An Coimisiún um
Rialáil Cumarsáide
Commission for
Communications Regulation

Response to Consultation on ComReg's draft Radio Spectrum Management Strategy Statement for 2022 to 2024

Non-confidential Submissions to Document 21/90

Submissions to Consultation

Reference: ComReg 21/136s

Date: 17/12/2021

An Coimisiún um Rialáil Cumarsáide
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Content

1 Adrian Connor

To: COMREG: Market Framework Consult Team

From: Adrian Connor [✂ [redacted] ✂]

Re: Submissions to ComReg Document 21/90.
Submission on the future role of COMREG & the Amateur Radio Service regarding participation in national STEM promotion policy

Date: 20/10/2021

Dear Market Framework Consult Team

We are in the midst of a global digital & technological revolution. It could be argued that there has never been a greater focus on science, technology, engineering and mathematics (STEM) - by government, industry and society. STEM education and participation are viewed as a strategic, cross-societal, priority worldwide (OECD, 2018). In 2017 the Irish Department of Education and Skill (DES) published its "STEM Education Policy Statement 2017-2026" with the stated ambition that...

> "...Ireland will become the best education and training service in Europe by 2026. Science, Technology, Engineering and Mathematics (STEM) are at the heart of a technological revolution which is transforming the way we live and the way we work. If Ireland is to be at the forefront of this transformation, we must be a leader in nurturing, developing and deploying STEM talent. (DES, 2017 p.3)".

There is now a myriad of STEM education programmes and initiatives at all levels of Irish society. Government-funded bodies, such as Science Foundation Ireland (SFI) and STEM industry players are collaborating with and funding education providers & volunteer groups to promote and teach STEM skills to promote STEM careers. This comprehensive approach is designed to ensure the next generation of engineers, scientists, technicians and to give Ireland's industrial policy a competitive advantage. One could argue that there has never been a more opportune time to attract like-minded people to Amateur Radio. Amateur Radio is the original STEM pursuit; we learn about signal propagation and the properties of the electromagnetic spectrum, design and construct antennae, radios, radio-related equipment, and integrate the latest technologies into our projects. Indeed, Amateur Radio enthusiasts were involved in early breakthroughs in telecommunications and related technologies. That tradition continues to this day, with astronauts, Nobel Prize-winning physicists & CEOs of tech giants being current licenced radio operators. The global digital & technological revolution is built on the shoulders of Amateur Radio pioneers and the generations of science & technology leaders it continues to inspire.

A cursory review of social media platforms demonstrates an active community of Irish licenced & non-licensed radio hobbyists who utilise the radio spectrum in many ways; from experimenting with traditional forms of radio equipment to developing and utilising software-defined receiving technology that can be tasked as radio receivers, ionospheric measuring devices, passive radar, engaging with space-based technologies etc. Many amateur radio enthusiasts pursue radio in ways that crossover with other STEM hobbies & interest groups, the field of education and their careers.

This submission contends that the radio spectrum should be made more accessible to citizens of all ages & abilities. This would be in line with the national STEM promotion agenda referenced above. One possible way for COMREG to support national policy in this regard would be to explore different methodologies as to how the acquisition of Amateur Radio licences can be made more accessible.

Recent developments in the UK have demonstrated successful collaboration between OFCOM (The UK regulator) and the Radio Society of Great Britain (RSGB); the representative body for UK amateur radio. OFCOM's press release "Lockdown signals a boost for amateur radio" (July 2020), celebrated two successful collaborative initiatives between OFCOM and the RSGB. The first initiative was the successful move by the RSGB to online examinations (as demonstrated by the increased numbers of UK candidates taking this route). The second, synergistic initiative, is the "Get on the Air to Care" campaign – an initiative related to the current Coronavirus pandemic. Both these collaborations were informed by the need for the UK Amateur Radio community and its regulator to support the UK national interest during the current Coronavirus pandemic. The RSGB led and delivered these initiatives with regulator support. This is a clear example of the regulator demonstrating its corporate and social responsibilities at a time of national crisis by seeing the value of the Amateur Radio Service vis-à-vis social cohesion and being able to support STEM distance learning during these times of social distancing.

COMREG too has corporate & social responsibilities. This is referenced in its "roles & responsibilities" - specifically that COMREG is "responsible for encouraging innovation". By encouraging innovation COMREG ensures a vibrant & sustainable domestic telecommunications industry. A vibrant telecommunications industry requires the production of engineers, technicians & scientists through STEM learning and participation. Therefore, COMREG's goal of "encouraging innovation" is aligned with the stated government policy of promoting STEM learning and participation. Amateur Radio is a gateway to STEM learning and participation, a gateway that can ultimately lead to a person choosing a STEM career, a choice that can lead to innovation within the Irish telecommunications industry.

By supporting and collaborating with the Irish Amateur Radio community, COMREG can help deliver on the government's STEM learning aims and objectives by making the licencing examination process available online and by introducing a novice licence. A novice licence would open the radio spectrum to potential STEM experimenters & innovators of all ages and abilities. Moreover, COMREG could potentially influence telecommunications industry partners to assist in this development and support the IRTS to develop high quality, freely available, online educational supports for aspiring licensees; thereby acting in the national interest concerning STEM learning & participation and potentially securing future talent for its industry.

Through this submission, I hope I have demonstrated the potential of the Amateur Radio Service to serve the national interest. COMREG's support to enable the Amateur Radio Service to evolve by becoming more accessible would aid the service to more fully align with national STEM policy. The availability of a Novice Licence and online examinations would give the Amateur Radio Service an enhanced capability to partner with STEM promotion bodies and initiatives. COMREG's role in this would also be viewed as the regulator delivering on its corporate & social responsibilities and would give COMREG opportunities to highlight this fact by partnering with the amateur community in STEM promotion initiatives. This indeed would be "encouraging" & "innovative".

Best Regards

Adrian Connor [✂ [redacted]
[redacted] ✂]

2 Albert White

From: Albert White [✂ [redacted] ✂]
Sent: 20 October 2021 12:18
To: Market Framework Consult
Subject: Submissions to ComReg Document 21/90

Dear ComReg,

I am a licenced amateur radio operator [✂ [redacted] ✂] having passed the HAREC exam back in 2016 and would like to makesubmissions regarding the topics in the document relating to Amateur Radio.

5.2.9 / 5.7-9 & Annex 3 Novice and Entry-class licensing

From outreach activities in amateur radio, I have come across many people who are unable to partake at all in the service due to the HAREC exam and the associated training and costs. My submissions therefore are related to ways to increase participation nationally in the amateur service. I note that the CEPT recommendations do deal with visitor licences for lower levels; my responses will not deal with this topic as I think we would be best served focussing on a national syllabus that suits our needs rather than spending the effort on administration of a visitor or reciprocal arrangement. Furthermore, it is my opinion that if you are sufficiently interested in amateur radio that you wish to operate in other countries then you should hold a HAREC standard licence.

There are basically two groups of people that I see as being the audience of a novice licence:
• Those who are interested in amateur radio from a communication or engineering perspective but for whatever reason are unable to attain the HAREC exam. In this group I would include Scouts, kids in 'maker' and STEM groups, people studying for the full HAREC exam, transition students etc. In all these cases the syllabus of the exam is too broad and/or the cost prohibitively high for them to enter amateur radio. Most of this group would in time progress to completing the HAREC exam.
• Those who only want to partake in a limited way in the amateur radio service. In this group I would include for example hillwalkers who I have seen using PMR for perceived reliable communication, who would be much better served by amateur bands and repeater use. I have also seen people innocently using cheap handhelds on frequencies and powers that they are not entitled to use! Such radios are on sale in stores in Ireland and readily available online. Users in this group may be happy to stay with this licence and not progress to the full HAREC exam.

So how do we provide a licence for these groups that also addresses the need for an amateur station to operate at the required standard?

I would suggest that such a licence be restricted to bands, power, and equipment (and possibly modes) that would allow a syllabus to be written to satisfy the requirements for operation.

Specifically, I would suggest a novice licence that allowed operation on 2m & 70cm, with a maximum of 5W using commercial amateur radio equipment. To operate this to HAREC standard the novice syllabus could be a modified HAREC syllabus that:
• Deals with radio regulations for the permitted bands and modes only.
• Has a greatly simplified electrical syllabus as the licence would be restricted to using commercial off the shelf equipment.
• Includes some antenna theory to allow antenna experimentation.
• Does not include any HF related content.
• Increased focus on operation including repeater usage and the satellite service.

I believe by taking this approach of seeing what we want to offer in a novice licence and why, that a suitable syllabus

can be constructed that will ensure HAREC standards of proficiency in technical and operational aspects of amateur radio relevant to the privileges that the licence would confer.

However, it is not just the licence and syllabus that needs consideration. For this to be successful it also needs to be accessible and affordable. I note the RSGB and ARRL offer online exams, and the total costs for attaining the license seem to be less than €50.

Such a novice license also opens op some interesting opportunities:
• It will be easier to hold training for the exam. Running a course for the HAREC exam typically takes months; however, with a limited syllabus it would be possible to bring students up to examination standard in a much shorter time. This opens the possibility of covering the material in a short course for Scouts, STEM/maker clubs, & outdoor groups.
• Increased trainers. Although all amateurs have passed the HAREC few would be confident enough to teach the material. A simplified syllabus could be offered by many more clubs and individual operators.
• An ability to tailor "upgrade" courses to focus on the additional requirements of the HAREC syllabus, which should be significantly easier for users to pass having had experience with the novice license.

5.2.9 Increase in permissible transmitter power and related issues

An increase in permissible transmitter power to 1500W is something that would affect only very few stations capable of running stations at that power. Most amateur stations run with the radio output at a maximum of 100W (typical for most HF bands) with some using additional equipment to boost the power to the 400W limit. Indeed, in urban locations with antenna restrictions many operators will be using lower power.

Since most operators will never use 1500W it seems unreasonable that measurement of non-ionising radiation be required for all stations. Ofcom appears to have taken a reasonable approach here by accepting modelling. As all operators can measure output power and are using well understood antenna designs, modelling should suffice.

I would suggest therefore that the following be considered to meet the needs of those requesting higher power and those of us with more modest means:
• Update the list of contests where it is permissible to use higher power.
• Allow individual stations to apply for power limit increases to 1500W where they can demonstrate compliance with non-ionising radiation (either modelling or measurement).
• Allow stations running 25-400W to comply with non-ionising radiation by modelling as Ofcom have done.
• <25W portable or mobile stations are exempt.

Best Wishes,
Albert White,
[✂ [redacted]
[redacted] ✂]

3 AMSAT Ireland

Dear ComReg

For over 50 years ***AMSAT*** ® groups in North America and elsewhere have played a key role in significantly advancing space science, space education, and space technology.

Undoubtedly, the work now being done by ***AMSAT*** ® volunteers throughout the world will continue to have far-reaching, positive effects on the very future of Amateur Radio, as well as governmental, scientific and commercial activities in space.

In response to your latest consultation reference ComReg Document 21/90, and on behalf of the members of ***AMSAT Ireland***, we wish to confirm our support for the proposed request for an amendment to the Radio Amateur power allocation as printed in Annex 5.

Regarding the issue of entry-level or novice-level licencing, we would like to see this introduced into the country. This is something which is required for the future development of our hobby. We feel that this initiative is vitally important in order for amateur space operations to be promoted to the youth of Ireland. The greater number of youth we can encourage into amateur radio the better in the long term for Science, Technology, Engineering and Mathematics educational purposes.

VHF and UHF frequencies will continue to prove paramount for this aspect of the hobby and we hope that this part of the spectrum will be given special consideration if entry/notice licencing is introduced.

Finally, we hereby give our full support to all proposals/submitted documentation by "National Radio Society of Ireland" (NRSI) regarding ComReg Document 21/90

4 Apple

Apple Response to The Commission for Communications Regulation ("ComReg") "Proposed Strategy for Managing the Radio Spectrum 2022 to 2024"

Contact Details Graham MacDonald
Senior Spectrum Policy Advisor
Apple Inc.
[✂ [redacted] ✂]
[✂ [redacted] ✂]

Date 22 October 2021

Executive Summary

Apple Inc. (Apple) appreciates the opportunity to submit this filing in response to The Commission for Communications Regulation ("ComReg") "Proposed Strategy for Managing the Radio Spectrum 2022 to 2024".

Apple appreciates the level of background material and detail contained in this strategy and applauds ComReg in their thoroughness. It is evidently impressive the effort that is involved in enabling access to spectrum for a multitude of innovative applications and services.

We are pleased to see the continuation of a balanced spectrum policy approach that brings additional licensed and licence-exempt spectrum into use to serve businesses and citizens, increasing spectrum access, promoting efficient and effective spectrum use, and supporting continued innovation.

Within this spectrum strategy document the breadth and depth of frequency ranges and topics is vast, therefore in this response Apple's focus has been in a few key areas where we believe it is important to assist develop an appropriate regulatory framework to the benefit of citizens, businesses, and the economy in general.

Please note that there is nothing confidential in this response.

If anything is unclear, or if further details are required, we'd be pleased to provide additional input.

……

Apple Detailed Response to ComReg "Proposed Strategy for Managing the Radio Spectrum 2022 to 2024"

Section 3.2.6: Monitor 5G developments in the 26 GHz Band

Apple appreciates that currently demand for access to the 26 GHz band might be limited but we believe the 26 GHz (24.25-27.5 GHz) is a prime 5G mmWave band as it suits dense 5G small cell networks in urban hotspots where additional capacity is vital.

Apple believes it is important to award 24.25-27.5 GHz for 5G in a timely manner noting 26 GHz was identified for IMT at WRC-19 and that landmark decision means national governments around the world now have the opportunity to consider assigning it for use in 5G networks. In doing so, they will help deliver long-lasting socio-economic benefits. According to the GSMA:

> 5G needs a significant amount of new harmonised mobile spectrum so defragmenting and clearing prime bands should be prioritised. Regulators should aim to make available 80-100 MHz of contiguous spectrum per operator in prime 5G mid-bands (e.g. 3.5 GHz) and around 1 GHz per operator in high-bands (e.g. mmWave spectrum).

Section 3.5 Licence-Exempt Short-Range Devices, Section 3.130

Extract from Section 3.130 -

> In November 2020, the CEPT adopted and published ECC/DEC (20)01 on the harmonised use of the frequency band 5945-6425 MHz (6 GHz Band) for Wireless Access Systems including Radio Local Area Networks (WAS/RLAN). In July 2021, the European Commission also published its Implementing Decision of (04)08 on the harmonised use of radio spectrum in the 5 945-6 425 MHz frequency band for the implementation of wireless access systems including radio local area networks. ComReg published Revision 13 of document 02/71 in July 2021 implementing that decision.

Apple would like to bring to your attention an error in Section 3.130 where it is stated "…. European Commission also published its Implementing Decision of (04)08 ….." as the European Commission Implementing Decision for 5945-6425 MHz is actually (EU) 2021/1067 and not ECC Decision (04)08 which relates to the 5 GHz ranges and is titled "On the harmonised use of the 5 GHz frequency bands for Wireless Access Systems including Radio Local Area Networks (WAS/RLAN)" (approved 9 July 2004 and amended 2 July 2021).

Apple notes the reference to the European Commission Implementing Decision (EU) 2021/1067 is not listed in Annex 6: List of recent EC Decisions. We suggest that it is included in this Annex since we believe that this European Commission Implementing Decision (EU) 2021/1067 is one of the most important regulations applicable to licence-exempt frequency ranges in recent times since it opens the lower 6 GHz (5945-6425 MHz) for WAS/RLAN hopefully paving the way for possible licence-exempt access also to the upper 6 GHz (6425-7125 MHz).

Chapter 4: Factors informing ComReg's proposed work plan for 2022-2024

Apple acknowledges that there are indeed a wide range of factors affect the need for access to existing and new spectrum including end-user demand, technology advancements, desire for international harmonisation to maximise economies of scale, as well as the need to ensure that these new applications/services and technologies have a level of confidence and security enabling them to evolve over time. To a certain extent one needs to also recognise that not all of these applications/services have historically had a clear route forward to appropriate access to spectrum. This is particularly true from a licence-extent perspective in relation to Wireless Access Systems / Radio Local Area Networks (WAS/RLAN). We recognise that all these requests for spectrum access place a burden on ComReg, like all other spectrum regulatory authorities, developing national and international policies.

Section 4.1: International harmonisation of radio spectrum

We agree with ComReg that while user demand has an impact of technology evolution direction, technology enhancements where access to wider bandwidths are needed will have a profound effect on the end user experience whether this is a single user or businesses. We support policy objectives that strive to develop international harmonisation measures as far as reasonably practicable. That said, there are instances where the existing ITU Radio Regulations are likely sufficient to enable a global ecosystem to prevail without the need for additional studies or development of new rules. We touch on this further in relation to mid-band 6 GHz licence-exempt spectrum access for WAS/RLAN.

Section 4.1.2: The 2023 World Radiocommunication Conference (WRC-23)

Apple considers one of the most important, and indeed controversial, agenda items for the WRC-23 to consider is Agenda Item 1.2, Resolution 245 (WRC-19) "Studies on frequency-related matters for the terrestrial component of International Mobile Telecommunications identification in the frequency bands 3 300-3 400 MHz, 3 600-3 800 MHz, 6 425-7 025 MHz, 7 025-7 125 MHz and 10.0-10.5 GHz".

We are pleased that ComReg is actively engaged in the work group preparing CEPT's input to WRC-23 as well as in the Radio Spectrum Policy Group which advises the European Commission on aspects of importance to the Union that will be dealt with at WRC-23.

Apple welcomes the opportunity to engage with ComReg on WRC-23 Agenda Item 1.2 and indeed in relation to other important Agenda Items which Apple has an interest in.

Section 4.39: Frequency Bands Above 24 GHz and **Annex 2 World Radiocommunication Conferences 2019 and 2023, section A2.1: Broadband Communications (5G and Wi-Fi)**

Extract from Section 4.39 under header "Frequency Bands Above 24 GHz"

> In response to Task 3 of the EC mandate, dealing with the 66-71 GHz frequency band, CEPT published Report 78 which considers that the existing technical conditions contained in both EC Decision for SRD (EU) 2019/1345 and CEPT ERC Recommendation 70-03 are sufficient to allow for the introduction of MFCN 5G systems in that band and no changes are required at this time.

Extract from Annex 2 World Radiocommunication Conferences 2019 and 2023, section A2.1 under header "Broadband Communications (5G and Wi-Fi)"

> The global harmonisation of suitable spectrum for IMT-2020 was a high-profile topic with discussion focussed on the bands 24.25-27.5 GHz, 37-43.5 and 66-71 GHz. After intensive negotiations, conditions for the use of these bands were agreed, including emission limits for the protection of passive services in adjacent bands.

Apple believes 57-66 GHz and 66-71 GHz frequency ranges, which already have a co-primary Mobile allocation in the Radio Regulations, should be made available under a licence-exempt regulatory environment. Prior to WRC-19 we believed a Mobile allocation was sufficient to enable IMT and non-IMT technologies to develop on an equal basis and that an IMT identification in 66-71 GHz was unnecessary.

While the WRC-19 amended the Radio Regulations to include an IMT identification in the 66-71 GHz frequency range it is clearly stated in the footnotes that "This identification does not preclude the use of this frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations.".

We agree that EC Decision for SRD (EU) 2019/1345 and CEPT ERC Recommendation 70-03 are sufficient to allow for the introduction of MFCN 5G systems in the 66-71 GHz band.

We believe it is important to avoid fragmenting 57-71 GHz creating effectively a hard border splitting the 57-71 GHz with licence-exempt in 57-66 GHz and licensed in 66-71 GHz.

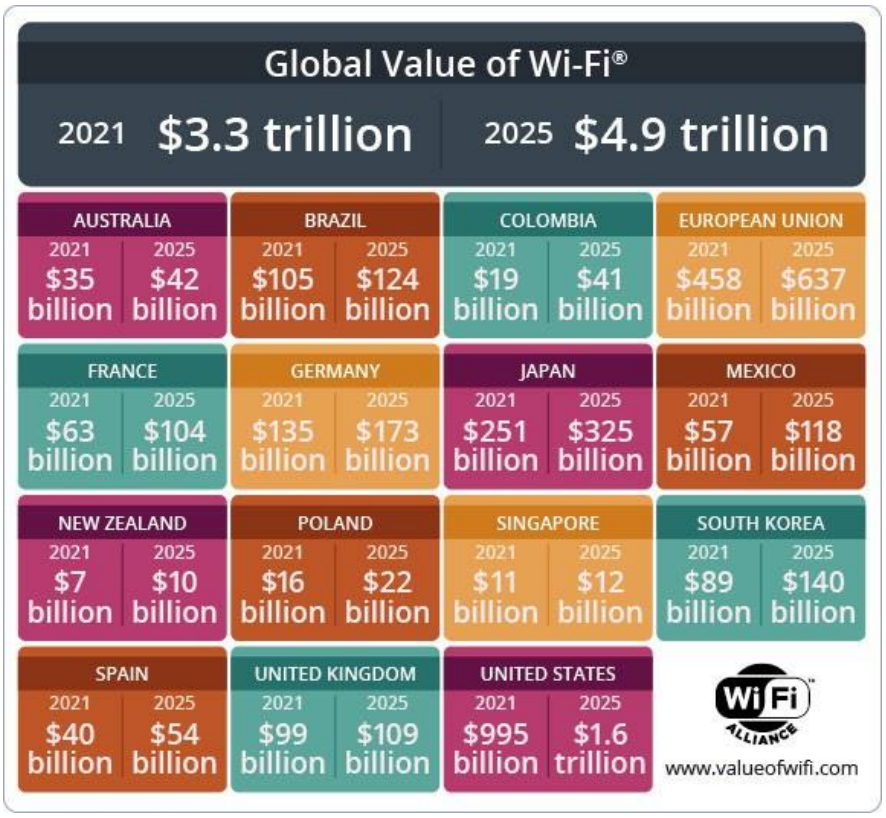
Section 4.51: The 3800-4200 MHz frequency band for terrestrial wireless broadband systems providing private local-area network connectivity

Apple believes that 3800-4200 MHz spectrum can be repurposed for IMT, since bands within 3.3-4.2 GHz are already used elsewhere for commercial 5G services and will continue to serve as the basis of 5G rollouts over the coming decade. Increasing the amount of globally harmonised spectrum in the range comes with major benefits. GSMA have stated[1] spectrum in the 3.5 GHz range (from 3.3-4.2 GHz) "would help speed up the introduction of 5G; improve network performance; help drive innovation; and bring down costs. It would also help boost economic benefits of up to $80 billion over a 15-year period".

Apple believes it is vital to have balance between having access to licensed mid-band spectrum within 3.3-4.2 GHz and access to licence-exempt mid-band spectrum in 5925-7125 MHz.

Section 4.61: The 6425 - 7125 MHz frequency band

Apple notes that in a recent revision to a previously published Wi-Fi Alliance (WFA) economic assessment study on the value of Wi-Fi to economies the new value to the global economy is anticipated to be $4.9 trillion by 2025.



Apple notes there will be instances where different forms of spectrum allocation are required, and we support a balanced approach to enable a potential new entrant to enter the market and/or expand.

Apple would like to specifically highlight the importance of the full 6 GHz band (5925-7125 MHz) for state-of-the-art Wireless Access Systems / Radio Local Area Networks (WAS/RLAN) systems and their evolution. While we acknowledge the significant progress made by the ECC and EC in developing regulations enabling licence-exempt access to the lower 6 GHz (5945-6425 MHz), we are of the opinion that licence-exempt access to the upper 6 GHz (6425-7125 MHz) is also imperative.

[1] 18 November 2019, The 3.5 GHz range in the 5G era

While we respect the World Radiocommunication Conference 2019 decision to study coexistence between IMT with other incumbent services, we do not believe that these studies should delay opening 5925-7125 MHz frequency range should Administrations wish to do so.

Apple does not believe an IMT identification is needed in any part of the 5925-7125 MHz frequency range as this would deny citizens and businesses the benefits of next generation of WAS/RLAN/Wi-Fi technologies.

Apple is aware that work has only recently started within CEPT on IMT coexistence studies under World Radiocommunication Conference 2023 (WRC-23) Agenda Item 1.2 and currently no decision has yet been made within CEPT.

We believe it is important that all the facts are available prior to CEPT Administrations taking a position on the future use of the 6425-7125 MHz band. **Apple therefore requests ComReg to consider supporting a new CEPT Work Item at the November 2021 ECC meeting to study the possible technical and usage conditions under which Low Power Indoor (LPI) and Very Low Power (VLP) portable WAS/RLAN operating in the 6425-7125 MHz band could coexist with existing services in the band.**

These studies should address:

- technical and operational characteristics of LPI and VLP WAS/RLAN in 6425-7125 MHz
- sharing and compatibility issues between LPI and VLP WAS/RLAN and incumbent services in the 6425-7125 MHz band
- any necessary mitigation techniques and conditions on LPI and VLP WAS/RLAN that would facilitate sharing with the incumbent services

Some additional background to this new Work Item proposal can be found below.

Globally and in Europe, there is a growing demand for licence-exempt WAS/RLAN to provide additional capacity and higher data rates as outlined in the following quotations:

> *During the next years, technological advances and accelerating deployments of ultra-fast access networks (fibre, cable, and FWA) will provide speeds in excess of 1 Gbit per second to many European households, enterprises, and public institutions. Gigabit connectivity is one pillar of the EU Digital Decade and a pre-requisite to Europe's Green transition and Digital transformation. Already today, some European operators are offering residential customers Fibre to the Home (FTTH) connectivity with data rates of 10 Gbits per second. By 2030, peak data rates between 50 and 100 Gbits per second are expected*[2].[3]
>
> *These data rates will have to be made available to the users most of whom will be using their connected devices indoors, with most mobile devices being connected through Wi-Fi. Studies of human behaviour patterns show that Europeans spend more than 90% of their time indoors. In line with this observation, more than 80% of mobile data traffic originates or terminates indoors, and it is predicted that in the coming years, this value will increase to more than 90%*[4].

To respond to these demands, additional spectrum is to be considered for use by WAS/RLAN technology. From technical and economic standpoints, the 6425-7125 MHz band is the most attractive option for extending the WAS/RLAN spectrum, particularly as many countries around the world (for example USA, Canada, Brazil, Honduras, Chile, Korea, and Saudi Arabia) plan or already authorized licence-exempt WAS/RLAN operation in the 5925-7125 MHz band.

Previous CEPT studies that were conducted for the 5925-6425 MHz band and presented in ECC Reports 302 and 316 already addressed, amongst other scenarios, in-band WAS/RLAN

[2] Analysys Mason: Full-fibre access as strategic infrastructure: strengthening public policy for Europe, June 2020. BREKO: Breitband Kompass 2016-2017, IEEE ComSoc: More Bandwidth, Please (presentation)

[3] In Switzerland, Internet provider Init7 is already offering FTTH speeds of 25 Gigabits per second to residential customers.

[4] RSPG18-001, BEREC and RSPG joint report on Facilitating mobile connectivity in "challenge areas", December 2017

coexistence with FS and FSS (Earth-to-space) which will also be the most relevant scenarios for the 6425-7125 MHz band. Additional scenarios for in-band WAS/RLAN coexistence in the 6425-7125 MHz band would need to address FSS (space-to-Earth) for feeder links of non-GSO MSS, RAS, EESS (passive) and SOS.

The proposed work would progress in parallel with the CPG and ECC PT1 effort on WRC-23 agenda item 1.2, which is examining the potential for identification of this band for IMT systems in Region 1. The studies proposed in this Report would assist CEPT in formulating its long-term goals for the band 6425-7125 MHz.

The proposed work would progress in parallel with the work being conducted by CPG and ECC PT1 in preparation for WRC-23 agenda item 1.2, which is examining the potential for identification of this band for IMT systems in Region 1. The studies proposed in this Report would be useful to assist CEPT in determining its long-term goals regarding the possible uses of the band 6425-7125 MHz.

World-wide 6 GHz Spectrum Map and justification for access to 5925-7125 MHz: It is important to note that other Administrations have already taken the decision to release, or are in the processes of releasing, the entire 6 GHz band (5925-7125 MHz) as depicted in the map[5] below.

Apple believes it is important to reiterate the justification on why WAS/RLAN needs access to the whole 1200 MHz range within 5925-7125 MHz.

New WAS/RLAN standards, in particular the evolution of Wi-Fi 6E to next generation Wi-Fi known as Wi-Fi 7, will need access to the full 1200 MHz in the 5925-7125 MHz frequency range to support current and emerging innovative use cases. Opening only 500 MHz of the lower 6 GHz band would mean WAS/RLAN networks in dense deployments would have to continue to utilise smaller channel bandwidths (as only one 320 MHz channel would be available). But with access

[5] GOVERNMENTS ACROSS THE WORLD ARE MAKING THE 6 GHZ BAND AVAILABLE ON A LICENCE-EXEMPT BASIS

to the full 1200 MHz, larger channel bandwidths of 160 MHz and especially 320 MHz, as supported by Wi-Fi 7, could be more easily accommodated.

Wider channel bandwidths increase spectrum efficiency and deliver high-bandwidth application and services, while maintaining the ability to share spectrum with incumbents and other licence-exempt deployments. A lack of wider channels would have a detrimental impact on real-time video services and high-bandwidth immersive services, such as augmented reality and virtual reality (AR/VR) services.

