needed connectivity to rural Ireland, and this is important to maintain in the event of the NBP running into further delays or difficulties which seems to be a recurring theme when it comes to the management of the NBP procurement & rollout program to date.

We welcome the opportunity to comment on:

• The design of a licensing framework that best provides for the effective management and efficient usage of the Fixed Links band identified in this consultation and the responses.

•A new hopefully Improved fee schedule for Fixed Links that facilitates the greatest number of use cases, in order to ultimately promote greater use of the spectrum that are identified in this consultation and the responses; Preliminary Consultation of Fixed Links Bands Review ComReg 20/109

• Review the technical conditions and guidelines for the deployment Fixed Links in the bands identified and consult on any proposed changes; and Advise and consult on new regulations to replace S.I. 370 of 2009

4

Table of Contents

2.1 The Fixed Link Licensing Regime

Comments further in the document.

Individual Link Licence fees

Comments further in the document.

2.2 Current Individual Fixed Link Bands

It is worth noting the level of existing FWA broadband Infrastructure in the country which is already at or in the process of being upgraded to NGA status. This is a testament to the commitment, investment of so many market operators have made and continue to make in rural Ireland. It is imperative that ComReg supports competition and infrastructure diversity when considering changes to the licensing regime.

2.3 Other spectrum management matters which are related to the Fixed Link Bands

WAS/RLAN above 5 GHz

In relation to Paragraph 52

52 "ComReg will continue to monitor and input into the discussions of this matter at the EC and ECC. Upon the adoption and publication of any future EC and/or ECC Decision, ComReg will consider the appropriate the implementation of those decisions"

We would advocate that an exemption exist for Fixed Wireless Access operators in a similar manner for the 5.8GHz Spectrum to allow operators use the 5925-6425 MHz band at an EIRP similar to that specified in the 5.8GHz Band for the purpose of providing Broadband access in rural areas. It would be a pity not to fully realise the potential of expanding the spectrum available to Fixed wireless operators so that the DAE 2025 objectives of a minimum speed of 100Mb/s per subscriber can be by giving existing operators access to more spectrum. We welcome that ComReg is closely monitoring the progress at the ECC and we would advocate that interested parties that may need to operate CBTC Secure Communications Train Based Control systems in Ireland be contacted to see if they are In fact using that spectrum for CBTC. If in fact that they are not using that spectrum it would be most helpful to the Fixed Wireless Access industry for ComReg to liberalise that spectrum on a License Exempt basis in a similar manner to the 5.8GHz Band.

We would welcome ComReg making available the 5925-6425 MHz on a provisional license exempt or light license basis pending full and formal adoption of a decision at the ECC.

3.1 Existing Use Cases

As a FWA operator we would like to comment on paragraph 68

> *68 For the purposes of this review, ComReg requested information on the use of Fixed Links in the Licence Exempt Bands in the Licensee RFI 74 . A total of 15 respondents to the RFI stated their use of licence exempt Fixed Links 75 . Separate ComReg data indicates that ComReg's RFI data did not capture the majority of licence exempt Fixed Links, due to a number of FWA operators with a large number of Licence Exempt FWA Fixed Links 76 failing to respond. ComReg therefore places limited weight on trends in this data as representing trends for all licence exempt Fixed Links. Bearing this in mind, ComReg notes the use of Fixed Links among these 15 users has increased in recent years with most of the licence exempt Fixed Links deployed for FWA in the 5 GHz band. Data gathered separately by ComReg on broadband subscriptions delivered by FWA corroborate this finding and indicates that the number of Fixed Links in the Licence Exempt Bands used for the provision of FWA for 2.4 GHz and 5 GHz bands has increased from Q1 2020.*

We do agree with both DotEcom and ComReg's observation that the scale of the deployment of license exempt fixed links are underestimated in this report. While we agree that it is likely due to a lack of response from FWA ISPs, it should be noted, that the Covid-19 pandemic and lockdowns aside, FWA operators are focused primarily on the need to connect the unconnected, or to upgrade the connected. We Regret the Inability of many FWA operators to submit this vital information to ComReg. For our part and we believe those of our peers particularly during the pandemic when so many of our subscribers are working from home, our priority has had to be the continued delivery of reliable service to the customer and therefore engagement with and responding to consultations was unfortunately lower down on the priority list. The constraints on resources of smaller operators like ourselves means responding meaningfully and accurately to a consultation in a period of just 4 weeks is exceptionally difficult. We have no doubt that this would have impacted on the other FWA operators' ability to collect information about license exempt links as requested earlier in the year. We would welcome a review of the consultation period length and encourage ComReg to perhaps publish the intention to hold a consultation well in advance (similar to the way that this consultation was flagged in advance because of the engagement during the request for information on deployed links made to operators earlier in the year).

If we consider that just 28 of FWA ISPs have built and deployed at least 1465 sites around Ireland to serve their local communities it would stand to reason there would be multiples of that figure in P-P links and P-MP links also.

It is noteworthy that the charts in paragraphs 56 and 57 show the value and importance of the FWA industry in Ireland. and that the FWA sector as market operators are investing and expanding as clearly demonstrated in the purchase of licenses and the increased number of FWA ISPs purchasing licenses.

It is striking to see the chart associated with paragraph 58 that FWA Operators are increasing investment and real deployment in Fixed Links in all bands (apart from 38GHz).

3.2 The use of Fixed Links in Ireland in an International context

We would advocate that ComReg monitor the use of light licensed schemes such as public safety spectrum allocations in the US and if possible allow for the application on a light licensed or license exempt basis, for the purposes of Deploying Fixed Wireless Access broadband in Rural Ireland. This request would be contingent on lower cost equipment being readily available to facilitate the rapid deployment of such networks, so that consumers would experience the benefits of such liberalisation without delay. An example where this could be readily achieved is in the 4.9GHz band where FCC has designated in the US that this is a public Safety band and that there is equipment available to meet that specification that is similar to other equipment operating in the 5.4 /5.8GHz. So it would be easy for FWA operators to Purchase and Deploy equipment to operate in the 4.9GHz band due to the fact that it is operating similar equipment already on its network. The availability or prospect of low cost equipment to operate in a particular band would be one of the most important factors to consider when liberalising spectrum access eg similar spectrum utilisation in other major jusrisdictions.

3.3 & 3.4 Other potential use cases for Fixed Links

A-Q1

The advent of newer 60GHz technologies means that a large-scale deployment of FWA networks are possible in Cities and Towns, and this can lead to future competition for access networks and increased choices for consumers. The Cambium Cnwave product line has the feature set, throughput performance (multi-Gigabit connectivity) and a compact formfactor allowing operators to disrupt the urban and suburban market. Further it can afford businesses and high end consumers who have need for redundancy of internet access / WAN access a possibility to connect over diverse infrastructures instead of relying on One Wholesale Operator infrastructure and pseudo diversity over said single wholesale operator infrastructure.

4.1 Spectrum availability and channel arrangements

A-Q2

As a FWA operator which consistently strives to have at least 20% over capacity on our network and which often need to deploy over 1Gb/s to a given site in order to maintain an over capacity of 20% above peak demand, therefore, we agree with the ITU /CEPT recommendation & endorse DotEcom's, and ComReg's view that 112MHz channels should be made available in those bands in so far as they do not restrict existing operators who have more narrow channel licenses already purchased. We would advocate a co-operative approach where ComReg could work with license holders to ensure that narrow channels are migrated from the middle of the band to the one of the edges of the band so that fragmentation is minimised.

Perhaps it would be worth considering that for a software channel change that ComReg would make that a condition of renewing a license for operators who have equipment that can be easily re-configured to a different channel. Perhaps this could be available with a nominal low-cost fee. And for a quicker turnaround perhaps a fair compensation model can be agreed between the operators. This would be difficult to implement and would require buy in and co-operation from all operators. However, it is important that Operators co-operate with each other to maximise the use of spectrum and the availability of high-speed broadband services to end consumers in Ireland. That said, if an operator wants an operator who's equipment is constrained to a given channel then it would be incumbent on the operator requesting the larger channel to pay for a replacement equipment and install cost, so that would allow the operator with the smaller allocation move off the channel without affecting its own services to its customers.

4.2 Block Licences

A-Q3

Individual Licenses are preferred for small to medium FWA ISPs like our own as it lowers the barriers for expanding and improving our infrastructure footprint. National block licenses are typically out of the financial reach of smaller operators, as previously demonstrated by the Auction of the 3.6GHz spectrum which resulted in the retiring of low cost local site licenses which were taken up by a number of small to medium FWA operators and then in the auction of the released spectrum to the highest bidder with MNOs getting the bulk of the spectrum and only 1 FWA operator, Imagine being successful in acquiring some spectrum. It is therefore of paramount importance that individual links can be purchased at a reasonable cost to facilitate the expansion of services from localised FWA providers. Promoting spectrum availability for SME operators will reduce the ability of larger operators to sit on and not deploy national block licenses. Spectrum availability for smaller operators can help ensure their survival and growth and would enable genuine choice and competition with real infrastructure

diversity choices for consumers across Ireland. Comreg facilitating ideas such as this would be helpful in ComReg fulfilling its obligations under A1.1.2 Promotion of Competition.

It is our view that Block licences should only be considered if and only if there is sufficiently significant part of the spectrum made available for individual link licenses. While one can understand the value in reducing paperwork for larger wider deployed networks. It is our view that larger networks already enjoy favourable access to spectrum by virtue of their scale and spending power. It therefore also important to consider the positive competition implications for maintaining a low barrier of entry for Fixed Wireless Operators in any given licensed band.

It is our preference to have individual licensed links with licenses assigned in as automated manner as possible to reduce the burden on ComReg and the operators seeking to deploy a link. The low-cost license regime is pivotal to allow smaller fixed wireless operators compete with the larger ISPs and MNOs.

4.3 Application and licensing process

A-Q4

We would advocate the use of automation and models built in on the licensing platform that could guide the License applicant to self-validate the application (link budgets availability characteristics) We would strongly advocate for the ability for a license applicant to pre-emptively select additional lower preference link channels and/or bands in the application procedure so that in the event of the first chosen channel and/or band is not available the operator can get a license grant in one brief exchange with ComReg without an iterative process back and forth between ComReg and the operator until the operator manages to be fortunate enough to select an available channel on a given band. Automating this in so far as possible and building in intelligence into the license application system would reduce the burden on both ComReg and the Operators.

Alternatively as an interim measure, or to address difficulties in automating the frequency allocation process, perhaps ComReg could instigate a process of advising on the suitability and/or availability of the requested channel v's nearby or similar channels which might be licensed to meet the link budget requirements. This may have the ancillary benefit of improving the efficiency of spectrum deployment.

4.4 Fixed radio links Guidelines

A-Q5

As a FWA operator, we welcome both DotEcom's and ComReg's views as outlined in paragraph 117. That network and technological progress is not impeded by lack of guidelines for a new technique or technology that has not been referred to in the guidelines. The requirement that such deployment to be notified in advance to ComReg is right and reasonable. And we endorse it wholeheartedly.

As an operator who is expanding its backhaul continuously we would endorse ComReg's view as outlined in paragraph 118 that relaxing of minimum distance of links as long as the purpose of which is for aggregating multiple links / frequencies to increase capacity and redundancy between sites. As long as the capacity / redundancy / availability could not be achieved with a higher capacity link.

4.5 Pricing

A-Q6

Independent SME FWA ISPs are price conscious, the success of the 80GHz band and the number of links deployed in that shows (at least empirically that lower cost licenses encourages more deployment in that band) we would advocate lowering the cost of licenses where bands are not that heavily used. It is important that ComReg is mindful that there is generally a downward trend in cost per Mb/s being charged to consumers, coupled with an upward trend in bandwidth capacity demands per customer, consequentially the demands on our backhaul licensed links are increasing while the profit an individual link would be de-creasing. Accordingly we would advocate that licenses taken out in the same company between two identical endpoints should receive a discount on second and subsequent licenses. This would be fairer on an expanding operator who is transitioning from one vendor to another and cannot combine the two frequencies into one antenna system. Lowering the barriers / costs associated with giving subscribers more bandwidth is a good thing and would help encourage even further investment in infrastructure by the operators (not to financially disincentivise them)

The current de-lineation of costs according to high usage path / congested area vs normal usage paths / areas, is very coarse and it is probable that in the Dublin area there are certain areas with an underinvestment in wireless links due to the cost of the deployment, having a granular approach with accurate models would help reduce the costs of deploying in less deployed areas in and around Dublin City. We would advocate an incremental process for a gradual increase costs licenses on a given band as the number of channels allocated in that band increases. This could also serve as an indicator of how busy a band actually is on a given path.

4.6 1.4 GHz band

A-Q7

It would be our preference assuming reasonable cost equipment is available for deploying links with 1.4GHz that this be assigned for FWA networks on a locally licensed basis (subject to availability of cost effective equipment being available in this band.

A-Q8

The Licensing model should such that it be made available on lower cost local licenses to assist local operators provide choice and more bandwidth to customers in their locality. If ComReg believes a national / regional block licensing model is needed, we would advocate strongly (subject to reasonable cost equipment being available by manufacturers) that a section of the band be reserved for local operators. This would improve competition and diversity of infrastructure in rural Ireland.

4.7 13 GHz and 15 GHz bands

A-Q9

It is understandable that 13GHz / 15Ghz have applications restricted when there is no availability of channel space. However there no logic to the regulator effectively holding back channels in this spectrum that have been since released or not renewed by the license holder of that channel. We would advocate a traffic light system that would inform users that a band in a given area is full and that license applications are not being accepted at this time. Further it might be worth ComReg considering the tidying up of these two bands(by moving smaller channel allocations to the edge of the bands (on renewal in so far as it is possible) as opposed to fragmenting and impeding potential for larger contiguous channel allocations in the band.

4.8 26 GHz band

A-Q10

We would advocate that the licensing model should such that it be made available on lower cost local licenses to assist local operators provide choice and more bandwidth to customers in their locality. If ComReg believes a national / regional block licensing model is needed, we would advocate strongly (subject to reasonable cost equipment being available from manufacturers) that a section of the band be reserved for local operators. This would improve competition and diversity of infrastructure in rural Ireland.

4.9 D-bands and W-bands

A-Q11

FWA operators like ourselves would be interested in deploying equipment in this band once it becomes available. However given the frequency range it is likely that as per DotEcom's and ComReg's view that it would be for ultra high capacity links in urban environments (due to inherent range limitations) of these bands. That said we can only fully comment when the specifications and limits on EIRP and the capability of equipment designed to operate in that band are known.

4.10 Licence exempt / light licensing

A-Q12

License exempt spectrum has allowed independent FWA operators deliver high speed internet access to rural Ireland where fixed line and MNOs that have historically focused on urban / suburban areas and consequentially failed to deliver high speed broadband in a timely manner to rural communities.

5.4GHz and 5.8GHz Bands have been key and remain key to delivering FWA broadband in Ireland in the past and as their sites and access requirements have grown where a site has been fed by one or two 5.4GHz / 5.8GHz fixed links, it has been and is common practice to re-invest in the site and replace the lower cost 5.4 GHz/ 5.8GHz backhaul links with links operating in other bands such as

- license exempt bands such as 17GHz, 24GHz
- if the link is sufficiently short distance the License Exempt 60GHz band.
- light licensed bands such as 80GHz
- licensed Bands such as 13GHz,15GHz and 18GHz

The migration away from 5.4GHz/ 5.8GHz backhaul links allows for re-deployment and more flexibility in delivering service on more sectors on a given site allowing for greater coverage.

This strategy is not unique to our company and is indeed replicated by our other colleagues in the FWA sector.

We agree with DotEcom's recommendation regarding not to close bands that have been previously open and in use.

5.4 GHz License Exempt band

The value of this band to us is increasing from a P-MP perspective and decreasing from P-P perspective primarily. The value of deploying a 5.4GHz sector is far greater to an FWA ISP when compared a P-P link in the 5.4GHz band

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The advent and availability of beamforming Mu-MIMO sectors, and high quality beam efficient scalar horn antennas from manufacturers such as RF-Elements with tight beam focus means that despite the very wide large scale deployment of License exempt links generally across the country, ISPs like our selves can manage the spectrum and adequately limit interference effects to / from other equipment operators. Thankfully we co-operate with and enjoy the co-operation of other neighbouring FWA Wireless networks and the rollout of these technologies means that interference incidents are fewer and farther between. Further the developments of Mu-MIMO and beaming forming equipment from manufacturers such has Cambium PMP and ePMP means that customers can enjoy improved service now and in the future.

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We wholeheartedly endorse ComReg's position as set out in paragraphs 148 and 149, we do agree that the current general authorisation framework for the bands is working quite well and that the FWA industry is able to manage link performance and any incidence of interference in the bands quite well. We would ask that ComReg inform the DCCAE and their advisors Analysys Mason that Interference is not a significant issue that is affecting FWA networks to any great extent. Not least because Analysys Mason felt unable to qualify every FWA network for NGA status in the recent NBP Mapping exercise which meant that the Intervention area as defined by the DCCAE and its advisors threatens to overbuild all FWA operators' infrastructure as currently deployed NGA capable infrastructure at significant cost to the Irish and European tax payer.

Other Opportunities for License Exempt Bands.

FWA operators such as our selves would welcome the expansion of License exempt and Light licensed spectrum available to allow us deliver even more services to subscribers in Rural Ireland. We would advocate that if equipment is available that is capable of delivering high speed broadband in other bands that ComReg consider facilitating the opening of spectrum for this purpose in bands such as 4.9GHz where there is equipment readily available internationally and proven in other jurisdictions, and that could be deployed rapidly to increase the bandwidth available and allow FWA operators to scale even further. If a general authorisation basis is not considered possible perhaps a light licensed model would be considered instead. We would welcome ComReg facilitating a conversation between FWA operators and other users of the 4.9GHz band such as radio astronomers etc.

The wide availability (internationally) of equipment designed to operate in the FCC allocated Bands for Public Safety 4940-4990 MHz and 5850-5925 MHz would mean that FWA operators could rapidly take advantage of these bands to provide additional bandwidth to more customers. ComReg facilitating ideas such as this would be helpful in and in no way contravene ComReg fulfilling its obligations under A1.1.2 Promotion of Competition.

Conclusion

This initiative very welcome and could not come soon enough as far as we are concerned. We would like to thank ComReg, in particular Martin O'Donoghue and Donnacha Hennessy who have worked extensively on this initiative and for their patience in dealing with our queries and assisting us in granting extensions to submit information during the initial RFI and we look forward to further engagement with them

on this important initiative. Finally, we would like to thank DotEcom for their excellent report which was very informative and clearly showed interesting trends in Infrastructure investment by the FWA Sector in Rural Ireland.

Ends.

11: Orion Digital Services Ltd (“Orion”);

ORION DIGITAL SERVICES LTD SUBMISSION TO COMREG 20/109

Review of the Fixed Radio Links Licensing Regime

FAO: Mr. Martin O Donoghue, Commission for Communications Regulation

Non-Confidential: Full Public Release Please

Disclaimer:

Orion Digital Services Ltd has compiled the information submitted in good faith and have exercised all due care in so far as possible with the constraints of meeting the deadline of 7th of December 2020. As an SME ISP we would advocate for longer consultations with more notice given the complexity of the subject matter, the resource constraints that smaller operators have to cope with. We would respectfully ask that ComReg review the 4 week consultation period practice to match the best practices outlined in DPER Public Consultation Guidelines, at the following location: https://www.gov.ie/en/publication/e9b052-consultation-principles-and-guidance/

THE IMPORTANCE OF FIXED LINKS LICENSING REGIME TO RURAL IRELAND

We are pleased to make this submission in response to Comreg 20/109. The review of the Fixed radio links licensing regime presents an opportunity for ComReg to Assist the Fixed Wireless Access Operators deliver even more high speed broadband to businesses and residences across all of Ireland. Particularly in areas where the population density is low. The support of network diversity provided by independent locally owned and operated companies is in Ireland's national economic interest and national security interest. ComRegs Liberalisation of the 5.8GHz band in ComReg's *Expanding Opportunities in the Radiocommunications Market: Fixed Wireless Access (FWA) - Consultation Paper 02/19*, combined with the availability of lower cost license exempt equipment in the 5 /5.8GHz, has transformed ICT landscape in rural Ireland, sowing the seeds of what would become an industry of approximately 50 local independent self-sustaining FWA operators serving over **100,000** connected subscribers in their local communities with high-quality high-speed broadband. According to Wireless Coverage Ltd's report authored by Mr. David Burns and commissioned by 28 ISPs for the 2019 NBP Mapping consultation in 2019 28 ISPs in the FWA industry have achieved the following coverage and market penetration:

Number of sites by 28 FWA ISPs	**1,465**
NGA Premises Passed by 28 FWA ISPs	**689,781**
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Number of Premises Connected to 27 FWA ISPs	**91,894***

Source Wireless Coverage Ltd. Report 30 September 2019 in response to the NBP mapping exercise

Fixed wireless operators welcome the clear recognition that the charts provide that Fixed Wireless operators are and continue to invest in high capacity links across Ireland.

Fixed wireless operators would welcome further liberalization of spectrum to facilitate deployment of further independent broadband infrastructure in rural Ireland. The importance of the independent FWA industry in Ireland cannot be overstated, and the Covid-19 pandemic has shown us the FWA industry were the ones connecting and carrying rural Ireland through the pandemic, while heavily subsidised entities have been surveying the country for what they might one day connect. At the time of submission, no homes or businesses have been connected by the NBP. It is essential that ComReg use all powers and resources available to help maintain the diversity of infrastructure deployed in rural Ireland. It is regrettable that this consultation did not take place prior to

the signing of the NBP contract in late 2019. As regulatory and policy measures and are preferable to subsidised interventions because they can reduce the need, the scale and hence the cost of Government subsidised interventions generally.

The FWA industry's existing broadband infrastructure and contribution to rural Ireland, despite being ignored and discounted by recent Irish Governments for the purposes of ensuring a ubiquitous provision of FTTH throughout the State, has a vital role to play in Ireland's future in providing real competition for internet access in Ireland particularly because of their focus in rural parts of Ireland typically underserved by larger ISPs whos' focus on more profitable urban markets. Supporting measures that reduce the costs and burden on independent fixed wireless operators expanding and upgrading their deployments in rural Ireland can help us provide the much needed redundancy to the Irish Government's NBP approach of placing all eggs in one publicly funded, private equity infrastructure basket. The FWA industry can and currently does provide much needed connectivity to rural Ireland, and this is important to maintain in the event of the NBP running into further delays or difficulties which seems to be a recurring theme when it comes to the management of the NBP procurement & rollout program to date.

We welcome the opportunity to comment on:

• The design of a licensing framework that best provides for the effective management and efficient usage of the Fixed Links band identified in this consultation and the responses.

•A new hopefully Improved fee schedule for Fixed Links that facilitates the greatest number of use cases, in order to ultimately promote greater use of the spectrum that are identified in this consultation and the responses; Preliminary Consultation of Fixed Links Bands Review ComReg 20/109

• Review the technical conditions and guidelines for the deployment Fixed Links in the bands identified and consult on any proposed changes; and Advise and consult on new regulations to replace S.I. 370 of 2009

Table of Contents

2.1 The Fixed Link Licensing Regime

Comments further in the document.

Individual Link Licence fees

Comments further in the document.

2.2 Current Individual Fixed Link Bands

It is worth noting the level of existing FWA broadband Infrastructure in the country which is already at or in the process of being upgraded to NGA status. This is a testament to the commitment, investment of so many market operators have made and continue to make in rural Ireland. It is imperative that ComReg supports competition and infrastructure diversity when considering changes to the licensing regime.

2.3 Other spectrum management matters which are related to the Fixed Link Bands

WAS/RLAN above 5 GHz

In relation to Paragraph 52

> *52 "ComReg will continue to monitor and input into the discussions of this matter at the EC and ECC. Upon the adoption and publication of any future EC and/or ECC Decision, ComReg will consider the appropriate the implementation of those decisions"*

We would advocate that an exemption exist for Fixed Wireless Access operators in a similar manner for the 5.8GHz Spectrum to allow operators use the 5925-6425 MHz band at an EIRP similar to that specified in the 5.8GHz Band for the purpose of providing Broadband access in rural areas. It would be a pity not to fully realise the potential of expanding the spectrum available to Fixed wireless operators so that the DAE 2025 objectives of a minimum speed of 100Mb/s per subscriber can be by giving existing operators access to more spectrum. We welcome that ComReg is closely monitoring the progress at the ECC and we would advocate that interested parties that may need to operate CBTC Secure Communications Train Based Control systems in Ireland be contacted to see if they are In fact using that spectrum for CBTC. If in fact that they are not using that spectrum it would be most helpful to the Fixed Wireless Access industry for ComReg to liberalise that spectrum on a License Exempt basis in a similar manner to the 5.8GHz Band.