Wi-Fi 7 will rely on up to 320 MHz channels to further improve latency, throughput, reliability, and quality of service relative to Wi-Fi 6. The FCC in the U.S. has said: “Making the entire band available for these unlicensed operations enables use of wide swaths of spectrum, including several 160-megahertz channels, as well as 320-megahertz channels, which promotes more efficient and productive use of the spectrum, and would also help create a larger ecosystem in the 5 GHz and 6 GHz bands for U-NII devices.”

Chapter 5: Proposed Radio Spectrum work plan for the period 2022-2024 and **Section 5.2.1: Programmatic spectrum management functions**

Apple fully supports ComReg’s objectives as defined in the spectrum work plan under section “5.2.1 Programmatic spectrum management functions” for the period 2022 to 2024. We see these activities and objectives are vitally important.

We are focussing in particular on processes and regulations that enable access to appropriate spectrum to meet the existing and future needs of citizens, businesses, and the economy since these can be quite challenging due to competing/conflicting perspectives within industry.

Section 5.2.2: MFCN

Apple has the following comments on the ComReg’s work plan items for MFCN for the period 2022-2024. Apple supports -

- completion of multi-band spectrum award for 700 MHz, 2.1 GHz, 2.3 GHz, and 2.6 GHz
- implementing future EC Implementing Decision to replace Commission Decision 2009/766/EC enabling deployment of M2M in 900 MHz and 1800 MHz
- implementing EC harmonisation decisions in bands for MFCN in support of next generation terrestrial wireless systems
- monitoring developments in 1.4 GHz band for MFCN and consult on the award of some or all of this band (noting consultation may also consider other harmonised bands for award)
- monitoring 5G 26 GHz developments and consult on making one or more portions 26 GHz available (noting consultation may also consider other harmonised bands for award)
- monitoring work in CEPT and EC on harmonised technical conditions for shared use of 3800-4200 MHz by private local networks and support harmonisation decisions
- contributing to EC’s and CEPT’s considerations of what efficiencies might be introduced for authorisation and licensing of spectrum for MFCN services in the future

We have some specific comments in relation to two topics / frequency bands that fall under Section 5.2.2: MFCN which are detailed below.

> **TV whitespace:** While Apple notes ComReg will review TV white space technology as part of any future discussions on 470-698 MHz, we believe this frequency range has exceptional propagation characteristics particularly suited for rural mobile broadband connectivity, localised long-range communications, and infrastructure enhancement under a Mobile allocation in the Radio Regulations. This does not necessarily mean that an IMT identification is needed, and it is more appropriate to maintain a technology and service neutrality approach for regulations for this frequency band that could also allow shared use of the band.

Monitor and input to the discussions on the 6425 - 7125 MHz band within Europe and at the ITU's WRC-23": Apple requests ComReg to consider the previous points raised on 6 GHz and in particular our views as expressed in Section 4.61: The 6425 - 7125 MHz frequency band (above) and also in Annex 2: Major agenda items scheduled for the 2023 World Radiocommunication Conference, Section A 2.17 (below).

Section 5.2.3: Broadcasting Services

Apple notes ComReg will review the future requirements for broadcasting as well as TV white space technology as part of any future discussions on 470-694/698 MHz, as well as consider what position to take on WRC-23 Agenda Item 1.5. We would like to reiterate that we believe this frequency range has exceptional propagation characteristics particularly suited for rural mobile broadband connectivity, localised long-range communications, and infrastructure enhancement under a Mobile allocation in the Radio Regulations. This does not necessarily mean that an IMT identification is needed, and it is more appropriate to maintain a technology and service neutrality approach for regulations for this frequency band that could also allow shared use of the band.

Section 5.2.4: EC harmonisation decisions (non MFCN)

Section 5.2.5 Terrestrial Fixed Services

Apple has not commented on these sections.

Section 5.2.6: Licence Exempt Short Range Devices (SRDs)

Apple supports ComReg's strategy for 2022-2024 to continue to facilitate the use of SRDs in accordance with international harmonisations measures; to promote spectrum management position in relation to IoT; and to implement the ECC Decision (04)08 on the harmonised use of the 5 GHz frequency bands for Wireless Access Systems including Radio Local Area Networks (WAS/RLAN) as amended July 2021.

Section 5.2.7: Satellite Services

Section 5.2.8: Private Mobile Radio Services

Section 5.2.9: Radio Amateur Services

Section 5.2.10: Unmanned Aircraft Systems ("UAS")

Section 5.2.11: Aeronautical and Scientific Services

Section 5.2.12: Defence Force Use of Spectrum

Apple has not commented on these sections.

Annex 2: Major agenda items scheduled for the 2023 World Radiocommunication Conference and **Section A 2.17: Mobile Broadband Communications**

With respect to WRC_23 Agenda Item 1.2, Apple notes ComReg is considering the bands that fall under ITU Region 1 but for completeness we suggest it is appropriate to reflect the full text from Resolution 245 for WRC-23 Agenda Item 1.2 to make it clearer which frequency bands are being considered. Resolution 245 "resolves to invite the ITU Radiocommunication Sector" 2 states -

2 to conduct and complete in time for WRC-23 the sharing and compatibility studies[1], with a view to ensuring the protection of services to which the frequency band is allocated on a primary basis, without imposing additional regulatory or technical constraints on those services, and also, as appropriate, on services in adjacent bands, for the frequency bands:

– 3 600-3 800 MHz and 3 300-3 400 MHz (Region 2);

– 3 300-3 400 MHz (amend footnote in Region 1);

– 7 025-7 125 MHz (globally);

– 6 425-7 025 MHz (Region 1);

– 10.0-10.5 GHz (Region 2),

Apple acknowledges that it is important to protect the protect existing users in the Fixed Satellite Service and the Fixed Service.

Apple supports enabling access to all, part, of **3.3-4.2 GHz** for IMT since it is already used elsewhere for commercial 5G services and will continue to serve as the basis of 5G rollouts over the coming decade. Increasing the amount of globally harmonised spectrum in this range comes with major benefits. GSMA have stated spectrum in the 3.5 GHz range (from 3.3-4.2 GHz) "would help speed up the introduction of 5G; improve network performance; help drive innovation; and bring down costs. It would also help boost economic benefits of up to $80 billion over a 15-year period"[6]. We believe it is vital to have balance between having access to licensed mid-band spectrum within 3.3-4.2 GHz and licence-exempt mid-band spectrum within 5925-7125 MHz.

Apple does not believe an IMT identification is needed or desirable for the **10-10.5 GHz** frequency range. We are supportive of ensuring access to 10-10.5 GHz under a technology neutral licence-exempt regulatory regime without any technology specific identifications.

Apple would like to specifically highlight the importance of licence-exempt access to the **full 6 GHz band (5925-7125 MHz)** for state-of-the-art Wireless Access Systems / Radio Local Area Networks (WAS/RLAN) systems and their evolution. Duly noting the World Radiocommunication Conference 2019 decision to study coexistence between IMT with other incumbent services, we do not believe an IMT identification is needed in any part of the 5925-7125 MHz frequency range as this would deny businesses and citizens the benefits of next generation of WAS/RLAN/Wi-Fi technologies.

Annex 6: List of recent EC Decisions

As mentioned previously, Apple notes the reference to the European Commission Implementing Decision (EU) 2021/1067 is not listed in Annex 6: List of recent EC Decisions. We suggest that it is included since we believe that this European Commission Implementing Decision (EU) 2021/1067 is one of the most important regulations applicable to licence-exempt frequency ranges in recent times since it opens the lower 6 GHz (5945-6425 MHz) for WAS/RLAN hopefully paving the way for possible licence-exempt access also to the 6425-7125 MHz band.

[6] 18 November 2019, The 3.5 GHz range in the 5G era

5 Benetel

From: Adrian O'Connor [✂ [redacted] ✂]
Sent: 22 October 2021 07:07
To: Market Framework Consult
Subject: Submissions to ComReg document 21/90

To whom it concerns,

Thank you for providing the opportunity to provide input on the Spectrum Consultation.
In our opinion, 5G Private Networks will be a significant market opportunity, as significant new 5G vertical use cases emerge across the world. Countries that have embraced a new approach to spectrum allocation to enable 5G Private Networks have generated significant early activity around new market verticals leveraging 5G.

Availability of spectrum to non-traditional telco operators can open up innovation around new 5GNR use cases.
Whether it is an approach like Germany, with a 100MHz of frequency available as an attractive price point for a localised area, or the UK enabling non-traditional telco licensing of 3.8-4.2GHz, as a couple of examples of several around the world, we believe that enabling spectrum in the 3-8 – 4.2GHz range would be incredibly beneficial to sparking innovation and exploration of new use cases.

Based on our experiences as an emerging Radio Unit provider in the new world of OpenRAN, we are seeing opportunities flourish when spectrum can be easily accessed. To benefit from 5G, we believe that a minimum of 100MHz of spectrum needs to be available to a licensee, so 400MHz of sub 6GHz spectrum would be appear to be ideal.
For any spectrum to make sense, there needs to be at least a small ecosystem of players supporting the various building blocks, so it is important that whatever spectrum is provided, is not just an Irish assignment. Availability of some UEs / CPEs and RU is key.

Regards,

Adrian O'Connor
CEO - Benetel

6 Cellnex

Cellnex Telecom comments on COMREG Consultation 21/90 Proposed Strategy for Managing the Radio Spectrum 2022 to 2024

Cellnex Telecom (**Cellnex**) welcomes the opportunity to provide comments on ComReg document 21/90 *Proposed Strategy for Managing the Radio Spectrum 2022 to 2024*.

Cellnex is the leading provider in Europe of infrastructure to operators of wireless telecommunication networks **Cellnex** has made a firm commitment to developing its portfolio, which currently comprises c.128,000 sites 71,000 of these are already in the portfolio and the rest in the process of closing or planned rollouts up to 2030. This positions the company at the forefront to support the development of next generation networks. Thanks to investments undertaken to boost its transformation and internationalisation drive, Cellnex now provides services in Ireland, Spain, Italy, Netherlands, United Kingdom, France, Switzerland, Poland, Portugal, Austria, Denmark and Sweden

Cellnex welcomes the ComReg initiative to share its spectrum strategy with the market as, spectrum decisions should provide long term certainty in order to foster the massive investment related decisions. It is key that the national spectrum strategy would be in line with the Irish needs to provide the best to Irish citizens. In this regard, the neutral host model and the infrastructure sharing solutions proposed and promoted by **Cellnex** will help operators to comply with the obligations arising from spectrum licenses.

Cellnex supports ComReg's prioritisation of spectrum management workplan activities as set out in section 5.1.

Cellnex wish to make specific comments on section 5.2.8 Private Mobile Radio Services. In particular we would like to comment on the need for dedicated spectrum for verticals and for Public Protection Disaster Relief (PPDR) services.

- **Spectrum demand for verticals and private networks.**

Many Irish and European industries are looking at the possibilities that the rollout of private communications networks can offer. Industry will benefit from secure and guaranteed communications and the improvements which can be achieved through the addition of elements such as artificial intelligence, edge computing and the development of robotic processes. Spectrum is key to promote this innovation and to enable the emergence of new service providers and revitalise the value chain.

The emergence of these new and innovative services is linked to the implementation of private networks operating on dedicated spectrum. A private or dedicated network will address business use cases by providing, for example, mission critical reliability, ultra-low latency requirements and massive bandwidth video processing, some features that a commercial network would not be able to cope with. The level of performance which can be delivered by industry's private wireless network are decisive in attaining the required level of connectivity for any particular process. Certain industrial sectors demand these hyper-local networks (e.g. networks with coverage limited to a particular industrial site) capable of

responding to their specific needs establishing its critical KPI's for the processes and therefore require a dedicated network.

Cellnex believes that a quick identification and allocation of dedicated spectrum for use by vertical and private networks is key to paving the way for the Irish and European industry of the future.

Moreover, for the vertical ecosystem and industry in general to benefit from dedicated spectrum to foster innovation and improve its competitiveness , we ask that ComReg also address the following issues:

1. Need for European vertical sector to have **long term certainty for the huge investments needed on private networks**.
2. **Time to market** is key for European industry for avoid lagging behind.
3. **European harmonisation** would be desirable in order to build on economies of scale and wider equipment ecosystem.

Being more specific, some proposals would be:

4. Regarding the B26GHz, assess the possibility of a scenario which allocates part of the band for licensed 5G MNO's services and part for Private networks.
5. Regarding band 3800-4200MHz, the band studied for private networks in Europe according to the RSPG, push for this band and make it available as soon as possible.
6. Regarding the 5.9GHz, for ITS (Intelligent transport System) services, take into consideration the European trend to consider the band as a dedicated band for ITS-G5 Short-range communications.

- **Spectrum for PPDR services.**

Public Protection Disaster Relief (PPDR) services have a critical national strategic impact and Cellnex conside that its deployment requires dedicated infrastructure and spectrum. The high reliability and mission critical performances required by these services cannot be addressed by commercial networks.

Today the PPDR services are mainly provided using narrowband technologies. However, it is reasonable to think that in the midterm, a migration to broadband technologies would happen. Even a coexistence between narrowband (TETRA / TETRAPOL) and broadband services (LTE / 5G) would be envisaged in the long run. For the deployment of a broadband PPDR network, dedicated spectrum is needed. Indeed, some Member States in the European Union have already allocated spectrum for broadband PPDR services.

As a conclusion, our suggestion would be to allocate spectrum for the Irish Broadband PPDR services focusing on the 700MHz band. The use of the 2x(5+3)MHz block identified by the European Commission is gaining momentum across Europe) and on the 400MHz bands.

Cellnex remains available to further elaborate on these comments and discuss any issues raised with ComReg.

7 Charlie Carolan

From: Charlie Carolan [✂ [redacted] ✂]
Sent: 19 October 2021 19:04
To: Market Framework Consult
Subject: Reference: Submission re ComReg 21/90

Dear ComReg Admin,
I would like to put forward my views on the following points from your Reference document.

Novice and Entry-class licensing
I would support a limited licence for the above, limited to UHF/VHF Only, in the event that it will enable Licensee's to develop additional Theory and Skills that would encourage upgrading their licence status at a later date if they wish to do so.

Increase in permissible transmitter power and related issues.
I would support an increase in permissible transmitter power during normal activity and not just during specific contest activity.

Kind regards

Charlie Carolan [✂
[redacted]
[redacted] ✂]

8 Connacht Radio Club

Connacht Radio Club

Dear ComReg

In response to your latest consultation reference ComReg-2190, and on behalf of the members of Connacht Radio Club, we wish to confirm our support for the proposed request by the "The Marconi Radio Group" for an amendment to the Radio Amateur power allocation as printed in Annex 5.

Our club has a mixture of interests in both radio contests and also DX-Chasing and we would like to see everyone afforded the same opportunity.

As modern radio equipment is produced to a very high standard and must meet strenuous testing prior to receiving its CE or FCC approval, so the chances of spurious emissions is greatly reduced. Designers of today's radios and amplifiers are focused on the need for better filtering and distortion reduction as they look for any area to improve their market presence.

With regards to meeting the terms of our licence, our members feel we have always measured up to these requirements. As was stated in section A3 of your report, we are also not aware of any interference been caused.

A small selection of test equipment will provide the details necessary for maintaining station compliance:

- PEP meters in line to ensure limits are maintained
- Spectrum analysers could be used to check for spurs or out of band problems
- Sniffers with oscilloscopes to note levels
- Field strength meter for EMF Radiation

On the question of how often measurements should be taken, we feel it sufficient to test upon installation and as changes are made.

Signature:

9 Dundalk Amateur Radio Society

Dundalk Amateur Radio Society.

[✂ [redacted]

✂]Dundalk

Co. Louth

Dear ComReg

In responding to your latest consultation reference ComReg-2190, and on behalf of the members of the Dundalk Amateur Radio Societyr, we wish to confirm our support for "The Marconi Radio Group" proposed request for an amendment to the Radio Amateur power allocation as printed in Annex 5.

Our club has a mixture of interests in both the radio contests and also DX-Chasing and we would like to see everyone afforded the same opportunity's.

As modern radio equipment is produced to a very high standard and must meet strenuous testing prior to receiving its CE or FCC approval so the chances of spurious emissions is greatly reduced. Designers of today's radio's and amplifiers are focused on the need for better filtering and distortion reduction as they look for any area to improve their market presence.

With regards to meeting the terms of our licence our members feel we have always measured up to these requirements and as was stated in section A3 of your report we are also not aware of any interference been caused.

A small selection of test equipment will provide the details necessary for maintaining a station compliance.

- PEP meters in line to ensure limits are maintained
- Spectrum analysers could be used to check for spurs or out of band problems
  Sniffers with oscilloscopes to note levels
- Field strength meter for EMF Radiation

On the question of how often measurements should be taken, we feel it sufficient to

test on installation and as changes are made would be sufficient.

Kind regards,

On behalf of the Dundalk Amateur Radio Society

Brian Whelan [✂ [redacted] ✂]

Secretary

10 Dynamic Spectrum Alliance

October 22, 2021

Commission for Communications Regulation
One Dockland Central
Guild Street
Dublin 1 Ireland D01 E4X0

Re: Proposed Strategy for Managing the Radio Spectrum 2022 to 2024: ComReg 21/90

Dear Sir/Madam,

The Dynamic Spectrum Alliance ("DSA")[1] respectfully submits these comments in response to the Commission for Communications Regulation ("ComReg") "*Proposed Strategy for Managing the Radio Spectrum 2022 to 2024*" (the "Strategy Statement"). DSA welcomes ComReg's interest in ensuring efficient assignment and use of scarce frequencies and in making spectrum available for new wireless services that will facilitate competition, enhance connectivity, and promote investment. DSA believes that providing new spectrum access options through use of new spectrum management tools will benefit competition, create conditions for innovation, and spur more rapid deployments of 5G networks and services.

DSA appreciates the opportunity to participate in the consultation and to present our views and comments, particularly on ComReg's plans for the future use of the 3800-4200 MHz and 5925-7125 MHz bands. We are available to discuss these comments and provide any additional information.

Respectfully submitted,

Martha SUAREZ
President
Dynamic Spectrum Alliance

[1] The DSA is a global, cross-industry, not for profit organization advocating for laws, regulations, and economic best practices that will lead to more efficient utilization of spectrum, fostering innovation and affordable connectivity for all. Our membership spans multinationals, small-and medium-sized enterprises, as well as academic, research and other organizations from around the world all working to create innovative solutions that will benefit consumers and businesses alike by making spectrum abundant through dynamic spectrum sharing. A full list of DSA members is available on the DSA's website at www.dynamicspectrumalliance.org/members

DSA COMMENTS

A. Introduction

DSA recommends that telecommunications regulators worldwide take a balanced approach between licensed, unlicensed, and lightly licensed when allocating spectrum to wireless broadband services. An unbalanced approach may have the unintended consequence of creating an artificial scarcity, which could, in turn, increase the cost of broadband access. Licensed and unlicensed spectrum bands will both play important and complementary roles in the delivery of advanced 5G services and that coordinated shared spectrum should be considered in spectrum planning. As part of spectrum planning, DSA also supports spectrum sharing that will lead to the more efficient utilization of spectrum and foster innovation and affordable connectivity for all. The opportunities made possible by spectrum sharing go beyond the economy, facilitating the evolution of the ecosystem as the potential for new use cases expands and large-scale applications are realized.

In the whitepaper entitled "*Automated Frequency Coordination - An established tool for modern spectrum management*,"[2] DSA makes the case that the use of databases to coordinate spectrum assignments has evolved significantly since its first introduction, but at its heart, it is nothing new. The basic steps are the same as in a manual coordination process or where a regulator assesses the opportunities for local licensing on a case-by-case basis. However, what is new includes:

(1) Surging consumer demand for wireless connectivity and hence the need to intensively share underutilized frequency bands;

(2) Significant improvements in the computation power to efficiently and rapidly run advanced propagation analysis and coordinate devices and users in near real-time; and

(3) More agile wireless equipment that can interact directly with dynamic frequency coordination databases.

There is no question that today we have the technical ability to automate frequency coordination and thereby lower transaction costs, use spectrum more efficiently, speed time-to-market for new services, protect incumbents from interference with greater certainty, and generally expand the supply of wireless connectivity that is fast becoming, like electricity, a critical input for most other industries and economic activity. Increasing spectrum access by a wide range of new users, including vertical sectors, will result in increased and more rapid deployment of new networks and services. The introduction of new licensing options supported by automated dynamic spectrum sharing technology is the best path to support such deployments.

[2] http://dynamicspectrumalliance.org/wp-content/uploads/2019/03/DSA_DB-Report_Final_03122019.pdf

B. Background on Spectrum Sharing in the 3.55-3.70 GHz Band in the United States

DSA would like to highlight some real applications that have been developed in the United States as a result of the commercial deployment of the 3.5 GHz Citizens Broadband Radio Service (CBRS) authorized by the Federal Communications Commission (FCC) in January 2020 – a major milestone for automated spectrum sharing.

Under the CBRS regulatory framework, the spectrum access system (SAS) coordinates CBRS frequency use and manages coexistence among the three tiers of access: 1) incumbent (e.g., navy radar and commercial fixed satellite services), 2) priority access licensed (PAL), and 3) general authorized access (GAA). The environmental sensing capability (ESC) network detects incumbent naval radar use of the band and alerts the SAS to move new terrestrial commercial operations to non-interfering channels. The SAS also interfaces with the FCC's Universal Licensing System (ULS) to obtain information about Fixed Satellite Service (FSS) incumbents and grandfathered fixed wireless systems. Using this information, the SAS is able to calculate aggregate interference from new commercial users to incumbents and enforce protection of these systems. In the twenty months of commercial operational experience, no incumbents have reported interference from new CBRS users, demonstrating the effectiveness of SAS management of the band.

New commercial users in the CBRS band have multiple options for accessing this 150 MHz of spectrum:

a) Acquisition of a PAL in the FCC's 2020 CBRS auction where use-or-share rights for county-based licenses were offered;

b) Use of the GAA tier, which does not require an individual license to operate, but does require use of certified equipment and connectivity to a SAS to receive a spectrum grant for operations with a particular transmit power and antenna orientation at a specific location and height; or

c) Leased rights from a PAL license holder.

Based on the type of device (fixed or personal/ portable) and its coordinates, information about the transmitter's location and operating parameters, and the technical rules the regulator puts in place to protect incumbents and/or adjacent users from harmful interference, the SAS calculation engine determines the list of available channels at the PAL's and/or GAA's device location and its maximum permissible radiated power. As described above, the SAS not only coordinates protection of incumbent users from new commercial operations, but also manages the assignment of frequencies to PAL and GAA users, protection of PAL operations, and co-existence among GAA users to maximize spectrum efficiency and provide deterministic access for all users. The automated SAS process provides near real-time management of the CBRS band, speeding time-to-market while minimizing uncertainty and administrative burdens.

Through this automation of shared spectrum, a whole host of private wireless network opportunities, from smart energy to smart city, have emerged. From business to leisure, hundreds of smart office, airport and stadium private networks have been deployed using CBRS as the result

of having access to spectrum without the need for an individual license. In fact, only a year and a half after receiving authorization for commercial operations, over 180,000 CBRS cell sites have been deployed across the United States with the vast majority of them using the GAA tier. Examples of such deployments include:

1) Retail

The American Dream Entertainment and Retail Complex in New Jersey has implemented CBRS to cover the entire 3 million square foot venue, servicing over 40 million annual visitors and more than 450 stores. Beyond the mall itself, CBRS has also been used for traffic and parking management, assessing approximately 33,000 parking spaces. Equipping security cameras, digital signage and other systems for both internal and external mall operations, CBRS has proved essential for supporting and enabling interesting such new use cases. This type of infrastructure deployment has proven to be faster and more economic than traditional fixed infrastructure, offering reliable and simple, yet effective means of connectivity.

2) Airport

In Dallas, CBRS has transformed airport communication systems, bringing airport staff and management connections onto the CBRS spectrum. Such deterministic spectrum access is critical in emergency scenarios to cater to higher power requirements and improve coverage. This network supports critical airport communications and coexists with a robust Wi-Fi network.

3) Sport stadium

Angel Stadium in Anaheim, California has adopted CBRS capabilities to support its internal communications, lightening the load on the Wi-Fi system, similar to what Dallas airport has achieved. Since the full commercial deployment of CBRS, they have also been working as a neutral host provider, offering Mobile Network Operators (MNOs) support in managing signal traffic for customers attending events. By not only supporting internal connectivity for both staff and customers but extending this service for the reinforcement of existing MNOs, CBRS has presented the opportunity to eliminate barriers and limitations, providing full, flexible coverage whenever it is needed – even when roaming.

4) Rural connectivity

Fixed Wireless Access providers, also known as Wireless Internet Service Providers (WISPs), are able to harness the newly available CBRS spectrum, tripling the amount of spectrum previously available to them. WISPs, which typically operate in rural areas and have been using this part of the CBRS band for the past 12-15 years, are transitioning older WiMAX and proprietary systems to the new CBRS rules and LTE equipment to expand their reach and improve their service offerings.

As we reflect on the use cases developing across the United States, it is clear that CBRS has revolutionized the ways in which spectrum is utilized to improve connectivity across a diverse

number of vertical sectors. [3] DSA believes that adopting a similar spectrum sharing model in Ireland will enable more users, including verticals, to access scarce and valuable spectrum resources, leading to lower-costs, lower barriers to entry, and most effective allocation for innovative businesses. This, in turn, enables and encourages competition and innovation by existing service providers as well as new entrants.

C. Unlicensed Sharing in the 6 GHz Band

Another important example of innovative spectrum sharing is the 6 GHz Band, where regulators worldwide are enabling license-exempt Wireless Access Systems/Radio Local Area Networks (WAS/RLAN) use on a shared basis with incumbent services. In the United States, the entire 1200 MHz (5925-7125 MHz) of the 6 GHz Band has been made available for license-exempt use on a shared basis with incumbent services. Two categories of license-exempt devices have been authorized to date: 1) Low Power Indoor (LPI) devices, and 2) Standard Power (SP) devices that can operate both outdoors and indoors under the coordination of an automated database system, known as the Automated Frequency Coordinator (AFC). A third category of Very Low Power (VLP) portable devices is also under consideration.

Under the new rules, WAS/RLAN operations in the band are able to commence while also ensuring that existing incumbent services, including fixed satellite services, fixed services and mobile service with some applications, such as electronic news gathering, can continue to thrive. The introduction of license-exempt devices did not necessitate a spectrum clearance process, which would have been complex and expensive.

In addition to the United States, many other countries, including the Republic of Korea, Saudi Arabia, Brazil, Canada, Chile, Peru, Costa Rica, Honduras, and Guatemala have already permitted license-exempt use across the entire 6 GHz Band. Mexico and Colombia are engaged in consultations that proposed to make the entire 1200 MHz available for license-exempt use.

D. DSA Recommendations to ComRega. 3800–4200 MHz

As ComReg considers options for introducing new terrestrial wireless broadband services in the 3800-4200 MHz band, the DSA encourages ComReg to leverage commercially available automated sharing technology, which will enable new IMT systems to begin operations in this band while also protecting incumbent FSS users. Automated sharing system will enable ComReg to encourage more users to leverage shared spectrum, maximize spectrum efficiency where it may

[3] Other examples of CBRS deployments can be found here: >https://www.lightreading.com/5g/charter-to-start-first-cbrs-market-buildout-in-2021/d/d-id/769456?itc=lrnewsletter_cabledaily<; >https://www.telecompetitor.com/wisps-get-cbrs-range-as-great-as-six-miles-at-100-mbps-speeds/<; >https://ongoalliance.org/news/watch-communications-and-bec-technologies-partner-to-expand-rural-internet-access/<; >https://www.fiercewireless.com/wireless/wispa-cbrs-a-good-guide-for-3-45-3-55-ghz<; https://enterpriseiotinsights.com/20210714/channels/news/las-vegas-deploys-largest-private-municipal-lte-network-in-45-days?utm_campaign=RCR%20Newsletter&utm_medium=email&_hsmi=140455124&_hsenc=p2ANqtz-8_naAz8kuWAD4MfCsNIO_UI-BHN_Tmp_iZplCd7CyjjErXRYqqzuw2clkX7aZjVjvO_rXC6x2qLT514s778wtgZli-kkEvx9mmlXvfu-4IsAQOaUM&utm_content=140455124&utm_source=hs_email.

be possible to authorize multiple users to operate on an overlapping and shared basis, and create more operational flexibility for new users to access spectrum for both indoor and outdoor use cases.

In addition to implementing automated shared access technology, DSA recommends that ComReg consider a tiered licensing approach where incumbents, such as FSS operators, are in the top tier, while new entrants are in one or more lower tiers and may operate so long as they protect the top tier. Such a tiered approach could be adopted as follows:

> Tier 1 – Incumbent users. Users operating in the band that have the highest priority in accessing spectrum. Their access must be guaranteed at all times during their operation so their radio equipment does not need to be aware of other operations sharing the band.
>
> Tier 2 – Licensed new users. New entrant users that require a degree of certainty in accessing spectrum. In order to ensure that the band can be shared with this tier of new users, it is fundamental that the operation of incumbent services is well understood (for example, they operate only in certain areas) and is predictable (for example, they operate at certain times or there is a way to know when spectrum needs to be vacated). If such information is not accurate enough or it is not available, then access to the band for Tier 2 users might be greatly reduced or not possible at all.
>
> Tier 3 – Opportunistic users. New entrant users that can access spectrum on an unlicensed or licensed by rule basis. These users may not need access to spectrum over a larger geographic area and/or are operating indoors or on a campus or may be operating in more remote areas where spectrum usage will not be as competitive. In many cases, such networks are deployed in very remote areas where spectrum is largely unused and the risk of interference to higher tier users is negligible. There might be other cases where there is sufficient spectrum available and the envisioned applications allow QoS flexibility, for example because the band would mainly be used to provide additional capacity to networks using other anchor frequencies. In such cases, it is conceivable to have a third tier of users with minimal regulatory barriers and no need for interference protection from other Tier 3 users.

It is also possible to combine a tiered licensing approach with streamlined secondary market rights. For example, the new license conditions might include the right for the license holder to lease the spectrum to other users – whether on a geographic basis (partitioning) or by sub-dividing the spectrum (disaggregating). Such a secondary market can drive innovation, allow new technology to be deployed by leased spectrum users, and support various sectors, such as enterprise networks and industrial uses.

Additionally, DSA recommends that ComReg consider implementing a "use-it-or-share-it" policy for licensed spectrum. Conceptually, use-it-or-share-it rules authorize opportunistic access to licensed spectrum that is locally unused or underutilized. Until the spectrum is actually put to use in a local area, it should be available for non-interfering use by networks and devices. Licensees lose no rights whatsoever. In 2016 the FCC authorized opportunistic access by GAA users to unused PAL spectrum in the CBRS band. Opportunistic use of unused PAL spectrum is controlled

by the SAS, which requires that GAA users must periodically check with the database to renew permission to continue operating. This is one of the key reasons for the success of CBRS.

A general use-it-or-share-it authorization has a number of affirmative benefits. First, opportunistic access reduces spectrum warehousing in areas where the economics are least attractive for large service providers. It might increase access for operators that are interested in deploying, but who lack needed spectrum access in that local area. Second, opportunistic access further encourages secondary market transactions by facilitating price discovery on both the supply and demand side. For licensees, it will both identify users interested in a potential lease or partition and provide information on the potential value (i.e., how much is my spectrum worth?). For users, opportunistic use is an opportunity to test the local market and to determine the value of a more secure, longer-term lease or partition agreement (i.e., how much am I willing to pay for spectrum?). Third, opportunistic access will lower barriers to entry for innovative new use cases by parties that at least initially either cannot afford or do not believe they need to pay for exclusive use and interference protection. The option to deploy, at least initially, without committing to the cost of a long-term lease or license could be particularly useful for small providers and industries.

b. 5925-7125 MHz

DSA would like to specifically highlight the importance of the full 6 GHz Band (5925-7125 MHz) for state-of-the-art WAS/RLAN systems and their evolution.[4] DSA believes that the highest and best use for this band is for WAS/RLAN devices. Unlicensed 6 GHz will also offload traffic from cellular 5G networks (total data offload to unlicensed going from 74% to 79% in 2022).[5] This will lower the costs of network deployment for mobile operators and for edge investment by neutral host and third-party providers. Importantly, it will also lower costs for consumers.

While we acknowledge the significant progress made by the ECC and EC in developing regulations enabling licence-exempt access to the lower 6 GHz (5945-6425 MHz), DSA is of the opinion that licence-exempt access to the upper 6 GHz (6425-7125 MHz) is also imperative. The entire 1200 MHz of spectrum in the 6 GHz Band is required to meet the projected demand for mid-band WAS/RLANs and other uses. It would also support future Wi-Fi 7 devices feature 320 MHz wide channels. If only the lower 500 MHz is made available, only one 320 MHz channel is possible. On the other hand, three non-overlapping 320 MHz channels will be supported if the entire 1200 MHz of the 6 GHz Band is made available for WAS/RLAN.

While we respect the World Radiocommunication Conference 2019 decision to study coexistence between IMT with other incumbent services, DSA does not believe that these studies should delay opening 5925-7125 MHz frequency range should Administrations wish to do so. Furthermore, DSA does not believe an IMT identification is needed in any part of the 5925-7125 MHz frequency range as this would deny citizens and businesses the benefits of next generation of WAS/RLAN/Wi-Fi technologies.

[4] DSA notes that in a recent revision to a previously published Wi-Fi Alliance (WFA) economic assessment study on the value of Wi-Fi to economies the new value to the global economy is anticipated to be $4.9 trillion by 2025.

[5] See Cisco Systems, Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2017-2022.

DSA is aware that work has only recently started within CEPT on IMT coexistence studies under World Radiocommunication Conference 2023 (WRC-23) Agenda Item 1.2 and currently no decision has yet been made within CEPT. We believe it is important that all the facts are available prior to CEPT Administrations taking a position on the future use of the 6425-7125 MHz band.

DSA requests that ComReg consider supporting a new CEPT Work Item at the November 2021 ECC meeting to study the possible technical and usage conditions under which LPI and VLP portable WAS/RLAN could coexist with existing services in the 6425-7125 MHz band.

Finally, DSA recommends that ComReg begin consideration of permitting standard power operations operating under an automated frequency coordination system, such as an AFC. There are unique high power indoor and outdoor RLAN operations that can benefit from this category of device. The DSA believes that standard power access points (and client devices) could operate throughout the band under AFC control while fully protecting incumbent services.

E. Conclusion

DSA appreciates the opportunity to provide input on ComReg's Strategy Statement. We believe that the use of spectrum sharing and automated sharing technology can help ComReg to reach its policy goals of facilitating spectrum access by a variety of entities and use cases, fostering investment, and encouraging innovation, while also reducing administrative burdens on both ComReg and industry players.

11 Enda Broderick

Enda Broderick
[✂[redacted]
[redacted]
[redacted]
[redacted]
✂]22-10-2020

Dear ComReg

In response to your 21/90 consultation and as a follow up to my initial email of 13th May 2021.

My reason for posing the initial question was to gain a greater understanding as to why Ireland is lagging so many other countries on adopting a multi-tiered approach and encouraging a greater take up of the hobby. I can see the progress been made elsewhere and the benefits that can be achieved through expanding the entrance options.

The term "STEM" (Science, Technology, Engineering and Maths) has been doing the rounds and many 3rd level institutions are putting resources around encouraging in students for these programs. As Radio Amateur's we have a unique hobby to cater for all the elements of a STEM program[1]. This been adopted in other regions and shown to be a benefit to education and a positive impact on the take up of Amateur Radio all while having an entry path that is encouraging and manageable while studying alongside other 2nd or 3rd level material.

To date I have not encountered any regulator noting a negative effect of introducing a tiered grade system and while the details of any such system would yet have to be decided there are good examples already in place, with which to base a model on including guidance on the cept format comparable with other countries.

In contrast to a Radio Amateur licence, obtaining a marine radio licence "Short Range Certificate for VHF operators"[2] is obtainable after 8 hours of instruction and a short exam. Accepting the differences between the two in a technical nature and the extra benefits available to Radio Amateur's, it does show as an example (only) that there could be an entry level akin to the marine level developed whereby an operator would be allocated 5W and VHF/UHF privileges as a starting point, working to a novice and then full licence.

Over the years I have been involved in a number of events where we have brought Amateur Radio to the public through commemorative events (Most recently Alcock & Brown Centenary[3] in 2019, where we worked with the local schools to introduce radio and the radio history of the Clifden to the students all of whom made radio contacts during their visit), Scouting JOTA and the highlight of the past few years, has been involved with facilitating a linkup in 2020 with the international Space Station and Athlone Community College[4]. Following this event there were discussions about promoting a TY program that could be ran in conjunction with teachers and Radio Amateurs to develop the science and radio elements. It is still our hope this can happen once covid abates.

[1] http://www.arrl.org/files/file/ETP/Stories/ARRL_Amateur_Radio_in_the%20_STEM-Classroom_4_16(1).pdf

[2] https://www.seafarers.ie/Seafarer/Training-Courses-and-Medical-Fitness-Certificates/Radio-Operators-Short-Range-Certificate-of-Competency-SRC

[3] https://alcockandbrown100.com/

[4] https://www.rte.ie/news/regional/2020/1207/1182861-space-station-athlone/?fbclid=IwAR01dip6YCT1WLbVboldSB0N7aCVWDGSs6ofMqS-FqgvJrrMiCq6YjNIw2E

Having an achievable target (bearing in mind their study time required to complete other subjects) to get them started on the radio journey would be a welcome option.

I can appreciate the pull-on resources this may have in ComReg, however I would hope ComReg would look on the introduction of a tiered licence and the administration process around it as an overall positive for the hobby, youth and future engineers who may one day even work for ComReg. On the Comreg website[5] it states, "We are responsible for facilitating competition, for protecting consumers and for **encouraging innovation**", I believe there are few groups better placed than Irish Radio Amateurs to assist with encouraging innovation with your support.

In your consultation you posed a question as to how a level of competence can be achieved, I would like to think that having a tiered path would inevitably end up with a higher skilled person overall as they move between levels and gain a better understanding instead of cramming to meet an exam standard and not developing a wider knowledge in the process.

I thank you for the opportunity to respond and portray my view and that of others in our community.

Kind Regards

Enda Broderick

[5] https://www.comreg.ie/about/what-we-do/

12 ESB

Networks Telecoms, ESB Networks

ESB Networks' Response to ComReg's Consultation on Proposed Strategy for Managing the Radio Spectrum 2022 to 2024 (21/90)

22/10/2021

1. INTRODUCTION

ESB Networks (ESBN) welcomes the opportunity to respond to the Commission for Communications Regulation (ComReg) consultation on its Proposed Strategy for Managing the Radio Spectrum 2022 to 2024 (ComReg Document 21/90).

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. ESBN commends ComReg on a well thought out strategy for managing the radio spectrum from 2022 – 2024. ESBN's comments on ComReg's proposals are listed below.

2. ESBN Response

ESBN has engaged with ComReg on a number of matters over recent years primarily through consultation processes.

ESBN were successful in acquiring a licence for spectrum in the 400 MHz range in ComReg's 2019 award process. ESBN commends ComReg on understanding the requirement for dedicated radio for Smart Grid. ESBN intends to begin deploying its nationwide network from the summer of 2022. ESBN's licence is for 2 x 4 MHz of spectrum in the 410 – 414 MHz paired with 420 – 424 MHz range. ComReg had initially intended to release 410 – 415.5 MHz paired with 420 – 425.5 MHz, however reduced the amount of spectrum available in the award due to potential requirement of spectrum by OGCIO for PPDR.

ESBN outlined in consultation responses to ComReg how the provision of 2 x 5 MHz of radio spectrum would allow the deployment of an enhanced and more pervasive Smart Grid network. ESBN notes that OGCIO and ComReg have not come to a decision on what spectrum should be made available for PPDR as per following statement from ComReg;

"*ComReg envisages that another BB-PPDR spectrum options update will be provided in due course following further engagement with OGCIO and the existing licensees, and when further information is available.*"

ESBN encourages ComReg to make a decision soonest on what spectrum should be made available for PPDR. In the event that 414 – 417 MHz and 424 – 427 MHz was not required for PPDR, ESBN encourages ComReg to make this spectrum available for ESBN to enable a greater Smart Grid network for the benefit of all consumers of electricity in Ireland. ESBN are happy to engage further on this with ComReg. Equally, ESBN would benefit from knowing if this spectrum will be used by OGCIO for PPDR as this knowledge would allow ESBN build in potential interference mitigation measures when designing and deploying its Smart Grid network.

ESBN actively engaged and provided ComReg with details on its usage of fixed links with respect to ComReg's Fixed Link Review. ESBN will continue to engage with this formal process to assist in developing the most efficient Fixed Links process for all users and ComReg.

ESBN commends ComReg on developing and operating an efficient and valuable Test and Trial scheme. ESBN has used this scheme a number of times. Allowing industry trial actual equipment in frequency bands of interest facilitates the gathering of invaluable insights into technology, its capabilities and potential for deployment. The Test and Trial scheme is a key

enabler and driver of innovation in Ireland and ESBN commends ComReg's continued focus in this area.

ESBN will formally engage with ComReg on its PMR Licence review when this process begins. ESBN previously engaged with ComReg on its TPBR review. The use of this spectrum is very important for Utilities including ESBN.

ENDS

13 ESOA

Aarti Holla-Maini
Secretary General
[✂[redacted]✂]

22 October 2021

The Commission for Communications Regulation Ireland
By Email: marketframeworkconsult@comreg.ie

Subject: Submissions to COMREG Document 21/90 – National Spectrum Strategy 2021-2024

ESOA would like to thank the Commission for Communications Regulation ("COMREG") for the opportunity to provide comments on their "Proposed Strategy for Managing the Radio Spectrum 2022 to 2024" (the "Consultation").

ESOA [1] is a non-profit organisation established with the objective of providing a platform for collaboration between satellite operators globally and a unified voice for the sector. ESOA is recognised as the representative body for satellite operators by international, regional and national bodies including regulators, policymakers, standards-setting organisations such as 3GPP and international organisations such as the International Telecommunications Union and the World Economic Forum. As the world's only CEO-driven satellite association, ESOA leads the sector's response to global challenges and opportunities. It offers a unified voice for the world's largest operators, important regional operators and other companies that engage in satellite-related activities.

The COVID-19 pandemic has highlighted the global criticality of connectivity which has become a necessity to all institutions, undertakings, or communities of people in the world. Satellite systems bring people online no matter where they are located and is also the fastest connectivity solution deployable when natural disaster strike. As such the socio-economic benefits the satellite industry brings is simply invaluable and should be at the top of every country's digital agenda.

The satellite communications sector is going through several major innovation trends. Non-geostationary systems have deployed that are capable of providing unprecedented connectivity levels, including for very high-gigabit capacity, low-latency applications. Geostationary platforms have been also subject to strong capacity enhancements driven by a systematic digitisation of space technologies, the 'softwarisation' of satellite operations and other virtual network functions. Combined with the advent of new ground antennas and reliance on steerable spot beams using various frequency bands, these progresses have increased flexibility in geographical coverage and spectrum use.

ESOA would like to commend COMREG for the proposed strategy, considering the needs of different stakeholders, while respecting international framework from ITU and CEPT. We are especially grateful to Ireland for providing the certainty of spectrum allocated to Fixed Satellite Services to ensure our sector can access the frequencies of importance in the L, S, C, Ku and Ka-bands.

ESOA further notes the COMREG plan to work in the 40-5-43.5 GHz for 5G. Given the increasing congestion in FSS usage of the Ka-band with over 130 GSO satellites and several NGSO constellations, the satellite industry is developing into Q/V-bands. In term of ITU Radio Regulation, footnote 5.516B identifies 40-40.5GHz in all 3 ITU Regions for ubiquitous deployment of HD-FSS. More importantly, the full Q/V-band FSS spectrum (37.5-50.2 GHz) is required for satellite gateways. Therefore, ESOA asks COMREG to take this into account when licensing this band and requires provisions to ensure that future 5G operation do not prevent or interfere with FSS gateways.

Finally, ESOA noted COMREG has initiated the important work of reviewing the satellite licencing scheme. ESOA will be grateful to be able to provide detailed input from the satellite industry's perspective when COMREG release it for consultation.

[1] The members, activities, and other details about ESOA can be found at www.esoa.net

14 Eutelsat

Commission for Communications Regulation
One Dockland Central, Guild Street,
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Ireland

Friday, 22 October 2021

Subject: Submissions to ComReg Document 21/90 – Eutelsat's response to ComReg's consultation on its Proposed Strategy for Managing the Radio Spectrum 2022 to 2024

Eutelsat, one of the world's largest satellite operators, would like to thank the Commission for Communications Regulation (ComReg) for the opportunity to comment on its Proposed Strategy for Managing the Radio Spectrum 2022 to 2024 (hereafter, the 'Strategy'). Eutelsat wishes to express its views on this Strategy in the following paragraphs, mainly regarding satellite services spectrum in Ireland.

But first, Eutelsat appreciates that ComReg is considering the needs of the different users of the radio frequency spectrum, while taking into account the regional and international regulatory framework from the International Telecommunication Union (ITU), the European Conference of Postal and Telecommunications administrations (CEPT), and the European Commission (EC).

The spectrum used by satellite services

Satellite as a key connectivity enabler

Eutelsat would like to use this occasion to highlight the key role satellites play in connecting people everywhere and supporting the socio-economic development of many countries.

Among other benefits, satellites present a cost-effective solution for tackling the digital divide by providing broadband access directly to remote and hard to reach areas. A wide range of entities, private and public, benefit from reliable, resilient, and secure communications services provided by satellites on land, in the air, and at sea. In many countries, satellites are being used to help expand the coverage of mobile networks to places that would not otherwise be covered. Furthermore, the integration of satellites in the 5G ecosystem will bring high throughput 5G and cloud computing services to all users, everywhere. The video market is also a key component of satellite services, with solutions such as direct-to-home broadcasting and distribution of TV channels.

At the ITU, several bands are allocated for the provision of fixed satellite services (FSS) in Region 1, and this is reflected in Ireland's Radio Frequency Plan. Among these we can in particular highlight the C-band (3.4-4.2 GHz, 4.5-4.8 GHz downlink, and 5725-7075 MHz uplink), Ku-band (10.7 -12.75 GHz, 13.4-13.65 GHz downlink and 12.75-13.25 GHz, 13.75-14.50 GHz uplink) and Ka-band (17.3-20.2 GHz downlink, 17.3-18.4 GHz and 27.5-30 GHz uplink), Q/V-bands (37.5-42.5 GHz downlink, 42.5-43.5, 47.2-50.2 and 50.4-52.4 GHz uplink).

All these bands are important for satellite services because of the different characteristics they present and applications they support. The C-band is fundamental with its unique characteristics such as ubiquitous coverage and rain resilience. The Ku-band is key to offer direct-to-home broadcasting services, as well as connectivity services for enterprise networks. The Ka-band is used on more than one hundred satellites in geostationary orbit and over a thousand satellites in non-geostationary orbit globally to provide among others broadband services to consumers and enterprises. The Q/V band enables access to wide bandwidths for the gateways of the forthcoming generation of high and very high throughput satellites, and for user terminals in a future step.

Eutelsat currently operates 18 satellites that cover Ireland and provide video and connectivity services in the C-band, Ku-band and Ka-band. Eutelsat is thus very pleased to read Ireland is planning to continue to facilitate the licensing of earth station above 3 GHz and to facilitate the exemption of individual licensing for certain classes of terminals, as stated in section 5.2.7 of the Strategy. Eutelsat notes that ComReg wishes to consult on the Satellite Earth Station Licensing regime during the 2022-2024 period and is looking forward to contribute.

Development of Q/V band harmonization at CEPT

Eutelsat would like to emphasize the current work ongoing at CEPT regarding the use of the Q/V band for satellite services.

A new ECC Decision to harmonize the uplink bands 47.2-50.2 GHz and 50.4-52.4 GHz for FSS gateways and earth stations has been validated by Working Group Frequency Management (WGFM) and will soon be submitted at ECC for publication. On the same frequency bands, a new work item to potentially revise ECC Decision (05)08 on HDFSS has been validated by WGFM to be studied at FM44 from next year.

In parallel, a revision of ERC Decision (00)02 is underway at CEPT level, that addresses the use of the band 37.5-40.5 GHz by the fixed service and downlink FSS earth stations. This is partly linked to the work on the 42 GHz band at CEPT, that is mentioned in section 4.2.2 paragraph 4.41.

Eutelsat therefore encourages ComReg to contribute to the discussions at CEPT to support satellite services, especially on the harmonization of the Q/V band.

<u>The need to protect satellite services from in-band and adjacent-bands interference</u>

Several elements of ComReg's work plan in the next 3 years could have an impact on the provision of satellite services, and Eutelsat wishes to explore some of them below.

In the C-band

With its unique characteristics such as wide geographic coverage and rain resilience, the C-band has been used for decades by satellites to provide data connectivity and video services, and satellite operators and their users rely heavily on services using these frequencies. Significant investments have been made to launch and develop C-band satellite services, and many earth stations are located in Europe as part of their global reach.

In the 3.8-4.2 GHz band (section 4.2.2 paragraphs 4.51 to 4.54 and section 5.2.2 paragraph 5.4.ix)

FSS earth stations in the 3.4-4.2 GHz band are being used to receive signals from satellites in geostationary orbit. The long distance over which the signal must be transmitted makes it very weak compared to terrestrial signals such that earth stations are very sensitive to interference from other users in the band and adjacent bands. In practice, co-frequency, co-coverage sharing between IMT and FSS systems is impossible unless very clear and specific technical conditions are imposed. In Europe, because of the decision to harmonize the 3.4-3.8 GHz band for generalized IMT / 5G use, satellite services are now restrained to the 3.8-4.2 GHz band.

Eutelsat understands that following the Radio Spectrum Policy Group (RSPG) Opinion of June 2021 'on additional spectrum needs and guidance on the fast rollout of future wireless broadband networks', the EC wishes to mandate a study on the technical conditions for the shared use of the 3.8-4.2 GHz band for local vertical applications with low/medium power stations. The RSPG recommends investigating this possibility while protecting earth stations in the band

In view of the importance of C-band for FSS and the importance of FSS for worldwide connectivity, Eutelsat would like to stress the need to ensure that the whole 3.8-4.2 GHz band continues to be available for current and future FSS operations in Europe and in Ireland.

In the 6 GHz band

Eutelsat notes that ComReg intends to consult on the manner in which the 5.9 GHz band will be regulated for Intelligent Transport Systems (ITS) in Ireland, following the EC implementation Decision EU 2020/1426 (section 5.2.4 and 4.2.1 of the Strategy). In doing so, Eutelsat would recommend defining technical conditions that protect incumbent users in the band or in adjacent bands, including satellite services, from harmful interference.

Higher in the 6 GHz band, ComReg is following and taking part to the discussions around the 6425-7125 GHz band, that is being studied as part of the ITU World Radio Conference 2023 agenda item 1.2 (section 4.2.2 paragraphs 4.61 and 4.62, and section 5.2.2 paragraph 5.4.xviii). The 6425-7075 MHz band is part of the uplink FSS C-band. In the case of satellite uplink bands, it is not only the interference to IMT stations from transmitting satellite Earth station which needs to be considered for compatibility studies, but also the aggregate interference from IMT stations into the satellite receiver. Co-frequency co-coverage sharing between IMT and FSS is very complicated in practice even in uplink bands, and the introduction of IMT in the 6425-7125 GHz band could be a threat to FSS operations in this band. Instead of allowing IMT in this band, Eutelsat would suggest preferring the re-farming of mid-band spectrum used by older mobile generation to satisfy the MNOs' needs, as mentioned in section 4.4.1 paragraphs 4.76 and 4.77.

In the mmWaves

Eutelsat and the satellite industry have invested a significant amount of time and budget in the development of satellites and complete ecosystem in Ka-band, for provision in particular of fixed broadband access and connectivity to earth stations in motion (ESIM). From 2022, Eutelsat will operate its Konnect VHTS satellite in Ka-band, providing high quality broadband services over Europe and the Middle East. This latest-generation satellite service enables all types of users, from consumers

to businesses, schools, hospitals, and governments to enjoy the social and economic opportunities that internet connectivity entails, whether they are in urban, rural or the remotest locations at affordable prices.

The uplink and downlink Ka-bands are therefore critical and should remain available for satellite services. As such, Eutelsat would suggest making sure the satellite services in the 28 GHz band are protected from adjacent band interferences when ComReg studies the introduction of terrestrial 5G in the 26 GHz band or other harmonized bands for IMT (section 5.2.2 paragraph 5.4.viii). As of today, there is little use of mmWaves for IMT, and the 3.25 GHz available in the 26 GHz band should be more than sufficient to accommodate current and future demand of terrestrial 5G in these bands.

In the above-mentioned Q/V bands, Eutelsat feels special care should be given to the protection of the satellite gateways and earth stations before any conclusion is taken regarding the use of the 42 GHz band for IMT (section 4.2.2 paragraph 4.41).

Satellite for IoT

In section 5.2.6 of the Strategy, Eutelsat notices ComReg is planning to work on licence exempt Short Range Devices (SRD) and Internet of Thing (IoT) in the next 3 years.

Beyond terrestrial solutions, satellite based IoT solutions can offer ubiquitous coverage, enabling objects to transmit data irrespective of their location and demonstrating the fundamental complementarity between terrestrial networks and satellite technology. Eutelsat would therefore recommend ComReg to keep in mind satellite IoT connectivity services when addressing Ireland's spectrum management position in relation to IoT.

Moreover, license exempt SRD bands can be used for the provision of IoT connectivity applications by satellite, and Eutelsat appreciates ComReg plans to continue to facilitate the use of SRDs in Ireland in accordance with international and regional harmonisations.

In conclusion, Eutelsat would like to thank ComReg for ensuring earth stations will continue to be protected and encourages ComReg to take into account the potential impact on satellite services' operations when studying and regulating spectrum access for other services.

Eutelsat is confident ComReg will duly consider the above comments and looks forward to taking part to future consultations on spectrum and satellite services issues.

If you have any questions, please contact:

Chloe Savinien
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[✂ [redacted]
✂]

Respectfully submitted,

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15 EUWENA

Response EUWENA to ComReg consultation

'Proposed strategy for managing the radio spectrum 2022 to 2024'

Ref ComReg 21/90; dated 10/09/21

The below is a joint response from (all the initiators of} newly established association EUWENA to ComReg's consultation on medium term spectrum management in Ireland
Since EUWENA was established around the emerging market for private wireless networks, the need for spectrum harmonisation and -availability and the enhancing of a comprehensive ecosystem for private wireless usage, we felt that a response from the association is appropriate.

We will first introduce EUWENA and then comment on specific articles of the consultation that are most related to our remit:

Private Wireless Networks for Verticals Using Private Dr Shared Local Spectrum.

1. About EUWENA

EUWENA (European Users Wireless Enterprise Network Association[1] was set up in April 2021, following a series of parallel conversations during early 2021 between private mobile networks pioneer, Christian Regnier and critical communications industry experts, Peter Clemons and Koen Mioulet, who recognised the urgent need for a European-level initiative to promote the greater uptake of 3GPP-based private mobile networks. Christian, Peter and Koen were joined from the beginning by Antoine van der Sijs, Christopher Gehlen, Kerim Agdaci, Shaun McGinley and Thomas Hervieu, with the support and attendance of Tony Boyle and Johann Schmid at the inaugural meeting in March 2021.

The founding members all share EUWENA's common values and goals and represent companies from across Europe: AirFrance, Privinnet and LD expertise (France), Quixoticity (United Kingdom), ULWIMO and Strict (Netherlands), Sigma Wireless (Ireland), Opticoms (Germany} and Neutroon (Spain), as well as industry associations, AGURRE (France} and KMBG (Netherlands). It is expected that many more companies and associations will become a part of EUWENA over the coming months and years.

2. Main drivers for EUWENA establishment

In recent times, all EUWENA participants have experienced first-hand the challenging, often protracted process of requesting and acquiring spectrum for private wireless network use in their home markets. In a few European countries private and local spectrum for enterprise usage is now available; in a few more countries preparations for private spectrum are ongoing; in many others, no spectrum for private wireless networks has been made available at all yet. In addition, the spectrum that has been made available for private and local networks differs between countries, which is detrimental for the eco system . This lack of spectrum harmonisation across Europe is one of the main drivers for EUWENA. It is also one of the main concerns for enterprises - notably the pan European ones - that are establishing private wireless solutions to optimise their processes.

3. The scattered, fragmented usage of wireless in industries.

Some EU countries have allocated shared spectrum or 'private' spectrum as it is popularly called for enterprise wireless networks. This spectrum enables an enterprise or its service provider to deliver high QoS wireless connectivity for its critical operational processes. Examples of this are

Video control for AGV (automated guided vehicles)
Plant control via IoT
Robotics and autonomous machinery
Data transmission for critical operational processes
AR and VR for enhance efficiency and customer interaction
Trunked voice communication for critical processes

They are deployed in a wide variety of sectors ('verticals') such as

Manufacture and industry
Logistics and warehousing
Ports and airports
Utility grids
Petro chemical plants
Health and hospitals
And many more.

The diversity of use cases and sectors applying private wireless already points at one Achilles heel: the fragmentation of the users. EUWENA aims at overcoming that chasm between users, between verticals and between users and their regulators in articulating spectrum demand.

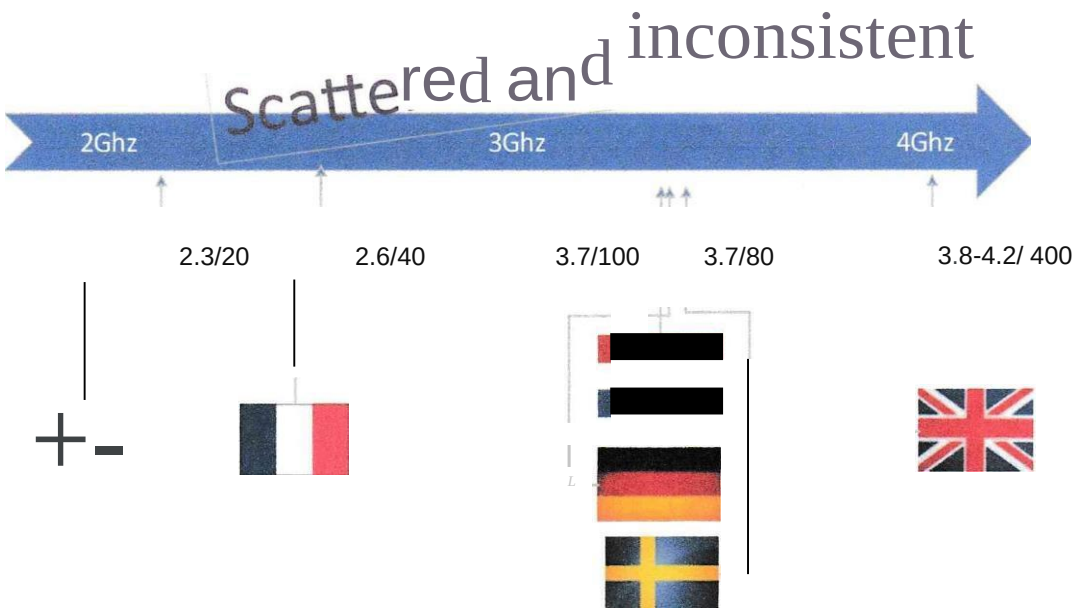
4. The current EU spectrum landscape for verticals

Across Europe, countries have made spectrum available for geographically dispersed, shared usage by verticals. Not all countries have done so, in some a private user is still 'at the mercy' of existing spectrum holders, often MNO's. In some countries multiples of 20MHz have been set aside for enterprise usage; the example that draws a lot of attention being Germany. The Netherlands though, already made (some) shared private spectrum available a decade ago. Other counties have recently followed, notably the UK is now very active too . EUWENA sets out to follow and aggregate all these international developments

A case in point is the USA where a very successful private and shared spectrum regime has been implemented around the CBRS spectrum (Citizen Band Radio Service).