We would welcome ComReg making available the 5925-6425 MHz on a provisional license exempt or light license basis pending full and formal adoption of a decision at the ECC.

3.1 Existing Use Cases

As a FWA operator we would like to comment on paragraph 68

> *68 For the purposes of this review, ComReg requested information on the use of Fixed Links in the Licence Exempt Bands in the Licensee RFI 74 . A total of 15 respondents to the RFI stated their use of licence exempt Fixed Links 75 . Separate ComReg data indicates that ComReg's RFI data did not capture the majority of licence exempt Fixed Links, due to a number of FWA operators with a large number of Licence Exempt FWA Fixed Links 76 failing to respond. ComReg therefore places limited weight on trends in this data as representing trends for all licence exempt Fixed Links. Bearing this in mind, ComReg notes the use of Fixed Links among these 15 users has increased in recent years with most of the licence exempt Fixed Links deployed for FWA in the 5 GHz band. Data gathered separately by ComReg on broadband subscriptions delivered by FWA corroborate this finding and indicates that the number of Fixed Links in the Licence Exempt Bands used for the provision of FWA for 2.4 GHz and 5 GHz bands has increased from Q1 2020.*

We do agree with both DotEcom and ComReg's observation that the scale of the deployment of license exempt fixed links are underestimated in this report. While we agree that it is likely due to a lack of response from FWA ISPs, it should be noted, that the Covid-19 pandemic and lockdowns aside, FWA operators are focused primarily on the need to connect the unconnected, or to upgrade the connected. We Regret the Inability of many FWA operators to submit this vital information to ComReg. For our part and we believe those of our peers particularly during the pandemic when so many of our subscribers are working from home, our priority has had to be the continued delivery of reliable service to the customer and therefore engagement with and responding to consultations was unfortunately lower down on the priority list. The constraints on resources of smaller operators like ourselves means responding meaningfully and accurately to a consultation in a period of just 4 weeks is exceptionally difficult. We have no doubt that this would have impacted on the other FWA operators' ability to collect information about license exempt links as requested earlier in the year. We would welcome a review of the consultation period length and encourage ComReg to perhaps publish the intention to hold a consultation well in advance (similar to the way that this consultation was flagged in advance because of the engagement during the request for information on deployed links made to operators earlier in the year).

If we consider that just 28 of FWA ISPs have built and deployed at least 1465 sites around Ireland to serve their local communities it would stand to reason there would be multiples of that figure in P-P links and P-MP links also.

It is noteworthy that the charts in paragraphs 56 and 57 show the value and importance of the FWA industry in Ireland. and that the FWA sector as market operators are investing and expanding as clearly demonstrated in the purchase of licenses and the increased number of FWA ISPs purchasing licenses.

It is striking to see the chart associated with paragraph 58 that FWA Operators are increasing investment and real deployment in Fixed Links in all bands (apart from 38GHz).

3.2 The use of Fixed Links in Ireland in an International context

We would advocate that ComReg monitor the use of light licensed schemes such as public safety spectrum allocations in the US and if possible allow for the application on a light licensed or license exempt basis, for the purposes of Deploying Fixed Wireless Access broadband in Rural Ireland. This request would be contingent on lower cost equipment being readily available to facilitate the rapid deployment of such networks, so that consumers would experience the benefits of such liberalisation without delay. An example where this could be readily achieved is in the 4.9GHz band where FCC has designated in the US that this is a public Safety band and that there is equipment available to meet that specification that is similar to other equipment operating in the 5.4 /5.8GHz. So it would be easy for FWA operators to Purchase and Deploy equipment to operate in the 4.9GHz band due to the fact that it is operating similar equipment already on its network. The availability or prospect of low cost equipment to operate in a particular band would be one of the most important factors to consider when liberalising spectrum access eg similar spectrum utilisation in other major jusrisdictions.

3.3 & 3.4 Other potential use cases for Fixed Links

A-Q1

The advent of newer 60GHz technologies means that a large-scale deployment of FWA networks are possible in Cities and Towns, and this can lead to future competition for access networks and increased choices for consumers. The Cambium Cnwave product line has the feature set, throughput performance (multi-Gigabit connectivity) and a compact formfactor allowing operators to disrupt the urban and suburban market. Further it can afford businesses and high end consumers who have need for redundancy of internet access / WAN access a possibility to connect over diverse infrastructures instead of relying on One Wholesale Operator infrastructure and pseudo diversity over said single wholesale operator infrastructure.

4.1 Spectrum availability and channel arrangements

A-Q2

As a FWA operator which consistently strives to have at least 20% over capacity on our network and which often need to deploy over 1Gb/s to a given site in order to maintain an over capacity of 20% above peak demand, therefore, we agree with the ITU /CEPT recommendation & endorse DotEcom's, and ComReg's view that 112MHz channels should be made available in those bands in so far as they do not restrict existing operators who have more narrow channel licenses already purchased. We would advocate a co-operative approach where ComReg could work with license holders to ensure that narrow channels are migrated from the middle of the band to the one of the edges of the band so that fragmentation is minimised.

Perhaps it would be worth considering that for a software channel change that ComReg would make that a condition of renewing a license for operators who have equipment that can be easily re-configured to a different channel. Perhaps this could be available with a nominal low-cost fee. And for a quicker turnaround perhaps a fair compensation model can be agreed between the operators. This would be difficult to implement and would require buy in and co-operation from all operators. However, it is important that Operators co-operate with each other to maximise the use of spectrum and the availability of high-speed broadband services to end consumers in Ireland. That said, if an operator wants an operator who's equipment is constrained to a given channel then it would be incumbent on the operator requesting the larger channel to pay for a replacement equipment and install cost, so that would allow the operator with the smaller allocation move off the channel without affecting its own services to its customers.

4.2 Block Licences

A-Q3

Individual Licenses are preferred for small to medium FWA ISPs like our own as it lowers the barriers for expanding and improving our infrastructure footprint. National block licenses are typically out of the financial reach of smaller operators, as previously demonstrated by the Auction of the 3.6GHz spectrum which resulted in the retiring of low cost local site licenses which were taken up by a number of small to medium FWA operators and then in the auction of the released spectrum to the highest bidder with MNOs getting the bulk of the spectrum and only 1 FWA operator, Imagine being successful in acquiring some spectrum. It is therefore of paramount importance that individual links can be purchased at a reasonable cost to facilitate the expansion of services from localised FWA providers. Promoting spectrum availability for SME operators will reduce the ability of larger operators to sit on and not deploy national block licenses. Spectrum availability for smaller operators can help ensure their survival

and growth and would enable genuine choice and competition with real infrastructure diversity choices for consumers across Ireland. Comreg facilitating ideas such as this would be helpful in ComReg fulfilling its obligations under A1.1.2 Promotion of Competition.

It is our view that Block licences should only be considered if and only if there is sufficiently significant part of the spectrum made available for individual link licenses. While one can understand the value in reducing paperwork for larger wider deployed networks. It is our view that larger networks already enjoy favourable access to spectrum by virtue of their scale and spending power. It therefore also important to consider the positive competition implications for maintaining a low barrier of entry for Fixed Wireless Operators in any given licensed band.

It is our preference to have individual licensed links with licenses assigned in as automated manner as possible to reduce the burden on ComReg and the operators seeking to deploy a link. The low-cost license regime is pivotal to allow smaller fixed wireless operators compete with the larger ISPs and MNOs.

4.3 Application and licensing process

A-Q4

We would advocate the use of automation and models built in on the licensing platform that could guide the License applicant to self-validate the application (link budgets availability characteristics) We would strongly advocate for the ability for a license applicant to pre-emptively select additional lower preference link channels and/or bands in the application procedure so that in the event of the first chosen channel and/or band is not available the operator can get a license grant in one brief exchange with ComReg without an iterative process back and forth between ComReg and the operator until the operator manages to be fortunate enough to select an available channel on a given band. Automating this in so far as possible and building in intelligence into the license application system would reduce the burden on both ComReg and the Operators.

Alternatively as an interim measure, or to address difficulties in automating the frequency allocation process, perhaps ComReg could instigate a process of advising on the suitability and/or availability of the requested channel v's nearby or similar channels which might be licensed to meet the link budget requirements. This may have the ancillary benefit of improving the efficiency of spectrum deployment.

4.4 Fixed radio links Guidelines

A-Q5

As a FWA operator, we welcome both DotEcom's and ComReg's views as outlined in paragraph 117. That network and technological progress is not impeded by lack of guidelines for a new technique or technology that has not been referred to in the guidelines. The requirement that such deployment to be notified in advance to ComReg is right and reasonable. And we endorse it wholeheartedly.

As an operator who is expanding its backhaul continuously we would endorse ComReg's view as outlined in paragraph 118 that relaxing of minimum distance of links as long as the purpose of which is for aggregating multiple links / frequencies to increase capacity and redundancy between sites. As long as the capacity / redundancy / availability could not be achieved with a higher capacity link.

4.5 Pricing

A-Q6

Independent SME FWA ISPs are price conscious, the success of the 80GHz band and the number of links deployed in that shows (at least empirically that lower cost licenses encourages more deployment in that band) we would advocate lowering the cost of licenses where bands are not that heavily used. It is important that ComReg is mindful that there is generally a downward trend in cost per Mb/s being charged to consumers, coupled with an upward trend in bandwidth capacity demands per customer, consequentially the demands on our backhaul licensed links are increasing while the profit an individual link would be de-creasing. Accordingly we would advocate that licenses taken out in the same company between two identical endpoints should receive a discount on second and subsequent licenses. This would be fairer on an expanding operator who is transitioning from one vendor to another and cannot combine the two frequencies into one antenna system. Lowering the barriers / costs associated with giving subscribers more bandwidth is a good thing and would help encourage even further investment in infrastructure by the operators (not to financially disincentivise them)

The current de-lineation of costs according to high usage path / congested area vs normal usage paths / areas, is very coarse and it is probable that in the Dublin area there are certain areas with an underinvestment in wireless links due to the cost of the deployment, having a granular approach with accurate models would help reduce the costs of deploying in less deployed areas in and around Dublin City. We would advocate an incremental process for a gradual increase costs licenses on a given band as the number of channels allocated in that band increases. This could also serve as an indicator of how busy a band actually is on a given path.

4.6 1.4 GHz band

A-Q7

It would be our preference assuming reasonable cost equipment is available for deploying links with 1.4GHz that this be assigned for FWA networks on a locally licensed basis (subject to availability of cost effective equipment being available in this band.

A-Q8

The Licensing model should such that it be made available on lower cost local licenses to assist local operators provide choice and more bandwidth to customers in their locality. If ComReg believes a national / regional block licensing model is needed, we would advocate strongly (subject to reasonable cost equipment being available by manufacturers) that a section of the band be reserved for local operators. This would improve competition and diversity of infrastructure in rural Ireland.

4.7 13 GHz and 15 GHz bands

A-Q9

It is understandable that 13GHz / 15Ghz have applications restricted when there is no availability of channel space. However there no logic to the regulator effectively holding back channels in this spectrum that have been since released or not renewed by the license holder of that channel. We would advocate a traffic light system that would inform users that a band in a given area is full and that license applications are not being accepted at this time. Further it might be worth ComReg considering the tidying up of these two bands(by moving smaller channel allocations to the edge of the bands (on renewal in so far as it is possible) as opposed to fragmenting and impeding potential for larger contiguous channel allocations in the band.

4.8 26 GHz band

A-Q10

We would advocate that the licensing model should such that it be made available on lower cost local licenses to assist local operators provide choice and more bandwidth to customers in their locality. If ComReg believes a national / regional block licensing model is needed, we would advocate strongly (subject to reasonable cost equipment being available from manufacturers) that a section of the band be reserved for local operators. This would improve competition and diversity of infrastructure in rural Ireland.

4.9 D-bands and W-bands

A-Q11

FWA operators like ourselves would be interested in deploying equipment in this band once it becomes available. However given the frequency range it is likely that as per DotEcom's and ComReg's view that it would be for ultra high capacity links in urban environments (due to inherent range limitations) of these bands. That said we can only fully comment when the specifications and limits on EIRP and the capability of equipment designed to operate in that band are known.

4.10 Licence exempt / light licensing

A-Q12

License exempt spectrum has allowed independent FWA operators deliver high speed internet access to rural Ireland where fixed line and MNOs that have historically focused on urban / suburban areas and consequentially failed to deliver high speed broadband in a timely manner to rural communities.

5.4GHz and 5.8GHz Bands have been key and remain key to delivering FWA broadband in Ireland in the past and as their sites and access requirements have grown where a site has been fed by one or two 5.4GHz / 5.8GHz fixed links, it has been and is common practice to re-invest in the site and replace the lower cost 5.4 GHz/ 5.8GHz backhaul links with links operating in other bands such as

- license exempt bands such as 17GHz, 24GHz
- if the link is sufficiently short distance the License Exempt 60GHz band.
- light licensed bands such as 80GHz
- licensed Bands such as 13GHz,15GHz and 18GHz

The migration away from 5.4GHz/ 5.8GHz backhaul links allows for re-deployment and more flexibility in delivering service on more sectors on a given site allowing for greater coverage.

This strategy is not unique to our company and is indeed replicated by our other colleagues in the FWA sector.

We agree with DotEcom's recommendation regarding not to close bands that have been previously open and in use.

5.4 GHz License Exempt band

The value of this band to us is increasing from a P-MP perspective and decreasing from P-P perspective primarily. The value of deploying a 5.4GHz sector is far greater to an FWA ISP when compared a P-P link in the 5.4GHz band

5.8 GHz License Exempt band

In a similar way to the 5.4GHz band the value of this band to us is increasing from a P-MP perspective and decreasing from P-P perspective primarily. The value of deploying a 5.8GHz sector is far greater to an FWA ISP when compared a P-P link in the 5.8GHz We would advocate an increase the max EIRP in rural areas in line with (Ofcom in UK) to 36 dBm which would increase the range of rural base stations by up to 41%

The advent and availability of beamforming Mu-MIMO sectors, and high quality beam efficient scalar horn antennas from manufacturers such as RF-Elements with tight beam focus means that despite the very wide large scale deployment of License exempt links generally across the country, ISPs like our selves can manage the spectrum and adequately limit interference effects to / from other equipment operators. Thankfully we co-operate with and enjoy the co-operation of other neighbouring FWA Wireless networks and the rollout of these technologies means that interference incidents are fewer and farther between. Further the developments of Mu-MIMO and beaming forming equipment from manufacturers such has Cambium PMP and ePMP means that customers can enjoy improved service now and in the future.

17GHz License Exempt band

We note ComReg's observation in Paragraph 145 notwithstanding CEPT Report 44 stating that this band is of little use. We have extensively deployed 17GHz links and will continue to do so over the coming years. We consider this band vital for low cost high speed backhaul to our sites. And provides redundancy for Licensed links at a low cost. This band allows us to deliver higher bandwidth to our customers at a lower cost.

We are pleased to see ComReg's recognition in paragraph 146 of availability of equipment for 17GHz band and that it is currently deployed in so many of our networks.

It is our experience that we have yet to encounter any interference on these links in our Rural based deployments. And therefore, agree that a light licensing framework is not required for this band. We follow and advocate for the practice of deploying large gain antennas with reduced input power to minimise interference with our neighbouring ISPs.

We would welcome widening the band from the current 200MHz if at all possible. We would invite ComReg to consider extending the spectrum allocation of this band as much as possible or at the very least 50MHz to accommodate higher capacity symmetric links.

24GHz License Exempt band

We have extensively deployed 24GHz links and will continue to do so over the coming years. We consider this band vital for low cost high speed backhaul to our sites. And

provides redundancy for Licensed links at a low cost. This band allows us to deliver higher bandwidth to our customers at a lower cost.

It is our experience that we have yet to encounter any interference on these links in our Rural based deployments. And therefore, agree that a light licensing framework is not required for this band. We follow and advocate for the practice of deploying large gain antennas with reduced input power to minimise interference with our neighbouring ISPs.

We would welcome widening the band from the current allocation of 250MHz if at all possible. We would invite ComReg to consider extending the spectrum allocation of this band as much as possible.

60GHz License Exempt band

60GHz will become increasingly important both in short range P-P and P-MP applications. We note DotEcom's observation in 5.2.2 that it has not enjoyed extensive use prior to June 2019. We would like to point out the main reason we see for this is that products operating in the 60GHz band have only relatively recently being made available at a relatively reasonable cost. With 802.11ay and 802.11ad links being available from companies such as Cambium, Ubnt, Ignitenet, Radwin, and MikroTik. 60GHz use in our network has increased dramatically in the past 18 months and will likely continue with the release of new products such as the Cambium CnWave product lines with 7.5Gb/s FDX multigigabit connectivity.

66-71GHz Priority Reservation for 5G

It is our opinion that this be released under a general authorisation and subject to technology neutral performance characteristics, such as n x 1Gb/s, or x Gbps /GHz increasing the spectrum availability here has exciting prospects for advanced wireless service capabilities in urban and suburban locations. As noted by RSPG18-005 FINAL the distance from the Oxygen Absorption peak in this frequency range allows for increased cell radius or P-P link range. We would advocate for a technology neutral general authorisation for this portion of the band.

With products such as Cnwave from Cambium one can create a multigigabit Wireless Fabric which is a game changer in providing low cost high capacity access services in Housing Estates, Business and Industrial parks. This can allow businesses a real choice in infrastructure so as not to be reliant on one wholesale overground pole deployed wired ISP infrastructure which as the electrical power network and the incumbent historical experience has shown on an all too regular basis is regularly significantly impacted by storm related outages

Interference Management, Registration vs Light Licensing

We wholeheartedly endorse ComReg's position as set out in paragraphs 148 and 149, we do agree that the current general authorisation framework for the bands is working quite well and that the FWA industry is able to manage link performance and any incidence of interference in the bands quite well.

Other Opportunities for License Exempt Bands.

FWA operators such as our selves would welcome the expansion of License exempt and Light licensed spectrum available to allow us deliver even more services to subscribers in Rural Ireland. We would advocate that if equipment is available that is capable of delivering high speed broadband in other bands that ComReg consider facilitating the opening of spectrum for this purpose in bands such as 4.9GHz where there is equipment readily available internationally and proven in other jurisdictions, and that could be deployed rapidly to increase the bandwidth available and allow FWA operators to scale even further. If a general authorisation basis is not considered possible perhaps a light licensed model would be considered instead. We would welcome ComReg facilitating a conversation between FWA operators and other users of the 4.9GHz band such as radio astronomers etc.

The wide availability (internationally) of equipment designed to operate in the FCC allocated Bands for Public Safety 4940-4990 MHz and 5850-5925 MHz would mean that FWA operators could rapidly take advantage of these bands to provide additional bandwidth to more customers. ComReg facilitating ideas such as this would be helpful in and in no way contravene ComReg fulfilling its obligations under A1.1.2 Promotion of Competition.

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This initiative very welcome and could not come soon enough as far as we are concerned. We would like to thank ComReg, in particular Martin O'Donoghue and Donnacha Hennessy who have worked extensively on this initiative and for their patience in dealing with our queries and assisting us in granting extensions to submit information during the initial RFI and we look forward to further engagement with them on this important initiative. Finally, we would like to thank DotEcom for their excellent report which was very informative and clearly showed interesting trends in Infrastructure investment by the FWA Sector in Rural Ireland.

Ends.

12: Regional Telecom Ltd (“Regional Telecom”)

REGIONAL TELECOM LTD
SUBMISSION TO COMREG 20/109

Review of the Fixed Radio Links Licensing Regime

FAO: Mr. Martin O Donoghue, Commission for Communications Regulation

Non-Confidential: Full Public Release Please

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Fixed wireless operators would welcome further liberalization of spectrum to facilitate deployment of further independent broadband infrastructure in rural Ireland. The importance of the independent FWA industry in Ireland cannot be overstated, and the Covid-19 pandemic has shown us the FWA industry were the ones connecting and carrying rural Ireland through the pandemic, while heavily subsidised entities have been surveying the country for what they might one day connect. At the time of submission, no homes or businesses have been connected by the NBP. It is essential that ComReg use all powers and resources available to help maintain the diversity of infrastructure deployed in rural Ireland. It is regrettable that this consultation did not take place prior to

the signing of the NBP contract in late 2019. As regulatory and policy measures and are preferable to subsidised interventions because they can reduce the need, the scale and hence the cost of Government subsidised interventions generally.

The FWA industry's existing broadband infrastructure and contribution to rural Ireland, despite being ignored and discounted by recent Irish Governments for the purposes of ensuring a ubiquitous provision of FTTH throughout the State, has a vital role to play in Ireland's future in providing real competition for internet access in Ireland particularly because of their focus in rural parts of Ireland typically underserved by larger ISPs whos' focus on more profitable urban markets. Supporting measures that reduce the costs and burden on independent fixed wireless operators expanding and upgrading their deployments in rural Ireland can help us provide the much needed redundancy to the Irish Government's NBP approach of placing all eggs in one publicly funded, private equity infrastructure basket. The FWA industry can and currently does provide much needed connectivity to rural Ireland, and this is important to maintain in the event of the NBP running into further delays or difficulties which seems to be a recurring theme when it comes to the management of the NBP procurement & rollout program to date.

We welcome the opportunity to comment on:

• The design of a licensing framework that best provides for the effective management and efficient usage of the Fixed Links band identified in this consultation and the responses.

•A new hopefully Improved fee schedule for Fixed Links that facilitates the greatest number of use cases, in order to ultimately promote greater use of the spectrum that are identified in this consultation and the responses; Preliminary Consultation of Fixed Links Bands Review ComReg 20/109

• Review the technical conditions and guidelines for the deployment Fixed Links in the bands identified and consult on any proposed changes; and Advise and consult on new regulations to replace S.I. 370 of 2009

Table of Contents

2.1 The Fixed Link Licensing Regime

Comments further in the document.

Individual Link Licence fees

Comments further in the document.

2.2 Current Individual Fixed Link Bands

It is worth noting the level of existing FWA broadband Infrastructure in the country which is already at or in the process of being upgraded to NGA status. This is a testament to the commitment, investment of so many market operators have made and continue to make in rural Ireland. It is imperative that ComReg supports competition and infrastructure diversity when considering changes to the licensing regime.

2.3 Other spectrum management matters which are related to the Fixed Link Bands

WAS/RLAN above 5 GHz

In relation to Paragraph 52

> *52 "ComReg will continue to monitor and input into the discussions of this matter at the EC and ECC. Upon the adoption and publication of any future EC and/or ECC Decision, ComReg will consider the appropriate the implementation of those decisions"*

We would advocate that an exemption exists for Fixed Wireless Access operators in a similar manner for the 5.8GHz Spectrum to allow operators use the 5925-6425 MHz band at an EIRP similar to that specified in the 5.8GHz Band for the purpose of providing Broadband access in rural areas. It would be a pity not to fully realise the potential of expanding the spectrum available to Fixed wireless operators so that the DAE 2025 objectives of a minimum speed of 100Mb/s per subscriber can be by giving existing operators access to more spectrum. We welcome that ComReg is closely monitoring the progress at the ECC and we would advocate that interested parties that may need to operate CBTC Secure Communications Train Based Control systems in Ireland be contacted to see if they are In fact using that spectrum for CBTC. If in fact that they are not using that spectrum it would be most helpful to the Fixed Wireless Access industry for ComReg to liberalise that spectrum on a License Exempt basis in a similar manner to the 5.8GHz Band.

We would welcome ComReg making available the 5925-6425 MHz on a provisional license exempt or light license basis pending full and formal adoption of a decision at the ECC.

3.1 Existing Use Cases

As a FWA operator we would like to comment on paragraph 68

> *68 For the purposes of this review, ComReg requested information on the use of Fixed Links in the Licence Exempt Bands in the Licensee RFI 74 . A total of 15 respondents to the RFI stated their use of licence exempt Fixed Links 75 . Separate ComReg data indicates that ComReg's RFI data did not capture the majority of licence exempt Fixed Links, due to a number of FWA operators with a large number of Licence Exempt FWA Fixed Links 76 failing to respond. ComReg therefore places limited weight on trends in this data as representing trends for all licence exempt Fixed Links. Bearing this in mind, ComReg notes the use of Fixed Links among these 15 users has increased in recent years with most of the licence exempt Fixed Links deployed for FWA in the 5 GHz band. Data gathered separately by ComReg on broadband subscriptions delivered by FWA corroborate this finding and indicates that the number of Fixed Links in the Licence Exempt Bands used for the provision of FWA for 2.4 GHz and 5 GHz bands has increased from Q1 2020.*

We do agree with both DotEcom and ComReg's observation that the scale of the deployment of license exempt fixed links are underestimated in this report. While we agree that it is likely due to a lack of response from FWA ISPs, it should be noted, that the Covid-19 pandemic and lockdowns aside, FWA operators are focused primarily on the need to connect the unconnected, or to upgrade the connected. We Regret the Inability of many FWA operators to submit this vital information to ComReg. For our part and we believe those of our peers particularly during the pandemic when so many of our subscribers are working from home, our priority has had to be the continued delivery of reliable service to the customer and therefore engagement with and responding to consultations was unfortunately lower down on the priority list. The constraints on resources of smaller operators like ourselves means responding meaningfully and accurately to a consultation in a period of just 4 weeks is exceptionally difficult. We have no doubt that this would have impacted on the other FWA operators' ability to collect information about license exempt links as requested earlier in the year. We would welcome a review of the consultation period length and encourage ComReg to perhaps publish the intention to hold a consultation well in advance (similar to the way that this consultation was flagged in advance because of the engagement during the request for information on deployed links made to operators earlier in the year).

If we consider that just 28 of FWA ISPs have built and deployed at least 1465 sites around Ireland to serve their local communities it would stand to reason there would be multiples of that figure in P-P links and P-MP links also.

It is noteworthy that the charts in paragraphs 56 and 57 show the value and importance of the FWA industry in Ireland. and that the FWA sector as market operators are investing and expanding as clearly demonstrated in the purchase of licenses and the increased number of FWA ISPs purchasing licenses.

It is striking to see the chart associated with paragraph 58 that FWA Operators are increasing investment and real deployment in Fixed Links in all bands (apart from 38GHz).

3.2 The use of Fixed Links in Ireland in an International context

We would advocate that ComReg monitor the use of light licensed schemes such as public safety spectrum allocations in the US and if possible allow for the application on a light licensed or license exempt basis, for the purposes of Deploying Fixed Wireless Access broadband in Rural Ireland. This request would be contingent on lower cost equipment being readily available to facilitate the rapid deployment of such networks, so that consumers would experience the benefits of such liberalisation without delay. An example where this could be readily achieved is in the 4.9GHz band where FCC has designated in the US that this is a public Safety band and that there is equipment available to meet that specification that is similar to other equipment operating in the 5.4 /5.8GHz. So it would be easy for FWA operators to Purchase and Deploy equipment to operate in the 4.9GHz band due to the fact that it is operating similar equipment already on its network. The availability or prospect of low cost equipment to operate in a particular band would be one of the most important factors to consider when liberalising spectrum access eg similar spectrum utilisation in other major jusrisdictions.

3.3 & 3.4 Other potential use cases for Fixed Links

A-Q1

The advent of newer 60GHz technologies means that a large-scale deployment of FWA networks are possible in Cities and Towns, and this can lead to future competition for access networks and increased choices for consumers. The Cambium Cnwave product line has the feature set, throughput performance (multi-Gigabit connectivity) and a compact formfactor allowing operators to disrupt the urban and suburban market. Further it can afford businesses and high end consumers who have need for redundancy of internet access / WAN access a possibility to connect over diverse infrastructures instead of relying on One Wholesale Operator infrastructure and pseudo diversity over said single wholesale operator infrastructure.

4.1 Spectrum availability and channel arrangements

A-Q2

As a FWA operator which consistently strives to have at least 20% over capacity on our network and which often need to deploy over 1Gb/s to a given site in order to maintain an over capacity of 20% above peak demand, therefore, we agree with the ITU /CEPT recommendation & endorse DotEcom's, and ComReg's view that 112MHz channels should be made available in those bands in so far as they do not restrict existing operators who have more narrow channel licenses already purchased. We would advocate a co-operative approach where ComReg could work with license holders to ensure that narrow channels are migrated from the middle of the band to the one of the edges of the band so that fragmentation is minimised.

Perhaps it would be worth considering that for a software channel change that ComReg would make that a condition of renewing a license for operators who have equipment that can be easily re-configured to a different channel. Perhaps this could be available with a nominal low-cost fee. And for a quicker turnaround perhaps a fair compensation model can be agreed between the operators. This would be difficult to implement and would require buy in and co-operation from all operators. However, it is important that Operators co-operate with each other to maximise the use of spectrum and the availability of high-speed broadband services to end consumers in Ireland. That said, if an operator wants an operator who's equipment is constrained to a given channel then it would be incumbent on the operator requesting the larger channel to pay for a replacement equipment and install cost, so that would allow the operator with the smaller allocation move off the channel without affecting its own services to its customers.

4.2 Block Licences

A-Q3

Individual Licenses are preferred for small to medium FWA ISPs like our own as it lowers the barriers for expanding and improving our infrastructure footprint. National block licenses are typically out of the financial reach of smaller operators, as previously demonstrated by the Auction of the 3.6GHz spectrum which resulted in the retiring of low cost local site licenses which were taken up by a number of small to medium FWA operators and then in the auction of the released spectrum to the highest bidder with MNOs getting the bulk of the spectrum and only 1 FWA operator, Imagine being successful in acquiring some spectrum. It is therefore of paramount importance that individual links can be purchased at a reasonable cost to facilitate the expansion of services from localised FWA providers. Promoting spectrum availability for SME operators will reduce the ability of larger operators to sit on and not deploy national block licenses. Spectrum availability for smaller operators can help ensure their survival

and growth and would enable genuine choice and competition with real infrastructure diversity choices for consumers across Ireland. Comreg facilitating ideas such as this would be helpful in ComReg fulfilling its obligations under A1.1.2 Promotion of Competition.

It is our view that Block licences should only be considered if and only if there is sufficiently significant part of the spectrum made available for individual link licenses. While one can understand the value in reducing paperwork for larger wider deployed networks. It is our view that larger networks already enjoy favourable access to spectrum by virtue of their scale and spending power. It therefore also important to consider the positive competition implications for maintaining a low barrier of entry for Fixed Wireless Operators in any given licensed band.

It is our preference to have individual licensed links with licenses assigned in as automated manner as possible to reduce the burden on ComReg and the operators seeking to deploy a link. The low-cost license regime is pivotal to allow smaller fixed wireless operators compete with the larger ISPs and MNOs.

4.3 Application and licensing process

A-Q4

We would advocate the use of automation and models built in on the licensing platform that could guide the License applicant to self-validate the application (link budgets availability characteristics) We would strongly advocate for the ability for a license applicant to pre-emptively select additional lower preference link channels and/or bands in the application procedure so that in the event of the first chosen channel and/or band is not available the operator can get a license grant in one brief exchange with ComReg without an iterative process back and forth between ComReg and the operator until the operator manages to be fortunate enough to select an available channel on a given band. Automating this in so far as possible and building in intelligence into the license application system would reduce the burden on both ComReg and the Operators.

Alternatively as an interim measure, or to address difficulties in automating the frequency allocation process, perhaps ComReg could instigate a process of advising on the suitability and/or availability of the requested channel v's nearby or similar channels which might be licensed to meet the link budget requirements. This may have the ancillary benefit of improving the efficiency of spectrum deployment.

4.4 Fixed radio links Guidelines

A-Q5

As a FWA operator, we welcome both DotEcom's and ComReg's views as outlined in paragraph 117. That network and technological progress is not impeded by lack of guidelines for a new technique or technology that has not been referred to in the guidelines. The requirement that such deployment to be notified in advance to ComReg is right and reasonable. And we endorse it wholeheartedly.

As an operator who is expanding its backhaul continuously we would endorse ComReg's view as outlined in paragraph 118 that relaxing of minimum distance of links as long as the purpose of which is for aggregating multiple links / frequencies to increase capacity and redundancy between sites. As long as the capacity / redundancy / availability could not be achieved with a higher capacity link.

4.5 Pricing

A-Q6

Independent SME FWA ISPs are price conscious, the success of the 80GHz band and the number of links deployed in that shows (at least empirically that lower cost licenses encourages more deployment in that band) we would advocate lowering the cost of licenses where bands are not that heavily used. It is important that ComReg is mindful that there is generally a downward trend in cost per Mb/s being charged to consumers, coupled with an upward trend in bandwidth capacity demands per customer, consequentially the demands on our backhaul licensed links are increasing while the profit an individual link would be de-creasing. Accordingly we would advocate that licenses taken out in the same company between two identical endpoints should receive a discount on second and subsequent licenses. This would be fairer on an expanding operator who is transitioning from one vendor to another and cannot combine the two frequencies into one antenna system. Lowering the barriers / costs associated with giving subscribers more bandwidth is a good thing and would help encourage even further investment in infrastructure by the operators (not to financially disincentivise them)

The current de-lineation of costs according to high usage path / congested area vs normal usage paths / areas, is very coarse and it is probable that in the Dublin area there are certain areas with an underinvestment in wireless links due to the cost of the deployment, having a granular approach with accurate models would help reduce the costs of deploying in less deployed areas in and around Dublin City. We would advocate an incremental process for a gradual increase costs licenses on a given band as the number of channels allocated in that band increases. This could also serve as an indicator of how busy a band actually is on a given path.

4.6 1.4 GHz band

A-Q7

It would be our preference assuming reasonable cost equipment is available for deploying links with 1.4GHz that this be assigned for FWA networks on a locally licensed basis (subject to availability of cost effective equipment being available in this band.

A-Q8

The Licensing model should such that it be made available on lower cost local licenses to assist local operators provide choice and more bandwidth to customers in their locality. If ComReg believes a national / regional block licensing model is needed, we would advocate strongly (subject to reasonable cost equipment being available by manufacturers) that a section of the band be reserved for local operators. This would improve competition and diversity of infrastructure in rural Ireland.

4.7 13 GHz and 15 GHz bands

A-Q9

It is understandable that 13GHz / 15Ghz have applications restricted when there is no availability of channel space. However there no logic to the regulator effectively holding back channels in this spectrum that have been since released or not renewed by the license holder of that channel. We would advocate a traffic light system that would inform users that a band in a given area is full and that license applications are not being accepted at this time. Further it might be worth ComReg considering the tidying up of these two bands(by moving smaller channel allocations to the edge of the bands (on renewal in so far as it is possible) as opposed to fragmenting and impeding potential for larger contiguous channel allocations in the band.

4.8 26 GHz band

A-Q10

We would advocate that the licensing model should such that it be made available on lower cost local licenses to assist local operators provide choice and more bandwidth to customers in their locality. If ComReg believes a national / regional block licensing model is needed, we would advocate strongly (subject to reasonable cost equipment being available from manufacturers) that a section of the band be reserved for local operators. This would improve competition and diversity of infrastructure in rural Ireland.

4.9 D-bands and W-bands

A-Q11

FWA operators like ourselves would be interested in deploying equipment in this band once it becomes available. However given the frequency range it is likely that as per DotEcom's and ComReg's view that it would be for ultra high capacity links in urban environments (due to inherent range limitations) of these bands. That said we can only fully comment when the specifications and limits on EIRP and the capability of equipment designed to operate in that band are known.

4.10 Licence exempt / light licensing

A-Q12

License exempt spectrum has allowed independent FWA operators deliver high speed internet access to rural Ireland where fixed line and MNOs that have historically focused on urban / suburban areas and consequentially failed to deliver high speed broadband in a timely manner to rural communities.

5.4GHz and 5.8GHz Bands have been key and remain key to delivering FWA broadband in Ireland in the past and as their sites and access requirements have grown where a site has been fed by one or two 5.4GHz / 5.8GHz fixed links, it has been and is common practice to re-invest in the site and replace the lower cost 5.4 GHz/ 5.8GHz backhaul links with links operating in other bands such as

- license exempt bands such as 17GHz, 24GHz
- if the link is sufficiently short distance the License Exempt 60GHz band.
- light licensed bands such as 80GHz
- licensed Bands such as 13GHz,15GHz and 18GHz

The migration away from 5.4GHz/ 5.8GHz backhaul links allows for re-deployment and more flexibility in delivering service on more sectors on a given site allowing for greater coverage.

This strategy is not unique to our company and is indeed replicated by our other colleagues in the FWA sector.

We agree with DotEcom's recommendation regarding not to close bands that have been previously open and in use.

5.4 GHz License Exempt band

The value of this band to us is increasing from a P-MP perspective and decreasing from P-P perspective primarily. The value of deploying a 5.4GHz sector is far greater to an FWA ISP when compared a P-P link in the 5.4GHz band

5.8 GHz License Exempt band

In a similar way to the 5.4GHz band the value of this band to us is increasing from a P-MP perspective and decreasing from P-P perspective primarily. The value of deploying a 5.8GHz sector is far greater to an FWA ISP when compared a P-P link in the 5.8GHz We would advocate an increase the max EIRP in rural areas in line with (Ofcom in UK) to 36 dBm which would increase the range of rural base stations by up to 41%

The advent and availability of beamforming Mu-MIMO sectors, and high quality beam efficient scalar horn antennas from manufacturers such as RF-Elements with tight beam focus means that despite the very wide large scale deployment of License exempt links generally across the country, ISPs like our selves can manage the spectrum and adequately limit interference effects to / from other equipment operators. Thankfully we co-operate with and enjoy the co-operation of other neighbouring FWA Wireless networks and the rollout of these technologies means that interference incidents are fewer and farther between. Further the developments of Mu-MIMO and beaming forming equipment from manufacturers such has Cambium PMP and ePMP means that customers can enjoy improved service now and in the future.

17GHz License Exempt band

We note ComReg's observation in Paragraph 145 notwithstanding CEPT Report 44 stating that this band is of little use. We have extensively deployed 17GHz links and will continue to do so over the coming years. We consider this band vital for low cost high speed backhaul to our sites. And provides redundancy for Licensed links at a low cost. This band allows us to deliver higher bandwidth to our customers at a lower cost.

We are pleased to see ComReg's recognition in paragraph 146 of availability of equipment for 17GHz band and that it is currently deployed in so many of our networks.

It is our experience that we have yet to encounter any interference on these links in our Rural based deployments. And therefore, agree that a light licensing framework is not required for this band. We follow and advocate for the practice of deploying large gain antennas with reduced input power to minimise interference with our neighbouring ISPs.

We would welcome widening the band from the current 200MHz if at all possible. We would invite ComReg to consider extending the spectrum allocation of this band as much as possible or at the very least 50MHz to accommodate higher capacity symmetric links.

24GHz License Exempt band

We have extensively deployed 24GHz links and will continue to do so over the coming years. We consider this band vital for low cost high speed backhaul to our sites. And

provides redundancy for Licensed links at a low cost. This band allows us to deliver higher bandwidth to our customers at a lower cost.

It is our experience that we have yet to encounter any interference on these links in our Rural based deployments. And therefore, agree that a light licensing framework is not required for this band. We follow and advocate for the practice of deploying large gain antennas with reduced input power to minimise interference with our neighbouring ISPs.

We would welcome widening the band from the current allocation of 250MHz if at all possible. We would invite ComReg to consider extending the spectrum allocation of this band as much as possible.

60GHz License Exempt band

60GHz will become increasingly important both in short range P-P and P-MP applications. We note DotEcom's observation in 5.2.2 that it has not enjoyed extensive use prior to June 2019. We would like to point out the main reason we see for this is that products operating in the 60GHz band have only relatively recently being made available at a relatively reasonable cost. With 802.11ay and 802.11ad links being available from companies such as Cambium, Ubnt, Ignitenet, Radwin, and MikroTik. 60GHz use in our network has increased dramatically in the past 18 months and will likely continue with the release of new products such as the Cambium CnWave product lines with 7.5Gb/s FDX multigigabit connectivity.

66-71GHz Priority Reservation for 5G

It is our opinion that this be released under a general authorisation and subject to technology neutral performance characteristics, such as n x 1Gb/s, or x Gbps /GHz increasing the spectrum availability here has exciting prospects for advanced wireless service capabilities in urban and suburban locations. As noted by RSPG18-005 FINAL the distance from the Oxygen Absorption peak in this frequency range allows for increased cell radius or P-P link range. We would advocate for a technology neutral general authorisation for this portion of the band.

With products such as Cnwave from Cambium one can create a multigigabit Wireless Fabric which is a game changer in providing low cost high capacity access services in Housing Estates, Business and Industrial parks. This can allow businesses a real choice in infrastructure so as not to be reliant on one wholesale overground pole deployed wired ISP infrastructure which as the electrical power network and the incumbent historical experience has shown on an all too regular basis is regularly significantly impacted by storm related outages

Interference Management, Registration vs Light Licensing

We wholeheartedly endorse ComReg's position as set out in paragraphs 148 and 149, we do agree that the current general authorisation framework for the bands is working quite well and that the FWA industry is able to manage link performance and any incidence of interference in the bands quite well. We would ask that ComReg inform the DCCAE and their advisors Analysys Mason that Interference is not a significant issue that is affecting FWA networks to any great extent. Not least because Analysys Mason felt unable to qualify every FWA network for NGA status in the recent NBP Mapping exercise which meant that the Intervention area as defined by the DCCAE and its advisors threatens to overbuild all FWA operators' infrastructure as currently deployed NGA capable infrastructure at significant cost to the Irish and European tax payer.

Other Opportunities for License Exempt Bands.

FWA operators such as our selves would welcome the expansion of License exempt and Light licensed spectrum available to allow us deliver even more services to subscribers in Rural Ireland. We would advocate that if equipment is available that is capable of delivering high speed broadband in other bands that ComReg consider facilitating the opening of spectrum for this purpose in bands such as 4.9GHz where there is equipment readily available internationally and proven in other jurisdictions, and that could be deployed rapidly to increase the bandwidth available and allow FWA operators to scale even further. If a general authorisation basis is not considered possible perhaps a light licensed model would be considered instead. We would welcome ComReg facilitating a conversation between FWA operators and other users of the 4.9GHz band such as radio astronomers etc.

The wide availability (internationally) of equipment designed to operate in the FCC allocated Bands for Public Safety 4940-4990 MHz and 5850-5925 MHz would mean that FWA operators could rapidly take advantage of these bands to provide additional bandwidth to more customers. ComReg facilitating ideas such as this would be helpful in and in no way contravene ComReg fulfilling its obligations under A1.1.2 Promotion of Competition.

Conclusion

This initiative very welcome and could not come soon enough as far as we are concerned. We would like to thank ComReg, in particular Martin O'Donoghue and Donnacha Hennessy who have worked extensively on this initiative and for their patience in dealing with our queries and assisting us in granting extensions to submit information during the initial RFI and we look forward to further engagement with them

on this important initiative. Finally, we would like to thank DotEcom for their excellent report which was very informative and clearly showed interesting trends in Infrastructure investment by the FWA Sector in Rural Ireland.

Ends.

13: Siklu Communication Ltd (“Siklu”)

Siklu

Siklu's Response to:
ComReg's Review of the Fixed Radio Links Licensing Regime

Date: 13/12/2020 Version: 01
Author: Daniel Ephraty

About Siklu

Siklu Communications is a leading global vendor for fixed terrestrial radios operating in 60/70/80GHz. Well over 100,000 of our E-band and V-band radios are installed globally, including in Ireland.

About Siklu's Response

Siklu would like to thank ComReg for the opportunity to comment on its Review of the Fixed Radio Links Licensing Regime (ComReg 20/109). As Siklu's portfolio is limited to V-band (60GHz) and E-band (70/80GHz), we limit our comments to these bands only.

Q1: Used Cases

E-band has some unique advantages:

- Of all the currently-available fixed terrestrial bands, E-band has the largest amount of contiguous spectrum: 2x 5GHz. This is key to achieving multi Gigabit air capacity: 5Gbps, 10Gbps, and 20Gbps. Indeed, presently, E-band is the only band that can achieve such high air capacities.
- Lack of interference and a very high potential for frequency reuse, both due to the exceptional high degree of antenna (spatial) filtering.
- Friendly regulation (spectrum access is simple and inexpensive)

Because of these advantages, and because the market has had access to inexpensive and reliable E-band radios over the past 10 years, this band has become very successful in many countries. This of course is the case also in Ireland, as ComReg notes in paragraph 58.

Traditionally, one application dominated use of high-frequency fixed terrestrial wireless: backhaul, for both fixed and mobile networks. However, over recent years, the combination of low-cost radios, easily accessible E-band spectrum, and its unique advantages, caused many new and exciting applications to emerge in E-band:

- Access / Last mile / Gigabit to the Home. ISPs and other network operators are using E-band to establish their own infrastructure, extend their wired footprint, and provide business and residential consumers fast broadband connection, and a large choice of providers. Here are a couple of concrete examples: an ISP in Mexico, and Google Fibre in the USA.
- Smart Cities. These are networks owned by municipalities in order to connect their assets (police stations, schools, libraries, etc.) to a broadband network. Siklu E-band radios form the basis of over 200 Smart Cities (as is illustrated in this example in Bradford in the UK).
- Security. Low frequency (2.4GHz, 5GHz) are the traditionally frequencies for CCTV backhaul. These bands have become congested and unreliable due to interference, and many deployments are migrating to E-band. This includes strategic infrastructure, such as ports and power plants. For example, this international airport in the USA.
- Campus connectivity. Hospitals, universities, business parks are using E-band to interconnect facilities. Here is an example from a university in Scotland.
- Connecting the unconnected. Bridging the digital divide, or providing broadband to those who don't have it, is a key priority in many countries. E-band is typically used, as illustrated in this example, where E-band provides broadband to 800 of the poorest residents in Cleveland.

In the context of this consultation, and in particular: ComReg's proposal to block-license E-band, there is another important point relating to the above use cases: *the profile of licensees*. Whereas in the past, licensees were almost exclusively large organisations (national fixed and mobile operators / infrastructure companies), in recent years more and more small businesses are deploying E-band: security companies installing wireless backhaul to their CCTV cameras, small regional ISPs turning to wireless to extend their otherwise wired footprint, small business campuses wishing to interconnect several offices into a single network without the expense of trenching, etc. Siklu encourages ComReg to ensure these small businesses continue to enjoy fair and unfettered access to the E-band spectrum in order not to stifle these nascent use cases.

Q2: Guidelines document 09/89R2

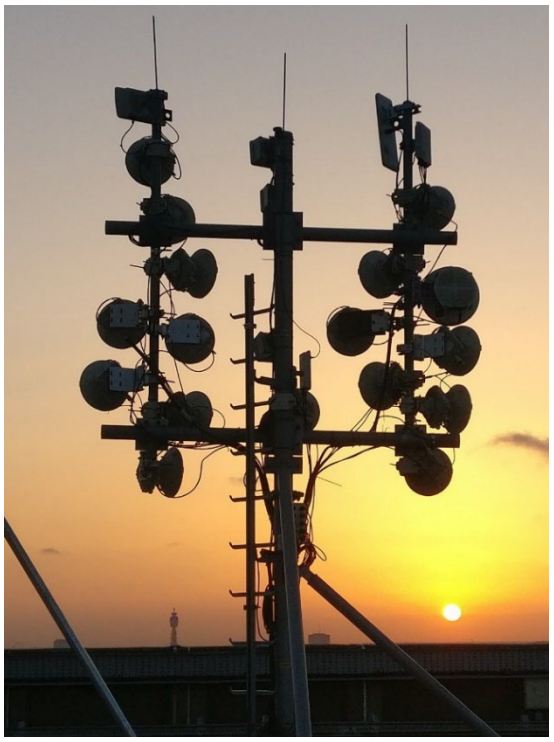
Maximum Channel Bandwidth

In recent years, Siklu has witnessed a clear global trend for higher air-capacities in E-band: 5Gbps, to 10Gbps, and more recently: 20Gbps (we elaborate on this point in our response to Q3 below). Large channel bandwidths are key to supporting such high air-capacities. The current ComReg limitation of 2.25GHz is sufficient for air-capacities up to 10Gbps (the 'standard' expectation of E-band radios today). However, Siklu does expect this limitation to become restrictive within a year or two, as demand grows for 20Gbps radios and higher. Indeed, the component supply chain for 50Gbps radios is already available, and such radios are expected to become commercially available in line with the growth in 5G fronthaul deployments.