The below image visualises the current availability of private spectrum in EU countries:

Spectrum allocations pvt wireless: (band in Ghz/bandwidth in Mhz)



The picture clearly displays that the amount of spectrum and the band in which it operates differs vastly between countries. In addition, there are vast differences in tariffing for the spectrum too. Thus, the situation is far from harmonised. That IS a predicament for two reasons:

1. Uniformity. A pan European producer, petrochemical corporation' or transport company is confronted with different spectrum and solutions per individual country and thus cannot standardise on plant operations solutions.
2. Eco system. In the absence of harmonisation, the availability of equipment and devices may suffer from too low a market size and lack of scale.

Both these plights hinder the establishment of wireless services and networks that propel our industries into the 21st century .

Nonetheless (!}, markets like Netherlands and Germany have seen tremendous uptake[2] in private local licences which demonstrates the demand from industry for high performance business critical networks.

The RSPG and the EU have recently recognised the plight of the verticals: commissioner Branislav Stanchev has recently held presentations in which he calls for uniformity of spectrum for vertical, harmonisation of issuing conditions and..... the establishment of a common voice of the (fragmented) verticals! EUWENA aims at being the latter.

5. Individual ComReg queries

[1] This example was recently publicly presented at a pan European spectrum summit
[2] Netherlands has already had over 500 systems in the 1800 guard band and close to 200 licences in 3.5 Ghz, Germany has just started licencing local shared spectrum and already displays over 150 applications in 3.5 Ghz

With the above as background, **we wiH** now respond to some of the individual paragraphs of the ComReg consultation, that are most closely related to our remit: private wireless solutions and spectrum. Let us begin generally by articulating that at present Ireland stands out in Europe as one of the countries that didn't yet allocate shared private spectrum which may put it at a disadvantage in terms of economic development and industry 4.0 development.

5.1. Articles 4.51- 4.53 of the consultation

In these articles ComReg stipulates the inclination of CEPT and the EC to develop the band 3800 - 4200 MHz for local and private wireless purposes and indicates its inclination to monitor that development and provide input to it.

As is clear from the previous paragraphs, EUWENA strongly recommends Ireland to also liberate spectrum for private local networks *given* the enormous uptake in other countries and merits thereof for industry and economy. Harmonisation is a prerequisite so ComReg would do well to adhere to a band that is likely to become a European harmonised band like 3800 - 4200 or one that is a de facto standard like 3.7 - 3.8 Gz used in multiple countries . Fragmentation of spectrum is evidently detrimental to *the* development *of a* thriving economy as indicated *above*

5.2. Article A 3.39 - 3.46 of the consultation

ComReg elaborates how the EC perceives 5G as an enabler for industry, how RSPG articulates the need or local private spectrum and recommends to consider and study 3800 - 4200 MHz to this end.

EUWENA strongly agrees with the intended harmonisation and urges ComReg to follow closely. We point out that the attention of the RSPG for the quest for private spectrum for verticals is rather sudden as in its October consultations there was still mention of 'no visible articulated demand from verticals'... *Very recently the ERC recognised the burden of lack of harmonisation, of availability at all* and off varying licencing conditions and consequently embarked on a policy towards harmonisation, all of which occurred over the last half year. We urge ComReg on behalf of Irish industry to keep close pursuit of the EU development and apply pressure on RSPG to cling to the current direction and not get distracted by incumbent forces.

6. Closing remark

With this we encourage ComReg to pursue its spectrum strategy and the setting aside of spectrum for verticals. EUWENA, as a representative body of European private wireless users and -experts is available for further input and reflection, either through its Irish fellow founder or through its chairman or secretary. ComReg is welcome to use Euwena as a *'voice* of the industries' in this sense.

Christian Regnier

Chairman - EUWENA

[✂ [redacted]
✂]

[1] There is a EUWENA website in the making, as per today there are no publicly accessible documents yet.

16 Galway Radio Club

Galway Radio Experimenters Club

Response to the

Consultation on ComReg's Draft Radio Spectrum Management Strategy 2022 to 2024

Published by the

Commission for Communications Regulation

From the

Galway Radio Experimenters Club (GREC)

Chapter 1 - Introduction

1.1 The Galway Radio Experimenters Club (GREC) welcomes the opportunity provided by the Commission for Communications Regulation (ComReg) to comment on the Draft Radio Spectrum Management Strategy 2022-2024 published on 10 September 2021, document ComReg 21/90. Chapter 1 of this document is a scene-setting section whilst Chapter 2 deals with specific suggestions concerning various issues which IRTS believe falls within the remit of a spectrum management strategy framework.

1.2 The GREC has been in existence for over 30 years, and represents a group of Amateur Radio Operations in the Galway area. The GREC is a member of the Irish Radio Transmitters Society (IRTS) which is the Irish national society that represents licensed amateur radio operators in Ireland in respect of government and public relation matters.

Chapter 2 - Amateur Radio Examinations

2.1 ComReg has raised a number of issues in respect of current and future examinations to obtain an amateur licence raised in paragraphs 3.1 to 3.14 of Annex 3 and paragraphs 5.7 – 5.10 of ComReg 21/90. To date ComReg has not published any opinion on the implementation of the CEPT Novice Licence or an Entry Level Licence as described in CEPT ERC Report 32 and ECC Report 89 respectively.

2.2 A key set of conditions (from ERC Report 89) is that the associated privileges for each licence level is aligned with the licence itself as follows:

> The general characteristics of the associated privileges are:-
> **Entry level licence:** Restricted access to spectrum with limited power levels. Essentially a national licence with privileges to suit the local environment. For using of amateur radio station outside native country it is necessary to apply for a licence if bilateral agreements between countries do not foresee some simplified procedure. Limits may be placed on home constructed transmitters.
> **Novice licence:** Wider spectrum access and higher power permitted than with an Entry Level licence. Consistent with the privileges of ECC/REC(05)06 for temporary operation outside native country.
> **HAREC based licence:** Access to all amateur allocations and techniques authorised in the respective country, internationally recognised through T/R 61-02 and fully consistent with the privileges of T/R 61-01 for temporary operation outside native country.

Applying a set of restrictions at each licence level is similar to the set of conditions that would currently be applied as part of the HAREC based licence - in other words restrictions on transmission power as well as spectrum in use.

2.3 As indicated in the “IRTS Irish Amateur Radio Survey - Attitudes and engagement survey results” (see https://www.irts.ie/cgi/st.cgi?engagement_survey), three of the four themes from the analysis clearly show a need to raise awareness of the Amateur Radio Hobby and in attracting the youth to the hobby. A tiered licence level facilitates the introduction of Amateur Radio to a younger audience, allowing them to experiment at restricted levels and to grow and develop into the higher levels.

2.4 As also indicated in “Section 1 Highlights” of the “IRTS Irish Amateur Radio Survey” (see 2.3 above), of the 160 respondents, the age breakdown is as follows:

Age	% of Respondents
<18 years old	1%
18-25 years old	2%
26-44 years old	16%
45-64 years old	56%
65-74 years old	20%
> 75 years old	5%

Assuming the number of respondents (160) as being representative of IRTS Membership (approximately 1,000 members), which in turn could be considered representative of the 4,190 licenced Amateur Radio Operators (Source: ComReg), we get the following pro-rata breakdown of Amateur Radio Operators in Ireland:

Age	% of Respondents	No. of 4,200 operators
<18 years old	1%	42
18-25 years old	2%	84
26-44 years old	16%	672
45-64 years old	56%	2,352
65-74 years old	20%	840
> 75 years old	5%	210

81% of the Amateur Radio Operators are aged 45 or older, with an extremely small number of youth as licenced Amateur Radio Operators.

We need to encourage more to join the hobby, and in particular we need to encourage the youth to join the hobby.

2.5 Based on anecdotal information, from the HAREC exams held in 2020 and so far in 2021, 2 people under 18 took the exam and passed. It should be recognized that this was a great achievement, and congratulations should be given to both for passing the exam. But - there were only 2.

We need to encourage the youth to join the hobby.

2.6 Indicated in “Section 1 Highlights” of the “IRTS Irish Amateur Radio Survey” (see 2.3 above), 68% of the respondents have been involved in Amateur Radio for 20 years or more, with only 16% being involved in the 0-5 years range. Applying this to the 4,190 overall number of Amateur Radio Operators, 2,849 have been involved for over 20 years with only 670 being involved for < 5 years. Aligning that with the data in 2.4 above, it could be considered that the age group of those involved in Amateur Radio for 20 years or more are also likely in the age range of 45 onwards, with an emphasis on the latter end of that age range.

We need to encourage more to join the hobby, and in particular we need the youth to join the hobby.

Proposal

GREC believes that there is a need to introduce a tiered licence level within Ireland, with emphasis on the CEPT Entry and Novice Licence as described in the CEPT ERC Reports referenced above. This would facilitate and encourage a younger group of Amateur Radio Operators which in turn would sustain the Amateur Radio Hobby in Ireland.

Summary

GREC would like to take this opportunity to thank ComReg for making available their Strategy document for consultation.

We feel that it is vital for the Amateur Radio Hobby that we encourage new members (particularly the youth) to become involved in Amateur Radio and we believe that this can be achieved with a tiered license structure.

GREC states that nothing in this document should be considered confidential or restricted.

17 Galway VHF Club

Galway VHF Group

[✂[redacted]

✂]19th October 2021

Re 5.7 Novice and Entry Class Licencing

Dear ComReg

In responding to your latest consultation reference ComReg-2190, and on behalf of the members of The Galway VHF Group, we wish to confirm our support for an Entry Level Licence.

Whilst we understand that our National Society, the IRTS, does not support this initiative, they do not represent the view of all Radio Amateurs on this issue - it was quite divisive! It should be noted that many IARU countries support an Entry level Licence or Tiered system and they have been pressing all countries to support this initiative. I am sure you are aware of those European Countries currently implementing this system.

In the interests of encouraging youth and inclusivity we feel that, although this may involve some changes in regulations over time, this would a positive step forward

We thank you for including this in your Spectrum Management Document which is a move in the right direction.

Yours sincerely

Stephen C. Wright

_____

Stephen C. Wright (Secretary

Galway VHF Group

[✂[redacted]

✂]19th October 2021

Dear ComReg

In responding to your latest consultation reference ComReg-2190, and on behalf of the members of The Galway VHF Group, we wish to confirm our support for "The Marconi Radio Group" proposed request for an amendment to the Radio Amateur power allocation as printed in Annex 5.

Our club has a mixture of interests in both the radio contests and also DX-Chasing and we would like to see everyone afforded the same opportunity's.

As modern radio equipment is produced to a very high standard and must meet strenuous testing prior to receiving its CE or FCC approval so the chances of spurious emissions is greatly reduced. Designers of today's radio's and amplifiers are focused on the need for better filtering and distortion reduction as they look for any area to improve their market presence.

With regards to meeting the terms of our licence our members feel we have always measured up to these requirements and as was stated in section A3 of your report we are also not aware of any interference been caused.

A small selection of test equipment will provide the details necessary for maintaining a station compliance.

- PEP meters in line to ensure limits are maintained,
- spectrum analysers could be used to check for spurs or out of band problems
- sniffers with oscilloscopes to note levels
- and a field strength meter for EMF Radiation

On the question of how often measurements should be taken, we feel it sufficient to

test on installation and as changes are made would be sufficient.

Yours sincerely

Stephen C. Wright

Stephen C. Wright (Secretary)

18 George Donaldson

From: George Donaldson [✂ [redacted] ✂]
Sent: 19 October 2021 17:23
To: Market Framework Consult
Subject: Reference: Submission re ComReg 21/90

To whom it may concern

I am in full support of a Novice class license being introduced. We must endeavor to attract new blood to the hobby.
I am also in full support of increased transmitter power.

--
Kind Regards

George Donaldson [✂ [redacted] ✂]

19 Gerry Feeney

From: Gerry Feeney [✂ [redacted] ✂]
Sent: 20 October 2021 12:41
To: Market Framework Consult
Subject: Reference Submission Re re Comreg 21/90

Dear Sir,
I wish to confirm my support for ..
1. The implementation of an “Entry Level Licence” and 2. An Increase in power for all licencees and not just contestes.

In particular I believe that the introduction of an “Entry level Licence” fits well with evolving STEM education at second level.

Regards,
Gerry Feeney
[✂ [redacted]
[redacted]
✂]

20 Huawei

Huawei's response to ComReg's consultation <Proposed Strategy for Managing the Radio Spectrum 2022 to 2024>

Key Points for Consultation of Ireland ComReg's Spectrum Strategy

HUAWEI TECHNOLOGIES CO., LTD.

Contents

1 700M: SDL is not yet Mature, Both in Ecosystem & Radio Deployments.

As part of the Second Digital Dividend process, the allocation of 700 MHz band should be **technology neutral** to accommodate the development of IMT services including 4G LTE, NB-IoT and 5G NR. That should allow operators to take full advantage of the 700M blocks allocation.

This band is ideally suited for both rural coverage expansion and indoor coverage, there is already a well-developed ecosystem of LTE and 5G network equipment and devices. The band has been released and is already in use in a number of countries in EU as well as worldwide; bringing significant benefits to Irish consumers.

Regarding the **738-758 MHz** block in the centre gap, which is the SDL (Supplementary Downlink); **the ecosystem in 700M SDL is not mature yet**, i.e. BT in UK and Sunrise in Switzerland bought 700M SDL, although it has not been utilised as yet. Although, ample opportunity for further utilisation in the future as there is support ensuring stability for such.

Deployment of 700 MHz SDL has great chance to result in **PIM3 issue** to operators' FDD 800MHz spectrum band when used in conjunction with SDL.

For radio module of 700MHz, if one single module is to support both 700MHz FDD and SDL, then an **extra guard band** with 738-743MHz SDL part needs to reserve.

So, there is need of 10MHz guard band for TX and RX in 700MHz totally. Another option is to develop a separate module for 700M SDL so as to avoid extra guard band.

2 1.4GHz: Suitablefor Mobile Service.

The number of devices supporting LTE 1400 and its band combination are increasing, there are more than 150 types of mobile phones and CPE supporting B32 up to today.

Several European MNOs such as Three (UK), Deutsche Telekom (Germany) and KPN/T-Mobile (Netherlands) have deployed mobile networks in 1.4G commercially. From the public information provided by Three, they have rolled out 1400MHz spectrum at 1,900 of its 4G sites across the UK, doubling capacity and increasing speeds by 150%, as of May 2021.

3 2.3GHz: Mature Ecosystem for Mobile Services. Update of Co-existence Requirements Being in Progress in ECC, to Facilitate Maximum Usage of Active Antenna Units.

The 2300-2400 MHz range is **widely used for mobile services**, and during 2021 more countries are considering or planning to assign spectrum in this range for use in LTE and 5G networks. EU countries have started to deploy TDD 2.3G.

Existing mature ecosystem for mobile service in 2.3GHz (Main device chips support n40, Leading infrastructure vendors including Huawei provide equipment for radio networks since 2020).

[✂ [redacted] ✂]

ECC has additional baseline requirements above 2403 MHz to protect WIFI, resulting in some impact on the product design for radio equipment.

BS BEM out-of-band e.i.r.p. limits

BEM element	BS e.i.r.p.	Power limit
Additional baseline	Pmax > 42 dBm	1 dBm / 5 MHz
Additional baseline	24 dBm < Pmax ≤ 42 dBm	(Pmax -41) dBm / 5 MHz
Additional baseline	Pmax ≤ 24 dBm	-17 dBm / 5 MHz

We believe that this band would provide a boost to the capacity available for data services. In particular, in order to respond to market demand, it is of key importance to have **large contiguous bandwidths on the basis of nationwide coverage** for the introduction of MFCN (Mobile/Fixed Communications Network) systems in this band.

4 Private Network: 3.8~4.2GHz, Suggest Spectrum used to All Parties (verticals, MNOs).

The latest Mandate from Radio Spectrum Committee < Draft Mandate to CEPT on technical conditions regarding the shared use of the 3.8-4.2 GHz frequency band for terrestrial wireless broadband systems providing local-area network connectivity in the Union> focuses on vertical industries and digital transformation, and is mainly about local area networks.

We suggest this band should be accessible to all parties (verticals, MNOs), and allow the combination of flexible terrestrial wireless broadband systems together with local networks.

5 6GHz: Recommend Considering the Upper 6GHz Band for IMT (5GAdvanced / 6G).

The lower and upper 6 GHz frequency bands (5925-6425 MHz and 6425-7125 MHz respectively) represent very valuable mid-bands spectrum for which appropriate regulatory frameworks should be defined to allow benefiting from the potential value deliver benefits to citizens, consumers and industries.

European Administrations are considering the options for the upper 6 GHz band in relation with to WRC-23 Agenda Item 1.2.

The spectrum requires the expansion of IMT (5G NR) in the timescale 2025-2030 and to develop a European roadmap. GSMA estimates that up to an additional 2 GHz of mid-bands spectrum will be needed – beyond what is available for IMT today – in this time frame to guarantee the IMT-2020 requirements for 5G, address smart sustainable cities, and drive European digitalization of industries which is key to achieving the ambitions in the EU Green Deal and to form a low carbon economy.

The upper 6 GHz is an important opportunity for Europe to address the additional need for mid-bands spectrum and support the EU connectivity and Green Deal goals.

We would suggest to ComReg to potentially **consider the upper 6 GHz band for IMT (5G Advanced/ 6G)**, and further, to support an IMT identification of this band at the WRC-23 to create a global/regional ecosystem.

6 5G mmWave: the General Progress is Considerably Slow in European Countries.

26GHz band is actually 24.250-27.550 GHz. Fixed links are used across EU (and Ireland as well) in the lower part of the spectrum, 24.5-26.5 GHz (CEPT ECC T/R 13-02), while, for the time being, the assignment to 5G were mainly in 26.5-27.5G (e.g. Italy).

In Ireland, 24.745 – 25.277 GHz paired with 25.753 GHz – 26.285 has been **block assigned to mobile operators** that moved point-to-point individual links from 25.277 - 25.445 GHz paired with 26.285 - 26.453 GHz to their blocks.

Momentum is slowly growing but a number of the large EU countries i.e. France, have not seen the necessity to release the 26 GHz band or portions of the 26 GHz band at this time other than for trialling, while others, i.e. Germany and the UK, have sought to use portions of the band for indoor or local/regional use. The Czech Republic has adopted a different approach and decided to make the band available for experimental licences to inform future regulatory and technical considerations due to lack of demand.

If operators within Ireland build interest, we suggest to commence assigning 5G licenses within the upper band of this spectrum (26.5-27.5) with minimum blocks of 200MHz in order to guarantee quality performances. Assignment in a second stage of the remaining part will allow wider virtual channel by means of intra-band carrier aggregation.

Moreover Club-use licensing scheme shall be taken into consideration to enhance local coverage and/or campus/enterprises indoor connection. Within this licensing scheme, each licensee can use the entire awarded spectrum (up to 1 GHz) in areas where other licensees do not use frequencies and each license holder has pre-emptive rights on its assigned lot

Identification of 26GHz by WRC-19 and EU for 5G mm-wave deployment (Frequency Group 30) will drive the shift of existing links in **24.5-26.5 GHz** in other bands once the entire band is assigned to 5G. **28GHz is a candidate band for relocating existing 26GHz links**.

Huawei understands concerns from FSS providers on Fixed Service and FSS coexistence but Radio Regulation allocates 28GHz on primary basis to both the services and ECC Decision (05)01 provides the regulatory framework for deploying FS and FSS identifying 27.8285-28.4445 GHz and 28.9485-29.4525 GHz for the use of FS systems.

Moreover the possibility to use wide channels up to 112MHz grants enough bandwidth for achieving 1Gbps over sort-medium distances either as standalone links or in dual band links.

Along with 28GHz alternative bands for 26GHz links relocation are 23 GHz, for little longer distances or 32GHz and 38GHz for shorter ones.

We suggest to keep monitoring the interest on the band for IMT applications and proceed by steps as done in other EU countries.

7 Terrestrial Fixed Service

Block licensing is already in force in 26GHz, Huawei suggests taking into consideration to extend this approach also to other bands in order to incentivize an efficient spectrum reuse since the operators are responsible for the self-coordination within the block and have to monetize the spectrum investment maximizing the link deployment.

ETSI mWT-ISG is also promoting for E-Band a hybrid approach to block licensing introducing link-by-link declaration by users: the operators implements self-coordination within the block but due to the individual link fee are incentivized in efficiently using the assigned block. The administration can monitor actual spectrum utilization without the burden of coordination.

Block assignment shall take into consideration the possibility to use channels as wide as 112MHz according to CEPT Recommendations.

Huawei suggests considering block licensing in order to incentivise an efficient spectrum reuse, speed up network deployment and ease the assignment procedures.

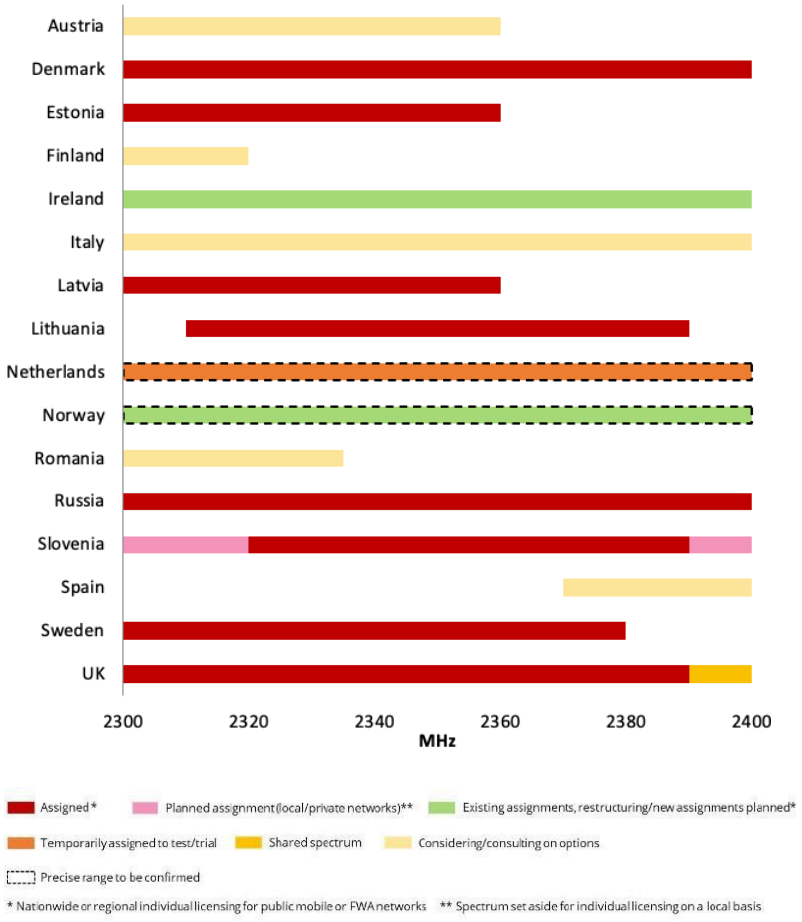
8 Future EC Harmonisation Decisions

EC mandate on 40.5-43.5GHz – links in 42GHz.

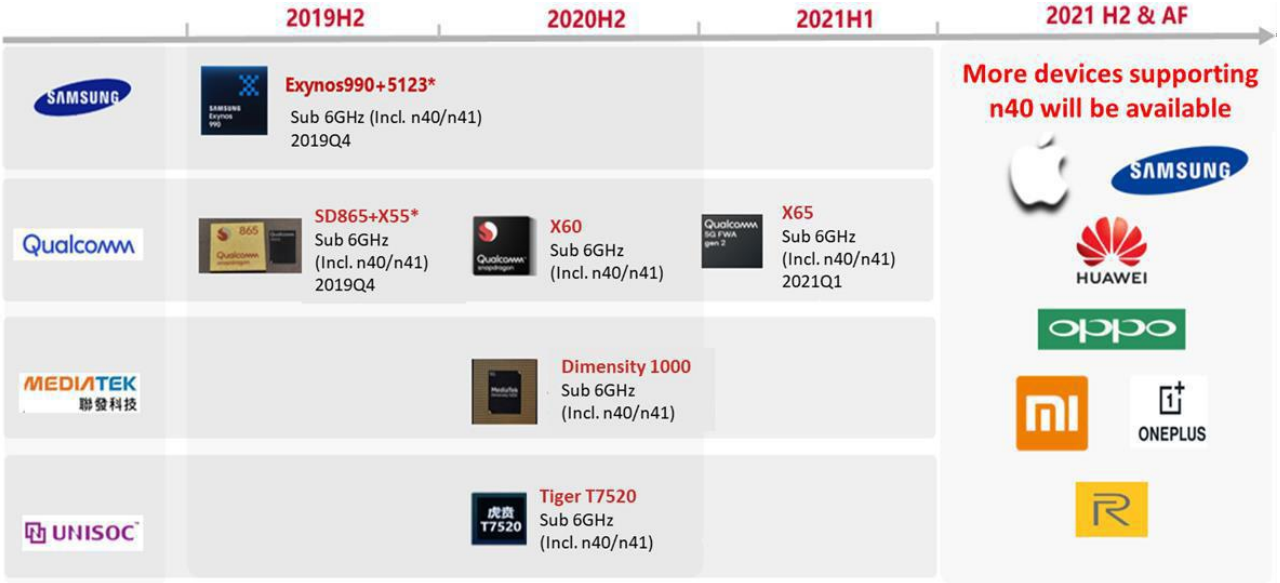
As a result, we suggest using E-Band as alternative band on new links and minimising licenses in 42GHz. Since no interest presented in 26GHz at current stage, no expectation for significant interest in 42GHz within the next set of years. No requirement to relocate existing 42GHz links at present. There will be ample opportunity for review on this spectrum, this review finds further focus within 26GHz spectrum as it primarily considers the next set of years.

9 ANNEX – List of References

1. <Ends the bidding of the 700 MHz band>, JULY 21, 2021: https://portal.mineco.gob.es/es-es/comunicacion/Paginas/210721_np_-subasta_.aspx
2. < GSA-National-Spectrum-Positions-mid-band-Septemeber-2021>:



3. Main device chips support n40, with more to come after 2021H2.



4. GSA database (GAMBoD): 4G & 5G Devices Networks, Technologies and Spectrum Database: https://gsacom.com/gambod-lte-5g-devices/
5. ECC Decision (14)02: Harmonised technical and regulatory conditions for the use of the band 2300-2400 MHz for Mobile/Fixed Communications Networks (MFCN), Approved 27 June 2014
6. GSMA, "5G Mid-Band Spectrum Needs – Vision 2030," July 2021, https://www.gsma.com/spectrum/resources/5g-mid-band-spectrum-needs-vision-2030/
7. Please refer to: https://www.ofcom.org.uk/__data/assets/pdf_file/0025/68902/radar_event_presentation.pdf
8. ECC Decision (05)01: The use of the band 27.5-29.5 GHz by the Fixed Service and uncoordinated Earth stations of the Fixed-Satellite Service (Earth-to-space) https://docdb.cept.org/download/2856

10 Disclaimer

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21 IAA

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Technology and Training Directorate

An Stiúrthóireacht Teicneolaíochta & Oiliúna

Patrick McGrath
National Aeronautical Frequency Manager,
Irish Aviation Authority,
Control Tower Building,
Huntstown, Cloghran
Swords,
Co. Dublin
22nd of October 2021

REF: Irish Aviation Authority Response to ComReg Consultation Proposed Strategy for Managing the Radio Spectrum 2022 to 2024 (ComReg 21/90)

Dear Sir/ Madame,

The Irish Aviation Authority (IAA) would like to thank ComReg for the opportunity to express its views on the consultation on the Proposed Strategy for Managing the Radio Spectrum 2022 to 2024.

The IAA acknowledges ComReg's work thus far in ensuring that Irelands Spectrum resources are managed effectively.

We also acknowledge the continuing work between ComReg and IAA in order to ensure adequate spectrum is available for aeronautical services and that spectrum efficient technologies are deployed within the aeronautical bands.

Aviation safety is at the core of IAA's fundamental objectives.

MBSA2 spectrum award

We welcome the inclusion within the strategy, MFCN use in the 2.6 GHz Band and the IAA's aeronautical primary radars, which operate in the adjacent 2.7 – 2.9 GHz band. We will continue to work to ensure mitigations are in place to allow for access to this important spectrum award. We look forward to continued work with ComReg on this matter.