Siklu therefore encourages ComReg to remove the 2.25GHz channel limitation in E-band, and harmonise with ECC Recommendation (05)07, Figure A4.2, which defines channels up to 4.5GHz in width. This will ensure that Ireland continues to have access to the most modern and highest capacities E-band radios which are expected to hit the market over the next couple of years.

High/Low Co-location

Guidelines 09/89R2 also stipulate high/Low co-location requirements in section 2.6. Siklu acknowledge that in microwave frequencies (up to ~40GHz), it is a good industry practice to *separately* co-locate high-transmitters and low-transmitters. However, we are confident this is not the case in E-band, due to the exceptional degree of spatial filtering provided by the antennas at these high frequencies. Indeed, Siklu does not advocate high/low separation to our customers, who often come up with dense hub-and-spokes deployments, where the 'hub' comprises a random mix of high and low transmitters. Here are some photos of Siklu E-band radios, illustrating this:



Despite the high level of radio density, and mixed high/low approach, our customers never report any degradation in performance, or other interference-related issues.

Notwithstanding the experience of Siklu's thousands of E-band deployments [✂[redacted]✂], we are not aware of any other national regulator who enforces high/low co-location in E-band. This includes of course the USA and the UK, arguably the largest global markets for E-band radios.

Based on the above, Siklu encourages ComReg to abolish the high/low criterion in E-band, or at the very least: significantly reduce the current 100m search radius.

Q3: Block Licensing

Siklu believes it would be a grave mistake to block-license E-band, for the following reasons:

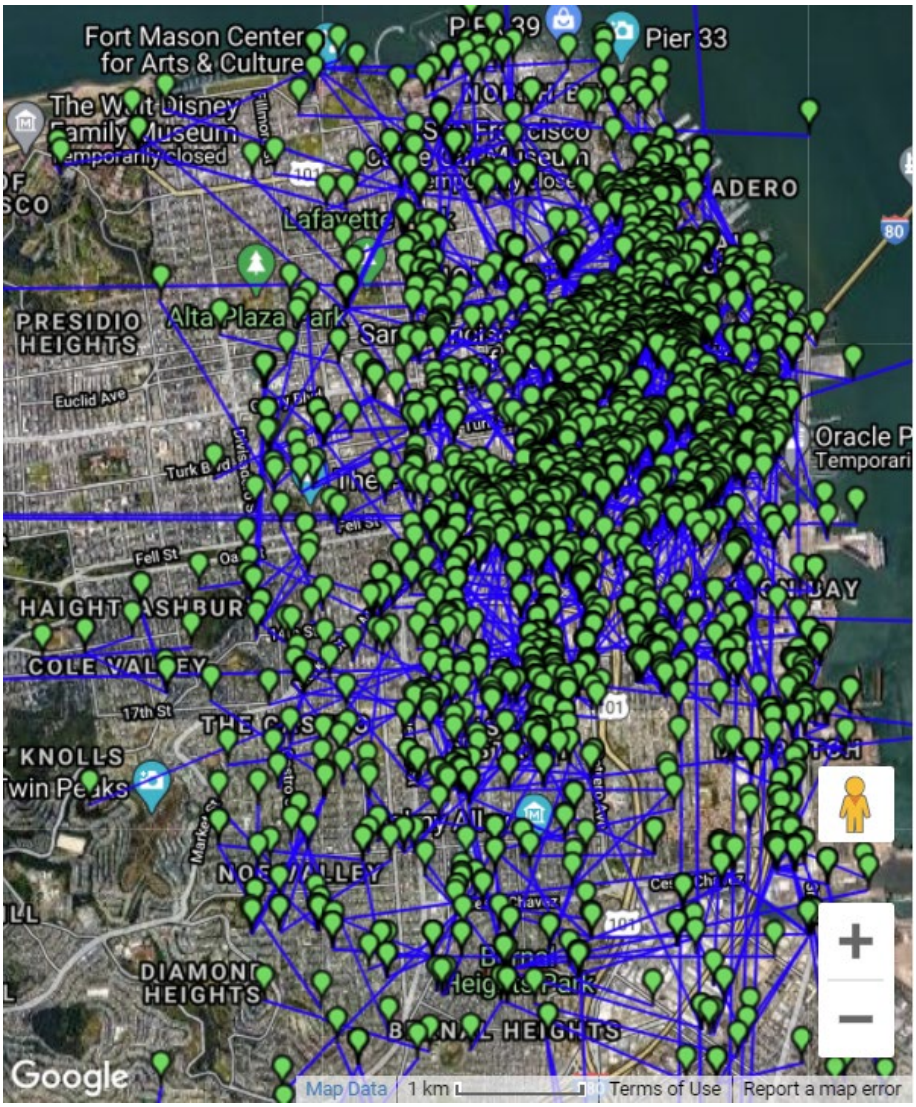
Inefficient spectrum use

Block-licensing leads to inefficient spectrum use.

E-band is well known to have exceptional frequency reuse. This is primarily due to the strong spatial filtering of the antennas, ranging from 0.5° beam-width in a 2ft antenna (50dBi), to 2° beam-width for a 0.5ft antenna (38dBi). Other factors contributing to strong frequency reuse are:

- The need for a clear line-of-sight. That is, the transmitted signal is often blocked from propagating in unwanted directions due to obstructions (buildings, vegetation, etc.).
- The robust modulations used. The very wide channels available (up to 2250MHz in Ireland) means robust, low-level modulations can be used; modulations that can tolerate high degrees of co-channel and adjacent-channel interference.
- The low transmit power (<20dBm) limited by solid state technology in E-band, ensures propagation range is limited.

Indeed, we see very dense interference-free E-band deployments, particularly in urban areas. To illustrate this, we plotted the E-band links registered in the (publically-accessible) FCC database for the downtown San Francisco Area. This shows **over 1,300 E-band links in an area of approximately 40Km^2**:



[✂ [redacted] ✂]

This level of deployment density is not unique to San Francisco, or the USA alone. Indeed, we observe this in other countries where we can access the licensing database, notably the UK and Australia. Crucially, **this level of deployment density is simply not attainable in a block-licensing regime**, because no single operator/customer has the need (and often the means) to deploy so many links over small areas. In other words, block-licensing would no-doubt lead to a far less efficient use of the spectrum, compared to the one demonstrated.

In this context, we submit (together with this response document) one of Siklu's contribution to ETSI ISGmWT, demonstrating that just 1-2 E-band channels are sufficient to replace the ~5,000 microwave mobile backhaul links in Mumbai, as well as the penalty associated with spectrum block allocation.

Unfair spectrum access

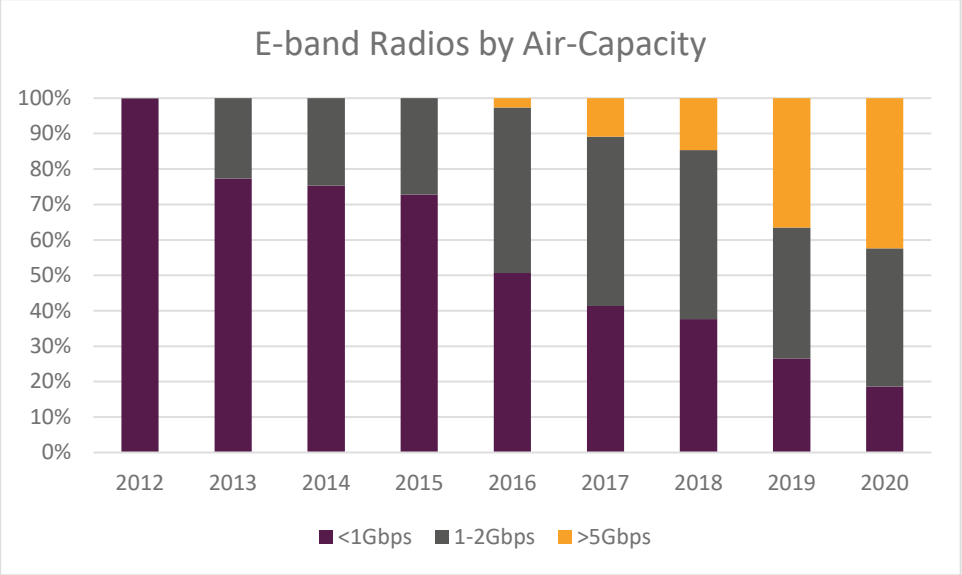
Block licensing leads to unfair spectrum access.

In our response to Q1 above, we described the changing landscape of E-band licensees. In the past, licensees where largely characterised as few large operators/organisations, deploying on a national or regional scale. Over the past few years, this profile has changed significantly, with many small players deploying E-band links: security firms, small regional ISPs, campuses, etc. Block-licencing favours a small number of large licensees at the expense of the many smaller ones. Therefore, Siklu believes block-licensing would ultimately lead to unfair and biased access to the spectrum.

Limits availability of contiguous spectrum

Block-licensing restricts the maximum channel bandwidth available to specific licensees in specific areas, and therefore also the maximum achievable air-capacity.

Over the past few years, the industry has shown a clear trend of opting for larger and larger air-capacities: 5Gbps, to 10Gbps, and more recently: 20Gbps. To illustrate this trend, consider the E-band radios shipped by Siklu globally over the last 9 years, by air-capacity:



Clearly, radios supporting larger air capacities are becoming more prevalent, and these radios require wide channels in order to operate. In fact, in 2020, over 40% of all E-band links Siklu shipped globally are 10Gbps-capable, requiring a 2,000MHz channel bandwidth.

The inevitable demand for ever higher air-capacities will require even wider channels. A case in point is 5G: it currently seems that the most likely path of 5G mobile development is *fronthaul*. If anything, fronthaul will require 20Gbps and even 50Gbps, necessitating even wider channels.

Indeed, Siklu believes contiguous spectrum is one of the key advantages of E-band, and is necessary for the implementation of multi Gigabit radios. Any block-licensing regime will reduce the available contiguous spectrum, and thereby restrict air capacity.

Summary

Siklu strongly encourages ComReg to avoid block-licensing in E-band. We believe it would be detrimental in that it would:

- Lead to inefficient spectrum use
- Limit fair access to the spectrum
- Reduce the amount of accessible contiguous spectrum, and therefore stifle growth in achievable air capacity.

Indeed, to the best of our knowledge, no other national regulator has taken a block licensing approach in E-band.

Q4: Improve Licence applications

Siklu has never applied to ComReg for licences, and therefore cannot directly comment on the process. However, we have been told by our customers in Ireland that they sometimes find the licensing process somewhat challenging. We believe that many of these challenges would be resolved if ComReg made public the database of existing links.

Hopeful licensees in Ireland submit their applications in the dark. They have no way of knowing what type of other links are already installed in the area of interest, and therefore no way of gauging the likelihood of channel availability. Consequently, they might unknowingly make futile applications. Or often, make multiple applications to increase the likelihood of success. This inevitably leads to an unnecessary burden on ComReg and frustration on the part of the applicants.

Equally importantly, applicants have no effective way of appealing an unfavourable decision by ComReg. They have no way of independently checking if a mistake or oversight resulted in an application being incorrectly refused.

We are aware that ComReg recently made some information available via the new function on its eLicensing platform. However, this includes only frequency and location, which are not enough to gauge channel availability and potential interference. Other key data (e.g., transmit power, antenna gain, receiver sensitivity) are missing, and the data currently available is therefore of very limited practical use.

Siklu encourages ComReg to **make publically accessible the database of existing links, including all relevant technical details**. This would have the following key benefits:

- Increased likelihood of successful applications (because hopeful licensees would be able make more informed applications)
- More effective appeal process (because any appeal would be evidence-based)
- Better transparency and accountability.

Other regulators, have adopted our suggested approach, and made publically available their databases, notably: the FCC (USA), Ofcom (UK) and ACMA (Australia).

Q11: D-Band and W-Band

D-band and W-band have many potentially useful applications, e.g.:

- High capacity (e.g., imaging)
- Sensing (e.g. health scanning)
- High precision (e.g., automated assembly)

Siklu's focus is on the potential use of these bands in fixed outdoor wireless, with particular interest in high air-capacity (20Gbps and higher).

Broadly speaking, there are 3 ways to increase air-capacity:

- Use of higher (more complex) modulation schemes, although this is inefficient due to diminishing returns: going from N-QAM to (N+1)-QAM costs ~3dB in system gain, but gains only $1/\log_2 N$ in capacity.
- Adding antennas (e.g., LOS MIMO), but this is expensive and often impractical due to the large footprint.
- Increasing the channel bandwidth. This is the most efficient means of increasing air-capacity: the gain is linear with the channel bandwidth, while the impact on system gain is relatively small (~3dB per doubling the channel width). For this reason, contiguous spectrum is key to increasing air-capacity.

E-band has 2x 5GHz of contiguous spectrum, although ComReg regulations currently limit the channel size to 2.25GHz. Siklu therefore encourages ComReg to remove this limitation, as discussed in our response to Q2 above.

W-band, apparently rich in spectrum, is in fact highly fragmented:

- 92-94GHz
- 94.1-100GHz
- 102-109.5GHz
- 111.8-114.25GHz.

There are two relatively large chunks of contiguous spectrum, that may serve as a coupled pair of ~6GHz channels (94.1-100GHz, 102-109.5GHz), but implementing a 2GHz duplex separation would be quite challenging.

ECC SE19 is working on 250MHz channel grid (as in E-band), but effectively, the widest channel is a pair of 3.5GHz.

Overall then, W-band seems to offer little advantage in comparison with E-band.

D-band is also fragmented, but has more contiguous spectrum: 130-134GHz, 141-148.5GHz, 151.5-164GHz and 167-174.8GHz. However, system gain and propagation are inferior to E-band:

- D-band has higher attenuation due to fog, water vapour and rain, and
- Lower system gain (lower transmit power, higher receiver noise figure)

Overall, D-band has the potential to facilitate high-capacity transmission, albeit over very short distances (we estimate that in practice, range will be limited to 1Km or less).

In summary, Siklu believes that while W-band and D-band will have some use in fixed wireless connectivity, this will be limited, as neither can compete with E-band for air-capacities and range.

Q12: Licensing in 60GHz

Siklu agrees with ComReg's view that no change is required in the licensing regime of the 60GHz band (57-71GHz).

Like E-band, the 60GHz band has exceptional frequency reuse, for all the reasons we outlined in our response to Q3 above. But unlike E-band, propagation is severely limited in the lower part of this band (57-66GHz), due to oxygen absorption (attenuation of up to 15dB/Km), further improving frequency reuse.

Furthermore, the prevalent technologies used in this band (WiGig, Terragraph) employ built-in interference-mitigation techniques.

Last but not least, we note that to the best of our knowledge, the 60GHz band is licence-exempt in all other countries (where use of this band is permitted).

Siklu view on E-band and V-band spectrum regulation

ISGmWT WI 14

Yigal Leiba - CTO

April, 2016

Outline

- E-band and V-band deployment topologies
- Real world link planning and density example
- E-band Regulation
  - Fully coordinated vs. lightly licensed
- V-band regulation
  - License exempt vs. lightly licensed vs. block licensing

E-band and V-band topologies

- Rooftop to rooftop/tower
  - Typically used for ‘long range’ links (up to a few Km), thus primarily relevant to E-band
  - Protected by interference primarily by antenna spatial filtering
  - Secondary protection due to typically low transmit power, typically high NF and typically robust modulation schemes utilized
- Street level
  - Typically used for short range links (up to 300m)
  - V-band typically preferred due to smaller antenna dimensions
  - E-band with small antenna is also possible
  - Strongly protected from interference due to LOS blockage and absorption by Oxygen
  - Secondary protection by antenna spatial filtering

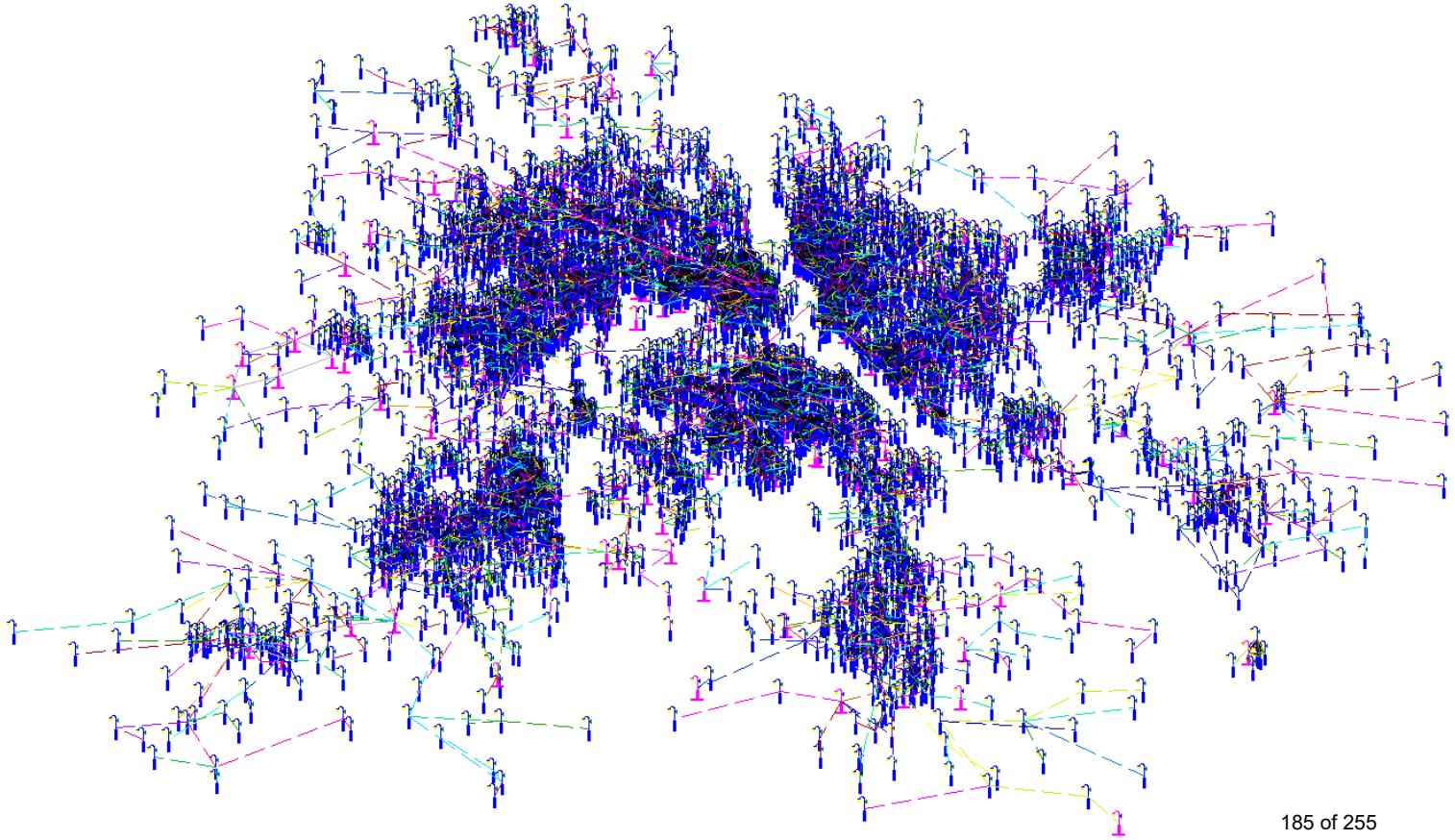
E-band and V-band topologies – cont'd

- Rooftop to street
  - Typically used for short to medium range links (up to 500m)
  - V-band and E-band are both suitable, but V-band often preferred due to smaller antenna dimensions on the street level end
  - Strongly protected from interference due to LOS blockage, additionally protected by antenna spatial filtering and/or absorption by Oxygen

Real world planning scenario - example

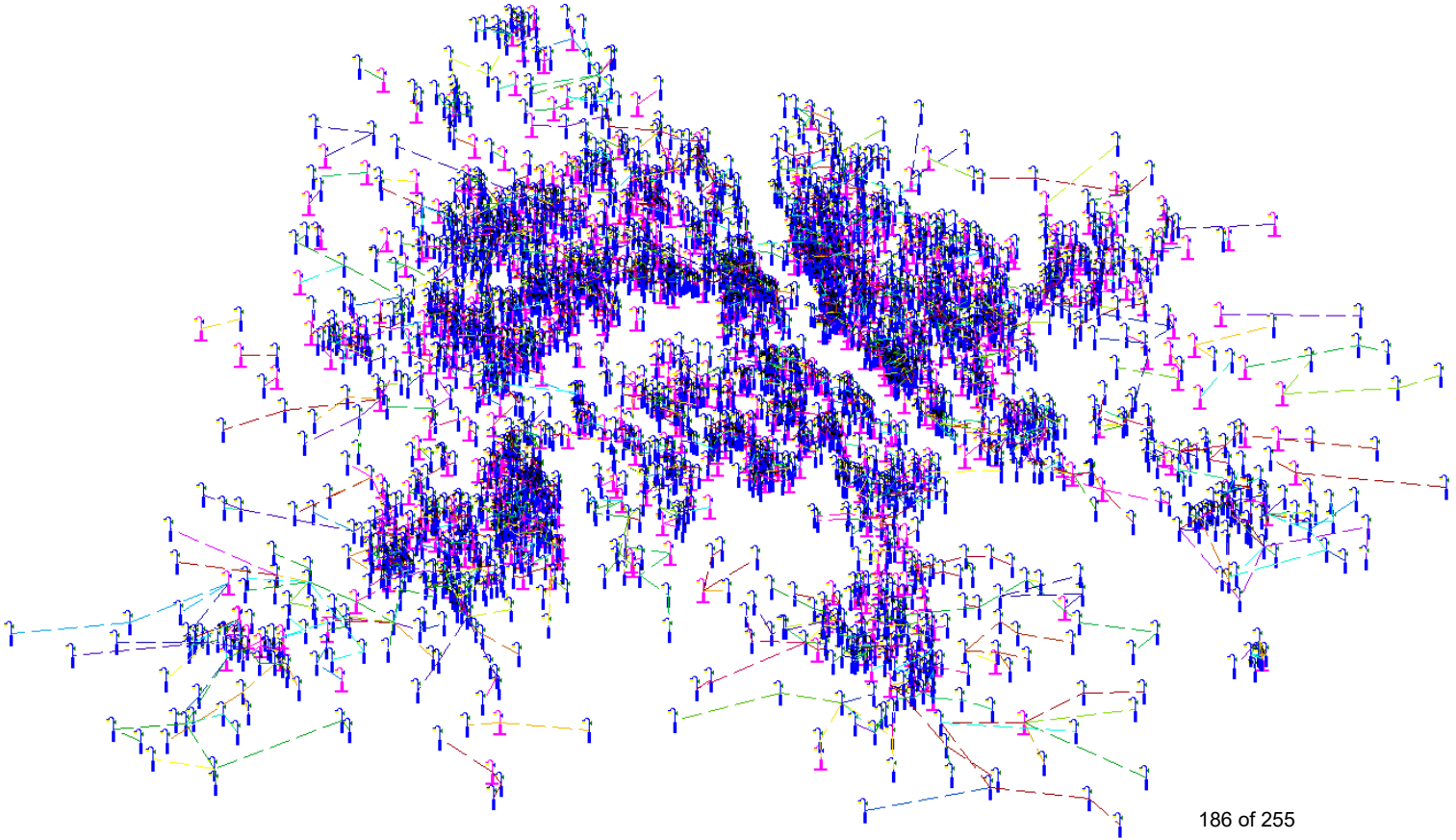
- Assign E-band frequency channels for a 5225 links deployment where the majority are inside a 40Km x 40Km area cell
- Assume half of the links belong to operator-A (2612 links) and the other half to operator-B (2613 links)
- Link distance limited to 2Km
- Attempt to assign frequency channel per link (**all vertically polarized**)
- Target spectral efficiency is ETSI class 4L
- Antennas are 43dBi ETSI class 2 compliant
- The network is designed and frequencies are assigned by Siklu network planning tool