Aeronautical Services

The safety and efficiency of air transport is dependent on navigation, instrument landing systems and communication services that use radio frequencies.
As World Radio Conference 2023 nears, we acknowledge that Comreg are continuing to liaise with relevant stakeholders, including the IAA to encourage an ensure the efficient use of spectrum and to

promote Ireland's interest at international fora.

Aircraft RAD/ALT and work with CEPT

The IAA support the work that CEPT and the EC are carrying out on the potential development of harmonised technical conditions for the shared use of the 3800-4200 MHz band by private local networks and take actions as appropriate to support any harmonisation decisions adopted.

It is vital that this important item is include in the strategy and we hope that a solution that accommodates spectrum allocation in 3800-4200 MHz shall also include mitigation's that ensures the continued safe operation of RAD/ALTS on aircraft.

Date: 22nd of October 2021

Patrick McGrath

National Aeronautical Frequency Manager

22 IECRO Ireland

IECRO Ireland

www.iecro.com/ireland

Dear ComReg Administration,

As representative body in Ireland for the "International Emergency Communication Registry of Operators" (IECRO), IECRO Ireland has identified that there are a number of important topics which merit response in relation to the ComReg 21/90 consultative document.

IECRO Ireland through its amateur volunteer emergency communicators, strives to be an effective partner in emergency and disaster response, providing multiple levels of radio communications expertise and capacity.

IECRO Ireland seeks to develop, train and equip it's volunteer emergency communicators, with the skills, knowledge and experience to safely deliver resilient radio and other communications in emergency and disaster situations.

1. **We support the proposal to amend the amateur radio power allocation:**

   On behalf of all the members of IECRO Ireland, this letter is to confirm our support for the proposed request for an amendment to the amateur radio power allocation.

   All of our membership have received significant repeated training with regards to managing their stations in an effective and safe manor. We currently provide this training from ten locations throughout the country. Our membership only use the minimum level of power as required in order to establish communication with other stations. This will continue into the future, however our ability to establish potentially important communications is hampered by the current limit. None of our members are aware of any complaints of interference experienced as a result of contesting operations using this higher power, we deem the equipment proposed by the Marconi Radio Group to be more than adequate for safely enabling this power increase.

2. **Entry level or novice licence:**

   IECRO Ireland fully supports the proposal for an entry/novice licence for the Republic of Ireland. This would be invaluable for not just amateur volunteer emergency communications but also for all aspects of amateur radio.

3. **NRSI:** IECRO Ireland has decided to fully support the “National Radio Society of Ireland” (NRSI) in terms of its submission during this consultation period.

23 Intel

From: Kraemer, Michael [✂ [redacted] ✂]
Sent: 22 October 2021 15:05
To: Market Framework Consult
Subject: Submissions to ComReg Document 21/90

Dear Sirs,

Intel Corporation (Intel) appreciates the opportunity to provide comments on the proposed strategy for managing the radio spectrum 2022 to 2024 (ComReg document 21/90).

Intel is an industry leader with the purpose to create world-changing technology that enriches the life of every person on earth. We stand at the brink of several technology inflections — artificial intelligence (AI), 5G network transformation, and the rise of the intelligent edge — that together will shape the future of technology. Silicon and software drive these inflections, and Intel is at the heart of these developments. Intel's global broadband objectives are the same as those of most governments and consumers: We want to enable high-speed and high-quality, widespread, affordable broadband in all countries extending computing technology to connect and enrich the lifes of every person on earth. We strongly encourage all administrations to establish technology and service neutral policies, expeditiously assign sufficient amounts of suitable spectrum for both licensed and license-exempt use and permit compliance to globally recognized standards.

In this context, Intel appreciates ComReg's decision to implement the European Commission Decision on the harmonized use of radio spectrum in the 5945-6425 MHz frequency band for the implementation of wireless access systems including radio local area networks, by publishing Revision 13 of document 02/71 in July 2021. Regarding the 6425 - 7125 MHz frequency band, as described in clauses 4.61 and 4.62, as well as clause 5.4 xviii. of the RSMSS consultation document, Intel is of the view that this band should be made available for WAS/RLAN use in order to address the rapid technology developments with Wi-Fi 6E and Wi-Fi 7, and to provide sufficient capacity to respond to the ever-increasing traffic on WAS/RLAN networks (even more so during the Covid-19 pandemic) as well as the introduction of new innovative applications and use cases.

Various countries around the world have already opened the entire 6 GHz band for use by unlicensed technologies such as Wi-Fi (e.g. the US, Republic of Korea, Brazil, Canada, Chile, Saudi Arabia and others) whilst many other countries are currently developing plans to do so (see https://www.wi-fi.org/countries-enabling-wi-fi-6e for the latest situation). At the same time, the IEEE standard 802.11ax (Wi-Fi 6) supporting this band has already been completed and a large equipment ecosystem is in place with 338 million Wi-Fi 6E devices being sold globally in 2021 (Source: The Wi-Fi Alliance/IDC). Likewise, it is important to take into account existing ecosystem support when considering the needs for more licensed MFCN mid-band spectrum and we believe the 3.8-4.2 GHz and 4.4-4.99 GHz bands are ideal opportunities as they are already supported by 3GPP band n77 and n79 equipment. It is critical to ensure the protection and even expansion of incumbent users and we are of the view that in general macro-outdoor MFCN use can be more easily coordinated in FSS downlink bands like those mentioned above, whereas FSS uplink bands like the 6 GHz range are more suitable for low-power Wi-Fi type usage.

Previous CEPT studies (see ECC Reports 302 and 316) on the coexistence between Wi-Fi and incumbent users in the lower 6 GHz band have demonstrated coexistence and with the incumbent user situation being very similar in the upper 6 GHz band, we are of the view that Wi-Fi could be introduced in the 6425-7125 MHz band without impacting the continued use of the band by incumbents. On the contrary, previous ITU studies (see Report ITU-R S.2367) on the coexistence between MFCN and incumbent users in the lower 6 GHz band have shown that only low-power indoor MFCN usage would be possible in order to protect incumbent users, which is not the type of deployment that is envisaged by the mobile industry in the mid-band spectrum range given the macro-outdoor usage in other MFCN bands like the 3.4-3.8 GHz band.

Therefore, we would like to suggest that ComReg carefully monitors the ongoing discussions in CEPT and ITU around the possible MFCN use of the 6425-7125 MHz band and the corresponding sharing studies, to ensure full protection of incumbent users as well as sufficient spectrum for future Wi-Fi traffic growth and technology evolutions; both these objectives could be achieved by making the band available for license-exempt use, similar to the 5945-6425 MHz band.

We thank ComReg again for the opportunity to provide our views on this important topic and remain available for questions and further discussions.

Best regards,

Michael Kraemer
Director Communications Policy EMEA
Intel Germany GmbH & Co. KG
m: [✂ [redacted] ✂]
email: [✂ [redacted] ✂]

24 Irish Radio Transmitters Society

IRISH RADIO TRANSMITTERS SOCIETY
Since 1932

Amateur Radio in Ireland
www.irts.ie

PATRON Michael D. Higgins
PRESIDENT OF IRELAND

Response to the

Consultation on ComReg's Draft Radio Spectrum Management Strategy 2022 to 2024

Published by the

Commission for Communications Regulation

From the

Irish Radio Transmitters Society (IRTS)

October 2021

Table of Contents

Chapter 1 - Introduction

1.1 The Irish Radio Transmitters Society (IRTS) welcomes the opportunity provided by the Commission for Communications Regulation (ComReg) to comment on the Draft Radio Spectrum Management Strategy 2022-2024 published on 10 September 2021, document ComReg 21/90. Chapter 1 of this document is a scene-setting section whilst Chapters s 2 to 4 deal with specific suggestions concerning various issues which IRTS believe falls within the remit of a spectrum management strategy framework.

1.2 The IRTS was founded in 1932. It is a non profit organisation and is the Irish national society that represents licensed amateur radio operators in Ireland in respect of government and public relation matters. The IRTS is an active member of the International Amateur Radio Union (IARU), the worldwide federation of national amateur radio organizations with member-societies in more than 140 Member States of the ITU. IARU is a sector member of the Radiocommunication (R) and Telecommunication Development (D) sectors of the International Telecommunication Union (ITU). IARU also has observer status in all six regional telecommunication organisations, including the European Conference of Postal and Telecommunications administrations (CEPT), which addresses European technical telecommunications regulatory matters, often under mandate from the European Commission.

1.3 IRTS Members recently hold or have held within IARU Region 1 the roles of Chairman of the Political Relations Committee (PRC) and Chairman of the Spectrum and Regulatory Liaison Committee (SRLC).

Amateur Service

1.4 Amateur radio internationally is part of the leisure category of radiocommunications applications but has the distinction of being defined as a radiocommunications service in the ITU Radio Regulations[1], an international treaty instrument. In Article 5 of the Radio Regulations a number of frequency bands have been allocated to the amateur service and amateur-satellite service throughout the radio frequency spectrum.

1.5 Article 1.56 of the Radio Regulations describes the Amateur Service as," a radiocommunication service for the purpose of self-training, intercommunication and technical investigations carried out by amateurs, that is, by duly authorised persons interested in radio technique solely with a personal aim and without pecuniary interest."

1.6 Amateur Radio is primarily a hobby in which participants use various types of radio communications equipment to communicate with other radio amateurs for public service, recreation and self-training and technical investigations. The term ‘amateur’ is

[1] Radio Regulations of the International Telecommunication Union, Geneva.

not a reflection on the skills of the participants, which are often addressing state of the art techniques in radiocommunications; rather, the term ‘amateur’ indicates that amateur radio communications are not primarily involved in any commercial activities.

1.7 In Ireland radio amateurs, having passed an appropriate technical and regulatory examination, are licensed by the Commission for Communications Regulation (ComReg) under the Wireless Telegraphy (Amateur station Licence) Regulations, 2009 (S I No. 192 of 2009) Radio amateurs establish radiocommunications stations in order to conduct experiments with a view to the development of science or technique. Amateur stations utilise but are not limited to frequency bands allocated in Ireland to the amateur service. Irish radio amateurs are therefore involved in the recreational, public service, self training, technical investigations and experimentation aspects of the global amateur radio movement.

1.8 Amateur radio operators enjoy personal (and often worldwide) radio communications with each other and in many jurisdictions (including Ireland) are able to support their communities with emergency and disaster communications as appropriate, while increasing their personal knowledge of electronics and radio theory.

Public Service Activities

1.9 In furtherance of public service emergency activities a group of radio experimenters formed the Amateur Radio Emergency Network (AREN). This network operates under the umbrella of the IRTS and is essentially run by the AREN organisation in co-operation with ComReg. The Network was sanctioned following Ireland’s adoption of Resolution 640 (1979) of the ITU Radio Regulations, which provides for the utilisation of amateur radio communications in emergency situations. Previously, Irish radio experimenters were licensed to communicate only with other radio amateurs nationally and internationally. ComReg, however, now extends the terms and conditions of the licences’ of radio amateurs who are members of AREN to permit them to pass messages on behalf of a range of designated emergency services. It is worth mentioning that the contribution of amateur radio operators to providing communications in times of emergency or natural disasters throughout the world is well recognised and documented.

1.10 A side benefit of amateur and experimental radio is the fostering of an interest in STEM subjects (Science, Technology, Engineering, and Mathematics) in children and young people, which in many instances will stimulate an educational and career path for the person involved. This is turn should create a greater pool of professionally qualified persons available for employment in the Irish Information and Communications Technology (ICT) sectors.

1.11 There are approximately three million amateur stations in the world, a number that is increasing at the rate of 7% annually. Currently there are circa 2000 amateurs licensed in Ireland. The number and variety of modes of emission used by radio amateurs are also expanding, creating internal pressures within the amateur service for their accommodation at the expense of users of established modes such as single-sideband telephony and manual

Morse code telegraphy operations. These new modes include digital voice, data and image transfer. Their use improves the efficiency of amateur operations, but also increases the popularity of amateur radio and therefore the amount of frequency congestion.

Amateur-Satellite Service

1.12 Four years after the launch of the first man-made satellite (Sputnik) amateur radio enthusiasts launched OSCAR 1 (Orbital Satellite Carrying Amateur Radio) in 1961. Since then the amateur satellite programme has developed significantly and today ARISS (Amateur Radio on the International Space Station) allows school children throughout the world to speak with the astronauts. The participation of Irish Schools in this programme has fostered great interest in science among pupils, parents and teachers and attracted significant positive media comment. In addition the FunCube project allows schools to experience orbital physics and satellite telemetry experiments.

1.13 Amateur spacecraft are now not limited to low Earth orbiting (LEO) and high Earth orbiting (HEO) spacecraft after the launch of Es'hail 2, a Qatari satellite launched into geostationary orbit in November 2018 by means of a SpaceX Falcon 9 rocket. The payload of Es'hail 2 includes a linear transponder for amateur communications with an uplink on 2.4 GHz and downlink on 10.45 GHz.

Other Radiocommunication Studies

1.14 In addition amateur radio operators continue to investigate propagation effects and are contributing to a greater understanding of how radio waves propagate for small percentages of time. Such scientific and investigative work requires frequency allocations in key parts of the spectrum and an extensive beacon network in order to conduct measurements over long periods of time. IRTS has recently implemented two propagation beacons in the vicinity of 40 MHz to study the transition from HF to VHF propagation, particularly E and F layer ionospheric events.

1.15 In the context of the self-training and technical investigation aspects of amateur radio, the IRTS welcomed the Minister for Communications, Energy and Natural Resources'[2] commitment in the Department's 2014 Consultation on Spectrum Policy Priorities, to ensure that an adequate amount of useful spectrum continues to be available for amateur radio and scientific applications. Spectrum for these applications is important from an educational, research and recreational perspective and is vital in helping to ensure an ongoing interest in technology and in furthering our understanding of radio propagation and communications.

Chapter 2 - Spectrum Management

2.1 The Irish Radio Transmitters Society (IRTS) has studied the document 'Consultation on Radio Spectrum Management strategy 2022 – 2024 and wishes to submit the following observations.

2.2 IRTS in common with IARU and most IARU member societies around the World continues to have three major concerns and objectives:

1. Ensure an adequate supply of suitable spectrum is allocated and is available to the amateur service and amateur-satellite service in the range 3 kHz to 3THz,
2. Ensure the overall noise floor in all current frequency bands does not increase to a level where small signal reception is not feasible in a typical domestic environment, which would make the hobby unattractive to many persons, and
3. Make every effort to encourage young people and others to take an interest in radiocommunications and other STEM subjects through amateur radio, thus facilitating a motivated and knowledgeable nucleus of people who are likely to be employed in the ICT sector in later years.

2.3 IRTS fully appreciates the valuable nature of spectrum and of the need to ensure that a balance is struck between the competing demands of the commercial sector, defence and public safety, the scientific community and others. Spectrum for amateur radio applications is important from an educational, research and recreational perspective and is vital in helping to ensure our ongoing interest in technology and in furthering our understanding of radio propagation and communications as well as participating in public service activities. In this regard there are thousands of radio amateurs around the World who spend their personal time training in order to provide communications and services when requested to do so. As climate change continues to influence global weather patterns with increasing severity, so the public service role for the amateur service is also likely to rise.

2.4 While ComReg has major responsibilities with regard to implementing national spectrum policy and dealing with the many commercial users of the radio spectrum, the Society continues to find its interaction with ComReg to be very effective and productive. The Society enjoys a very good working relationship with both ComReg and the Department of the Environment, Climate and Communications (DECC) and would wish the dual complementary roles of ComReg and DECC to continue.

2.5 IRTS takes the view that it will probably be increasingly the case that changes in spectrum usage will be processed initially at the level of the regional telecommunications organisations such as CEPT before more general changes are processed through WRCs of the ITU. IRTS experience of this process has been generally positive. It is however unfortunate that a number of smaller administrations cannot attend project teams (PT) of the CEPT Conference Preparatory Group which become active as soon as a WRC has finished and the provisional agenda for the next WRC is agreed. In Europe it is these PTs which are initially addressing WRC agenda items, including the consideration of

European Common Proposals (ECP) as well as the CEPT position and brief. IRTS persons who attend PT meetings as IARU delegates often find that it is only the administrations opposing amateur items which speak and significantly influence the initial CEPT position. However with more administrations present in the PTs attending discussions on amateur items as well as other minority interest agenda items there would likely be a more balanced approach to the debate on these items. This would avoid the need to deal with such matters at the CPG which smaller administrations attend.

2.6 IRTS is also concerned that administrations with diminishing resources take a neutral position internationally on amateur radio agenda items when nationally they are supportive of the amateur movement and its needs. Such neutrality impacts the likelihood of finding sufficient support for ECPs on amateur issues proposed by IARU and other administrations. IRTS would appreciate a review of the situation in CEPT and perhaps some mechanism of resource sharing could be implemented by the smaller administrations and a system of multi country input documentation developed.

2.7 The spectrum requirements which IRTS has outlined in later sections of this response need to be addressed against the pertinent definitions and regulations in regulatory texts as follows:

2.8 The possession and use of radio equipment in Ireland is governed by the Wireless Telegraphy Act 1926, (Act No 45 of 1926), (as amended), which stipulates that an appropriate Wireless Telegraphy licence must be held, unless licence exempted.

"'Wireless Telegraphy' means the emitting and receiving, or emitting only or receiving only, over paths which are not provided by any material substance constructed or arranged for that purpose, of electric, magnetic or electromagnetic energy of a frequency not exceeding 3 million megahertz, whether or not such energy serves the conveying (whether they are actually received or not) of communications, sounds, signs, visual images or signals, or the actuation or control of machinery or apparatus.".

2.9 IRTS is an active member society of the IARU and is fully involved through IARU at the international and regional level, firstly in the identification of spectrum requirements through the ITU process of WRCs and secondly through the CEPT process by means of appropriate amendments to the European Common Allocation (ECA) table. Once allocations to the amateur service are included in the Radio Regulations and/or ECA, IARU Region 1 has a tradition of developing band plans to cater for all interests. National IARU member societies then develop the IARU plan to take account of any unique national requirements. IRTS believes that the amateur service should continue to self-regulate how individual frequencies and sub-bands should be utilised. Indeed shortly after Revision 4 of ComReg 09/45 IRTS undertook a consultative exercise to develop national band plans in the 30.0-70.5 MHz frequency range. As mentioned in Part 1 two propagation beacons have been activated in the vicinity of 40 MHz.

2.10 Table 1 below provides IRTS' spectrum aspirations for the period stated in the consultation document. Column 2 of Table 1 details frequency bands of interest and

column 3 provides the reasons for proposed access or change in status. Further explanation on some of the frequency bands is provided in the text following Table 1 below.

Band	Frequency Range	Notes/Reason for Proposal
1	5 250 – 5 450 kHz	Again request transfer of 5 280 kHz, 5 300 kHz, 5 332 kHz, 5 348 kHz 5 400 kHz and 5 405 kHz from A1.4 to A1.3 of the Amateur Station Licence Guidelines 09/45 R4. This would provide more flexibility to avoid primary services operating in 5 351.5 – 5 366.5 kHz
2	50 – 54 MHz	To support whenever possible harmonisation with other regions, sub regions and neighbouring countries in the 50-54 MHz amateur allocation.
3	75.5 - 77.5 GHz	75.5-76 GHz as per ECA secondary
4	77.5 - 78.0 GHz	primary
5	78.0 – 81.0 GHz	secondary
6	81.0 – 81.5 GHz	secondary see RR 5.561A
7	122.25 – 123.00 GHz	secondary
8	134.0 – 136.0 GHz	primary
9	136.0 – 141 GHz	secondary
10	241.0 – 248.0 GHz	secondary
11	248.0 – 250.0 GHz	primary

Table 1 – IRTS 2021 Spectrum Interest

5 250 – 5 450 kHz

2.11 The amateur service was successful in obtaining a 15 kHz band (5 351.5 – 5 366.5 kHz) in this frequency range at ITU WRC-15 and IRTS is grateful that ComReg released this 15 kHz band in a timely manner. However stations using this band have a power limit of 15W eirp. It should be noted that primary service usage is high, often on a continuous basis. In such a scenario sharing is extremely difficult and the frequency band is often unusable for long periods of time, which perhaps gives an impression that the band is not being used by Irish amateurs. IRTS therefore requests again that ComReg check spectrum occupancy and consider whether additional spectrum should be made available to the Irish amateur service as proposed below.

Proposal

2.12 IRTS requests the transfer of 5 280 kHz, 5 300 kHz, 5 332 kHz, 5 348 kHz 5 400 kHz and 5 405 kHz from A1.4 to A1.3 of the Amateur Station Licence Guidelines 09/45 with the current operating conditions. This would provide more flexibility to avoid primary services operating in the band 5 351.5 – 5 366.5 kHz. Concerning 50 – 54MHz please see Table 1 above.

50 – 54 MHz

2.13 IRTS has four proposals relating to the band 50 – 54 MHz. No. 5.166A of the ITU RR reads as follows:

5.166A Different category of service: in Austria, Cyprus, the Vatican, Croatia, Denmark, Spain, Finland, Hungary, Latvia, the Netherlands, the Czech Republic, the United Kingdom, Slovakia and Slovenia, the frequency band 50.0-50.5 MHz is allocated to the amateur service on a primary basis. Stations in the amateur service in these countries shall not cause harmful interference to, or claim protection from, stations of the broadcasting, fixed and mobile services operating in accordance with the Radio Regulations in the frequency band 50.0-50.5 MHz in the countries not listed in this provision. For a station of these services, the protection criteria in No. 5.169B shall also apply. In Region 1, with the exception of those countries listed in No. 5.169, wind profiler radars operating in the radiolocation service under No. 5.162A are authorized to operate on the basis of equality with stations in the amateur service in the frequency band 50.0-50.5 MHz. (WRC-19)

Proposal 1 - IRTS requests that Ireland at WRC-23 joins the UK and other CEPT countries in Number 5.166A of the ITU RR which provides primary status for the amateur service in the band 50.0-50.5 MHz.

Proposal 2 – In order to provide consistency with adjacent allocations IRTS proposes that 52 – 54 MHz be allocated to the amateur service on a secondary basis.

Proposal 3 – That subject to the agreement of Proposal 1 consider the raising of the power level in the band 50.0 – 50.5 MHz to 400 Watts (20dBW) to align with the current power level in the only other VHF primary band 144 – 146 MHz allocated to the amateur service and

Proposal 4 - Studies for a possible new secondary allocation to the Earth exploration-satellite (active) service for space-borne radar sounders within the range of frequencies around 45 MHz should address the need to protect the incumbent amateur service in the adjacent 50-54 MHz band.

WARC-79 Microwave Bands

2.14 Concerning paragraphs **3.170 and 3.171** of the 2019-2021 Strategy Statement which indicates that ComReg will consider allocating the 76 -81 GHz, 134 – 141 GHz and 241 – 250 GHz bands to the amateur service in Ireland and that this would align the Irish table with that of the ECA and Article 5 of the Radio Regulations. IRTS is grateful for this work item but would request the inclusion of 75.5 – 76.0 GHz as per the ECA and 81.0 – 81.5 GHz as per RR 5.561A. The band 122.25 – 123.00 GHz is also missing from the EHF frequency range.

2.15 IRTS understands that ComReg were unable to complete the release of millimetric bands above 47.2 GHz discussed during the last strategy period but have

transferred this matter to the next strategy period, 2022 – 2024. Since it is now almost half a century since ITU WARC-1979 allocated EHF frequency bands to the amateur and amateur-satellite services, IRTS would be grateful if this issue could be carried out as soon as possible

Proposal

2.16 IRTS therefore proposes that ComReg release the following bands to the amateur service and the amateur-satellite service in Ireland:

75.5 - 77.5 GHz on a secondary basis (75.5 – 76.0 GHz as per ECA)
77.5 - 78.0 GHz on a primary basis
78.0 – 81.0 GHz on a secondary basis
81.0 – 81.5 GHz on a secondary basis (see RR 5.561A)
122.25 – 123.00 GHz on a secondary basis
134.0 – 136.0 GHz on a primary basis
136.0 – 141 GHz on a secondary basis
241.0 – 248.0 GHz on a secondary basis
248.0 – 250.0 GHz on a primary basis

2.17 Since this will require an update to the Radio Frequency Plan and an update to the licence guidelines IRTS would like to propose several additional changes to ComReg09/45 R4.

2.18 Concerning Section 6.3, entitled ‘Automatic Stations’, the band identification digit for the range 30 – 69.9 MHz should be ‘1’ to reflect recently licensed and commissioned 40 MHz propagation beacons EI1KNH and EI1CAH.

2.19 Concerning the band 50.0 – 50.5 MHz which has primary status in the UK by virtue of No. 5.166A of the ITU RR, IRTS requests consideration of a power increase in this sub-band to 400 Watts p.e.p. in a similar manner to the current power level in the band 144 – 146 MHz.

Chapter 3 - Other Matters

SII Forum

3.1 IRTS read with interest **paragraph 3.13** of ComReg 21/90 concerning the establishment of the Spectrum Intelligence and Investigations Operators Forum (SII) known as the Forum. This body is intended to deepen engagement between ComReg and licensees as well as spectrum stakeholders. ComReg will recall that IRTS has on several past occasions requested such a body particularly in respect of preparing national positions which may impact the 2000 amateur licensees and other stakeholders at meetings of the European Commission, ITU, CEPT and ETSI. See also paragraph 3.1

Proposal

IRTS would appreciate an invitation to future meetings of the SII forum.

Amateur Radio Examinations

3.2 In **paragraph 3.172** of ComReg 21/90 it is stated that the agreement with IRTS for managing the current HAREC examination expires 21 December 2021 and an invitation to participate in a tender process will be published on the ComReg web-site in due course. IRTS hopes that the invitation will also include the possibility of an on-line examination as well as a paper exam at a traditional examination venue.

3.3 ComReg has raised a number of issues in respect of current and future examinations to obtain an amateur licence raised in **paragraphs 3.1 to 3.14 of Annex 3 and paragraphs 5.7 – 5.10** of ComReg 21/90**.** To date ComReg has not agreed to implement the CEPT Novice Licence or an Entry Level Licence as described in CEPT ERC Report 32 and ECC Report 89 respectively. Other administrations also have mixed views on one or both of the licences of a lower than HAREC standard. There is also a resource issue concerning the management of two additional licensing levels. Nevertheless the CEPT Novice Licence has been implemented in 25 CEPT countries in accordance with the terms of Recommendation ECC/REC/(05)06 as revised in 2016. The novice exam syllabus is contained within ERC Report 32.

3.4 IRTS has recently shared the concerns of a number of IARU Member Societies who find their membership numbers dwindling mainly because their membership tends to comprise retired white males. At the other end of the age range younger persons interested in radiocommunications tend to require immediacy and research has shown that their interest may be jeopardized if they have to wait for one of the two exam sessions per year. As a consequence IARU required its Member Societies to ‘Make every effort to encourage young people and others to take an interest in radiocommunications

and other STEM subjects through amateur radio, thus facilitating a motivated and knowledgeable nucleus of people who are likely to be employed in the ICT sector in later years.'

3.5 It is also opportune that IARU-Region1 is scheduled to convene a virtual workshop 15-24 October 2021 which will include extensive discussions between Regions 1, 2 and 3 on the future direction for amateur radio. IRTS will be represented at this workshop and the question of licensing is likely to be discussed.

Proposal

IRTS suggests that until more informed data is available ComReg and IRTS should be guided by the results of the examination tender and the IARU Region 1 Workshop dealing with the future of amateur radio

Transmitter Power Levels

3.6 **Paragraphs 5.11 to 5.13 and A3.15 to A3.34** of ComReg 21/90 deal with a proposal by the Marconi Radio Group to raise power levels in a number of frequency bands on a 24/7 basis. Unfortunately IRTS was not aware of this proposal until publication of ComReg 21/90. Within the document ComReg seeks answers to a number of questions especially in relation to a measurement regime to ensure compliance with licensing conditions.

Proposal

Due to a lack of time and resources IRTS is unable to respond to these questions by the due date but would be willing to join an online project team to develop proposals to respond to the posed questions.

Passive Services

3.7 According to **paragraph 3.183** consideration will continue to be given to the possibility of promoting and potentially establishing "quiet zones" for particular frequency bands around specific areas of radio spectrum research such as Bir Castle.

3.8 I-LOFAR is the Irish station in the European-wide network of radio telescopes, used to observe the Universe at low frequencies in the range 10-240 MHz. This is a very wide frequency range and for the amateur service in Ireland alone could impact allocations at 10 MHz, 14 MHz, 18 MHz, 21 MHz, 24 MHz, 28 MHz, 40 MHz, 50 MHz, 60 MHz, 70 MHz and 144 MHz. Of course many of the lower frequencies will be influenced by long distance ionospheric propagation during periods of high solar flux.

3.9 IRTS will continue to follow the LOFAR issue closely and seek clarity on how amateur licensees would be impacted by this development.

Chapter 4 - International Harmonisation

ITU World Radiocommunication Conference 2023

4.1 IRTS and other IARU Member Societies seek to protect the primary amateur and amateur-satellite service allocations in all the bands that may be affected by WRC-23 agenda items. IRTS does not wish to see any changes or reductions in the primary allocations to the amateur and amateur-satellite services. IRTS notes that several agenda items include within their scope spectrum ranges that include secondary amateur and amateur-satellite allocations. IRTS asserts that the amateur and amateur-satellite services have shared and coexisted successfully with the primary services within these bands without any difficulties for many years. Therefore IRTS does not foresee any need for changes in the secondary amateur and amateur-satellite service allocations in these ranges.