Real world planning scenario – 5K link network



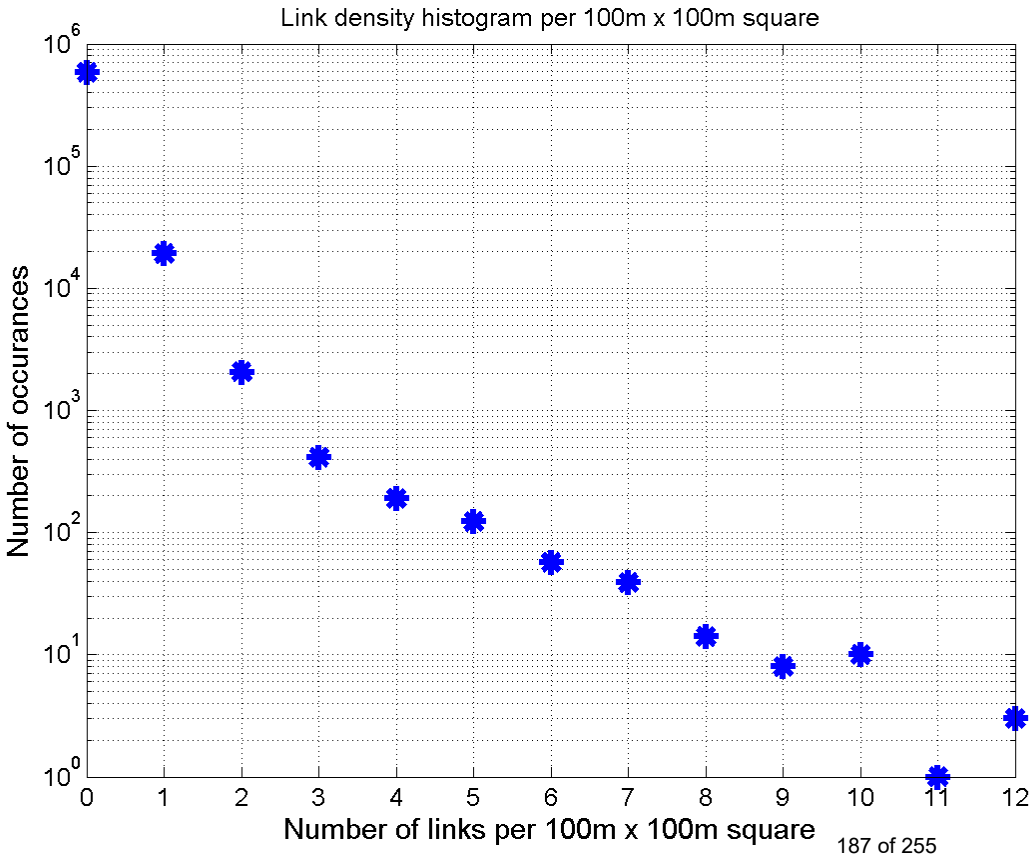
185 of 255

Real world planning scenario – 2.5K link network



Real world planning scenario – link density

- Link density is measured on the entire 5K links network by
  - Subdividing the rollout area to 100m x 100m squares
  - Counting how many links pass each square
- Densities up to 1200 links per 1 square Km where found



Real world planning scenario - results

	Number of links		Number of channels		% of links using 1st channel	
Case	**Operator A**	**Operator B**	**Operator A**	**Operator B**	**Operator A**	**Operator B**
Light licensing	5000 (total for both operators)		3 (total for both operators)		91.4%	
Block Allocation	2500	2500	3	3	95.2%	95.5%

Conclusions

- Interference rejection performance and link density are excellent!
- Block allocations make poor use of spectrum
  - 6 channels vs. 3 channels, where even in the case of 5000 links 91.4% of the links use only one channel and only 0.67% had to revert to the third channel
- Block allocations efficiency degrades even more when many carriers contend for limited spectrum

E-band regulation – Fully coordinated vs. lightly licensed

- Lightly licensed implies low license cost and short application time
- Fully coordinated implies high license cost and long application time
- Major shortcoming of lightly licensed is potential abuse of spectrum resource
  - Use of inefficient modulation schemes in congested areas
  - Requesting licenses just to ‘reserve-the-path’ thus blocking real users of the spectrum
  - Using dispersed narrow channels thus blocking wide channels
- No difference in interference level or spectrum use efficiency is expected if the stake holders use the spectrum responsibly
- Fully coordinated approach attempts to prevent abuse of spectrum by making its cost high

E-band regulation – Fully coordinated vs. lightly licensed – cont'd

- Lightly licensed has the clear advantage to all stake holders if spectrum abuse can be prevented
  - Interference should be prevented at registration stage (as currently done in the US)
  - Interference analysis tools should identify and prevent abuse of spectrum already in the link registration stage
- A less favorable option is to divide the spectrum between fully coordinated and lightly licensed operation regimes (e.g. UK)
  - Disadvantage: segmenting the spectrum is always less efficient than keeping a larger shared resource pool
  - Disadvantage: Does not prevent spectrum abuse in the lightly licensed regime
  - Advantage: Allows the market forces to play out. Those willing to pay will get their guaranteed, interference free, broadband channel

V-band regulation – License exempt vs. lightly licensed vs. block licensing

- Block licensing is a big no-no
  - Grossly inefficient use of the spectrum resource
  - It is hard or even impossible to assign a fair share of the spectrum to small stake holders (i.e. small operators, non-operators)
- License exempt implies no license cost and zero application time
  - Unfortunately also zero regulatory protection from interference
- Lightly licensed implies low license cost and short application time
  - However, V-band remains license exempt for non P2P applications
  - The interference protection thus possible by light licensing is dubious

V-band regulation – License exempt vs. lightly licensed – cont'd

- V-band preferred regulation should be license exempt
  - The limited protection offered by P2P light licensing in an otherwise license exempt band is not worth the trouble
  - Interference rejection in V-band street level applications is very strong
  - The license exempt paradigm will enable new possibilities for many applications
  - Operators who wish the protection could retreat to E-band
- A small portion of the band (64-66 GHz) might be more amenable to be lightly license
  - both propagation and interference conditions are closer to E-band

Siklu

Magic in the air

14: Space Exploration Technologies Corp (“Space X”)

SPACEX

December 7, 2020

Mr Martin O Donoghue
Commission for Communications Regulation
Dockland Central
1 Guild St
North Dock
Dublin, D01 E4X0

Submitted Via Email to: marketframeworkconsult@comreg.ie

RE: ComReg 20/109 – Consultation: Review of the Fixed Radio Links Licensing Regime

Space Exploration Technologies Corp. ("**SpaceX**") appreciates this opportunity to provide input to the Commission for Communications Regulation ("**ComReg**") in response to the preliminary consultation on the Review of the Irish Fixed Radio Links Licensing Regime issued November 9, 2020, (the "**Consultation**").

SpaceX welcomes the review of the Irish fixed radio link licensing regime, noting that a further review is scheduled for Q2 2021 in relation to the satellite earth station licensing regime.

In line with the EU's objective to connect all its citizens and its European Digital Strategy, it is now recognized that internet access has become a necessity—and an equalizer—for its citizens. Individuals, businesses, institutions, and governments now rely more on broadband for any number of services, from remote learning to telework to telehealth. The current COVID-19 pandemic has unequivocally demonstrated that, while existing telecommunications networks have performed well to meet these needs in many areas, billions that live in the most rural and remote areas, and even those in urban environments, remain on the wrong side of the digital divide. Powerful next-generation satellite systems *flying today* that can reach all corners of the country with high-speed, affordable service are critical to bridging this gap.

As you may know, SpaceX is working to design, develop, and deploy a non-geostationary orbit (NGSO) satellite constellation known as "Starlink" to deliver broadband service directly to consumers around the world. The United States Federal Communications Commission (FCC) authorized SpaceX in March 2018 to construct, launch, and operate a constellation of 4,425 NGSO satellites operating in low Earth orbit in Ku- and Ka-band frequencies. SpaceX is proud to have also been granted a trial license in Ireland.

Starlink's high-capacity, high-speed, low-latency satellite network will advance the goal of delivering broadband connectivity in the near term to all Irish citizens, particularly those without access now or in the near-term to broadband services traditionally available only to customers in urban and suburban areas.

Notably, new technologies like Starlink may require updates to existing rules, policies, and regulation. Accordingly, SpaceX respectfully makes a number of comments below on the Consultation and looks

forward to working with ComReg to ensure that Irish consumers will be provided with more choice and better services in the future.

About SpaceX
SpaceX is a private American company founded in 2002 by Elon Musk to revolutionize space technologies, with the ultimate goal of enabling humanity to become a multi-planetary species. The company and its more than 7,000 employees design, manufacture and launch advanced rockets and spacecraft.

SpaceX has achieved a series of historic milestones, including becoming the first private company to successfully launch and return a spacecraft (Dragon) from low-Earth orbit (LEO) in December 2010. In May 2012, the company again made history when Dragon berthed with the International Space Station (ISS), delivered cargo for the astronauts on board, and returned safely to Earth–a technically challenging feat previously accomplished only by governments. In May 2020, SpaceX became the first private company in history to send astronauts to orbit, safely returning them to Earth two months later. To date, SpaceX has successfully launched more than 100 missions to space.

About Starlink
SpaceX has leveraged its accumulated expertise in space system manufacturing, design and operations to develop Starlink, a constellation of satellites designed to provide high-speed, low-latency, competitively-priced broadband service to locations around the world where access to the Internet has been unreliable, expensive or completely unavailable.

The first Starlink constellation consists of over 4,400 NGSO satellites employing advanced communications and space operations technology. To date, SpaceX has launched over 900 Starlink satellites in a little over 18 months, and is now the largest operational satellite constellation by a more than factor of two. Since 2018, SpaceX has invested hundreds of millions of dollars in Starlink and is currently building its own satellites and end-user terminals. Starlink is currently serving thousands of paying customers in the United States and Canada. SpaceX is authorized to serve many more countries and we will be launching service in these countries in the next few months.

SpaceX and Ireland
SpaceX is excited to commence operations in Ireland and to facilitate this it has already: (i) registered with ComReg as an authorised provider of electronic communications services and received a General Authorization, and (ii) obtained a 'Test and Trial' license from ComReg to begin trialing its equipment and services in up to 1,000 homes or premises around the country.

SpaceX is authorized by the FCC and several other European Union jurisdictions to deploy its satellite constellation in the following Ku- and Ka-band frequencies:

- 10.7 – 12.7 GHz User Terminal Downlink
- 14.0 – 14.5 GHz User Terminal Uplink
- 17.8 – 18.55 GHz and 18.8 – 19.3 GHz Gateway Downlink
- 27.5 – 29.1 and 29.5 – 30.0GHz Gateway Uplink

SpaceX intends to seek approval to use these bands within Ireland and elsewhere in the EU to support the deployment of broadband services throughout the country and is working with ComReg and other national providers to facilitate this service.

SpaceX Comments on the Consultation

SpaceX understands that, under the Radio Frequency Plan for Ireland (ComReg Document 20/58) and ComReg's existing fixed and satellite licensing schemes, there are a number of frequency bands that are allocated to both fixed services and fixed-satellite services on a co-primary basis (including in some of the bands noted above that SpaceX wishes to seek approval to use) but that take-up from other satellite providers for use in these bands has been low thus far.

Given this context, SpaceX would like to make the following comments in relation to Section 2.3 of the Consultation (Spectrum Management Matters which are related to the Fixed Link Bands):

- ComReg refers to a range of frequency bands being allocated to fixed services and fixed satellite services (including in the 10.7-12.7 and 17.7-19.7 GHz range) on a 'co-primary' basis, which would imply both type of services operating on an equal footing rather than on a primary / secondary basis (noting the current focus on fixed services in these frequency bands);

- SpaceX requests ComReg provide further clarity on this 'co-primary' point and confirm: (i) that ComReg is empowered and willing to allocate spectrum for fixed satellite services in these bands, and (ii) the terms of accessing spectrum for fixed satellite services in these bands (in what circumstances and the process for doing so) to facilitate the deployment of satellite services;

- SpaceX requests further guidance and clarity on how, practically, ComReg proposes to license fixed satellite service providers that seek approval for use of equipment in the 10.7 – 12.7 and 14.0 – 14.5 GHz bands (noting that paragraph 37 of the Consultation states that ComReg has not yet allocated the 17.7-19.7 GHz frequency band to fixed-satellite services, further noting that effective deployment of new broadband satellite user terminals will require a license-exempt or blanket-license regime to be established in Ireland); and

- The 14-14.5 GHz band appears to be currently allocated exclusively for fixed satellite services. SpaceX requests ComReg's confirmation that this band will continue to be exclusively allocated to satellite services only as SpaceX considers this critical to ensure adequate provision of satellite services in Ireland.

- As a practical matter, one step that may reduce interference in these bands, is for ComReg to publish on its web site the exact locations of all licensed FS stations. This would allow other users of the spectrum to plan around these locations

- In general, SpaceX encourages ComReg to examine all of its spectrum licensing decisions through the lens of efficiency. A new allocation or licensing decision should be made by deciding which outcome uses the spectrum in question most efficiently and allows the greatest number of users in the band.

Conclusion

SpaceX appreciates the opportunity to provide comments in response to the Consultation. We look forward to working with ComReg over the coming months and years. Please do not hesitate to contact me at [✂[redacted]✂] or [✂[redacted]✂] should ComReg seek further information or wish to discuss our comments in greater depth.

Sincerely yours,

Matt Botwin
Director, Market Access
Space Exploration Technologies, Corp.
1155 F Street, NW, Suite 475
Washington, DC 20004 USA
[✂[redacted]✂]

15: Three Ireland (Hutchison) Limited ("Three")

Fixed Links Licensing

Response to Document 20/109

from Three

7th December 2020

1. Introduction

Three is pleased to submit this response to ComReg's consultation on Fixed Links. These links operate "behind the scenes" but provide an essential support to many communication services. It is important that the licensing regime develops and adapts to changes in demand and changes in technology. We welcome ComReg's review and provide answers to the specific questions asked below.

2. Response to Questions

Q1: ComReg seeks the views of interested parties on the existing and potential use cases identified above and whether there are other use cases that should be considered in determining an appropriate licensing framework. In the case of other potential use cases please provide supporting material for your answers.

Three agrees that ComReg has identified the main use cases for fixed links. There are other use cases that are not fixed links, but nonetheless occupy the same spectrum and need to be taken into consideration when planning for fixed links, e.g. mobile service in the 26GHz band. Further comments are provided on this band below in response to Q.10.

Q2. ComReg seeks views of interested parties regarding the current and future channel arrangements for all the Fixed Link Bands in ComReg's Guidelines document 09/89R2, and any other channel arrangements recommended or being considered by the CEPT and/or ITU. Please provide evidence and reasoning for your views.

Due to rapidly increasing consumer demand and deployment of 5G technology, many of the existing frequency bands are being rendered obsolete for mobile backhaul applications due to limitations in maximum channel bandwidth. Even frequency bands supporting 56 MHz channel arrangements in XPIC configuration are deemed inadequate to meet the peak speeds required by new 5G technology. In response to this increased demand, Three is in the process of migrating away from the traditional bands and primarily deploying in the 18 GHz, 26 GHz and 80 GHz bands. Three would advise that when reviewing channel arrangements, consideration should be given to providing 224 MHz channels in all bands were sufficient spectrum is available.

Below is a view on frequency bands from U6 GHz and above as Three does not deploy microwave technology in bands below U6 GHz.

U6 GHz – 40 MHz Channels allowed at present. Three would suggest that 80 MHz channels should be made available so that the U6 GHz band can be used for Mobile Backhaul in certain rural scenarios.

7 GHz – 28 MHz Channels allowed at present. Three has very few radio links in this band and plans to vacate the band entirely. We do not anticipate any future use of the 7 GHz band due to lack of available spectrum.

11 GHz – 40 MHz channels allowed at present. Three would suggest that 80 MHz channels should be made available so that the 11 GHz band can be used for Mobile Backhaul in certain rural scenarios.

13 GHz – 56 MHz channels allowed at present. Three would suggest that 112 MHz channels should be made available so that the 13 GHz band can be used for Mobile Backhaul in certain rural scenarios. With increased fibre deployment and moves to higher frequencies, it is likely that the 13 GHz band will become less congested making it feasible to support wider channel arrangements. At present, 13 GHz is only used as a last resort for new radio links.

15 GHz – 56 MHz channels allowed at present. Three would suggest that 112 MHz channels should be made available so that the 15 GHz band can be used for Mobile Backhaul in certain rural scenarios. With increased fibre deployment and migration to higher frequencies, it is likely that the 15 GHz band will become less congested making it feasible to support wider channel arrangements. At present, 15 GHz is only used as a last resort for new radio links.

18 GHz – 110 MHz channels allowed at present. Three would suggest that 220 MHz channels should be considered in this band. There are all-outdoor microwave solutions available today which support 224 MHz channel spacings. The 18 GHz band has more available spectrum than the 13 GHz and 15 GHz bands making it suitable for 224 MHz channels.

23 GHz – 112 MHz channels allowed at present. As Three holds a national licence in the 26 GHz band, Three does not licence new radio inks at 23 GHz. It is unlikely that we will use this band in future due to limitations in available spectrum.

26 GHz Band – Block allocated with maximum 28 MHz available in licenced area of the band. Three has a very small number of individually licenced point to point links in this band. These will be replaced over the short to medium term in favour of radio links in our own 26 GHz national licence. See further comments on the wider 26GHz band in response to Q.10.

28 GHz – 112 MHz channels allowed at present. Due to ownership of spectrum in 26 GHz band, Three does not licence new radio inks at 28 GHz. It is unlikely that we will use this band due to limitations in available spectrum.

31 GHz - 112 MHz channels allowed at present. As Three holds a national licence in the 26 GHz band, Three does not licence new radio inks at 31 GHz. It is unlikely that we will use this band due to limitations in available spectrum.

38 GHz - 112 MHz channels allowed at present. As Three holds a national licence in the 26 GHz band, Three does not licence new radio inks at 38 GHz. It is unlikely that we will use this band due to higher capacity offered by E-Band solutions which can achieve similar range to 38 GHz. However, Three would suggest that 224 MHz channels should be made available in this band.

42 GHz - 112 MHz channels allowed at present. As Three holds a national licence in the 26 GHz band, Three does not licence new radio inks at 42 GHz. It is unlikely that we will use this band due to higher capacity offered by E-Band solutions which can achieve similar range to 42 GHz. However, Three would suggest that 224 MHz channels should be made available in this band.

70 / 80 GHz – No changes required.

Q3. ComReg seeks the views of interested parties on block licensing one or more of the frequency bands listed above, and/or any other relevant frequency bands. Please provide supporting material that informs your position.

Due to the high volume of licenced links in the above bands, Three does not believe that block licencing of spectrum is appropriate in existing bands due to the very high relocation costs that would be incurred to vacate spectrum. However, for new bands such as W-Band or D-Band which are currently unoccupied, Three would be open to the view that block licencing might be appropriate to ensure more efficient use of the spectrum.

Given the very low volume of links deployed in the 42 GHz band, this could also be considered for block allocation however it is uncertain that this band would attract much appeal given that E-Band offers a higher capacity alternative to 42 GHz.

Q4: ComReg seeks the views of interested parties on the measures that could be taken to improve the turnaround times for fixed links licence applications and would assist licensees in their network planning. Please provide supporting evidence for your answers.

Three is of the view that most licence applications are processed within a reasonable timeframe. We would estimate that most applications are processed within one to two weeks of submission. We would suggest however that applicants be given a fixed number of escalations that can be used in emergency situations where very quick turnarounds are required. An upper limit could be placed on the number of escalations per operator in a given year so as to avoid abuse of the escalation procedure.

Q5: ComReg welcomes the views of interested parties regarding the matters discussed in DotEcon's report and ComReg's preliminary views regarding the Guidelines document and the technical parameters therein. Respondents should provide appropriate supporting information when expressing any views.

No further comments.

Q6: ComReg also welcomes views on any further technical matters regarding the deployment of Fixed Radio Links a respondent may deem relevant. Again, Respondents should provide appropriate supporting information when expressing any views.

ComReg seeks views from interested parties on:

- specific aspects of the guidelines that should be reviewed (i.e. is there any aspect of the guidelines that may inhibit certain uses or technologies outlined above);

With increasing capacity demand, it is likely that operators will begin to deploy link bonding where E-Band links are aggregated with lower frequency links. In such scenarios, the reliability is provided by the lower band and capacity is provided by the higher band. In such deployment scenarios, it is reasonable to accept a lower availability on the E-Band portion given that the reliability is provided by the other frequency band in the bonded group. The guidelines need to be updated to accommodate this and to allow E-Bands to be licenced with lower availability when bonded with a different band.

- information that ComReg could provide in order to ensure better coordination of frequencies and encourage the efficient use of the spectrum more generally;

No suggestions

- the structure of the fee schedule (e.g. views on the likely value differences across bands, bands likely to be more or less valuable, congestion charging).

No suggestions

- any pricing methodologies that would be suitable for some or all of the Fixed Link Bands (taking account of demand and supply considerations as may apply to each).

ComReg might consider the benefit of offering pro-rata refunds if licences are cancelled during their 12-month term. Application of a processing cancellation fee and the refund of the residual value of the licence may be a better solution to the current situation where operators apply for temporary licences.

Q7: ComReg seeks the views of interested parties on the current and potential future use of the 1.4 GHz Band and whether all of this band should be included in an award for wireless broadband in the future.

Three does not have any plans to deploy equipment in the 1.4 GHz Band.

Q8: To the extent that respondents are of the view that the 1.4 GHz Band should be awarded for wireless broadband, ComReg seeks the views of respondents on when those rights of use should be assigned.

No Comments.

Q9: ComReg seeks the view of interested parties on the potential re-opening of the 13 GHz and 15 GHz bands in the Congested Area. Please provide supporting information with your response.

Three does not have a particularly strong opinion on this matter. The 13 GHz and 15 GHz are unsuitable for use in congested areas and therefore it likely that the number of radio links in these bands will diminish over time due to increased fibre deployment and migration onto higher frequency bands that are suitable for mobile backhaul.

Therefore, it is our view that there will be little demand for 13 GHz and 15 GHz spectrum in congested areas. As such, it should be possible to re-open licencing in these areas and perhaps in time remove congestion charges altogether as the number of radio links decrease.

Q10: ComReg seeks views from interested parties on the current use of the 26 GHz Band for Fixed Links. Respondents should note that any views in relation to the future use of the band for other technologies and uses (e.g. wireless broadband-ECS/5G) will be considered separately as part of ComReg's 26 GHz Study due to be published in Q4/2020.

Notwithstanding ComReg's statement that it intends consult separately on the use of the 26GHz band for Mobile/ECS/5G (5G) services it is important that this matter is considered at the same time as the future use of the band for fixed links. These matters cannot be considered separately as any new implementation of fixed links in the band now could preclude use of the same spectrum for 5G.

The 26GHz band is considered to be a Pilot band for 5G in Europe, and Member States are required to make a large portion of this band available for 5G service from 2020 on (Article 54 EECC). The most efficient use of this band can be made when large contiguous blocks are available to users. Significant parts of the band are already incumbered in Ireland because of its use for FWALA, Point to point fixed links (National Licences) and Point to point fixed links (Individual Licences). ComReg should use the opportunity of this review to reorganise allocations in the band to deliver the most efficient use. At this time, only 1,097MHz of spectrum is free at the upper end of the band and available to be assigned to 5G services. Three is of the view that this is not adequate to meet future demand for 5G services. ComReg should now consider each of the current allocations (FWALA, P2P National, P2P Individual) with a view to making more spectrum available for 5G service. If some re-organisation of the band is required, then it is best that that is flagged now so that current users can begin to plan for the change.

At this time, Three is of the view that the 26GHz P2P National Licences could not easily be moved to a different band as licensees have only recently re-invested in equipment in this band and it supports a large amount of operational links. There are relatively few links operating in the P2P Individual Licence sub-band and ComReg should now begin to plan for migration out of this sub-band altogether for fixed links. This would liberate an additional 168MHz of spectrum that is contiguous to the 5G sub-band, expanding the total available to 1,265MHz.

ComReg should now give notice to existing P2P Individual Licensees in the 26GHz band (which includes Three) that it intends to re-allocate the sub-band to 5G service. Three considers that 2 years would be adequate notice of this change of allocation, and during this period alternative assignments could be identified. It is likely that many of the existing individually licensed links could be re-tuned to use the currently vacant channels within the National Licence sub-band, or even to a portion of the FWALA band which is also not heavily used.

Q.11 ComReg seeks the views of interested parties on the potential future use of the D-band and W-band and the equipment availability for those bands. Please provide supporting information with your response.

Three would view the D-Band and W-Band as potentially being extremely important in the evolution of mobile backhaul. With increased site density and shorter site to site distance, it is likely that the W-Band and D-Band could provide very high capacity solutions in Urban and Dense Urban environments. As the technology remains in early stages of development, we have yet to evaluate performance and reliability in these bands.

It is possible that W-Band and D-Band links could be aggregated with lower frequency bands to leverage the very high capacity available at the higher frequency with the greater reliability of the lower band microwave.

Once these bands become available, Three would suggest that block allocation of spectrum may be advisable in order to maximise efficient usage of these bands.

Q12: ComReg seeks the views of interested parties on the current and future use of the 5.8 GHz, 17 GHz, 24 GHz and 60 GHz licence-exempt bands, and the requirement to implement a Light Licensing framework to address interference issues in the licence-exempt bands. Please provide evidence in support of your views.

Three has not deployed microwave equipment in the licence-exempt bands. At this point in time, we do not have any plans to use these bands.

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16: Viasat Inc (“Viasat”)

7 December 2020

Mr. Martin O Donoghue
Commission for Communications Regulation
One Dockland Central, Guild Street, Dublin 1, Ireland, D01 E4X0

Submitted to: marketframeworkconsult@comreg.ie

RE: **Submissions to ComReg 20/109**

Viasat is pleased to have the opportunity to comment on the Commission for Communications Regulation's (ComReg) "Preliminary Consultation on the Fixed Links Bands Review" (ComReg Document 20/109) and the accompanying Consultant's report (ComReg Document 20/109A) ("Consultation"). As the fixed links band 24.25-27.5 GHz (26 GHz) band is adjacent to the 27.5-29.5 GHz (28 GHz) band (Earth-to-space), which is used for satellite broadband service. Viasat offers comments focused on the frequency management of fixed links, including channel arrangements. Viasat also offers comments on the paired satellite band 17.7-19.7 GHz (18 GHz) band (space-to-Earth) that is used for fixed links and satellite service.

Viasat also has great interest in ComReg's intention to issue additional consultations regarding a new licensing framework for satellite earth stations and terminals according to the annual action plan for 2020/2021, as well as ComReg's intention to issue an Information Notice and Consultant's report in Q4 2020 on an appropriate licensing framework or frameworks for assigning spectrum in the 26 GHz band for Mobile/Fixed Communications Networks (MFCN)/electronic communications services (ECS). Viasat intends to present additional details related to the new licensing framework for satellite stations and the 26 GHz frequency band in future submissions.

Viasat is a global leading provider of communications solutions across a wide variety of technologies, both satellite and terrestrial. As the world's only vertically integrated end-to-end satellite operator, Viasat designs and builds every component of our networks—user terminals, satellite payloads and ground stations—to meet the market demand for reliable, effective and affordable, high-speed broadband connectivity.

Viasat's use of the Ka band, specifically the paired frequency bands 27.5-30 GHz (Earth-to-space)/17.7-20.2 GHz (space-to-Earth), is robust as Viasat uses this spectrum to

make high-speed broadband services available to millions of households and businesses in North America, Central America, Latin America,[1] Australia,[2] and across Europe[3].

The 28 GHz portion of the Ka band, that is adjacent to the 26 GHz band, is a critical element of the satellite broadband connected world. The satellites using the 28 GHz band bridge the digital divide today and will continue to do so in the future. These satellites provide ubiquitous connectivity that no other technology can offer.

Viasat has pioneered mobile broadband services using innovative antenna designs for Earth Stations in Motion (ESIM) service to aircraft, ships and other land-based users. For example, passengers and crew on aircraft, use the 28 GHz band, in addition to the rest of the Ka band identified above, to meet demand for gate-to-gate, high-speed broadband for communications and entertainment, cabin support, and fleet digitization and maintenance. Global shipping and passenger vessels rely on the 28 GHz and the rest of the Ka band above for navigation and broadband communications benefiting passengers and crew and facilitating the transportation of cargo. Trains, buses and other land-based vehicles, including emergency vehicles, also rely on satellite broadband services, operating in the 28 GHz band and the rest of the Ka band, for passenger connectivity, operations and maintenance support, and fleet tracking. According to CEPT 5G Roadmap, Europe[4] has harmonized the 27.5-29.5 GHz band for broadband satellite service and is supportive of the worldwide use of this band for ESIM.

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1 https://viasat.com.mx/community-wi-fi/?lang=en; *Viasat Brings Fastest Home Satellite Internet Service to Mexico*, https://www.viasat.com/news/viasat-brings-fastest-home-satellite-internet-service-mexico; *Viasat Completes Brazilian Residential Internet Service Roll-Out--Now Covers 100% of the Country; Offers New Premium Satellite Internet Service Plan with Highest Speed and Data*, https://www.prnewswire.com/news-releases/viasat-completes-brazilian-residential-internet-service-roll-outnow-covers-100-of-the-country-offers-new-premium-satellite-internet-service-plan-with-highest-speed-and-data-301161443.html.

2 *Viasat Wins $286M Satellite Broadband Deal with Australia*, https://spacenews.com/viasat-wins-286m-satellite-broadband-deal-australia/.

3 *Viasat's Expansion in Europe Helps Bridge the Gap to Faster Broadband (video)*, https://corpblog.viasat.com/viasats-expansion-in-europe-helps-bridge-the-gap-to-faster-broadband/; *Viasat Affirms Commitments to Bring its Powerful ViaSat-3 Satellite to Europe*, https://www.viasat.com/news/viasat-affirms-commitments-bring-its-powerful-viasat-3-satellite-europe.

4 *See Action B.3* in https://www.cept.org/Documents/ecc/57839/ecc-20-055-annex-15_cept_5g_roadmap.

Taking into account the critical connectivity services described above, Viasat provides answers to the following questions included in the Consultation:

Q2. ComReg seeks views of interested parties regarding the current and future channel arrangements for all the Fixed Link Bands in ComReg's Guidelines document 09/89R2, and any other channel arrangements recommended or being considered by the CEPT and/or ITU. Please provide evidence and reasoning for your views.

Answer. Viasat is of the view that channel arrangement modifications for fixed links need to take into account the current use and future demands of satellite service applications. For example, the 28 GHz (27.5-29.5 GHz) and 18 GHz (17.7-19.7 GHz) bands are in extensive use by satellite broadband systems today. Therefore, any changes to fixed link channel arrangements should only be undertaken in consultation with satellite operators. Here, Viasat is concerned that demand for fixed links for greater capacity (including fixed links for mobile backhaul) requiring the application of new technologies, *e.g.*, active antenna systems[5], including mesh point-to-point, also called multi-point-to-multi-point topology, which may adversely impact the existing radio environment for satellite.

Q3. ComReg seeks the views of interested parties on block licensing one or more of the frequency bands listed above[6], and/or any other relevant frequency bands. Please provide supporting material that informs your position.

Answer. Viasat is of the view that block licensing for fixed links should not prevent the development and future use of satellite services allocated on a co-primary basis in the same frequency bands. In particular, Viasat has no concerns with the bands proposed in ComReg 20/109, i.e., 32 GHz, 80 GHz, 92-114.25 GHz, 130-174 GHz. Viasat is against, however, the introduction of 200 megahertz block assignments for the new type of point-to-multi-point fixed links in the 28 GHz band unless compatibility studies prove that coexistence is possible.

Q10: ComReg seeks views from interested parties on the current use of the 26 GHz band for fixed links. Respondents should note that any views in relation to the future use

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5 *See* Studied by SE19 as Working item SE19_44 "New microwave PMP technologies based on active antennas for 5G backhaul above 27.5 GHz": http://eccwp.cept.org/default.aspx?groupid=45.

6 *See* Paragraph 91 of the ComReg 20/109 "The DotEcon Report notes that block licenses offer strong benefits for users who want to be able to deploy a large number of links at similar frequencies at short notice. DotEcon identifies the 32 GHz, 80 GHz, 92-114.25 GHz, 130-174 GHz bands as potentially suitable for Block licensing at some point in the future."

of the band for other technologies and uses (e.g., wireless broadband-ECS/5G) will be considered separately as part of ComReg's 26 GHz Study due to be published in Q4/2020.

Answer. Viasat supports continued use of the 26 GHz for terrestrial fixed links. As outlined in the Consultation, there is no immediate need to make any decisions on the future of fixed links in the 26 GHz frequency band.

As outlined in EC DEC 2019/784, ComReg should only consider identifying more than one gigahertz of spectrum for terrestrial IMT/5G if there is market demand for it. Otherwise, it should not identify more than one gigahertz.

Viasat supports ComReg's 20/109 decision not to consider the 28 GHz band for possible migration of fixed links from the 26 GHz band. As the Consultation points out, the 26 GHz band is only in the early stages of use by the terrestrial IMT/5G industry. Given the vast amount of spectrum in the 26 GHz band for both terrestrial IMT/5G (i.e., 1 gigahertz) and existing fixed links, there is no need to consider the 28 GHz band for fixed migration, particularly given that the 28 GHz band is already heavily used by satelliteservices. As mentioned in Paragraph 94 of the Consultation, the 32 GHz (31.8-33.4 GHz) band can be used as an alternative for the migration of fixed links from the 26 GHz frequency band, if needed. This migration would only be needed if terrestrial IMT/5G services expanded beyond the 1 gigahertz available in the 26 GHz band. Also, the 32 GHz frequency band can be used as a replacement for block licenses in the 26 GHz band when those licenses expire in 2028.

Viasat summarizes the following points and urges ComReg:

1. to continue use of the 26 GHz band for fixed link services as there are vast amounts of spectrum available for terrestrial IMT/5G in the band;
2. to consider that changes in channel arrangements for fixed links need to take into account the use of the existing satellite service applications, especially, in the 28 GHz and 18 GHz bands that are extensively used by satellite broadband systems today;
3. to adopt the CEPT Roadmap for terrestrial IMT/5G that harmonizes and secures the 28 GHz band for satellite broadband service: and
4. to ensure that block licensing for fixed links does not prevent development and future use of satellite services allocated in the co-primary frequency bands.

Viasat appreciates ComReg's consideration of the information above and commitment to the development of satellite broadband services throughout the 27.5-30 GHz and 17.7-20.2 GHz portions of the Ka band, including the 28 GHz portion of the band. We remain at your disposal to answer any further questions or provide further details as requested.

17: Virgin Media Ireland Ltd (“Virgin”)

Virgin Media response to:

Preliminary Consultation: Fixed Links Bands Review

ComReg 20/109

7th December 2020

Virgin Media Ireland Limited ('Virgin Media') welcomes the opportunity to respond to ComReg's Consultation ('the Consultation') on the Fixed Links Bands Review ('ComReg 20/109).

Please find our responses to ComReg's questions in the following section.

Response to Consultation Questions

Q. 1 ComReg seeks the views of interested parties on the existing and potential use cases identified above and whether there are other use cases that should be considered in determining an appropriate licensing framework. In the case of other potential use cases please provide supporting material for your answers

ComReg identifies that the potential use cases for the bands assigned for use by Fixed Links are:

- narrowband telemetry and control applications;
- broadcast distribution;
- backhaul from mobile cell sites;
- fixed wireless access;
- links within core networks;
- advanced fixed wireless services in urban areas; and
- specialist low latency links (e.g. for financial trading).

Virgin Media agrees with the identified use cases.

Q. 2 ComReg seeks views of interested parties regarding the current and future channel arrangements for all the Fixed Link Bands in ComReg's Guidelines document 09/89R2, and any other channel arrangements recommended or being considered by the CEPT and/or ITU. Please provide evidence and reasoning for your views.

ComReg sets out the current and future channel arrangements as follows:

- Any larger channel bandwidths being recommended by the CEPT and/or the ITU should be made available as part of the licensing regime;
- Possibly making the 112 MHz channels available in the 13 GHz and 15 GHz bands for Fixed Links.

Virgin Media welcomes the proposal to ensure that the Fixed Links licensing regime aligns with the recommendations of CEPT and/or the ITU. In particular we fully support the proposal to make available larger channel bandwidths. However the potential for interference with other channels will need to be considered by ComReg and operators with any proposal in this regard.

Higher bandwidths will be required on existing fixed links and for new fixed links as customers request greater throughputs. Virgin Media believes that some higher throughputs may be possible by the constantly improving technology (better Rx thresholds, higher transmit powers, etc.) but higher bandwidths will be necessary in many cases.

In relation to the 112 MHz channels Virgin Media would request that ComReg be mindful of any potential interference associated with this.

Q. 3 ComReg seeks the views of interested parties on block licensing one or more of the frequency bands listed above, and/or any other relevant frequency bands. Please provide supporting material that informs your position.

Virgin Media agrees with ComReg's proposal on block licensing one or more of the frequency bands listed in the Consultation, and /or any other relevant frequency bands. This would reduce the necessity for multiple applications and therefore streamline the process.

ComReg proposes to provide for block licences for the 80GHz band in urban centres excluding Dublin. We do not support the proposal for block licensing for the 80GHz because of the likely impact on the availability of this band for future deployments. While ComReg has proposed that the Dublin region would be excluded from any potential block licensing, other major urban locations are provided for. We do not agree that block licensing should be available in any location.

We support the proposal to follow the CEPT published recommendations for the channel arrangements in both the W-band 92-114.25 GHz) and the D-band (130-174.8 GHz) once equipment for Fixed Links in these bands became available.

Q. 4 ComReg seeks the views of interested parties on the measures that could be taken to improve the turnaround times for fixed links licence applications and would assist licensees in their network planning. Please provide supporting evidence for your answers

Virgin Media would support any proposal to improve the turnaround times for fixed links licence applications. Currently there is uncertainty around when an application will be fully approved and this can affect an operator's planning.

ComReg suggests that there are issues with regard to the applications received from applicants and that these issues can have an impact on turnaround time for licence applications. One issue that ComReg highlights is that there can be delays by applicants in responding to ComReg emails. ComReg further suggests that an improvement in planning by applicants along with early demand forecasts could help ComReg better manage the resource flow.

Virgin Media suggests that perhaps a more automated licensing application process would alleviate some of these issues. For example ComReg states that in some situations operators do not provide link budgets or correct information in their applications. We propose that ComReg considers the development of a new automated application process instead of the existing xml process that would be more user friendly, would provide guidance on the application process and that would also automatically detect these issues upon application. Where issues are detected applications would not progress until all and/or correct information is provided by the applicant. We suggest that an automated response is generated when an application is being reviewed and when an application has been approved by ComReg. This would alleviate some of the issues ComReg has identified and would streamline the process for both applicants and ComReg.

Q. 5 ComReg welcomes the views of interested parties regarding the matters discussed in DotEcon's report and ComReg's preliminary views regarding the Guidelines document and the technical

parameters therein. Respondents should provide appropriate supporting information when expressing any views.

Virgin Media agrees with ComReg's preliminary view that the Guidelines document should be reviewed on a regular basis to reflect equipment and technology developments.

Q. 6 ComReg also welcomes views on any further technical matters regarding the deployment of Fixed Radio Links a respondent may deem relevant. Again, Respondents should provide appropriate supporting information when expressing any views.

Virgin Media agrees with ComReg's preliminary views with regard to the deployment of fixed radio links and that licensees should be able to deploy new equipment/techniques not specifically referred to in the guidelines upon notification to ComReg, and the permitting of shorter path lengths for Fixed Radio Links that use techniques such as band carrier aggregation (BCA) to increase capacity.

Q. 6 b
ComReg seeks views from interested parties on:

• specific aspects of the guidelines that should be reviewed (i.e. is there any aspect of the guidelines that may inhibit certain uses or technologies outlined above);

• information that ComReg could provide in order to ensure better coordination of frequencies and encourage the efficient use of the spectrum more generally;

• the structure of the fee schedule (e.g. views on the likely value differences across bands, bands likely to be more or less valuable, congestion charging).

• any pricing methodologies that would be suitable for some or all of the Fixed Link Bands (taking account of demand and supply considerations as may apply to each).

Where appropriate, please provide supporting material with your response.

Virgin Media considers that the annual fees especially on the frequencies 38GHz and below on higher bandwidths can impact or impede the use of these frequencies. This issue becomes more apparent when operators are dealing with cross border links and are therefore in a position to compare to the equivalent Ofcom pricing model. Virgin Media welcomes the fact that a full review of the Fixed Links fee schedule will follow the preliminary consultation.

Q. 7 ComReg seeks the views of interested parties on the current and potential future use of the 1.4 GHz Band and whether all of this band should be included in an award for wireless broadband in the future.

Virgin Media has no comments.

Q. 8 To the extent that respondents are of the view that the 1.4 GHz Band should be awarded for wireless broadband, ComReg seeks the views of respondents on when those rights of use should be assigned.
Where appropriate, please provide supporting material with your response.

Respondents should note that views on the award of the 1.4 GHz band for WBB will form input to ComReg's separate consultation process to consider same, which would commence following the award of spectrum in the MBSA2.

Virgin Media has no comments.

Q. 9 ComReg seeks the view of interested parties on the potential re-opening of the 13 GHz and 15 GHz bands in the Congested Area. Please provide supporting information with your response.

Virgin Media would welcome the re-opening of the 13 GHz and 15 GHz bands in the Congested Area. This would allow operators to make use of this spectrum in the designated areas.

Q. 10
ComReg seeks views from interested parties on the current use of the 26 GHz Band for Fixed Links. Respondents should note that any views in relation to the future use of the band for other technologies and uses (e.g. wireless broadband-ECS/5G) will be considered separately as part of ComReg's 26 GHz Study due to be published in Q4/2020.

Virgin Media has no comments.

Q. 11 ComReg seeks the views of interested parties on the potential future use of the D-band and W-band and the equipment availability for those bands. Please provide supporting information with your response.

Virgin Media supports the proposal to open the D-band (130-174 GHz) and the W-band (92-114 GHz) as this would help address increasing demand for bandwidth. ComReg notes that these should not be opened for Fixed Links until equipment is readily available. If ComReg decides to wait until equipment is available to open these bands then it will be important that there is a quick and smooth process in place for opening up the band. Virgin Media would like to ensure that once equipment is available there is no delay for operators wishing to use either band.

Q. 12 ComReg seeks the views of interested parties on the current and future use of the 5.8 GHz, 17 GHz, 24 GHz and 60 GHz licence-exempt bands, and the requirement to implement a Light Licensing framework to address interference issues in the licence-exempt bands. Please provide evidence in support of your views.

The opening of higher frequency bands would be extremely beneficial to support the services offered by Virgin Media and other industry participants in future, specifically the 60GHz band (58.24GHz – 70.2GHz), which can provide high throughput last mile solutions. The ability to licence point to point and point to multipoint (self-organising mesh) equipment at 60GHz would be very beneficial. Virgin Media would request some information as to any plans in relation to this band.

In our pre-consultation submission we highlighted this band and its importance in the future. Virgin Media believes that just because to date most licence exempt Fixed Links operate in the 5.8 GHz licence-exempt band this does not mean that there will not be future demand for other bands and therefore potential for interference. It is important to ensure that future demand is managed effectively and in a timely manner.

A light licensing framework would be of benefit in the license-exempt bands to limit potential for interference. We would like more information as to how such a 'light licensing framework' would operate in practice. As ComReg points out there is a Light Licensing framework, namely a registration requirement for radio links deployed in the 5.8 GHz band but this does not address interference issues. Virgin Media would support a light-licensing framework that addresses interference issues across all licence-exempt bands, including the 60GHz band.

18: Vodafone Ireland Ltd (“Vodafone”)

Non-Confidential version

Vodafone Response to

Review of the Fixed Radio Links Licensing Regime

Reference: ComReg Doc 20/109

Introduction

Vodafone welcome the opportunity to respond to ComReg Doc 20/109 Review of the Fixed Radio Links Licensing Regime.

Use of radio links is of enormous importance to Vodafone in providing telecommunications services in Ireland, particularly as backhaul for public mobile networks.

The use of these links is a key enabler for us to meet the every growing demand for increased mobile data volumes, and the ability to licence and install links quickly enables us to respond dynamically to changes in customer demand. For example, in the recent Covid Emergency we have been able to add capacity quickly in the new geographic areas where demand occurred by using radio links. The timescale associated with installation of fibre would not meet this demand on time, and the cost of installing fibre remains high in Ireland.

Given ComReg's plan to Award more mobile spectrum in 2021 and expected large-scale rollout of 5G we anticipate that more radio links and higher bandwidth in links will be expected in the coming years.

We agree that radio link spectrum is an important national resource and should be used efficiently to deliver services to customers. We appreciate the extensive consultation process that ComReg are engaging in to ensure best use of this resource and look forward to engaging fully in future rounds of consultation.

ComReg Spectrum Consultation

Contents

1. Section 3.4: Preliminary views on potential use cases for Fixed Links

Q1: ComReg seeks the views of interested parties on the existing and potential use cases identified above and whether there are other use cases that should be considered in determining an appropriate licensing framework. In the case of other use cases please provide supporting material for your answers

1.1 Response

Vodafone Ireland are aligned with the use cases listed in the DotEcon report. Of particular interest to us is the advanced fixed wireless services. Beamforming and Interference Cancellation techniques are now becoming available to us from our suppliers and we see great potential for these techniques in metro areas under certain controls. For example, interference cancellation is reliant on a Nodal solution, which manages more than one fixed link system, so that is can measure the interference between the systems and compensate. For this system to work seamlessly, it would probably fit best in a block allocation scenario, but not exclusively. For applications made by Vodafone Ireland outside of block allocation, we would be of the understanding that we could apply for licence, knowing that there would be interference with our own system without interference cancellation and that ComReg would not reject the application because of interference, if the interference exists solely on the Vodafone network.

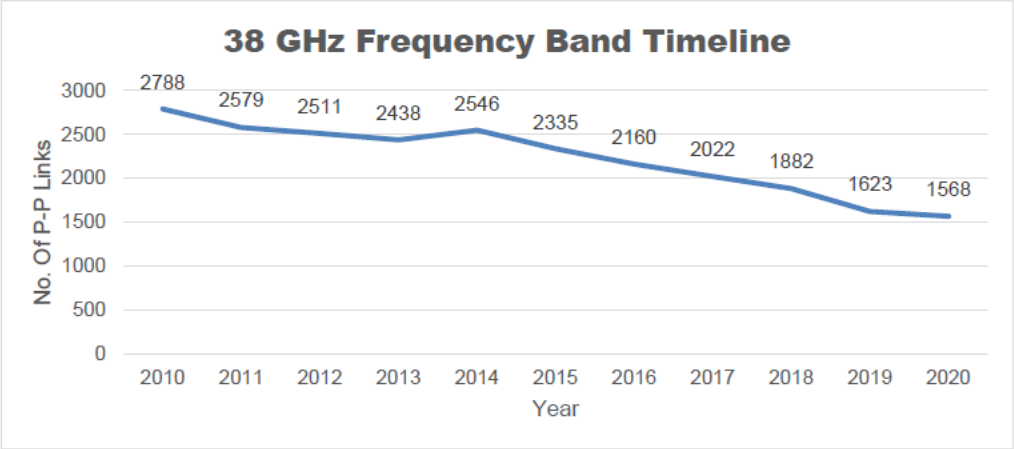
2. Section 4.1: Spectrum Availability and channel arrangements

Q2: ComReg seeks views of interested parties regarding the current and future channel arrangements for all the Fixed Link Bands in ComReg's Guidelines document 09/89R2 and any other channel arrangements recommended or being considered by the CEPT and/or ITU. Please provide evidence and reasoning for your views.