4.2 It is noted that until recently Irish preparations for major ITU and CEPT events have not been prepared in the public domain. IRTS continues to believe that the situation could be improved at the national and international level since most frequency allocations to the amateur service and amateur-satellite service have to be negotiated at some point in time in ITU and/or CEPT forums. In many countries a representative from the IARU national society is encouraged to participate in the national delegation and IRTS also seeks such an opportunity. See also **paragraph 2.23** concerning the SII Forum.

Proposal

4.3 IRTS seeks Irish (ComReg and DECC) support for the following provisional WRC-23 positions prepared by IARU as well as the IRTS Statement concerning Agenda Item 9.1b.

WRC-23 Agenda Item 1.2

4.4 to consider identification of the frequency bands 3 300-3 400 MHz, 3 600-3 800 MHz, 6 425-7 025 MHz, 7 025-7 125 MHz and 10.0-10.5 GHz for International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution **245 (WRC-19)**.

Preliminary IARU position on WRC-23 Agenda Item 1.2

The IARU supports retention of the amateur secondary allocation of 3 300-3 400 MHz in Regions 2 and 3.

The IARU opposes the identification of the band 10.0-10.5 GHz for IMT in Region 2 as well as the introduction of a mobile service allocation in the region, which would be a necessary precursor to its identification for IMT. Spectrum sharing with a mass market deployment of mobile systems can be challenging and experiences have shown that the legal implications of national IMT licensing processes and service provider requirements tend to result in removal of national amateur service assignments which can severely affect the development of amateur radio.

Considering j) of Resolution 245 (WRC-19) notes that harmonized worldwide arrangements for IMT are "highly desirable;" it logically follows that an undesirable regional identification for IMT must be weighed against the continuing requirements of incumbent services. While studies are only invited with regard to the protection of primary services, *considering k) and l)* and *recognizing c)* of the resolution make no distinction between primary and secondary allocations with regard to the need to protect existing services. The use and evolving needs of the amateur and amateur-satellite services must not be overlooked as an undesirable regional arrangement for IMT is being considered. The IARU requests that the special status of 10.45-10.5 GHz as a worldwide amateur-satellite allocation with no mobile allocation be respected.

WRC-23 Agenda Item 1.12

4.5 to conduct, and complete in time for WRC-23, studies for a possible new secondary allocation to the Earth exploration-satellite (active) service for spaceborne radar sounders within the range of frequencies around 45 MHz, taking into account the protection of incumbent services, including in adjacent bands, in accordance with Resolution **656 (Rev.WRC-19)**;

Preliminary IARU position on WRC-23 Agenda Item 1.12

The IARU believes that the studies for a possible new secondary allocation to the Earth exploration-satellite (active) service for space-borne radar sounders within the range of frequencies around 45 MHz should include the need to protect the incumbent amateur service in the adjacent 50-54 MHz band. The IARU will contribute to the studies to ensure adequate protection of the sensitive receivers used by stations in the amateur service in the 50-54 MHz band, especially the frequencies 50-50.5 MHz where the majority of amateur communication via the ionosphere is conducted, often with very low signal levels.

WRC-23 Agenda Item 1.14

4.6 to review and consider possible adjustments of the existing or possible new primary frequency allocations to EESS (passive) in the frequency range 231.5-252 GHz, to ensure alignment with more up-to-date remote-sensing observation requirements, in accordance with Resolution **662 (WRC-19)**;

Preliminary IARU position on WRC-23 Agenda Item 1.14

The IARU supports retention of the 248-250 GHz primary allocations and the 241 – 248 GHz secondary allocations to the amateur and amateur-satellite services.
Within this frequency range there is ongoing experimentation by amateur service stations, which is expected to grow as technology and equipment availability improves. Any introduction of EESS into the 241-250 GHz frequency range should not unduly constrain the ongoing experimental use by the amateur and amateur satellite services in their secondary and primary allocations or their future development.

WRC-23 Agenda Item 1.18

4.7 to consider studies relating to spectrum needs and potential new allocations to the mobile-satellite service for future development of narrowband mobile-satellite systems, in accordance with Resolution **248 (WRC-19)**;

Preliminary IARU position on WRC-23 Agenda Item 1.18

The IARU supports retention of the amateur secondary allocation of 3 300-3 400 MHz in Regions 2 and 3.

WRC-23 Agenda Item 9.1 Topic A

4.8 to consider and approve the Report of the Director of the Radiocommunication Bureau, in accordance with Article 7 of the Convention;

Preliminary IARU position on WRC-23 Agenda Item 9.1 Topic A

The IARU notes that the scope of Resolution 657 is very broad. The systems described in Report ITU-R RS.2456-0 utilize radio frequencies from 13 kHz up to at least 15 GHz.

A significant proportion of amateur activity is directly affected by daily and longer-term variations in space weather. Consequently, amateurs have a significant interest in space weather and its impact on the ionosphere and radio wave propagation. At the same time, the amateur and amateur-satellite services are incumbent services with allocations in frequency bands ranging from 135.7 kHz to 250 GHz.

In considering potential new regulatory provisions for the recognition of space weather systems, additional constraints on incumbent services including the amateur and amateur satellite services must be avoided.

IARU will monitor developments in WP 7C and will contribute to inputs via WP 5A.

WRC-23 Agenda Item 9.1 Topic B

4.9 to consider and approve the Report of the Director of the Radiocommunication Bureau, in accordance with Article 7 of the Convention on the activities of the Radiocommunication Sector since WRC-19

4.10 Review of the amateur service and the amateur-satellite service allocations in the frequency band 1 240-1 300 MHz to determine if additional measures are required to ensure protection of the radionavigation-satellite (space-to-Earth) service operating in the same band in accordance with Resolution **774 (WRC-19)**;

Preliminary IARU position on WRC-23 Agenda Item 9.1 Topic B

During many years of operational experience, the secondary amateur and amateur satellite services have successfully co-existed with all the primary services in the range 1 240-1 300 MHz with very few issues. In cases where certain applications (in particular wide bandwidth, high duty cycle applications) could increase the potential for interference, careful spectrum management and national licensing conditions have minimised any risk. Radio amateurs have successfully co-existed and innovated in this frequency range for many years and IARU believes that the regulatory status of the amateur and amateur satellite services in this range is already clear. Therefore any additional regulatory, operational or technical measures incorporated into the Radio Regulations are unnecessary. Any recommendations resulting from studies under Resolution 774 can be applied on a national basis and should be based on realistic assumptions, proportionate in scope and carefully justified so as not to unnecessarily inhibit development of the amateur services.

Statement from IRTS concerning WRC-23 Agenda Item 9.1 B

4.11 The Society is aware, through its membership of, and liaison arrangements with, the International Amateur Radio Union that certain studies are underway in both CEPT and the ITU concerning the 1240-1300 MHz frequency band. This is a frequency allocation in which radio amateurs in most jurisdictions enjoy operating privileges. Consequently IRTS is monitoring the progress of the ongoing technical studies concerning the Global Navigation-Satellite Service which are likely to continue up to and perhaps beyond 2023.

4.12 The 1240 MHz allocation is of huge importance to the amateur service. It provides radio amateurs with the opportunity to conduct very specific propagation studies during anomalous propagation events and also during very diverse meteorological conditions. As a consequence experimental results can be assessed against an ever changing background. Such studies also provide very valuable insights into patterns of propagation experienced at these frequencies. Those focussing on 1240 MHz experimentation studies place great importance on continued access to this frequency allocation. It all goes to underscore the concept of training and self education referenced

by the ITU in its acknowledgment of the contribution to radio science by the amateur service.

4.13 In the normal course of amateur radio activity IRTS believes that the potential for interference to other users in this part of the spectrum is minimal. However we do recognise that certain amateur radio operations, such as analogue television repeaters, offer somewhat greater potential for interference if such repeaters are sited in close proximity to the kind of services which are currently the subject of the studies commissioned by CEPT and the ITU.

4.14 IRTS recognises that as a secondary service in the band in question, careful spectrum management has to be maintained to ensure the viability of co-existing services. To date this has been successfully managed with very few issues arising globally which required remedial actions. As far as can be ascertained there was only one country in which two such issues arose. These were successfully dealt with by the concerned administration. In fact the secondary amateur and amateur satellite services have satisfactorily co-existed with all the primary services using this band for many years. IRTS believes that, despite a possible perception on the part of some primary operators, that additional regulatory measures would protect delivery of their services, IRTS are of the firm view that current arrangements are more than adequate and consider that any specific issues which might arise concerning interference should be addressed at national level and new global regulatory arrangements are not necessary.

4.15 In summary the Society requests that the DECC and ComReg, in pursuit of their respective roles, would be supportive of the need to protect the interests of the amateur service as these studies move forward. We further urge that any issues which do arise in the area of regulation be dealt with in the context of a limited potential for interference by the amateur service and in the knowledge that such issues could be dealt with satisfactorily at a national level.

Summary

IRTS would like to extend its thanks to ComReg for the opportunity to respond to this consultation and hopes that the Irish telecommunications regulator will be favourably disposed to the suggestions and requests outlined in this document. These have been prepared in order to address the global concerns and objectives of the International Amateur Radio Union of which IRTS is the Irish member society:

1. Ensure an adequate supply of suitable spectrum is allocated and is available to the amateur service and amateur-satellite service in the range 3 Hz to 3THz,
2. Ensure the overall noise floor in all current frequency bands does not increase to a level where small signal reception is not feasible in a typical domestic environment, which would make the hobby unattractive to many persons, and
3. Make every effort to encourage young people to take an interest in radiocommunications and other ICT subjects through amateur radio, thus facilitating a motivated and knowledgeable nucleus of people who are likely to be employed in the ICT sector in later years.

During the period of the strategy IRTS would wish to have an early exchange of views on proposals addressing WRC issues as well as other proposals.:

- Transfer of 5 280 kHz, 5 300 kHz, 5 332 kHz, 5 348 kHz 5 400 kHz and 5 405 kHz from A1.4 to A1.3 in document 09/45
- Support of the IARU position for the frequency band 50-54 MHz
- Release EHF spectrum allocated to the amateur service in the ECA and Article 5 of the RR in the range 75.5 - 250 GHz (including 81-81.5 GHz and 122.25 – 123.00 GHz)
- IRTS participation in SII forum
- Support the IARU/IRTS position generally in respect of CEPT preparations for ITU WRC-23 - agenda items 1.2, 1.12, 1.14, 1.18, 9.1a and 9.1b

IRTS remains at ComReg's disposal if further information or clarification is required. The IRTS would also like to state that **nothing in this document** needs to be considered restricted or confidential.

25 Jeffrey Roe

From: Jeffrey Roe [✂ [redacted] ✂]
Sent: 19 October 2021 22:32
To: Market Framework Consult
Subject: Submissions to ComReg Document 21/90.

Annex 3 Further detailed information on specific matters 3.9

I recently passed my HAREC exam and have gone on to now have a call sign. I fully support the idea of having different levels of licenses.

I believe a novice/foundation license can open the door to a whole new generation of enthusiasts. The current generation should be doing all we can to help the next generation be prepared for the world they will inhabit. To quote Science Foundation Ireland(SFI)'s vision statement "Ireland will be a global innovation leader in scientific and engineering research for the advancement of Ireland's economy and society." This can not be achieved without encouraging our young people to take up an interest in Science, technology, engineering, and mathematics (STEM) areas. Amateur radio is in a perfect position to become a great STEM hobby.

If we have a novice/foundation license, shorter courses can be embedded into summer camps, after school clubs, transition year programmes just to name a few. The full HAREC is too long for the previously mentioned settings and most importantly the pay back to these young people (getting on the air) comes too late. We might have lost them already from the hobby and unfortunate for Ireland's future from an interest in STEM.

Regards
Jeffrey Roe,

26 John Holland

John Holland [✂ [redacted] ✂] Response to ComReg 21/90 Proposed Strategy for Managingthe Radio Spectrum 2022 to 2024

Thank you for the opportunity to respond to ComReg 21/90 Proposed Strategy for Managing the Radio Spectrum 2022 to 2024. I would like to commend the ComReg team on another excellent and comprehensive strategy document.

Having responded to many ComReg consultations over the years in a professional capacity, mainly around mobile spectrum, this is my first time responding as a member of the amateur radio community as licensed amateur [✂ [redacted] ✂].

I have divided my responses into three parts relevant to Amateur radio. ComRegs work plan,

5.2.1 Programmatic spectrum management functions

Of all the excellent work ComReg do, one of the areas oof most interest to Amateurs is the area of interference. Anecdotally I hear many amateurs complaining of the significant increase in interference from Solar, LED lights and other electronics with switched mode power management.

Given ComReg has limited field resources and that such investigations are often time. consuming, I note that in 2017 it was decided to outsource the lower priority (mainly non commercial) interference cases, via competitive tender, to Butler Technologies. It would be of interest to the amateur community to understand how effective this outsourcing has been. As part of a future consultation perhaps it would be beneficial to survey the amateurs as possibly the main dependents on this part of ComRegs services for views on the effectiveness of this service and whether there may be opportunities for improvement given the significant increase in interference from Solar, LED lights and other electronics?

5.2.9 Novice and Entry-class licensing

I agree with ComReg's view that:

1. the CEPT's Harmonised Amateur Radio Examination Certificate ("HAREC") syllabus as examined in Ireland is adequate to achieve ComReg's primary objective of ensuring the efficient management and use of the radio frequency spectrum in Ireland; and
2. a standard below that guaranteed by the HAREC syllabus does not assure a reasonable level of proficiency in a) the technical and operational aspects of amateur radio; b) the regulations governing the amateur radio service in Ireland or c) ensure the conditions of an Amateur Station Licence can be met.

Having a degree in electronics and communication and 30 years experience in telecom, having studied the HAREC syllabus and passed with a high mark I believe that the level of the HAREC syllabus and exam is appropriate for HF operations up to 400w.

However, the HAREC syllabus and exam is a major stumbling block for many for entry into the hobby as it is equivalent to the top of three tiered systems used in other countries. As a scout leader of 8 years who recently ran a JOTA-JOTI event, there is huge interest in the youth, but an entry level licence is badly needed to get them started and training for such a licence similar to other countries would be within the capability of an average scout troop with licensed amateurs to run.

It is my feeling that a much simpler exam and licence allowing access to 70cm/2M at 5 watts for two years (renewable) for circa €50 would be appropriate.

5.2.9 Increase in permissible transmitter power and related issues

While I recognise the need for an increase in power levels there is not a one size fits all solution to this. Those in Urban Areas have completely different working conditions and limitations to those in remote Rural Areas.

My view would be:

1. Leave the existing power levels as is with for all amateurs with the errors corrected. (400 W in most cases)

2. Update the Competition list to include more recent competitions in consultation with the Amateur Community. (And allow the limit of 1500 W for competition only.)

3. Allow individual Amateurs to apply for an increase in limit to 1500 W provided they are capable of providing the measurements required and are able to show that they meet the terms of their licence in relation to non-ionising radiation. A fee similar to that for a special event licence should apply.

4. Measurement by modelling should be acceptable.

Other considerations

Given the increase in interference in urban areas, increase in apartment living and the difficulty obtaining planning for any reasonably competitive antenna system there has been an increase globally in licensed operators operating remote stations.

I believe this is a really great opportunity for those in these limiting situations. I would like to recommend that ComReg consider a licensee that would allow such remote operation.

I look forward to responding to future consultations.

Very Best Regards,

John Holland.

27 Jonathan Bradshaw

From: Jonathan M Bradshaw [✂[redacted]
✂]**Sent:** 11 October 2021 15:59
To: Market Framework Consult
Subject: Submissions to ComReg Document 21/90 : Proposed Strategy for Managing the Radio Spectrum 2022 to 2024

Following please find my submission for consideration and inclusion in; Proposed Strategy for Managing the Radio Spectrum 2022 to 2024 (Submissions to ComReg Document 21/90)

I would like to see included a detailed section around the retirement of the "2G" / "3G" mobile wireless spectrum and the related MNO's radio access technology.

The 2G/3G mobile network as been applied in a M2M context, for example a number of remote access devices in the consumer market segment address Gate Automation and are dependent on this RAT.

All the best Jonathan

Sent with ProtonMail Secure Email.

28 Keith Wallace

From: Keith Wallace [✂ [redacted] ✂]
Sent: 20 October 2021 00:37
To: Market Framework Consult
Cc: [✂ [redacted] ✂]; [✂ [redacted] ✂]
Subject: Submissions to Comreg Document 21/90

Dear Comreg,

I am a fairly recently licensed Amateur - [✂ [redacted] ✂]. (June -2016).

I would like to make the following comments/suggestions on the Above Document.

5.7 Novice and Entry-class licensing

Having sat both the Class 2 and Class 1 exams I believe that there should be an entry level restricted Licence (exam) similar to other European countries.

Having taken part in outreach programmes involving youth and the general public trying to encourage entry in the World of Amateur Radio, the Class 2 licence exam/content is a major stumbling block for many for entry into the hobby as it is equivalent to the three tiered system used in other countries.

It is my feeling that a much simpler exam and allowing access to 70cm/2M and the repeater system would possibly spark an interest and eventually lead on to upgrading to the Class 2 and Class 1 licence.

This however in my opinion should be limited to VHF/UHF (not HF as in some countries) and should be time limited to say 2 years max.

This would give ample time to develop an interest but also encourage those with a genuine interest to move on to a Class 2 licence.

Giving HF access at entry level would discourage further study in my opinion.

5.11 Increase in permissible transmitter power and related issues

While I recognise the need for an increase in power levels there is not a one size fits all solution to this.
Those in Urban Areas have completely different working conditions/limitations to those in remote Rural Areas.
Planning issues also come into play in erecting antennas to cope with higher power and to comply.

What I would suggest is:

1. Leave the existing power levels as is with for all amateurs with the errors corrected. (400 W in most cases)

2. Update the Competition list to include more recent competitions in consultation with the Amateur Community. (And allow the limit of 1500 W for competition only.)

3. Allow individual Amateurs to apply for an increase in limit to 1500 W provided they are capable of providing the measurements required and are able to show that they meet the terms of their licence in relation to non-ionising radiation. (Whether that be by measurement or by modelling).

With such a diverse hobby I think this is a much fairer system. Those that want higher power for DX'ing and competition have the ability to apply for it and those that want to continue as is can do so.

Regards

Keith Wallace
[✂ [redacted]
[redacted]
[redacted]
✂]reland
Ph: [✂ [redacted] ✂]
Fx: [✂ [redacted] ✂]
Mob: [✂ [redacted] ✂]
E-Mail: [✂ [redacted] ✂]

WEB: www.keithwallace.ie

29 Leinster Radio Club

Leinster Radio Club

Dear ComReg

In response to your latest consultation reference ComReg 21/90, and on behalf of the members of Leinster Radio Club, we wish to confirm our support for the proposed request by the "The Marconi Radio Group" for an amendment to the Radio Amateur power allocation as printed in Annex 5.

Our club has a mixture of interests in both radio contests and also DX-Chasing. We would like to see everyone afforded the same opportunity.

As modern radio equipment is produced to a very high standard and must meet strenuous testing prior to receiving its CE or FCC approval, so the chances of spurious emissions is greatly reduced. Designers of today's radios and amplifiers are focused on the need for better filtering and distortion reduction as they look for any area to improve their market presence.

With regards to meeting the terms of our licence, our members feel we have always measured up to these requirements. As was stated in section A3 of your report, we are also not aware of any interference been caused.

A small selection of test equipment will provide the details necessary for maintaining station compliance:

- PEP meters in line to ensure limits are maintained
- Spectrum analysers could be used to check for spurs or out of band problems
- Sniffers with oscilloscopes to note levels
- Field strength meter for EMF Radiation

On the question of how often measurements should be taken, we feel it sufficient to test upon installation and as changes are made to the station setup.

Regarding the issue of entry-level or novice-level licencing, we are also extremely keen to see this introduced into the country. This is something which is required for the future development of the hobby.

Finally, we hereby give our full support to all proposals/submitted documentation by "National Radio Society of Ireland" (NRSI).

Signed: E. Clarke

30 Marconi Group

Dear ComReg
On behalf of the Marconi Group, we would like to thank you for the opportunity to further expand on our request and answer your questions.

With reference to ComReg's concerns and requests outlined in ComReg-2190 paragraph 5.12 & 5.13 , we note that they are all in line with the existing ComReg 09/45 R4[1] requirements which every Radio Amateurs should already be familiar with. It is our opinion that the concerns highlighted can be addressed with any number of pieces of test equipment readily available on the market today and in use by Irish Radio Amateurs.

Extract from ComReg-2190

Increase in permissible transmitter power and related issues

5.12 The consequence of any proposed changes to current power levels is that amateurs operating in any of the relevant frequency bands must be able to accurately measure their transmitter output, be able to determine the gain of their antenna system and then be able to calculate the e.i.r.p. levels in use.

5.13 To aid the decision making on this matter ComReg is calling for comments on the above as well as inputs on the following questions:

i. In order to ensure that radio amateurs are able to meet the licence conditions relating to output power, how can ComReg ensure that all amateurs are able to accurately measure the actual Peak Envelope Power (PEP) power being used at any point in time?
ii. What type of equipment should each amateur station have at hand to make these measurements?
iii. How should ComReg ensure that radio amateurs are able to meet the terms of their licence conditions relating to non-ionising radiation? ComReg notes the approach recently adopted in the UK by Ofcom[212] but is of the preliminary view that measurement of sites is necessary to guarantee compliance with limits and to-date has not accepted modelling as an alternative.

In response to 5.12, to calculate the e.i.r.p. levels in use we simply need to populate the following formula where P_{tx} is the output power of the transmitter, L_c is the Cable loss and G_a is the Antenna gain.

$$EIRP = P_{tx}(dBm) - L_c\ (dB) + G_a\ (dBi)$$

[1] https://www.comreg.ie/publication-download/amateur-station-licence-guidelines

The information required can be obtained from a number of sources of which we wish to highlight a few, by way of example.

Antenna gain
In the case of commercially manufactured Radio Amateur antenna, manufacture's provides a detailed specification sheet given antenna gain for a given frequency. Where an antenna is home constructed or a detailed specification is unavailable antenna modelling software such as EZNEC[2] can be used to derive these calculations. This software is now available free of charge and has a easy learning curve with great community support for new users.

Peak Envelope Power (PEP)
There are many inline meters available on the market today offering PEP reading and PEP hold for maximum levels. We have taken a sample of the market by way of example (but not exclusive) instruments like the Diawa CN-901 HP3 SWR Power Meter/ PEP Meter[3] can be purchased at a very reasonable rate and cover this requirement as well as some basic functions, many Radio Amateurs have obtained Bird Through-line watt meters and there is also a good second hand market for this well-established brand. However more modern instruments such as the LP—500 Station Monitor[4] can function as a digital station monitor which displays detailed information about the transmitted signal of a station. It displays the sampled signals in numerous formats including Power/SWR, various oscilloscope functionality and a spectrum display included[5]. Any of these devices will provide you with the required PEP reading.

Line loss
Manufactures all provide specifications for their range of cables including loss values per meter/frequency. The total line loss can be simply calculated thereafter once a cable length is measured. For an extremely accurate measurement of the line loss a Vector Network Analyser (VNA) can be used; however, there are now many useful combination tools designed to test feed lines and antenna condition such as RigRxpert™ Antenna analyzers[6], which will produce the information quickly, well displayed and are rugged and portable.

Any of the sample meters shown (and similar on the market) in the response to 5.13-i will provide the measurements required to obtain forward, redefected and PEP power. As can be seen on the LP-500 manual, it can also be used to sample modulation waveforms both after the transmitter and simultaneously after an amplifier.

In response to 5.13-iii; While noting ComReg's position on the use of modelling; to ensure a station does meet its obligations in relation to measuring non-ionising radiation, we would be of the view that modelling could still be employed in the design & construction of a stations antenna system and then validated thereafter (at completion stage or after any

[2] https://eznec.com/
[3] http://www.daiwa-industry.co.jp/EN/CN901_manual_200413_ol.pdf
[4] http://www.telepostinc.com/Files/LP-500/LP-500-User_Guide.pdf
[5] http://www.telepostinc.com/LP-500.html
[6] https://rigexpert.com/products/antenna-analyzers/

modifications are made) if required with a field strength meter such as the Extech 480846 High Frequency RF EMF Meter[7] or a Narda Broadband Field Meter NBM-520[8]. Once tested, we would be of the opinion that a station configuration would be compliant unless modified. Units like these could be acquired as a pool resource within clubs as their requirement would be infrequent.

Currently ComReg would employ testing in an commercial environment where most commercial transmission would be of a consistent continuous duty cycle carrier unlike a Radio Amateur stations, who do not transmit on a consistent basis and on average spend a greater percentage of their on air time listening. That coupled with the low Duty Cycle modes traditionally used by Radio Amateur stations and the rating for Specific Absorption Rate (SAR) below 30Mhz (the most active band section) would all significantly pose a lesser risk, we would hope ComReg could see some reason for accepting modelling as a viable option based on the sample usage patterns.

Extract from ComReg-2190

Compliance with related licence conditions

A 3.33 ComReg needs to consider two other matters that are related to transmitter powers, spurious emissions and non-ionising radiation.

A 3.34 The limits of permitted spurious emissions and non-ionising radiation (NIR) are given in annex 2 of the guidelines. In order to ensure that amateurs are able to meet these licence conditions.

Spurious Emissions

To address the identification of spurious emissions a Digital Spectrum Analyser like the OWON XSA815TG[9] can be used, and available new for under €1,000. This instrument also provides several extra functions including a tracking generator. In contrast with less opportunity for home construction on the same level as the commercially produced transmitters and amplifiers (all of which are nowadays CE marked and tested for spurious emissions at manufacture) many Radio Amateurs have been experimenting with software defined receivers[10] (SDR), there have been a number of novel use cases developed including successfully adopting SDR's as wideband spectrum scopes and station monitors making it easy to identify any impurities in a transmission all on a low budget, further more as they are multifunctional they are more lightly to be inline and monitored on a more consistent basis.

[7] https://www.tester.co.uk/extech-480846-8ghz-rf-electromagnetic-field-strength-meter
[8] https://www.narda-sts.com/en/wideband-emf/nbm-520/
[9] https://www.aliexpress.com/item/1005003079903818.html
[10] https://www.sdrplay.com/

We hope that we have shown how your concerns can be met with regards to considering our request for increasing the power level in line with our temporally allocation and our European counterparts. While we have made some suggestions, they do not cover all the possible options available to today's Radio Amateurs. Again, we wish to highlight, that we agree (reference A 3.32) in that "there have been no reports of Irish radio amateurs causing interference to other services in the bands".

We welcome any follow up comments you may have.

---

31 Mayo VHF Group

[✂ [redacted] ✂],
Co. Mayo.

Mob: [✂ [redacted] ✂]
Email: [✂ [redacted] ✂]

19/10/2021

Dear ComReg

In responding to your latest consultation reference ComReg-2190, and on behalf of the members of **The Mayo VHF Group**, we wish to confirm our support for “The Marconi Radio Group” proposed request for an amendment to the Radio Amateur power allocation as printed in Annex 5.

Our club has a mixture of interests in both the radio contests and also DX-Chasing and we would like to see everyone afforded the same opportunity’s.

As modern radio equipment is produced to a very high standard and must meet strenuous testing prior to receiving its CE or FCC approval so the chances of spurious emissions is greatly reduced. Designers of today’s radio’s and amplifiers are focused on the need for better filtering and distortion reduction as they look for any area to improve their market presence.

With regards to meeting the terms of our licence our members feel we have always measured up to these requirements and as was stated in section A3 of your report we are also not aware of any interference been caused.

A small selection of test equipment will provide the details necessary for maintaining station compliance.

- PEP meters in line to ensure limits are maintained,
- spectrum analysers could be used to check for spurs or out of band problems
- sniffers with oscilloscopes to note levels
- and a field strength meter for EMF Radiation

On the question of how often measurements should be taken, we feel it sufficient to test on installation and as changes are made would be sufficient.

Or make Clubs own complete response as desired, we will offer any help we can.

Regards

Joe Fadden

Joe Fadden [✂ [redacted] ✂]
Mayo VHF Group Secretary

32 Midlands Radio Club

Midlands Radio Club

Dear ComReg

In response to your latest consultation reference ComReg 21/90, and on behalf of the members of Midlands Radio Club, we wish to confirm our support for the proposed request by the "The Marconi Radio Group" for an amendment to the Radio Amateur power allocation as printed in Annex 5.

Our club has a mixture of interests in both radio contests and also DX-Chasing. We would like to see everyone afforded the same opportunity.

As modern radio equipment is produced to a very high standard and must meet strenuous testing prior to receiving its CE or FCC approval, so the chances of spurious emissions is greatly reduced. Designers of today's radios and amplifiers are focused on the need for better filtering and distortion reduction as they look for any area to improve their market presence.

With regards to meeting the terms of our licence, our members feel we have always measured up to these requirements. As was stated in section A3 of your report, we are also not aware of any interference been caused.

A small selection of test equipment will provide the details necessary for maintaining station compliance:

- PEP meters in line to ensure limits are maintained
- Spectrum analysers could be used to check for spurs or out of band problems
- Sniffers with oscilloscopes to note levels
- Field strength meter for EMF Radiation

On the question of how often measurements should be taken, we feel it sufficient to test upon installation and as changes are made to the station setup.

Regarding the issue of entry-level or novice-level licencing, we are also extremely keen to see this introduced into the country. This is something which is required for the future development of the hobby.

Finally, we hereby give our full support to all proposals/submitted documentation by "National Radio Society of Ireland" (NRSI).