2.1 Response

Vodafone Ireland would support any increase in channel bandwidth across 11GHz, 13GHz, 15GHz, 18GHz, 23GHz, 28GHz and 38GHz bands. Of particular interest to us is the expansion of the 11GHz band to 80MHz[1] channels for long-haul fixed microwave and metro solutions in 28GHz and 38GHz. For 38GHz band, we would like to see future expansion to 224MHz bandwidth capabilities, which would make 38GHz band a viable alternative to 80GHz band, when implemented in 2+0 XPIC. The 38GHz band is in decline and on the Vodafone network only comprises of 4.8% of our total access microwave deployment,

Figure 44: The 38 GHz Frequency Band Timeline



238 There are thirty-six licensees using the 38 GHz frequency band as at 30 June 2020. The main licensees of the 38 GHz frequency bands in Ireland are:

Figure 1 – 38GHz Timeline. Band is in decline

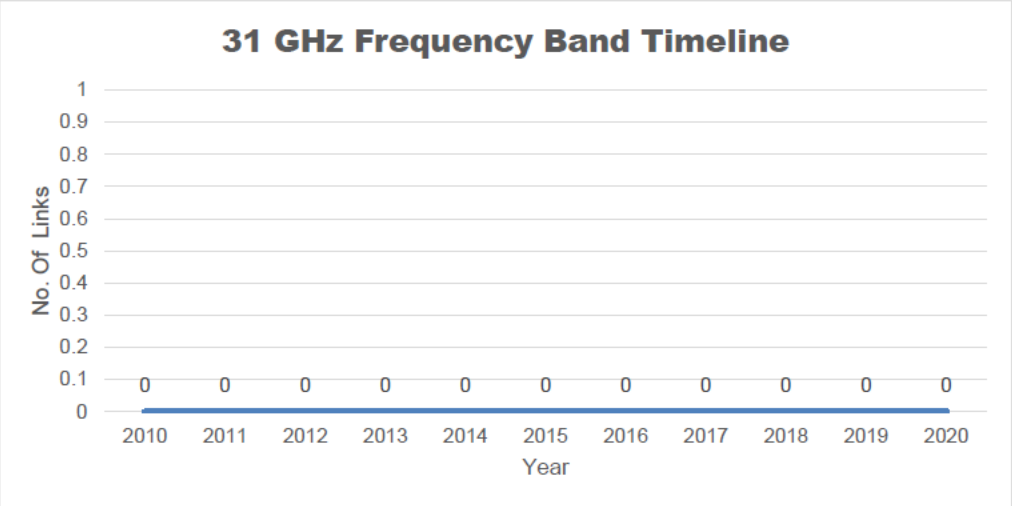
Vodafone Ireland does not currently have any licences in 32 GHz band, but acknowledges that this band may be a suitable replacement for 26GHz National Block at a future date. Given that 32GHz is not currently licenced by any operator[2], Vodafone Ireland would like ComReg to consider reserving currently closed band (31.8-33.4 GHz) for potential block licensing in the future and not allow applications in this band to allow for easy transition of 26GHz national block allocations, should the need arise, or as an additional block allocation. Vodafone seek clarification from ComReg to see if it is intended to open the upper 32Ghz band (31.8-33.4 GHz), as per ITU recommendation

[1] ECC Report: https://docdb.cept.org/download/b7f53395-a40b/ECC%20Report%20319.pdf

[2] As per ComReg-20109 Annex 1 Figure 43

ITU-R F.1520-1[3]?. Currently, not all of the 32Ghz band is open and the channel bandwidth is restricted to 28MHz on the current 31.0 to 31.3GHz range, which is not seen as a strong choice for high capacity fixed links.

Figure 43: The 31 GHz Frequency Band Timeline



235 There are no licensees of the 31 GHz frequency band in Ireland as at 30 June 2020.

Figure 2 – 31 GHz band not currently used by any operators

[3] ITU-R F.1520-1 https://www.itu.int/dms_pubrec/itu-r/rec/f/R-REC-F.1520-1-200202-S!!PDF-E.pdf

3. Section 4.2: Block Licences

Q3. ComReg seeks the views of interested parties on block licensing one or more of the frequency bands listed above, and/or any other relevant frequency bans. Please provide supporting material that informs your position.

3.1 Response

Vodafone supports any additional useable block licences that align to capacity goals for the spectrum and do not remove scalability potential in their implementation as hardware capabilities and advanced features are developed and deployed. Interference Correction is one important technique to consider, where spectrum congestion is an issue. Block allocation allows for self-regulation and more spectral efficiency through advanced techniques such as Interference correction, which is reliant on nodal hardware.

3.2 26GHz Block Allocation

Vodafone acknowledges that the current 26GHz National Block allocation may come to an end in 2028, without renewal due to possible re-allocation to 5G. Vodafone Ireland's reliance on this band is very significant, comprising of 40.72% of its access microwave deployment and is a good example of why block allocation at high bands works well due to Vodafone's ability to rapidly deploy and self-regulate in this band. Vodafone would be interested therefore in the possibility of using another band to replace the 26GHz allocation, and sees the 32GHz band (31.8 to 33.4GHz), as per ITU-R F.1520-1 and any future expansion of the channels bandwidths to 112MHz or higher as per ECC report[4] and ERC recommendations ERC REC 01 02.

Should the 32GHz band be opened as a Block allocation and a direct replacement of 26GHz band, Vodafone would need both a notice period and a further implementation period to carry out a smooth and efficient transition. We suggest that a decision on the use of 26GHz post 2028 should be made before the end of 2023. This decision should recognise the need to allow for the purchase of significant quantities of new equipment for the swap and for the subsequent and significant project management required to replace the 26GHz band. We look forward to further discussion with ComReg on the future of this band.

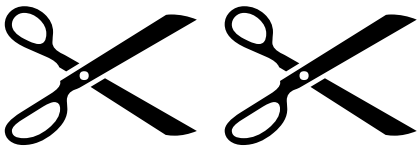


Figure 3 [✂ [redacted] ✂]

3.3 Additional Block Allocations

Vodafone has expressed an interest in additional block allocations, possibly in the 80GHz band. However, Vodafone would be hesitant to seek a block allocation in the 80GHz band should the allocation result in a reduction of current bandwidths allowable.

[4] ECC Report: https://docdb.cept.org/download/b7f53395-a40b/ECC%20Report%20319.pdf

Currently 1000MHz channel bandwidths are allowed. Block Allocation in 80GHz in other European countries has resulted in reduced bandwidth (max 500MHz), which Vodafone sees as restrictive for high-speed metro deployments and Optic Fibre alternatives. Vodafone also would not be in favour of an 80GHz block allocation due to the large deployments currently in this band and express concern about future congestion in this band, [✂ [redacted] ✂]

Figure 49: The 70 / 80 GHz Frequency Band Licensees

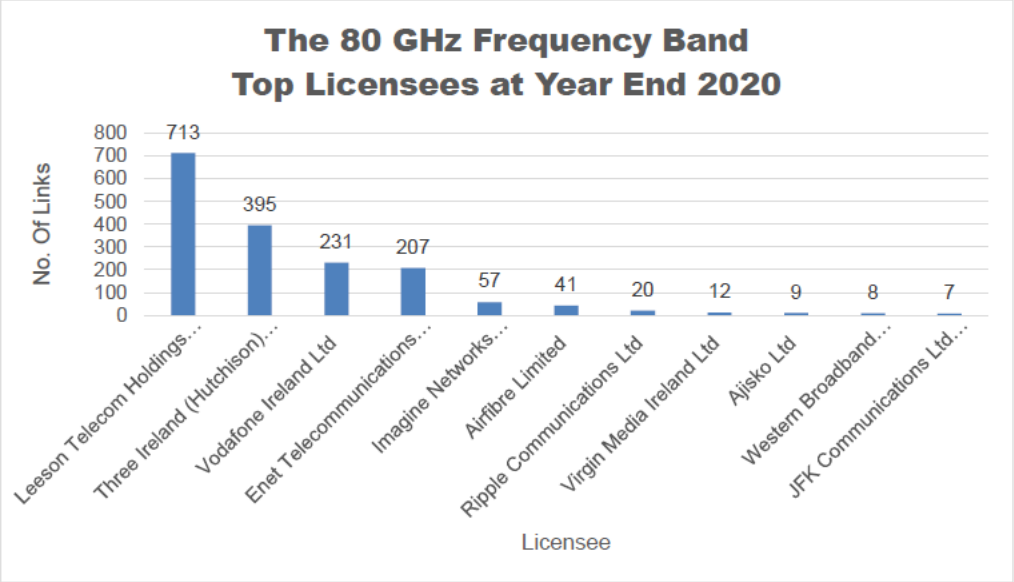


Figure 4 – 80GHz licensees at year end 2020

Where Vodafone does express an interest in block allocation is within the new W-Band and D-Band. Currently Vodafone is working with our suppliers to develop hardware to utilise these bands. We don't see the hardware becoming available for possibly the next 2 years, but we do see in particular the W-Band as a natural expansion of the 80GHz band, which is fast becoming congested in Dublin and other metro areas. Pending ETSI standards for these bands, and given they are not currently open for licensing, both the W-Band and D-Band offer the best opportunity for block allocation across all the bands, in our opinion.

4. Section 4.3: Application and Licensing process

Q4. ComReg seeks the views of interested parties on the measures that could be taken to improve the turnaround times for fixed links licence applications and would assist licensees in their network planning. Please provide supporting evidence for your answers

4.1 Response

By and large the current application process is adequate, but there are some improvements we would like ComReg to consider

1. Application for Multiband Aggregation Links should be a single application, so that it is understood to be a multiband application. As an example, Multiband application may consist of an 18GHz 2+0 XPIC and an 80GHz 1+0 application. The 18GHz 2+0 XPIC might be an existing licence and therefore a modification, or it might be a new licence. The 80GHz application would be a new licence application.

2. The above could also apply for Carrier Aggregation solutions that use adjacent channels. Current testing with our suppliers is seeing the development of Dual Carrier and Quad Carrier Outdoor Units (ODU's), which will see the possibility of implementing, single band, quad carrier solutions in adjacent and/or co-channel configurations. A single application method for this type of licence may also be considered, although we don't see deployment of this hardware in the Vodafone Ireland network for at least a year and, due to possible spectrum congestion in certain bands in certain areas, may not always be possible to deploy.

3. Online Tracking and Audit trail capabilities for each application, including an estimated time for approval. For example, the online tracking might include the following indicators:
    a. Application received, time, date and No.
    b. Estimated time for approval, or queue number
    c. Current Status
        i. Received
        ii. Under Review/Technical Assessment
        iii. More Info Required from Requester
        iv. Technical Approval
        v. Approved
        vi. Rejected
        vii. Cancelled by Requester
        viii. Additional Information

4. It would be advantageous for us to also have access to an online audit trail or history report that is maintained on a database for every application we make within a defined period, so that we can view reports on all applications we have made over a period of time and see what their outcome was. This would be particularly useful for rejected or cancelled applications so long as the information is detailed enough. For example, if we had a history report for all applications made in the last two years and we filtered on rejected and cancelled applications that show the frequency channels, at particular bandwidths that were rejected at the time, we could avoid duplicating an application if we knew it had previously been rejected. Due to the large number of planners in our

organisation, licence rejections and the reason behind them can be lost over time. This would only work within a limited time frame however, as licences can be cancelled and spectrum become available over time, so for the audit trail or history report to be useful, it will need to be limited to a period of two or three years maximum in our opinion, and also avoid licensee specific information that could be identified.

5. Section 4.4: Fixed Radio Links Guidelines

Q5. ComReg welcomes the views of interested parties regarding the matters discussed in DotEcon's report and ComReg's preliminary views regarding the Guidelines document and the technical parameters therein. Respondents should provide appropriate information when expressing views.

Q6. ComReg also welcomes views on any further technical matters regarding the deployment of Fixed Radio Links a respondent may deem relevant. Again, Respondents should provide appropriate supporting information when expressing any views

5.1 Response

Some clarity on Band Carrier Aggregation (BCA) or Multiband Aggregation Links is required. The principal of these type of links is to deploy using spectrum ordinarily not used, and at a lower availability target than what is normally accepted for fixed links, in parallel to a conventional, high availability fixed link. In conjunction with a single application process for these link types, Vodafone Ireland sees increased utilisation of this technique over the coming years, particularly in 18GHz + 80GHz and 23GHz + 80GHz in town/rural locations where standalone 80GHz will not meet availability targets and hop lengths exceed ~3km.

With respect to channel sizes, Vodafone would urge ComReg to implement CEPT and or ITU recommendations as soon as possible and when available. This ensures harmonisation across equipment vendors and regulatory channel allocations.

6. Section 4.5: Pricing

Q6 . ComReg seeks views from interested parties on:

- Specific aspects of the guidelines that should be reviewed (i.e. is there any aspect of the guidelines that may inhibit certain uses or technologies outlined above)
- Information that ComReg could provide in order to ensure better coordination of frequencies and encourage the efficient use of the spectrum more generally
- The structure of the fee schedule (e.g. views on the likely value differences across bands, bands likely to be more or less valuable, congestion charging)
- Any pricing methodologies that would be suitable for some or all of the Fixed Link Bands (taking account of demand and supply considerations as may apply to each

When appropriate, please provide supporting material with your response

6.1 Response

Vodafone Ireland would like to see a pricing structure applied to Band Carrier Aggregation (BCA) or Multiband Aggregation Links specifically. Due to the nature of these links, typically a conventional 2+0 XPIC, with high availability link aggregated with a high capacity, low availability link, that contravenes normal licence rules. We would be of the opinion that pricing reflects this type of configuration. Currently, the only licencing option is to pay for two separate licences, flagging the low availability link as being part of a Multiband Aggregation setup and ensure it is not rejected for low availability. Since the high capacity link has low availability and is being deployed on a path that it would not typically be deployed on, we feel that the cost of this high capacity/low availability licence should be very low. As a single licence application, for both systems, a single pricing structure could be applied. Our preference is that is the full cost of this licence is less than the current two licence cost we have today, as we see the high capacity component of the aggregated system as sub-optimal and therefore, not achieving minimum licence performance as set out in the ComReg Guidelines and should as a result be licenced at a reduced rate or only licenced against the optimal parallel fixed link. This principal can be applied to any multiband link, where the high capacity component is always sub-optimal and is reliant on the conventional system, but is providing high capacity capability. Initial deployment will be in 18GHz + 80GHz and 23GHz + 80GHz, but future deployment could include 15GHz + 32GHz for example.

Vodafone Ireland would also like ComReg to consider removing the price band 37 GHz < F< 39.5 GHz and merging this price band with the > 39.5 GHz band, effectively creating a >37 GHz price band. There is a notable decline in the 38GHz band Figure 1, driven largely by national block allocation and 80GHz uptake, at least from a Vodafone Ireland perspective. By making the 38GHz pricing the same as 42GHz and 80GHz, it could promote an uptake in the 38GHz band and if 224MHz channels became available, offer a viable alternative option for 80GHz, especially if deployed in 2+0 XPIC. Given the wideband range of the 38GHz band 1120MHz, this is a band best suited to 224MHz channels and would help alleviate the growing congestion in 80GHz while we wait on W-Band. Given the CEPT study into the possibility of redeploying 42GHz to 5G[5], like 26GHz, there is a potential gap between traditional bands and 80GHz that the 38GHz band might fulfil, if it has suitable capacity capability for metro areas.

[5] ComReg-20109A, page xvi, “42 GHz”

Vodafone Ireland are also concerned about potential Licence retention versus in-use fixed links in the 80GHz band. Potentially, the current pricing framework has led to a situation whereby a licensee could be retaining licences but not using them, as they are the cheapest licence per Mbps capacity available today. This could lead to a situation where a licensee can hold licenses, with very large bandwidths for very little cost per year and not deploy, resulting in apparent congestion of the band in certain areas. There is also the situation whereby a Licensee will upsell a product to a customer, but the customer never comes close to the utilising the full bandwidth of the product deployed. ComReg should consider remedies to prevent hoarding of 80GHz spectrum in busy zones. We suggest that link licence issuance and renewal should be conditional on implementation within a licence period (12months), effectively a 'use it or lose it regime'. At some point an audit of 80GHz deployment for all operators might help determine if all licensees are using these licences or are retaining for future use that has not yet been determined ie speculative planning. This audit should also determine typical utilisation across 80GHz to ensure that deployment of this band is working to its full and appropriate potential in the majority of cases.

Alternatively, a graded pricing structure at higher bandwidths that results in an increased price as bandwidth/capacity increases, might prevent or slow down any potential abuse of the current low pricing in 80GHz and ensure that Licensees only purchase licences for deployment and that license applications are more genuine. The cost and availability of Optical fibre is expensive and slow to deploy, which has led to a very attractive solution in 80GHz.

Finally, Vodafone Ireland would like ComReg to consider pricing structures of Nodal solutions that allow advanced techniques such as interference correction and beamforming, which will allow for much higher density of spectrum usage in metro areas. This technique will only work for operators who use a nodal deployment that can manage multiple fixed microwaves on a single unit. It is therefore an Operator specific deployment that cannot mix with other Licensees, unless they share the same nodal hardware. This technique will lead to greater utilisation of spectrum in Metro areas, reducing the angle of separation and allowing for frequency re-use, but requires careful channel assignment by ComReg. This technique could be used on the national block allocation and is a natural fit for that, but there is equal merit to use in 23GHz especially, and within the congestion zone. For it to be truly effective, the technique needs to be adopted by large operators and managed using preferred channels.

ComReg could consider an incentive to use this technique, in a similar way that XPIC licensing is incentivised.

7. Section 4.6: 1.4GHz Band

Q7. ComReg seeks the views of interested parties on the current and potential future use of the 1.4GHz Band and whether all of the band should be included in an award for wireless broadband in the future.

Having spoken to our colleagues in other markets we see that support for use of 1.4GHz for mobile is developing in a number of countries. The use of this band for Supplementary Downlink applications would add considerably to network capacity in the longer term, particularly in rural areas because of its greater coverage than 2.6GHz, the main 4G capacity band.

Q8. To the extent that respondents are of the view that the 1.4GHz Band should be awarded for wireless broadband. ComReg seeks the views of respondents on when those rights of use should be assigned.
Where appropriate, please provide supporting material with your response
Respondents should note that views on the award of the 1.4GHz band for WBB will form input to ComReg's spate consultation process to consider same, which would commence following the award of spectrum in the MBSA2.

In our response to ComReg 18/60, we suggested different timescales for the centre and extension portions of the 1.4GHz band.

Based on current equipment plans we now suggest the centre portion could usefully be used from start of 2024, with the extension portion following later.

8. Section 4.7: 13 GHz and 15 GHz bands

Q8. ComReg seeks the views of interested parties on the potential of re-opening of 13 GHz and 15 GHz bands in the Congested area. Please provide supporting information with your response.

8.1 Response

Vodafone Ireland is unlikely to deploy in the congested area[6], fixed links in the 13GHz and 15GHz band. Vodafone Ireland's preference in metro areas for fixed links is to use higher band, higher capacity fixed links, such as the 80 GHz band or the national block allocation of 26 GHz in Cross Polarisation configurations. Vodafone Ireland's goal in Metro areas is to reduce hop counts and reduce hop lengths. The density of radio sites and the availability of optical fibre in the congested area means we have little or no need for long fixed link microwave solutions in the congested area.

For this reason, Vodafone Ireland has no view on the opening of 13GHz and 15GHz in the congested area as the majority deployment on the Vodafone Ireland network in 13 GHz and 15 GHz is rural.

[6] The Congested Area is a geographic area within Dublin in the range E310000 to E320000 and N220000 to N240000 or 53°13'9.44"N to 53°23'14.2"N and 6°21'14.2"W to 6°11'48.32"W

9. Section 4.8: 26 GHz Band

Q10. ComReg seek views from interested parties on the current use of the 26 GHz band for fixed links. Respondents should note that any views in relation to the future use of the band for other technologies and used (e.g. wireless broadband-ECS/5G) will be considered separately as part of the ComReg's 26 GHz Study due to be published in Q4/2020

9.1 Response

Vodafone acknowledges that the current 26GHz National Block allocation may come to an end in 2028, without renewal due to possible re-allocation to 5G. Vodafone Irelands reliance on this band is very significant, comprising of 40.72% of its access microwave deployment and is a good example of why block allocation at high bands works due to Vodafone's ability to rapidly deploy and self-regulate in this band. Vodafone would be interested therefore in the possibility of using another band to replace the 26GHz allocation, and sees the 32GHz band (31.8 to 33.4GHz), as per ITU-R F.1520-1 and any future expansion of the channels bandwidths to 112MHz or higher as per ECC report[7] and ERC recommendations ERC REC 01 02.

Should the 32GHz band be opened as a Block allocation and a direct replacement of 26GHz band, Vodafone would need both a notice period and an implementation period to carry out a smooth and efficient transition. We suggest that a decision on the use of 26GHz post 2028 should be made before the end of 2023. This decision should recognise the need to allow for the purchase of significant quantities of new equipment for the swap and for the subsequent and significant project management required to replace the 26GHz band. We look forward to further discussion with ComReg on the future of this band.

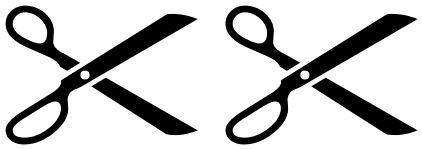


Figure 5 [✂ [redacted] ✂]

[7] ECC Report: https://docdb.cept.org/download/b7f53395-a40b/ECC%20Report%20319.pdf

10. Section 4.9: D-Bands and W-Bands

Q11. ComReg seeks the views of interested parties on the potential future use of the D-Band and W-Band and the equipment availability for those bands. Please provide supporting information with your response

10.1 Response

Vodafone's suppliers are currently developing W-Band and D-Band hardware. Expected date for centralised testing of this hardware is 2022 for W-Band and 2023 in D-Band across all vendors used within the Vodafone Group. Vodafone Ireland would support any block assignment being considered so long as the following points are considered:

- Block allocations should be contiguous channels to allow for greater flexibility per operator
- Channel Bandwidths available within blocks should align with CEPT/ITU recommendations (when published).
- Maximum Channel Bandwidths available as per CEPT/ITU recommendations (when published) when the bands become available

11. Section 4.10: Licence Exempt/Light Licensing

Q12. ComReg seeks the views of interested parties on the current and future use of the 5.8 GHz, 17 GHz, 24 GHz and 60 GHz licence-exempt bands, and the requirement to implement a Light Licensing framework to address interference issues in the licence-exempt bands. Please provide evidence in support of your views.

11.1 Response

Vodafone Ireland currently does not use 5.8 GHz, 17 GHz or 24 GHz bands. This is largely driven by high availability requirements within the network. We see no reason at this time to change the current Licence Exempt/Light Licensing regime.

19: Wireless Connect Ltd (“Wireless Connect”)

WIRELESS CONNECT LTD.
SUBMISSION TO COMREG 20/109

Review of the Fixed Radio Links Licensing Regime

Author: Tom Smyth, CTO Wireless Connect Ltd.

FAO: Mr. Martin O Donoghue, Commission for Communications Regulation

Non-Confidential: Full Public Release Please

Disclaimer:

Wireless Connect Ltd. *has compiled the information submitted in good faith and have exercised all due care in so far as possible with the constraints of meeting the deadline of 7th of December 2020. As an SME ISP we would advocate for longer consultations with more notice given the complexity of the subject matter, the resource constraints that smaller operators have to cope with. We would respectfully ask that ComReg review the 4 week consultation period practice to match the best practices outlined in DPER Public Consultation Guidelines, at the following location:* https://www.gov.ie/en/publication/e9b052-consultation-principles-and-guidance/

THE IMPORTANCE OF FIXED LINKS LICENSING REGIME TO RURAL IRELAND

We are pleased to make this submission in response to Comreg 20/109. The review of the Fixed radio links licensing regime presents an opportunity for ComReg to Assist the Fixed Wireless Access Operators deliver even more high speed broadband to businesses and residences across all of Ireland. Particularly in areas where the population density is low. The support of network diversity provided by independent locally owned and operated companies is in Ireland's national economic interest and national security interest. ComRegs Liberalisation of the 5.8GHz band in ComReg's *Expanding Opportunities in the Radiocommunications Market: Fixed Wireless Access (FWA) - Consultation Paper 02/19*, combined with the availability of lower cost license exempt equipment in the 5 /5.8GHz, has transformed ICT landscape in rural Ireland, sowing the seeds of what would become an industry of approximately 50 local independent self-sustaining FWA operators serving over **100,000** connected subscribers in their local communities with high-quality high-speed broadband. According to Wireless Coverage Ltd's report authored by Mr. David Burns and commissioned by 28 ISPs for the 2019 NBP Mapping consultation in 2019 28 ISPs in the FWA industry have achieved the following coverage and market penetration:

Number of sites by 28 FWA ISPs	**1,465**
NGA Premises Passed by 28 FWA ISPs	**689,781**
Non NGA premises Passed by 28 FWA ISPs	**1,456,470**
Number of Premises Connected to 27 FWA ISPs	**91,894***

Source Wireless Coverage Ltd. Report 30 September 2019 in response to the NBP mapping exercise

Fixed wireless operators welcome the clear recognition that the charts provide that Fixed Wireless operators are and continue to invest in high capacity links across Ireland.