33 Munster Radio Club

Munster Radio Club

Dear ComReg

In response to your latest consultation reference ComReg 21/90, and on behalf of the members of Munster Radio Club, we wish to confirm our support for the proposed request by the "The Marconi Radio Group" for an amendment to the Radio Amateur power allocation as printed in Annex 5.

Our club has a mixture of interests in both radio contests and also DX-Chasing. We would like to see everyone afforded the same opportunity.

As modern radio equipment is produced to a very high standard and must meet strenuous testing prior to receiving its CE or FCC approval, so the chances of spurious emissions is greatly reduced. Designers of today's radios and amplifiers are focused on the need for better filtering and distortion reduction as they look for any area to improve their market presence.

With regards to meeting the terms of our licence, our members feel we have always measured up to these requirements. As was stated in section A3 of your report, we are also not aware of any interference been caused.

A small selection of test equipment will provide the details necessary for maintaining station compliance:

- PEP meters in line to ensure limits are maintained
- Spectrum analysers could be used to check for spurs or out of band problems
- Sniffers with oscilloscopes to note levels
- Field strength meter for EMF Radiation

On the question of how often measurements should be taken, we feel it sufficient to test upon installation and as changes are made to the station setup.

Regarding the issue of entry-level or novice-level licencing, we are also extremely keen to see this introduced into the country. This is something which is required for the future development of the hobby.

Finally, we hereby give our full support to all proposals/submitted documentation by "National Radio Society of Ireland" (NRSI).

Signature:

34 National Radio Society of Ireland

National Radio Society of Ireland (NRSI)

A Society representing Radio enthusiasts in Ireland

Consultation Submission

Proposed Strategy for Managing the Radio Spectrum 2022 to 2024

Welcome statement from the NRSI President

National Radio Society of Ireland (NRSI) aims to be an open, transparent and fair organisation. Our main goal is to promote and
support radio as a hobby within Ireland with a positive modern-focused outlook. NRSI welcomes this opportunity to comment on ComReg Document 21/90 and as a stakeholder to further participate in the process of improving radio communications as a hobby within Ireland.

In order to achieve this we are willing to work with all other radio enthusiasts, organisations and groups within the country.

Amateur Radio Power Amendment

On behalf of all members of the National Radio Society of Ireland (NRSI), we wish to confirm our support for the proposed request by the Marconi Radio Group for an amendment to the Radio Amateur power allocation as printed in ComReg Document 21/90 Annex 5.

Our society has a mixture of interests in both radio contests and also DX-Chasing. We would like to see everyone treated fairly and afforded the same opportunity for radio operations.

Our society agree with the methods proposed by the Marconi Radio Group of using PEP meters, spectrum analysers, oscilloscopes and field strength meters.

With regards to the question of how often measurements should be taken,
we feel it sufficient to test upon installation and as changes are made to the station setup.

Irish Table of Frequency Allocations

In its 2019-2021 Strategy Statement, ComReg identified a work plan item in terms of considering the allocation of additional bands to the Amateur Service in Ireland.

This would align the Irish Table of Frequency Allocations with the European Common Allocation table and also the ITU Radio Regulations.

As a new national society, NRSI welcomes this and would be grateful if the society could be included during any future stakeholder meetings regarding this matter.

Entry-Level / Novice Licence

Regarding the issue of entry-level or novice-level licencing, we are also extremely keen to see this introduced into the country. This is an issue which carries a great deal of support within the Irish amateur radio community.

Our society appreciates that some changes would be required to allow for such licencing, however this has been achieved by a large number of countries to date and has proved highly successful. Entry-level or novice licencing is something our membership feel is required for the future development of the hobby within the Republic of Ireland. It is something we are passionate to see introduced and as such we would be grateful for inclusion during discussions relating to this matter.

Our society wishes to propose the following as one possible example of how this could be achieved on a practical level in an incredibly safe manor:

Lifetime licence (unlimited duriation), with possibility to upgrade later upon obtaining HAREC in order to avail of additional frequency access and higher power allowances
Commercially produced equipment usage
Practical training through local training clubs/centres
Proposed Maximum Power: 14dBW (c.25W) on following frequency ranges. These are primary allocations for the Amateur Radio Service, thus all of the above factors would carry no risk of interference nationally to other users:

28.0000 - 29.7000 MHz
144.0000 - 146.0000 MHz
430.0000 - 440.0000 MHz

Not all amateur radio operators are interested entirely in HF operations.
Many new amateurs initially wish to communicate on a more local basis and use repeaters/gateways.

Access to the these three frequency ranges would mainly provide entrants with a practical experience of UHF/VHF along with a section of HF, thus encouraging them to undertake HAREC assessment at a later period.

In addition, the society feels that a lower power access to the following and some of the GHz part of the spectrum would be beneficial for young entrants to the hobby:

50.0000 - 52.0000 MHz
69.9000 - 70.5000 MHz

Our society has additional ideas of how this process could be implemented whilst at the same time ensuring minimisation of resource usage.

As such, NRSI is always open and welcoming to further discussion with regards to how this matter could be achieved in a more detailed manor.

Our society is keen to participate and be of as much assistance as possible in regards to the aforementioned going forward into the future.

Spectrum Intelligence and Investigations (SSI) Operators Forum

NRSI is aware that in 2019 ComReg established a Spectrum Intelligence and Investigations (“SII”) Operators Forum with the aim to deepen engagement between ComReg and licensees by discussing topics of shared interest and future trends.

NRSI understands that the Forum met in September and December 2019 and was attended by a wide range of stakeholders.

National Radio Society of Ireland (NRSI), as a newly established representative body of radio enthusiasts, would be extremely grateful if it were possible to receive an invitation for future meetings of this forum.

35 OneWeb

OneWeb Communications SARL
16, rue Jean l'Aveugle
L-1148
Luxembourg

The Commission for Communications Regulation
Ireland

22 October 2021

Submissions to ComReg Document 21/90 - National Spectrum Strategy 2022-2024

In response to the consultation Proposed Strategy for Managing the Radio Spectrum 2022 to 2024, OneWeb would like to provide the following comments to COMREG.

General Background on OneWeb

OneWeb is a global telecommunications provider, with main European Union office in Luxembourg. The OneWeb system will provide low latency, high capacity, connectivity solutions to customers through a new generation of low-earth orbit (LEO) satellites. OneWeb believes that satellite systems have a key role to play in a multi-network broadband ecosystem, often in a complementary way to terrestrial telecommunication solutions.

OneWeb is being deployed worldwide and the OneWeb commercial services in northern Europe – including Ireland - will start at the end of this year. OneWeb sells satellite capacity on a wholesale, business-to-business model, and our distribution partners are the telecom service providers and mobile network operators in each country, along with large enterprises and government institutions itself, all of whom then provide broadband internet connections directly to unconnected, underserved end-users and citizens.

Re: section 2.2.1 The importance of radio spectrum

The COVID-19 pandemic has highlighted the critical nature of the digital infrastructure to the economy and communities of every nation including those in rural and remote areas. Lockdowns and quarantine measures across the world in the wake of COVID-19 are creating an increasing gulf: it has accelerated adoption of home working, digital health care, fintech and remote education for the connected population. However, the same jobs, education, and

public services are not accessible to the unconnected. As a result, the wealth prospect difference is growing larger the longer the pandemic lasts.

Partnerships between satellite and terrestrial operators are key to improve the access and affordability. Only by using LEO satellite constellations will universal service be truly achieved across Ireland. Particularly, OneWeb will be working hand in hand with our telecom partners who will use our cost effective, fibre-like connectivity solution to further their networks' reach. National mobile operators' customers will likely pay cost-effective fees similar to those of their counterparts in the cities. Successful partnerships such as these can enable remote communities to finally enjoy the benefits of truly inclusive connected societies, unlock digital opportunities, and spur economic growth.

4G and 5G matching QoS on our LEO system allows it not only to provide coverage where terrestrial build out is never going to be feasible economically, but also to the "temporarily" unconnected areas, as satellites provide an important interim infrastructure in areas even where terrestrial may eventually arrive. By encouraging telecom terrestrial operators to use satellites for interim infrastructure satisfying promptly the user demands, Nations can not only meet their universal service goals, but also begin to enjoy the advantages of a connected population and economies far sooner than expected.

Furthermore, satellite-based solutions offer highly robust technologic and operational solutions when facing natural disasters, and Fixed and Mobile satellite user terminals are the fastest way to establish or re-establish communication for emergency services to assist them during relief effort. In addition, combining OneWeb User Terminals to an existing or a vehicle mounted cellular base station can re-establish the entire public mobile network in a matter of hours to reconnect the whole community.

The above-described socio-economic benefits should be reflected in COMREG spectrum strategy prominently. Spectrum policy has a critical role to play on adoption of emerging technology such as the LEO satellites, and access to interference-free spectrum in bands such as Ku- and Ka- band is critical to operation of the OneWeb solutions. Moreover, affordability of these spectrum directly impacts the business case of bringing service into those rural and remote area.

Re: 4.2.2 Future EC Harmonisation Decisions, Frequency Bands Above 24 GHz

Regarding various spectrum bands under consideration for market verticals, OneWeb respectfully notes that we are currently using the 28 GHz band for our major gateway earth stations, and we are grateful to Ireland for respecting the value of this continued allocation to Fixed Satellite Services.

In addition, OneWeb would like to request that proper consideration by Ireland should be taken before licensing the 42GHz (40.5-43.5GHz) range. OneWeb is developing its second-generation constellation which will be deployed from 2024. Such constellation will use the Q/V satellite frequency allocations (38/48 GHz ranges).

Given the current congestion in the Ka band with over 130 GSO satellites and several NGSO constellations, the satellite industry is increasingly looking at Q/V as the new frontier for future development of satellite communication. Smaller terminal that would be possible in this band (30 cm diameter) make this attractive for mobility user such as on aircraft. In term of ITU Radio Regulation, footnote 5.516B identifies 40-40.5GHz in all 3 Regions for ubiquitous deployment of HDFSS. Furthermore, the whole of the spectrum range between 37.5-50.2 GHz is also required by feeder link Earth stations in the FSS allocations which require high spectrum bandwidth; such applications will alleviate the pressure on Ka-band.

In the case of OneWeb, we are intending to use extensively the FSS allocation in Q/V band (which ranges between 37.5 to 50.2 GHz) for feeder links for our next generation of gateway. As such OneWeb has already submitted satellite filings at the ITU and has also requested a license in the USA, i.e., submitted a request in the FCC processing round regarding this frequency band and any required licensing applications will be submitted to Ireland, when appropriate.

OneWeb would like to request COMREG to take into account the issues presented in this letter when licensing this band and ensure that proper mitigation measures be implemented to ensure interference-free operation for future commercial satellite services across Ireland.

OneWeb remains at disposal of the COMREG for any clarifications on OneWeb network and services shall you find it useful. We continue committed to provide relevant information to COMREG when required and, in particular, we will consider the outcome of the review of Fixed Satellite Earth Station licensing regime (mentioned in para. 3.140) currently under way, and provide our detailed view at appropriate time.

Yours truly,

Peng Zhao
Director of Government affairs and Policy

36 Pat Baynes

Padraic Baynes
[✂ [redacted] ✂]

Comreg,
One Dockland Central,
Guild Street,
Dublin, D01 E4X0
22/10/21

Padraic Baynes [✂ [redacted] ✂]Response to ComReg 21/90 Proposed Strategy for Managing the RadioSpectrum 2022 to 2024

Dear Comreg,

I want to make the following comments on the Above Document.

5.7 Novice and Entry-class licensing.

A more straightforward exam with access only to VHF/UHF bands would eventually lead an individual to upgrade to the Class 2 and Class 1 licence. The Entry-Class licence should be time-limited to a maximum of 2 years. This gives ample time to develop interest and encourage those to move on to a Class 2 and Class 1 licence.

5.11 Increase in permissible transmitter power.

I favour allowing individual Radio amateurs to apply for an increase in the limit to 1500 W provided they could give measurements to show they meet the terms and conditions of their licence. I would also like the current Competition list updated to include more recent competitions in consultation with the Radio Amateur Community.

Kind Regards

Padraic Baynes
[✂ [redacted] ✂]

37 RTÉ & 2RN

RTÉ & 2RN RESPONSE TO

COMREG CONSULTATION

Draft Radio Spectrum Management Strategy 2022 to 2024

ComReg 21/90

22nd October 2021

1. Introduction

RTÉ and 2RN welcome this opportunity to participate in the development of the ComReg Spectrum Management Strategy, and are pleased to see this draft spectrum strategy document as a particularly well considered and balanced proposal. We believe that this is an essential activity to set out and clarify the implementation of national spectrum policy. This is particularly important at this time where there is again heightened pressure that could reduce future access to quality spectrum for important services with high social value such as public service broadcasting. Ensuring that the correct balance is maintained here requires insightful judgement and clear policy guidance.

Terrestrial broadcasting is the leading distribution platform for TV in Europe delivering free to air access to reliable and inclusive information. In Ireland terrestrial TV (Saorview) is regularly the largest platform for TV reception (alongside subscription Satellite TV) and is currently received in 36% of Irish TV households[1]. Continued access to high quality UHF spectrum is required to maintain a strong, appealing, relevant and competitive free-to-air (FTA) broadcasting platform in Ireland, while also facilitating a highly successful and efficient sharing relationship with PMSE. Over the past 10 years – following the move from analogue to digital TV – 43% of spectrum previously allocated to broadcasting has already been re-assigned to mobile use, making it increasingly difficult to maintain a resilient broadcast network, and increasingly difficult to facilitate wireless technology used for programme making and events. The continued renewal and long term viability of terrestrial broadcasting depends on long term certainty of access to radio spectrum.

Although broadcast spectrum policy is the responsibility of the DECC, we would welcome greater regulatory certainty and reassurance from this ComReg spectrum strategy to support a long term future for public service broadcasting in Ireland, particularly in light of the upcoming WRC decisions relating to UHF spectrum. To this end Ireland should support a "no-change" position on agenda item 1.5 of WRC23. This would help insure that terrestrial broadcasting can continue to thrive and develop. While the promise of flexibility from a co-primary mobile allocation seems appealing on the surface – experience has shown that where spectrum is given a co-primary allocation at a WRC it is directly followed by clearance or preparations for clearance for mobile use. Broadcasting and Mobile services are still not compatible and unable to share spectrum in a meaningful way, even between neighbouring countries – in practice a co-primary allocation means one service or the other.

RTÉ and 2RN welcome ComReg's proposed work item to review usage in the 470 to 694 MHz frequency band to help inform the national position on WRC agenda item 1.5. In line with this agenda item, and given the potential influence of the findings, it is important that the scope of this work item is extended to take a proper critical look at spectrum demand and usage in the full 470 to 960MHz band for all users (current and potential future). RTÉ and 2RN would welcome the opportunity to contribute in any way to this study at an early stage.

RTÉ and 2RN would be happy to discuss any of the issues raised here with ComReg.

[1] TAM Ireland – September 2021, https://www.tamireland.ie/universes/

3 Specific Comments (referenced to sections in ComReg 21/90)

2.1.1 – We are grateful for the clarity on responsibilities for spectrum policy, in particular broadcast spectrum policy, given here. We note that it is a challenging area with overlapping and competing demands for resources; between policy that is driven primarily by economic and commercial factors and policy that is derived from social / cultural needs. We understand the difficulty in balancing these competing requirements in an organisation that is mostly tasked with focusing on economic and commercial drivers for spectrum management. We recommend that ComReg ensure that there is a distinction between senior personnel responsible for broadcast spectrum policy implementation and the more regular commercial / telecoms spectrum management – this is to ensure that the special requirements of broadcasting are not overshadowed by commercial demands.

We also encourage ComReg to ensure that DTCAGSM are aware of the implications of any spectrum management activities / spectrum policy implementation that could affect the availability and quality of radio spectrum available for broadcasting and PMSE. In particular DTCAGSM should be involved in the proposed study of 470 to 694MHz.

2.11 – We support the text in the section, noting the comments we have made on section 2.1.1 above are also applicable here.

2.19 – We would like to acknowledge the improved tone and recognition of broadcasting in this section compared to the most recent previous spectrum management strategy documents. However, we believe the text should go further with respect to broadcasting and consider capturing the following key message from the 2008-2010 spectrum management strategy "*Public policy goals play a significant role in determining spectrum management priorities. Technical efficiencies may have to be compromised in order to safeguard the provision of certain public services such as safety, defence and public broadcasting services. Technical and economic efficiencies may also be constrained by international obligations related to spectrum use, especially restrictions on the amount of power that can be exported across national borders."*

2.28 – This is an excellent idea and very useful.

2.38/2.39 – This work is welcome. We understand that the purpose of this work is to understand broadband habits, but care needs to be taken not to assume that responses around TV and video consumption over broadband imply substitution for broadcasting services, which also recorded increased usage during the Covid crisis without any reduction in quality whatsoever.

2.46 – We are grateful for ComReg's continued active participation at international level, and for ComReg's open attitude to sharing its work in this area. From speaking with international colleagues ComReg (and Ireland's) positive contribution to work in the area of spectrum management is well acknowledged. However, the single notable exception to this was ComReg's presentation at the 2020 European Spectrum Management conference where some comments were out of line with European and national spectrum policy, and leave us highly concerned that strong opinions like this could distort the policy making and

implementation process[2].

3.13 – This is a useful initiative. We recommend that ComReg consider using this group or a similar one to further reach out to PMSE users. This could help inform PMSE users, feed into future spectrum requirements, keep abreast of technological advancements and issues of mutual interest. PMSE industry participation could also help increase uptake in licensing of PMSE Equipment.

3.33 – Increased user demand for mobile data, and apparent demand for more spectrum, should not automatically lead to identification of new spectrum bands. We note ComReg's efforts to encourage more efficient use of existing mobile spectrum; this should always be pursued first before seeking additional spectrum.

3.36 – It is worth noting that there was also an increase in broadcast TV viewing during this time. Data from TAM Ireland showed an increase in live TV viewing during the Covid crisis in 2020 (11% increase from March 2019 to March 2020) before returning to pre-Covid levels[3] in April 2021 – other countries also saw an increase in live TV viewing in 2020 during the Covid crisis. This highlights the importance of a reliable and robust delivery method for public service broadcasting to deliver essential trustworthy news and education (e.g. RTÉ's home school hub) during the Covid crisis. 2RN's terrestrial broadcast network remained stable during the entire crisis, did not need enhancements and did not suffer restrictions on bandwidth or capacity that was experienced by OTT services[4].

3.70 – We are encouraged to see ComReg's efforts to stimulate and be ready for 5G in higher frequency bands which is where the substantial advancements (and substantial availability of underutilised spectrum) associated with 5G occur (e.g. higher order MIMO and active antenna systems, smart antennas). This is important to note when evaluating sub 1 GHz spectrum for potential mobile allocation where 5G does not bring the same level of enhancements over 4G.

3.82 – This is very valuable.

3.4.5 – This is a very useful tool.

3.145 – Regarding the decline in the number of PMSE licences shown in figure 20; it is possible that this does not reflect the true level of PMSE usage in Ireland. In addition to the Covid related downturn in the entertainment and events industries, in some cases the reduction in licenses could be due to multiple PMSE licences being condensed into fewer licences for similar amounts of equipment. Consider that further outreach and streamlining of the licensing application process may be needed to encourage possible existing users who maybe operating ad-hoc without licences, and going un-noticed in this assessment. It is also possible that some users may incorrectly assume that they are permitted to operate on a licence exempt basis, or that their equipment qualifies as a SRD.

[2] https://www.youtube.com/watch?v=lBOXnjIs0JI&list=PL-w3m3Fi4ZVlogdTrqI7TCJLlQxZQ9Nix&index=22

[3] TAM Ireland (tamireland.ie) – TV Overview March 2019, April 2020, March 2021, April 2021

[4] https://www.rte.ie/entertainment/2020/0320/1124393-youtube-and-netflix-limit-video-quality-during-pandemic/

It should also be noted that there have not been any major events – due to Covid – since the 700MHz band was repurposed (i.e. reducing the amount of spectrum available for PMSE). It is likely that the challenges in finding sufficient spectrum for PMSE at large events has yet to be witnessed – and further assessment should be made once events have returned to normal levels.

3.153 – We note that PMSE systems seem to be increasingly used to provide important public safety functions; such as venue evacuation and other safety announcements, in addition to their primary functions.

3.158 – There are indeed spectrum shortages for PMSE in certain locations e.g. RTÉ studios Donnybrook where there are routinely over 100 PMSE devices operating simultaneously in adjacent studios. It has become increasingly difficult to plan PMSE use in locations like this due to increased congestion from a reduced spectrum band, and growth in demand for the number of active devices needed for modern programme production. Any further increases in congestion could render the band practically unusable for many applications. Continued growth in use of wireless PMSE is expected in TV production studios, and major events. A recent study from the Electronic Communications Committee[5] found the numbers of UHF devices in sample UK cities and major European events between 2014 and 2019 have increased - in some cases by 40%. It is worth noting that growth recorded in this report was prior to the reduction in available spectrum following the 700MHz reassignment (i.e. with a loss of 96MHz), which is likely to influence further growth.

Significant increases in spectrum efficiency have been achieved through increased investment, and recent technology advancements making digital systems suitable for far more (but still not all) media production applications. Although it is worth noting that early adoption of high performance digital PMSE technology has resulted in high costs for early adopters, which may still be cost prohibitive for some users.

The value of the highly successfully sharing arrangement with PMSE and broadcasting should be recognised here. Further reductions in available spectrum, or increases in congestion will put this sharing and efficient use of spectrum at risk.

4.12 – This is very important. Ireland should continue to support common European positions on spectrum management, and ComReg should continue to make positive contributions, in line with national policy, in the development of those positions. See comments on section 2.46

4.17 – We are pleased to hear that preparations for WRC23 are underway. The Irish national position is of public interest and should be created in-line with national policy which in turn should be developed with input from all relevant stakeholders.

4.24 – It is helpful to see this illustration of the large and recently increased amount of suitable spectrum already available for mobile communications. Noting that even more spectrum is potentially available following WRC-19 (totalling over 15GHz) – although much

[5] ECC Report 323 – Spectrum Use and Future Spectrum Requirements for PMSE – Feb 2021

of it is in significantly higher frequency ranges that may not yet be ready for practical networks.

Figure 25 also indirectly highlights some inefficiency in current mobile spectrum use (sub 1GHz in particular) where more than 300MHz is already allocated to mobile, but significantly less is shown as being available. This should be factored into any wider analysis of UHF spectrum (see section 5.5-iv). Greater capacity and coverage of high capacity mobile networks is best achieved with additional investment in networks and infrastructure in existing bands, and the use of new spectrum in higher frequency bands – rather than seeking additional spectrum sub 1GHz where mobile device sizes would limit the efficiency of spectrum use.

4.45 – We are pleased to see efforts to increase the efficiency of existing mobile spectrum, prior to seeking more spectrum.

4.75 – It is worth highlighting the development of 5G broadcast as a downlink only technology for mobile TV services, on mobile handsets, in this section. This could be introduced without any need to change the radio regulations, and could in many cases be introduced alongside – and complementing - existing terrestrial broadcast networks.

4.76 – Re-farming of existing mobile spectrum for more efficient technologies and allocations is welcomed.

4.90 – It is important to include Broadcasting in this initiative and the results may help inform the debate on the future use of the UHF band. Noting recent studies (BBC[6] and the LoCAT Project[7]) show that DTT is more energy efficient at delivering TV data than other platforms. Video is often cited as a key driver for increased data demand.

5.4 - vi (p102) - While we note progress on the MBSA 2021 process we would welcome further clarity on the use of PMSE as well as PPDR in the 700MHz duplex gap and guard bands, as per Ireland's National Roadmap on the Use of the 700MHz Frequency Band[8].

5.4 - xvii (p104) – While carrying out these tasks it is important to manage expectations on the ability of TVWS to deliver services within current levels of usage of UHF spectrum.

5.5 – iv (p105) – We would like to be involved in this study from the beginning and would like to assist in the development of its scope. It is important to factor in that this should not be just a technical exercise looking at spectrum assignments, but should consider the level of quality of spectrum needed to ensure adequate service, noting the public service / social importance of broadcasting. The study should be extended to consider the entire 470 to 960MHz band in line with WRC-23 Agenda item 1.5.

5.22 – Suggest replacing the word "consumers" with "individuals", as "consumer" could imply commercial services only.

[6] BBC white paper : https://www.bbc.co.uk/rd/blog/2020-09-sustainability-video-energy-streaming-broadcast.
[7] The LoCat Project - European study on the carbon footprint of TV delivery. Ref. EBU Forecast 2021.
[8] DCCAE, March 2019

A2.16 – In line with WRC23 agenda item 1.5, the proposed study should cover the range 470 to 960MHz. The efficiency of use of spectrum in the 694 to 960MHz part of the band is important in the context of any future decisions that could affect the availability of high quality spectrum for broadcasting in the 470 to 694MHz part of the band. Furthermore, this work item should be listed as “to inform itself on the opportunities and potential costs (economic as well as social/cultural and political) for Ireland”.

A3.47 – We welcome ComReg’s generally cautious approach to TVWS. Note that so called “unutilised frequencies” at a local level, are often a function of highly efficient high power high tower multi frequency networks, and should not be interpreted as a lack of efficiency.

A3.48 – The concept is designed to “increase” spectrum usage – not necessarily improve, as even with careful planning there is a potential for additional interference to Broadcast networks and reduced opportunity for the existing sharing relationship with PMSE services.

A3.60 – Note that these TVWS trials do not provide any benefit that is not already promised by existing 4G/5G systems within existing mobile/broadband spectrum. New spectrum and new technologies (particularly when implemented at the potential detriment of other existing services) are not needed to deliver broadband to rural areas.

A3.61 – Note that it was not a trivial matter to assign these test frequencies, requiring some detailed modelling of the test locations and potential interference to existing DTT networks.

A3.63 – We agree with this summary of the TVWS issue.

38 Shannon Basin Radio Club

Date: 19/10/21

Ref: Submission re ComReg 21/90"

Dear ComReg

In responding to your latest consultation reference ComReg – 2190, and on behalf of the members of the Shannon Basin Radio Club, we wish to confirm our support for "The Marconi Radio Group" proposed request for an amendment to the Radio Amateur power allocation as printed in Annex 5.

Our clubs interests are a mixture of radio contesters and DX chasers and we would like to be afforded the same opportunity as our neighbours in Europe and worldwide.

All modern radio equipment is produced at a very high standard and must meet strenuous testing before it receives its CE and FCC approval so the chances of spurious emissions is greatly reduced. Designers of today's modern radios and amplifiers focus on the necessity for better filtering and distortion reduction as they look to improve their marketing presence.

With regards to meeting the terms of our licence our members feel we have always measured up to these requirements and as was stated in section A3 of your report we are also not aware of any interference been caused.

A small selection of test equipment will provide the details necessary for maintaining a station compliance.

- PEP meters in line to ensure limits are maintained,
- spectrum analysers could be used to check for spurs or out of band problems
- sniffers with oscilloscopes to note levels
- and a field strength meter for EMF Radiation

On the question of how often measurements should be taken, we feel it sufficient to test on installation, and as any changes are made to the station.

We thank you in advance of your understanding for our support for the amendment change to ComReg-2190 document "Radio Amateur Power Allocation and looking forward to a positive outcome.

Kind Regards on Behalf of the Shannon Basin Radio Club.

Patrick O'Connor[✂ [redacted] ✂]Chairman

Brian Canning [✂ [redacted] ✂] Secretary

Anthony Dolan [✂ [redacted] ✂] Treasurer.

Date: 19/10/21

Ref: Submission re ComReg 21/90"

Dear ComReg

With response to your consultation reference ComReg-2190 and on behalf of the members of the Shannon Basin Radio Club we confirm our support for the Novice and Entry class lisence.

We would like to note that many of our neighbours in Europe already enjoy a novice /entry class lisence which is now attracting younger members to the hobby.

In the interest of encouraging more youth into the hobby we feel that a novice / entry level lisence will be most beneficial to the hobby long term.

We thank you for this inclusion in your Spectrum Management Document, which we hope will be successful and look forward to our continuing support in the future years.

Thanks in advance of a positive outcome.

Kind Regards on behalf of the Shannon Basin Radio Club

Patrick O'Connor [✂ [redacted] ✂] Chairman

Brian Canning [✂ [redacted] ✂] Secretary

Anthony Dolan[✂ [redacted] ✂]Treasurer

39 Sigma Wireless

SIGMA WIRELESS

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MISSION CRITICAL COMMUNICATIONS

Response to ComReg Consultation Document:
'Proposed Strategy for Managing the Radio Spectrum 2022 to 2024'
Reference: ComReg 21/90
Date: 10/09/21

Prepared on behalf of Sigma Wireless, by industry expert, Peter Clemons & fully revised by Sigma Wireless

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Opening words

Sigma Wireless is a fully Irish owned systems integrator, headquartered in Finglas, Dublin, providing mission-critical communications since 1991. The majority of our customers are based in Ireland, although we also provide products and services directly and indirectly to over 20 countries overseas.

Our customer base covers a full range of critical communications users across practically all the vertical sectors from Government, public safety and utilities to healthcare, transport hubs, industries and enterprises. Whereas our traditional business was focused on professional mobile radio systems (PMR) and all related aspects of communications systems design, integration and support, our company is increasingly focusing on the next generation of mission-critical and business-critical solutions, especially 3GPP-compliant technologies such as private LTE and in the future, private 5G.