Fixed wireless operators would welcome further liberalization of spectrum to facilitate deployment of further independent broadband infrastructure in rural Ireland. The importance of the independent FWA industry in Ireland cannot be overstated, and the Covid-19 pandemic has shown us the FWA industry were the ones connecting and carrying rural Ireland through the pandemic, while heavily subsidised entities have been surveying the country for what they might one day connect. At the time of submission, no homes or businesses have been connected by the NBP. It is essential that ComReg use all powers and resources available to help maintain the diversity of infrastructure deployed in rural Ireland. It is regrettable that this consultation did not take place prior to

the signing of the NBP contract in late 2019. As regulatory and policy measures and are preferable to subsidised interventions because they can reduce the need, the scale and hence the cost of Government subsidised interventions generally.

The FWA industry's existing broadband infrastructure and contribution to rural Ireland, despite being ignored and discounted by recent Irish Governments for the purposes of ensuring a ubiquitous provision of FTTH throughout the State, has a vital role to play in Ireland's future in providing real competition for internet access in Ireland particularly because of their focus in rural parts of Ireland typically underserved by larger ISPs whos' focus on more profitable urban markets. Supporting measures that reduce the costs and burden on independent fixed wireless operators expanding and upgrading their deployments in rural Ireland can help us provide the much needed redundancy to the Irish Government's NBP approach of placing all eggs in one publicly funded, private equity infrastructure basket. The FWA industry can and currently does provide much needed connectivity to rural Ireland, and this is important to maintain in the event of the NBP running into further delays or difficulties which seems to be a recurring theme when it comes to the management of the NBP procurement & rollout program to date.

We welcome the opportunity to comment on:

• The design of a licensing framework that best provides for the effective management and efficient usage of the Fixed Links band identified in this consultation and the responses.

•A new hopefully Improved fee schedule for Fixed Links that facilitates the greatest number of use cases, in order to ultimately promote greater use of the spectrum that are identified in this consultation and the responses; Preliminary Consultation of Fixed Links Bands Review ComReg 20/109

• Review the technical conditions and guidelines for the deployment Fixed Links in the bands identified and consult on any proposed changes; and Advise and consult on new regulations to replace S.I. 370 of 2009

Table of Contents

5

2.1 The Fixed Link Licensing Regime

Comments further in the document.

Individual Link Licence fees

Comments further in the document.

2.2 Current Individual Fixed Link Bands

It is worth noting the level of existing FWA broadband Infrastructure in the country which is already at or in the process of being upgraded to NGA status. This is a testament to the commitment, investment of so many market operators have made and continue to make in rural Ireland. It is imperative that ComReg supports competition and infrastructure diversity when considering changes to the licensing regime.

2.3 Other spectrum management matters which are related to the Fixed Link Bands

WAS/RLAN above 5 GHz

In relation to Paragraph 52

> *52 "ComReg will continue to monitor and input into the discussions of this matter at the EC and ECC. Upon the adoption and publication of any future EC and/or ECC Decision, ComReg will consider the appropriate the implementation of those decisions"*

We would advocate that an exemption exist for Fixed Wireless Access operators in a similar manner for the 5.8GHz Spectrum to allow operators use the 5925-6425 MHz band at an EIRP similar to that specified in the 5.8GHz Band for the purpose of providing Broadband access in rural areas. It would be a pity not to fully realise the potential of expanding the spectrum available to Fixed wireless operators so that the DAE 2025 objectives of a minimum speed of 100Mb/s per subscriber can be by giving existing operators access to more spectrum. We welcome that ComReg is closely monitoring the progress at the ECC and we would advocate that interested parties that may need to operate CBTC Secure Communications Train Based Control systems in Ireland be contacted to see if they are In fact using that spectrum for CBTC. If in fact that they are not using that spectrum it would be most helpful to the Fixed Wireless Access industry for ComReg to liberalise that spectrum on a License Exempt basis in a similar manner to the 5.8GHz Band.

We would welcome ComReg making available the 5925-6425 MHz on a provisional license exempt or light license basis pending full and formal adoption of a decision at the ECC.

3.1 Existing Use Cases

As a FWA operator we would like to comment on paragraph 68

> *68 For the purposes of this review, ComReg requested information on the use of Fixed Links in the Licence Exempt Bands in the Licensee RFI 74 . A total of 15 respondents to the RFI stated their use of licence exempt Fixed Links 75 . Separate ComReg data indicates that ComReg's RFI data did not capture the majority of licence exempt Fixed Links, due to a number of FWA operators with a large number of Licence Exempt FWA Fixed Links 76 failing to respond. ComReg therefore places limited weight on trends in this data as representing trends for all licence exempt Fixed Links. Bearing this in mind, ComReg notes the use of Fixed Links among these 15 users has increased in recent years with most of the licence exempt Fixed Links deployed for FWA in the 5 GHz band. Data gathered separately by ComReg on broadband subscriptions delivered by FWA corroborate this finding and indicates that the number of Fixed Links in the Licence Exempt Bands used for the provision of FWA for 2.4 GHz and 5 GHz bands has increased from Q1 2020.*

We do agree with both DotEcom and ComReg's observation that the scale of the deployment of license exempt fixed links are underestimated in this report. While we agree that it is likely due to a lack of response from FWA ISPs, it should be noted, that the Covid-19 pandemic and lockdowns aside, FWA operators are focused primarily on the need to connect the unconnected, or to upgrade the connected. We Regret the Inability of many FWA operators to submit this vital information to ComReg. For our part and we believe those of our peers particularly during the pandemic when so many of our subscribers are working from home, our priority has had to be the continued delivery of reliable service to the customer and therefore engagement with and responding to consultations was unfortunately lower down on the priority list. The constraints on resources of smaller operators like ourselves means responding meaningfully and accurately to a consultation in a period of just 4 weeks is exceptionally difficult. We have no doubt that this would have impacted on the other FWA operators' ability to collect information about license exempt links as requested earlier in the year. We would welcome a review of the consultation period length and encourage ComReg to perhaps publish the intention to hold a consultation well in advance (similar to the way that this consultation was flagged in advance because of the engagement during the request for information on deployed links made to operators earlier in the year).

If we consider that just 28 of FWA ISPs have built and deployed at least 1465 sites around Ireland to serve their local communities it would stand to reason there would be multiples of that figure in P-P links and P-MP links also.

It is noteworthy that the charts in paragraphs 56 and 57 show the value and importance of the FWA industry in Ireland. and that the FWA sector as market operators are investing and expanding as clearly demonstrated in the purchase of licenses and the increased number of FWA ISPs purchasing licenses.

It is striking to see the chart associated with paragraph 58 that FWA Operators are increasing investment and real deployment in Fixed Links in all bands (apart from 38GHz).

3.2 The use of Fixed Links in Ireland in an International context

We would advocate that ComReg monitor the use of light licensed schemes such as public safety spectrum allocations in the US and if possible allow for the application on a light licensed or license exempt basis, for the purposes of Deploying Fixed Wireless Access broadband in Rural Ireland. This request would be contingent on lower cost equipment being readily available to facilitate the rapid deployment of such networks, so that consumers would experience the benefits of such liberalisation without delay. An example where this could be readily achieved is in the 4.9GHz band where FCC has designated in the US that this is a public Safety band and that there is equipment available to meet that specification that is similar to other equipment operating in the 5.4 /5.8GHz. So it would be easy for FWA operators to Purchase and Deploy equipment to operate in the 4.9GHz band due to the fact that it is operating similar equipment already on its network. The availability or prospect of low cost equipment to operate in a particular band would be one of the most important factors to consider when liberalising spectrum access eg similar spectrum utilisation in other major jusrisdictions.

3.3 & 3.4 Other potential use cases for Fixed Links

A-Q1

The advent of newer 60GHz technologies means that a large-scale deployment of FWA networks are possible in Cities and Towns, and this can lead to future competition for access networks and increased choices for consumers. The Cambium Cnwave product line has the feature set, throughput performance (multi-Gigabit connectivity) and a compact formfactor allowing operators to disrupt the urban and suburban market. Further it can afford businesses and high end consumers who have need for redundancy of internet access / WAN access a possibility to connect over diverse infrastructures instead of relying on One Wholesale Operator infrastructure and pseudo diversity over said single wholesale operator infrastructure.

4.1 Spectrum availability and channel arrangements

A-Q2

As a FWA operator which consistently strives to have at least 20% over capacity on our network and which often need to deploy over 1Gb/s to a given site in order to maintain an over capacity of 20% above peak demand, therefore, we agree with the ITU /CEPT recommendation & endorse DotEcom's, and ComReg's view that 112MHz channels should be made available in those bands in so far as they do not restrict existing operators who have more narrow channel licenses already purchased. We would advocate a co-operative approach where ComReg could work with license holders to ensure that narrow channels are migrated from the middle of the band to the one of the edges of the band so that fragmentation is minimised.

Perhaps it would be worth considering that for a software channel change that ComReg would make that a condition of renewing a license for operators who have equipment that can be easily re-configured to a different channel. Perhaps this could be available with a nominal low-cost fee. And for a quicker turnaround perhaps a fair compensation model can be agreed between the operators. This would be difficult to implement and would require buy in and co-operation from all operators. However, it is important that Operators co-operate with each other to maximise the use of spectrum and the availability of high-speed broadband services to end consumers in Ireland. That said, if an operator wants an operator who's equipment is constrained to a given channel then it would be incumbent on the operator requesting the larger channel to pay for a replacement equipment and install cost, so that would allow the operator with the smaller allocation move off the channel without affecting its own services to its customers.

4.2 Block Licences

A-Q3

Individual Licenses are preferred for small to medium FWA ISPs like our own as it lowers the barriers for expanding and improving our infrastructure footprint. National block licenses are typically out of the financial reach of smaller operators, as previously demonstrated by the Auction of the 3.6GHz spectrum which resulted in the retiring of low cost local site licenses which were taken up by a number of small to medium FWA operators and then in the auction of the released spectrum to the highest bidder with MNOs getting the bulk of the spectrum and only 1 FWA operator, Imagine being successful in acquiring some spectrum. It is therefore of paramount importance that individual links can be purchased at a reasonable cost to facilitate the expansion of services from localised FWA providers. Promoting spectrum availability for SME operators will reduce the ability of larger operators to sit on and not deploy national block licenses. Spectrum availability for smaller operators can help ensure their survival

and growth and would enable genuine choice and competition with real infrastructure diversity choices for consumers across Ireland. Comreg facilitating ideas such as this would be helpful in ComReg fulfilling its obligations under A1.1.2 Promotion of Competition.

It is our view that Block licences should only be considered if and only if there is sufficiently significant part of the spectrum made available for individual link licenses. While one can understand the value in reducing paperwork for larger wider deployed networks. It is our view that larger networks already enjoy favourable access to spectrum by virtue of their scale and spending power. It therefore also important to consider the positive competition implications for maintaining a low barrier of entry for Fixed Wireless Operators in any given licensed band.

It is our preference to have individual licensed links with licenses assigned in as automated manner as possible to reduce the burden on ComReg and the operators seeking to deploy a link. The low-cost license regime is pivotal to allow smaller fixed wireless operators compete with the larger ISPs and MNOs.

4.3 Application and licensing process

A-Q4

We would advocate the use of automation and models built in on the licensing platform that could guide the License applicant to self-validate the application (link budgets availability characteristics) We would strongly advocate for the ability for a license applicant to pre-emptively select additional lower preference link channels and/or bands in the application procedure so that in the event of the first chosen channel and/or band is not available the operator can get a license grant in one brief exchange with ComReg without an iterative process back and forth between ComReg and the operator until the operator manages to be fortunate enough to select an available channel on a given band. Automating this in so far as possible and building in intelligence into the license application system would reduce the burden on both ComReg and the Operators.

Alternatively as an interim measure, or to address difficulties in automating the frequency allocation process, perhaps ComReg could instigate a process of advising on the suitability and/or availability of the requested channel v's nearby or similar channels which might be licensed to meet the link budget requirements. This may have the ancillary benefit of improving the efficiency of spectrum deployment.

4.4 Fixed radio links Guidelines

A-Q5

As a FWA operator, we welcome both DotEcom's and ComReg's views as outlined in paragraph 117. That network and technological progress is not impeded by lack of guidelines for a new technique or technology that has not been referred to in the guidelines. The requirement that such deployment to be notified in advance to ComReg is right and reasonable. And we endorse it wholeheartedly.

As an operator who is expanding its backhaul continuously we would endorse ComReg's view as outlined in paragraph 118 that relaxing of minimum distance of links as long as the purpose of which is for aggregating multiple links / frequencies to increase capacity and redundancy between sites. As long as the capacity / redundancy / availability could not be achieved with a higher capacity link.

4.5 Pricing

A-Q6

Independent SME FWA ISPs are price conscious, the success of the 80GHz band and the number of links deployed in that shows (at least empirically that lower cost licenses encourages more deployment in that band) we would advocate lowering the cost of licenses where bands are not that heavily used. It is important that ComReg is mindful that there is generally a downward trend in cost per Mb/s being charged to consumers, coupled with an upward trend in bandwidth capacity demands per customer, consequentially the demands on our backhaul licensed links are increasing while the profit an individual link would be de-creasing. Accordingly we would advocate that licenses taken out in the same company between two identical endpoints should receive a discount on second and subsequent licenses. This would be fairer on an expanding operator who is transitioning from one vendor to another and cannot combine the two frequencies into one antenna system. Lowering the barriers / costs associated with giving subscribers more bandwidth is a good thing and would help encourage even further investment in infrastructure by the operators (not to financially disincentivise them)

The current de-lineation of costs according to high usage path / congested area vs normal usage paths / areas, is very coarse and it is probable that in the Dublin area there are certain areas with an underinvestment in wireless links due to the cost of the deployment, having a granular approach with accurate models would help reduce the costs of deploying in less deployed areas in and around Dublin City. We would advocate an incremental process for a gradual increase costs licenses on a given band as the number of channels allocated in that band increases. This could also serve as an indicator of how busy a band actually is on a given path.

4.6 1.4 GHz band

A-Q7

It would be our preference assuming reasonable cost equipment is available for deploying links with 1.4GHz that this be assigned for FWA networks on a locally licensed basis (subject to availability of cost effective equipment being available in this band.

A-Q8

The Licensing model should such that it be made available on lower cost local licenses to assist local operators provide choice and more bandwidth to customers in their locality. If ComReg believes a national / regional block licensing model is needed, we would advocate strongly (subject to reasonable cost equipment being available by manufacturers) that a section of the band be reserved for local operators. This would improve competition and diversity of infrastructure in rural Ireland.

4.7 13 GHz and 15 GHz bands

A-Q9

It is understandable that 13GHz / 15Ghz have applications restricted when there is no availability of channel space. However there no logic to the regulator effectively holding back channels in this spectrum that have been since released or not renewed by the license holder of that channel. We would advocate a traffic light system that would inform users that a band in a given area is full and that license applications are not being accepted at this time. Further it might be worth ComReg considering the tidying up of these two bands(by moving smaller channel allocations to the edge of the bands (on renewal in so far as it is possible) as opposed to fragmenting and impeding potential for larger contiguous channel allocations in the band.

4.8 26 GHz band

A-Q10

We would advocate that the licensing model should such that it be made available on lower cost local licenses to assist local operators provide choice and more bandwidth to customers in their locality. If ComReg believes a national / regional block licensing model is needed, we would advocate strongly (subject to reasonable cost equipment being available from manufacturers) that a section of the band be reserved for local operators. This would improve competition and diversity of infrastructure in rural Ireland.

4.9 D-bands and W-bands

A-Q11

FWA operators like ourselves would be interested in deploying equipment in this band once it becomes available. However given the frequency range it is likely that as per DotEcom's and ComReg's view that it would be for ultra high capacity links in urban environments (due to inherent range limitations) of these bands. That said we can only fully comment when the specifications and limits on EIRP and the capability of equipment designed to operate in that band are known.

4.10 Licence exempt / light licensing

A-Q12

License exempt spectrum has allowed independent FWA operators deliver high speed internet access to rural Ireland where fixed line and MNOs that have historically focused on urban / suburban areas and consequentially failed to deliver high speed broadband in a timely manner to rural communities.

5.4GHz and 5.8GHz Bands have been key and remain key to delivering FWA broadband in Ireland in the past and as their sites and access requirements have grown where a site has been fed by one or two 5.4GHz / 5.8GHz fixed links, it has been and is common practice to re-invest in the site and replace the lower cost 5.4 GHz/ 5.8GHz backhaul links with links operating in other bands such as

- license exempt bands such as 17GHz, 24GHz
- if the link is sufficiently short distance the License Exempt 60GHz band.
- light licensed bands such as 80GHz
- licensed Bands such as 13GHz,15GHz and 18GHz

The migration away from 5.4GHz/ 5.8GHz backhaul links allows for re-deployment and more flexibility in delivering service on more sectors on a given site allowing for greater coverage.

This strategy is not unique to our company and is indeed replicated by our other colleagues in the FWA sector.

We agree with DotEcom's recommendation regarding not to close bands that have been previously open and in use.

5.4 GHz License Exempt band

The value of this band to us is increasing from a P-MP perspective and decreasing from P-P perspective primarily. The value of deploying a 5.4GHz sector is far greater to an FWA ISP when compared a P-P link in the 5.4GHz band

5.8 GHz License Exempt band

In a similar way to the 5.4GHz band the value of this band to us is increasing from a P-MP perspective and decreasing from P-P perspective primarily. The value of deploying a 5.8GHz sector is far greater to an FWA ISP when compared a P-P link in the 5.8GHz We would advocate an increase the max EIRP in rural areas in line with (Ofcom in UK) to 36 dBm which would increase the range of rural base stations by up to 41%

The advent and availability of beamforming Mu-MIMO sectors, and high quality beam efficient scalar horn antennas from manufacturers such as RF-Elements with tight beam focus means that despite the very wide large scale deployment of License exempt links generally across the country, ISPs like our selves can manage the spectrum and adequately limit interference effects to / from other equipment operators. Thankfully we co-operate with and enjoy the co-operation of other neighbouring FWA Wireless networks and the rollout of these technologies means that interference incidents are fewer and farther between. Further the developments of Mu-MIMO and beaming forming equipment from manufacturers such has Cambium PMP and ePMP means that customers can enjoy improved service now and in the future.

17GHz License Exempt band

We note ComReg's observation in Paragraph 145 notwithstanding CEPT Report 44 stating that this band is of little use. We have extensively deployed 17GHz links and will continue to do so over the coming years. We consider this band vital for low cost high speed backhaul to our sites. And provides redundancy for Licensed links at a low cost. This band allows us to deliver higher bandwidth to our customers at a lower cost.

We are pleased to see ComReg's recognition in paragraph 146 of availability of equipment for 17GHz band and that it is currently deployed in so many of our networks.

It is our experience that we have yet to encounter any interference on these links in our Rural based deployments. And therefore, agree that a light licensing framework is not required for this band. We follow and advocate for the practice of deploying large gain antennas with reduced input power to minimise interference with our neighbouring ISPs.

We would welcome widening the band from the current 200MHz if at all possible. We would invite ComReg to consider extending the spectrum allocation of this band as much as possible or at the very least 50MHz to accommodate higher capacity symmetric links.

24GHz License Exempt band

We have extensively deployed 24GHz links and will continue to do so over the coming years. We consider this band vital for low cost high speed backhaul to our sites. And

provides redundancy for Licensed links at a low cost. This band allows us to deliver higher bandwidth to our customers at a lower cost.

It is our experience that we have yet to encounter any interference on these links in our Rural based deployments. And therefore, agree that a light licensing framework is not required for this band. We follow and advocate for the practice of deploying large gain antennas with reduced input power to minimise interference with our neighbouring ISPs.

We would welcome widening the band from the current allocation of 250MHz if at all possible. We would invite ComReg to consider extending the spectrum allocation of this band as much as possible.

60GHz License Exempt band

60GHz will become increasingly important both in short range P-P and P-MP applications. We note DotEcom's observation in 5.2.2 that it has not enjoyed extensive use prior to June 2019. We would like to point out the main reason we see for this is that products operating in the 60GHz band have only relatively recently being made available at a relatively reasonable cost. With 802.11ay and 802.11ad links being available from companies such as Cambium, Ubnt, Ignitenet, Radwin, and MikroTik. 60GHz use in our network has increased dramatically in the past 18 months and will likely continue with the release of new products such as the Cambium CnWave product lines with 7.5Gb/s FDX multigigabit connectivity.

66-71GHz Priority Reservation for 5G

It is our opinion that this be released under a general authorisation and subject to technology neutral performance characteristics, such as n x 1Gb/s, or x Gbps /GHz increasing the spectrum availability here has exciting prospects for advanced wireless service capabilities in urban and suburban locations. As noted by RSPG18-005 FINAL the distance from the Oxygen Absorption peak in this frequency range allows for increased cell radius or P-P link range. We would advocate for a technology neutral general authorisation for this portion of the band.

With products such as Cnwave from Cambium one can create a multigigabit Wireless Fabric which is a game changer in providing low cost high capacity access services in Housing Estates, Business and Industrial parks. This can allow businesses a real choice in infrastructure so as not to be reliant on one wholesale overground pole deployed wired ISP infrastructure which as the electrical power network and the incumbent historical experience has shown on an all too regular basis is regularly significantly impacted by storm related outages

Interference Management, Registration vs Light Licensing

We wholeheartedly endorse ComReg's position as set out in paragraphs 148 and 149, we do agree that the current general authorisation framework for the bands is working quite well and that the FWA industry is able to manage link performance and any incidence of interference in the bands quite well. We would ask that ComReg inform the DCCAE and their advisors Analysys Mason that Interference is not a significant issue that is affecting FWA networks to any great extent. Not least because Analysys Mason felt unable to qualify every FWA network for NGA status in the recent NBP Mapping exercise which meant that the Intervention area as defined by the DCCAE and its advisors threatens to overbuild all FWA operators' infrastructure as currently deployed NGA capable infrastructure at significant cost to the Irish and European tax payer.

Other Opportunities for License Exempt Bands.

FWA operators such as our selves would welcome the expansion of License exempt and Light licensed spectrum available to allow us deliver even more services to subscribers in Rural Ireland. We would advocate that if equipment is available that is capable of delivering high speed broadband in other bands that ComReg consider facilitating the opening of spectrum for this purpose in bands such as 4.9GHz where there is equipment readily available internationally and proven in other jurisdictions, and that could be deployed rapidly to increase the bandwidth available and allow FWA operators to scale even further. If a general authorisation basis is not considered possible perhaps a light licensed model would be considered instead. We would welcome ComReg facilitating a conversation between FWA operators and other users of the 4.9GHz band such as radio astronomers etc.

The wide availability (internationally) of equipment designed to operate in the FCC allocated Bands for Public Safety 4940-4990 MHz and 5850-5925 MHz would mean that FWA operators could rapidly take advantage of these bands to provide additional bandwidth to more customers. ComReg facilitating ideas such as this would be helpful in and in no way contravene ComReg fulfilling its obligations under A1.1.2 Promotion of Competition.

Conclusion

This initiative very welcome and could not come soon enough as far as we are concerned. We would like to thank ComReg, in particular Martin O'Donoghue and Donnacha Hennessy who have worked extensively on this initiative and for their patience in dealing with our queries and assisting us in granting extensions to submit information during the initial RFI and we look forward to further engagement with them

on this important initiative. Finally, we would like to thank DotEcom for their excellent report which was very informative and clearly showed interesting trends in Infrastructure investment by the FWA Sector in Rural Ireland.

Ends.