It is in this context, and in this capacity, that we welcome ComReg's Proposed Strategy for Managing the Radio Spectrum 2022-2024 Consultation Document and are also happy to provide a selective, yet comprehensive response. We strive to continue serving our long-standing mission-critical customers to the very best of our ability with the best possible equipment and solutions at our disposal. Clearly, sufficient, appropriate, harmonised and stable spectrum assets will be required for us and all our customers to fulfil our important roles within Irish and European societies and economies over the coming years and decades.

General, non-band-specific comments

The recent, ongoing, global COVID19 pandemic has unexpectedly changed the way that most of us now see the world - and how it might evolve over the coming years. The global pandemic has clearly shown how difficult it is – and will continue to be – to predict the future as we move deeper into the 2020s. Although COVID19 might eventually be brought under control, the sooner the better, we are also facing the equally important challenges of regional and global competition - with its potential for tensions between neighbouring nations - and the urgent need to tackle human-induced climate change and keep global warming down to as close to 1.5^{o}C as possible over the coming decades to preserve a high standard of living for future generations.

The ability for most advanced nations, including Ireland, to modify general life and work practices so quickly and so drastically to the new COVID19 reality back in March 2020 and there afterwards is a testament to the way our societies and economies have embraced digital and online ICT technologies in recent times, allowing societies to continue even when the majority of the population were confined to their homes. As custodian of Ireland's radio spectrum, ComReg played an important role in facilitating such rapid changes and keeping the Irish economy moving under such challenging circumstances. We therefore support the temporary COVID licences that were awarded to mobile network operators to cater for increased demand for mobile broadband services. This clearly was never envisaged within the original Strategy Document for 2019-2021!

It is expected that recent experiences will in fact accelerate the digital transformation of societies, industries and entire economies. Spectrum is the bedrock of this transformation: the basic natural resource and input to all telecommunications networks and solutions. As private LTE and 5G networks start enhancing and replacing the best-effort wireless solutions that are currently prevalent, sufficient, dedicated, harmonised spectrum at a European and global level becomes even more critical for the successful digital transformation programmes of Sigma Wireless' mission-critical customers within Irish Government agencies, industries and enterprises.

This is by far the strongest message and focus of Sigma's submission to you today, and we hope it will be one of the central components of your future spectrum strategy.

We therefore agree with your assessment of the importance of radio spectrum laid out in Section 2.2.1, and the work conducted whilst preparing the 2019-2021 Strategy Statement to measure the economic contribution of radio spectrum to Ireland and its increase over the period in terms of Gross Value Added (from €4 billion to €4.5 billion) and Gross National Income (from €6.2 billion to €7 billion). As you also mention, the number of employees in Ireland whose jobs are directly dependent on radio spectrum has also increased by over 10%. We look forward to ComReg's updates with its most recent data.

Given Sigma Wireless' important role in Irish public safety via our ownership and operational role within Tetra Ireland, we also agree with ComReg's highlighting of the social and secondary benefits of spectrum usage in Ireland (2.18-2.20). The efficient functioning of emergency services depends on reliable mobile communications, today and in the future. There is further discussion of how ComReg can continue to serve PPDR/emergency services in later sections of this submission. We also support ComReg's important role guaranteeing universal service, especially in more remote, rural areas, as well as consumer protection through the safeguarding of personal data and privacy, as laid out in Annex A1.1.5.

Sigma Wireless strongly believes in the pan-European and global approach to spectrum management also supported by ComReg (Sections 2.2.2, 4.1, 4.2 & Annexes 1,2) which requires close collaboration, coordination, and harmonisation of key frequency bands by cooperating spectrum management agencies to maximise the benefits of spectrum for the widest possible range of services and applications.

Sigma Wireless supports the innovative Test and Trial Ireland programme (3.1.5) which enables entrepreneurs, researchers and developers to trial wireless technologies quickly and at low cost across a wide range of frequency bands in Ireland. We note that the number of test and trial licences has been steadily increasing since 2015, and we definitely expect both ourselves and many of our customers to take advantage of this important facility at some time in the near future.

Sigma Wireless is also pleased to see ComReg actively setting up and participating in national and European initiatives to encourage greater cooperation between spectrum market participants, including emergency services and the defence sector:

The Spectrum Intelligence and Investigations Operators Forum (SII Forum) was established by ComReg in 2019 (section 3.13), with 2 meetings held before COVID19 restrictions, with key emergency services organisations, An Garda Síochána and Tetra Ireland taking part.

In a similar vein, at European level, it is good to see ComReg involved in CEPT's Civil-Military Frequency Management Forum (section 3.10/3.188) where spectrum managers from the commercial and defence sectors address issues of mutual interest.

As 5G services were rolled out in multiple countries around the world just as COVID19 was leading to restrictions imposed on the population, multiple conspiracy theories also started circulating in social media connecting 5G and COVID19. It can be very difficult to tackle such phenomena without concrete facts and robust arguments, so we welcome ComReg's continued monitoring of Non-ionising Radiation (NIR), to reassure all members of the community that all existing telecommunications services are operating at several orders of magnitude below levels that might cause concern for public health.

As world leaders gather in Glasgow, Scotland during early November for United Nations COP26 meetings to attempt to reduce greenhouse gas emissions sufficiently over the coming years and decades to keep global warming below 1.5°C, climate action is now becoming a central part of all Governments' current and future policies. Sigma Wireless supports ComReg's increased focus on the relationship between the ECS sector and climate change as it works closely with DECC to study and tackle this major issue (sections 4.89-4.92). We look forward to supporting ComReg as it plans to commission a study during 2022 to investigate the impact of climate change on electronic communications networks. It is also positive to see that the 400 MHz band spectrum award to ESB Networks for a nationwide Smart Grid network based on LTE, which was supported by Sigma Wireless, is considered to be a key enabler in the reduction of carbon emissions.

We therefore note that important progress has been made by ComReg during the current 2019-2021 spectrum strategy period in spite of the uniquely challenging circumstances caused by the COVID19 global pandemic. Sigma Wireless looks forward to continuing to support ComReg, its customers and the wider Irish society and economy during the upcoming 2022-2024 period.

400 MHz Band Spectrum Award

Sigma Wireless would like to acknowledge the importance of the 400 MHz Band Spectrum Award made during the final quarter of 2019, which is explained in greater detail in Section 3.7.1 of the consultation document. This Award is an important milestone for Irish, European and global development of Smart Grid applications in one of the key UHF bands (410-430 MHz; in this case, the lower part of this band, i.e. Band 87) supported by the global 3GPP community.

Traditionally, during 3G and early 4G deployments, 3GPP focused on spectrum allocations for regionally standardised and harmonised IMT/MFCN services above 700 MHz up to around 2.1 GHz. Very early cellular technologies such as NMT in Scandinavia and other parts of Europe had been deployed in 450 MHz (UHF2) and then upgraded to wider-band CDMA services for utilities and related services requiring wide-area, often remote, rural coverage. In other European countries, these same 450 MHz bands were occupied by a wide range of services, including narrowband PMR services. Increasingly obsolete CDMA systems are now being upgraded to private LTE, with a recent, large-scale nationwide deployment announced for this band by 450connect in Germany.

However, in many European countries, including Ireland, for historical reasons, 450 MHz is highly congested with existing narrowband users and other applications making it difficult to free up sufficient harmonised spectrum in 450 MHz (3GPP Bands 31 or 72) for mission-critical users, so 410-430 MHz has become an alternative band, with Bands 87 (410-415/420-425 MHz) and 88 (412-417/422-427 MHz) now approved by the European and global 3GPP community.

Following a process of extensive lobbying and close collaboration between ComReg and several interested parties, a significant part of Band 87 was allocated to wide-area SmartGrid applications and auctioned off during 2019 to ESB Networks as described in section 3.7.1. ESB Networks launched a pre-qualification questionnaire (PQQ) during late 2020 and is now in the tender phase of a process that will lead to a nationwide private LTE network being rolled out starting in 2022. Given the huge importance of such a project for Ireland, this can be considered one of the major successes of the 2019-2021 Period for ComReg.

As is also explained during section 4.92 of the consultation document, which forms part of section 4.6 dedicated to the ECS sector and climate change, the 400 MHz band spectrum award has placed ComReg at the vanguard in Europe for spectrum release for SmartGrid applications. This award is a key enabler of the reduction in climate emissions and fits into Government policy framework of Project Ireland 2040, DECC's National Mitigation Plan and SEAI Smart Grid Roadmap. Sigma Wireless is aware of extensive trials that have been conducted in Band 87 in United Kingdom and assignments made in Middle Eastern countries, which fully justify ComReg's policy decisions in this band.

BB-PPDR Bands

Public safety, emergency, PPDR services in Ireland and across Europe have been delivered for the past 15-20 years on a nationwide basis in the NATO 380-400 MHz band using ETSI TETRA standard solutions in the majority of cases, with Tetrapol technology as the base of nationwide systems in France, Spain, Switzerland and a small number of Eastern European countries. In late 2014, a specific working group, SA6, was set up within 3GPP to develop a common set of mission-critical communications standard applications based on LTE and future 5G technology. The majority of European Governments have been considering spectrum allocations for next-generation public safety/PPDR in multiple 400 MHz and 700 MHz frequency bands, supported by a series of European Commission recommendations and decisions, and technical and administrative work within 3GPP (RAN4) to harmonise a manageable number of common bands.

The author of this submission actually collaborated closely with LS telcom back in 2019 in a report to ComReg on PPDR options for mobile broadband spectrum following the Irish Government decision to include the main 2x30 MHz within 700 MHz Band 28 (703-733/758-788 MHz) in its Multi-Band Spectrum Auction freeing up valuable IMT spectrum for mobile operators.

In Document 20/98, published in October 2020, ComReg identifies three separate sub 1 GHz bands for future PPDR use in Ireland:

2x3 MHz available in Band 88 (414-417/424-427 MHz)

2x5 MHz in 700 MHz Guard Band (Band 68) at 698-703/753-758 MHz

2x3 MHz in 700 MHz Duplex Gap (Band 28A) at 733-736/788-791 MHz.

Following the 400 MHz spectrum band award to ESB Networks for Smart Grid in Band 87 as described in the previous section of this submission, there is a further 2x3 MHz available for PPDR services in the adjacent Band 88 band. The key characteristic of Band 88 is that it is a UHF1 band able to provide similar coverage and range to existing TETRA services provided by Tetra Ireland in 380-400 MHz NATO band, which means that existing sites can be re-purposed concurrently or over time for private, mission-critical LTE/5G operations.

There have been concerns within the mission-critical industry and community that there may not be a sufficiently large regional and global 410 MHz ecosystem of chipset vendors, network and terminal equipment manufacturers and solution providers to sustain the future development of Band 88 for PPDR. However, the same concerns were also displayed by the utilities/energy industry and community regarding the adjacent Band 87, whereas now there are multiple networks being deployed or under study across Europe and globally.

On September 21st at 450 MHz Alliance event in Dusseldorf, Germany, Ericsson announced it is joining Nokia to produce network equipment in 410-430 MHz, meaning that both major LTE/5G network equipment suppliers in Europe will now support the band. A wider chipset and device ecosystem will certainly emerge as more countries open up Band 88 for mission-critical usage, so Sigma Wireless and its industry partners are available to support ComReg and Irish Government OGCIO in its research into the practical use of this band for critical PPDR services and applications, just as we did for the adjacent Band 87 effort that resulted in ESB Networks commissioning a nationwide Smart Grid solution.

Sigma Wireless and its partners also encourage ComReg to carry out all necessary studies and consultations to determine the suitability of the other 2 spectrum bands under consideration for PPDR in the 700 MHz band mentioned above. Multiple European countries – at least a dozen at the most recent count, including the largest and most significant EU member states, France and Germany - have already assigned these frequencies for PPDR. ComReg should therefore continue to engage fully with its European counterparts in the public safety sector and spectrum regulation to provide clarity and stability that will allow equipment suppliers and service providers to move forward with R&D and product development, issues regarding full service availability, carrier aggregation etc.

It is very positive to read within the consultation document that ComReg is fully engaged with OGCIO to find long-term solutions to the spectrum issues faced by PPDR in Ireland. There is now clear recognition that emergency services users will require sufficient dedicated spectrum in recognised 3GPP bands to implement LTE/5G services within a reasonable timeframe during the current decade.

Although current emergency services users have guaranteed support for TETRA services from Tetra Ireland until at least the end of the current decade, the migration from existing services to next-generation 3GPP-based LTE/5G services will need to begin well in advance of this date in order to guarantee the orderly and timely build-out and operation of the network supporting advanced services. The timely assignment of these frequencies to PPDR is therefore recommended within the 2022-2024 timeframe of ComReg's upcoming spectrum strategy.

3800-4200 MHz private local-area networks

Sigma Wireless welcomes the increased focus by ComReg, other European regulators and the European Commission itself on identifying a common, harmonised spectrum band for private local-area networks across the European Union, which has led to 3800-4200 MHz (n77) being discussed at the very highest level and included in this consultation document in the relevant sections 4.51-4.54, 5.2.2/5.4ix + Annex 3 (A3.39-A.3.46).

As European societies and economies move forward into a radically different, highly competitive post-COVID19 world, its industries and enterprises will require sufficient, affordable, available spectrum resources to implement the smart factories, smart warehouses, smart logistics chains and smart cities of the future. Private LTE, and especially Private 5G networks will form the critical part of these solutions, and due to the acceleration of digital transformation processes across the value chain, they are required as soon as possible, and most definitely within the next strategy review period of 2022-2024.

The European Union, as an integral part of ITU Region 1, identified 3 main frequency bands – a low-band at 700 MHz (Band 28), mid-band around 3.5 GHz (n78) and high-band at 26 GHz (FR2 n258) - to launch the wider range of 5G services which will be on offer compared to 4G/LTE. The n78 band, offering up to 400 MHz in 3400-3800 MHz has been the sweet spot for initial 5G deployments across Europe, including Ireland, generating the most revenue for Governments from spectrum auctions to mobile operators.

Although spectrum for private networks has been made available for some considerable time in a number of European markets such as Netherlands, United Kingdom and parts of Scandinavia, it is only fairly recently that 3GPP-based private mobile networks have started to be deployed more extensively, as advances in 3GPP technology solutions have led to more modular, cost-effective deployments using scalable, virtualised core networks (vEPC/vIMS etc.) and small cells, as well as sufficient tranches of spectrum being made available.

In fact, over the past 24 months or so, private LTE/5G networks have become the fastest growing sector, with triple-digit annual increases in major markets. However, there is no common band for private deployments across Europe, leading to different frequency bands being chosen by different countries: France 2.6 GHz (B38), Germany 3.7-3.8 GHz (n78), UK 2.3 GHz (B40). There is therefore undoubtedly a clear need for a harmonised, pan-European allocation to overcome this fragmentation of the private enterprise network market, that could unlock even greater value over the next 5-10 years and beyond.

As part of a major spectrum liberalisation programme initiated by UK regulator, Ofcom, 3800-4200 MHz (Band 77) was one of a series of frequency bands to be freed up for local-area networks in summer 2019.

Recent C-band auctions in USA including overlapping n78/n77 frequency bands (3.7-3.98 GHz) concluded in early 2021 with the eye-watering sum of US$ 81 billion spent by mobile operators, plus $US 14 billion more in additional payments to incumbent satellite operators, so this clearly demonstrates the value and viability of the lower n77 band at 3800-4000 MHz.

There are recognised issues deploying higher-power LTE/5G IMT/MFCN services in the higher 4000-4200 MHz frequency range due to its proximity to spectrum used by critical aeronautical altimeters in 4200-4400 MHz for collision avoidance, so further studies may be required, continuous monitoring and some form of static or dynamic shared access mechanism to allow access for vertical industries wishing to deploy Industry 4.0 and related services over private wireless networks.

There are a growing number of examples of such dynamic shared access systems being implemented around the world, including CBRS in USA. A light licensing scheme for private local wireless networks in the 3800-4200 MHz spectrum band focused on recovering basic administrative costs for regulators and opening up significant bandwidth for vertical industries and enterprises will allow the latter to deploy more advanced services and applications for the full digital transformation of Irish and European societies and economies, with enormous benefits for citizens.

During 2021, Sigma Wireless has joined a group of industry pioneers to create a new association, EUWENA (European Users Wireless Enterprise Network Association) which aims to bring together similar-minded organisations to drive forward the increased uptake of private wireless enterprise networks across Europe, based on common, harmonised spectrum allocations such as 3800-4200 MHz. We believe passionately in the enormous

potential of such an ecosystem and look forward to working closely with ComReg during the 2022-2024 timeframe to make sure our industry and community needs are fulfilled.

PMR Licensing Regime Review

Although the mission-critical industry and communities are currently rightly focused on future technologies, services and applications, we must not forget the very significant economic and social benefits provided by existing PMR networks across a wide range of Irish Government, social and industrial sectors. Also, although the licensing statistics within section 3.7 of the consultation document suggest that Business Radio licences are suffering a steady decline in recent years, there are still many large, significant narrowband PMR networks operating across Ireland that will require continued development and support for many years to come.

Sigma Wireless therefore welcomes ComReg's review of existing PMR licensing regimes (sections 3.7.2, 5.2.8) and will be happy to assist the ongoing consultation process, as ComReg intends to publish an initial consultation document during Q2 2022. Sigma Wireless supports ComReg's intention to futureproof the PMR licensing regime and offer longer-term stability to existing users as we begin the longer-term migration to more advanced services based on 3GPP technologies, that, from experience, is likely to take at least one more decade to complete.

Commercial mobile network operators including MBSA 2021

Sigma Wireless recognises that commercial mobile network operators provide incredibly valuable services to society, and have been doing so now for decades, driving forward the mobile ecosystem. Mobile network operators either invest directly themselves or indirectly via their network and device equipment suppliers and other solutions providers in continuously improved mobile services and applications from generation to generation that have transformed societies and the way we live our lives.

However, Sigma Wireless' main focus in this submission to ComReg are our mission-critical users' current and future requirements for spectrum in Ireland, especially during the 2022-2024 strategy period being defined. Although we recognise the role of mobile network operators providing complementary best-effort mobile service to many of our customers, we also believe that there is significant room for dedicated spectrum for private networks to be deployed by our customers based on the latest 3GPP standard technologies.

We welcome the current Multi-Band Spectrum Auction (MBSA) process currently under way, although delayed for reasons explained in the consultation document. MBSA 2021 appears to be on track over the coming months to increase the total spectrum in possession of mobile network operators from 750 MHz to 1,100 MHz.

Mid-band spectrum continues to be activated in 3400-3600 and 3600-3800 MHz for 5G services; mobile operators have been able to access additional spectrum by way of temporary COVID licences to cope with increased demand during 2020 and 2021 lockdowns; there is the future option for mobile network operators to re-farm existing 2G/3G spectrum to provide 4G/5G services; new IMT/MFCN bands could potentially become available during the 2030s as further UHF spectrum is awarded, with further allocations of SDL/TDD spectrum in 1.4 GHz.

We therefore believe that once the MBSA 2021 process is completed, sufficient spectrum will be available to cater for the rapidly increasing demand for commercial mobile broadband services, especially when additional fibre assets are in place for urban and suburban areas, as well as new sites being made available for the densification of existing 4G/5G networks with the latest small cell and OpenRAN technologies.

26 GHz considerations

Ever since 5G research activities began back during early 2010s, it has been recognised that some of the higher bandwidths required for more futuristic services means that the mobile access industry will need to move up into millimetre wave frequencies (starting at 24/26 GHz) and perhaps eventually even into THz or sub-THz (beginning at above 100 GHz). Within Europe (ITU Region 1), Band FR2 n258 was identified as one of the primary 5G bands, although most interest from mobile operators has been in mid-band (3.5 GHz) for capacity and low-band (700 MHz) for wide-area coverage.

ComReg dedicates a significant section (3.2.6) of its consultation document to the 26 GHz band, and in particular the 26 GHz Band 5G Study published in January 2021. The key findings from this study are that there is still little usage of this band internationally and in Europe, due to limited demand and business case uncertainty. With hundreds of MHz of contiguous bandwidth available for individual operators and/or users, millimetre wave technology promises to deliver the full benefits of 5G in highly-dense environments, indoors, i.e. for Fixed Wireless Access as a replacement or enhancement for the so-called last-mile delivery of services.

There has even been some talk at European Commission level of offering this Band for use for private local networks across Europe. However, Sigma Wireless believes that such services are still many years away from becoming reality and that other frequency bands, such as 3800-4200 MHz in the mid-band offer vertical industries and enterprises a better path in the short term to full digital transformation of industrial processes and related mission-critical services.

Other significant bands of interest

ComReg also mentions many other specific frequency bands and services within its consultation document which are not currently the primary focus of Sigma Wireless and its partners or customers, but which deserve to be mentioned and briefly discussed in this final section of our submission.

The 1.4 GHz band (section 3.2.5) is an integral part of the L-Band extensively used by satellite services, GPS/GNSS and related services. 3GPP has standardised Band 50 which contains up to 85 MHz of contiguous spectrum (1432-1517 MHz) potentially available for at least shared use by mobile telecommunications services. A significant part of this is being considered by many administrations for SDL (supplemental downlink) services for MNOs which would allow additional bandwidth for video streaming services, for example.

ComReg has decided not to include the 1.4 GHz band in its MBSA 2021. Sigma Wireless believes that there could be a future opportunity for at least part of this band to be considered for TDD for mission-critical services, allowing different allocations for uplink and downlink, but this band is not a priority for the time period under consideration.

A large part of the 3GPP 5G n96 band (6425-7025 MHz) (sections 4.61/4.62) are being considered by the mobile industry as additional mid-band spectrum. There are a number of issues related to this spectrum band which is being hotly contested by the 3GPP (NR-U) and IEEE WiFi6E which will no doubt be ironed out over the coming months and years, because of the potential benefits to mobile consumers. However, Sigma Wireless has nothing specific to add as part of the current submission.

ComReg provides an important discussion within specific sections of Chapter 4 of its document of European Commission-led harmonisation of the use of radio spectrum by critical transportation systems across Europe, which is welcomed by Sigma Wireless as providing greater long-term certainty to specific customer groups such as railways, urban rail and intelligent transport systems which could generate enormous social and economic benefits for Ireland and the wider EU over coming years and decades.

The provision of the 5.9 GHz band (sections 4.25-4.36) with 60 MHz of contiguous spectrum shared between mainly road-based intelligent transport systems (ITS) and urban rail ITS has the potential to offer major improvements to citizen mobility across smart and safe cities and countries.

FRMCS (Future Railway Mobile Communications System) is the next-generation railway communications technology currently being studied by UIC/ERA to replace existing GSM-R solutions as these become obsolete and are no longer supported by equipment suppliers circa 2030. In Ireland, a GSM-R licence regime was put in place relatively late in 2013 with a licence awarded to Irish Rail as recently as late 2015.

Sigma Wireless supports ComReg's intention to implement European Commission decisions to extend FRMCS/RMR spectrum to 874.4-880/919.4-925 MHz and make 10 MHz of the 1900-1920 MHz band available for railway mobile radio during the 2022-2024 period, while protecting existing investments by Irish Rail in GSM-R as its existing licence expires in November 2026.

Satellite services are also becoming a hot topic, with the future possibility of a much closer integration of terrestrial and non-terrestrial services as 3GPP moves forward with 5G Advanced standardisation efforts. Satellite services have traditionally offered mission-critical users such as public safety and utilities full coverage for more remote areas, as well as redundancy when fixed assets become unavailable during major incidents. It is important for ComReg to continue to study and monitor possible future uses of satellite services as newer, LEO constellations with smaller, more modular form factors are launched to provide ubiquitous coverage.

Closing comments

Sigma Wireless welcomes the opportunity to comment on ComReg's Consultation Document ahead of the publication of its final Strategy for Managing the Radio Spectrum in Ireland 2022-2024.

A lot has happened since the previous Strategy Document was published 3 years ago. We are clearly now at an important juncture as mission-critical users begin to openly assess technologies such as 3GPP-based standards such as LTE and 5G for their future network requirements. Digital transformation is now well under way for key Government agencies, industries and enterprises, and this process will intensify over the coming 3 years.

We believe it is possible for ComReg to find the right balance between consumer needs that can be satisfied by the existing mobile network operators and mission-critical, industrial actors who require dedicated spectrum for private deployments. Our industry needs to build on the recent success of the 400 MHz band award to Smart Grid by proceeding to the allocation of sufficient spectrum for public safety/PPDR. There is also a unique opportunity for private local networks to be deployed in the short- to medium-term in 3800-4200 MHz. ComReg's role in facilitating this continued growth and development is critical.

Millimetre wave technology remains an interesting research topic but is probably not quite ready for prime time yet. It is also good to see other sectors such as urban rail, intercity railways, satellite/non-terrestrial operations and others moving forward towards more harmonised, dedicated spectrum allocations which will boost these sectors over coming years and decades.

We wish ComReg the very best and hope our comments are useful and will be taken into consideration as you move forward with the final definition of priorities for the next strategy period and their eventual implementation. We look forward to working closely with you to make sure that spectrum continues to be allocated for the benefit of all those organisations that use spectrum as an input into their critical operations.

On behalf of Sigma Wireless Communications Ltd
Tony Boyle
CEO

40 SpaceX

October 22, 2021

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Re: *Proposed Strategy for Managing the Radio Spectrum 2022 to 2024 (ComReg 21/90)*

To Whom It May Concern:

Starlink Internet Services Ltd. ("SpaceX") appreciates the opportunity to provide comments on the Commission for Communications Regulation's ("ComReg") Proposed Strategy for Managing the Radio Spectrum 2022 to 2024 (ComReg 21/90).[1] Below is a general overview of SpaceX and its Starlink product, along with specific responses to ComReg's proposed strategy for 2022-2024.

Background

SpaceX is a private company founded in 2002 to revolutionize space technologies, with the ultimate goal of enabling humanity to become a multi-planetary species. SpaceX has achieved a series of historic milestones and is proud to have become the first private company in history to send astronauts to orbit, safely returning them to Earth. To date, SpaceX has successfully launched more than 100 missions to space.

SpaceX is leveraging 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 in Ireland and anywhere around the globe. SpaceX's first-generation constellation consists of over 4,400 non-geostationary orbit (NGSO) satellites and extensive ground infrastructure employing advanced communications and space operations technology. SpaceX has invested billions of dollars in this system and is currently building 120 satellites per month, along with gateways and end-user terminals. Starlink has been designed to make efficient use of radio spectrum resources by optimizing its ability to flexibly share spectrum with other licensed satellite and terrestrial users, including by using advanced beam-forming and digital processing technologies. SpaceX links to the customer user terminals in the Ku-band for both uplink and downlink frequencies, with gateway links in the Ka-band.

The past year and a half have demonstrated conclusively the importance of connecting every person and business in Ireland. Starlink began service in Ireland on July 14, 2021, and today has a growing base of active customers and can reach them no matter where they live. Starlink customers in Ireland typically see speeds exceeding 100 Mbps, with reliability nearing 100 percent. In the

[1] *See* ComReg 21/90, "Proposed Strategy for Managing the Radio Spectrum 2022 to 2024", 10 September 2021.

coming months, SpaceX is excited to expand its service to more people and businesses in more places, reaching those who are currently unserved or underserved by broadband.

Response to Section 3.2.6 – Monitor 5G development in the 26 GHz Band

SpaceX appreciates the opportunity to submit further comments on ComReg's 26 GHz consultation.

In its initial response,[2] SpaceX explained that its network uses gateway earth stations in frequency bands (27.5 – 29.1 GHz) immediately adjacent to the upper portion of the 26 GHz band, beginning with two earth stations that were recently authorized in Ireland. These earth stations are essential to provide the backhaul for the high-speed data traffic used by Irish consumers. To ensure customers that rely on this ground infrastructure are protected, ComReg should adopt appropriate technical and operational rules. By striking this careful balance, ComReg can ensure all Irish consumers and businesses have access to broadband connectivity in even the farthest reaches of the country.

Responses to the consultation reveal two important themes. First, satellite respondents agree that if ComReg authorizes new uses of the 26 GHz band, it should adopt appropriate technical and operational rules that protect customers of next-generation satellite deployments.[3] Second, several respondents share the skepticism of the 26 GHz Band 5G Study[4] about the efficacy of the 26 GHz band for 5G at this time, attributable to "poor" economics (Dense Air) and the fact that "business and traffic cases are not yet clear" in the upper part of the band (Vodafone). As a result, SpaceX urges ComReg to proceed with caution—and sufficient safeguards—when considering whether to permit 5G use of the upper 26 GHz band.

Response to Section 5.2.5 – Terrestrial Fixed Services

SpaceX supports ComReg's intended strategy for Terrestrial Fixed Services.

Several bands allocated to fixed services are critical for SpaceX's current and planned satellite network. As ComReg noted in its ongoing Review of the Fixed Radio Links Licensing Regime ("Fixed Services Consultation"), the Fixed Service and Fixed-Satellite Service are allocated on a co-primary basis in several bands,[5] including the 17.7 – 19.7 GHz band and the 70/80 GHz bands. In some cases, the ITU has provided for interference protection from Fixed Services for Fixed-Satellite Services. As ComReg concludes its Fixed Services Consultation, it should account for Fixed-Satellite Services and ensure that deployment of Fixed Services in bands where the two

[2] *See* Submission of SpaceX in ComReg 21/47, "Non-Confidential Submissions to Documents 21/07 and 21/07a – Submissions to Consultation", 41-42, 13 May 2021.
[3] *See* ComReg 21/90, Annex 4.
[4] *See* ComReg 21/07a, "26 GHz Band 5G Study: A study by Plum Consulting and IDATE regarding the future use of the 26 GHz Band", 26 January 2021.
[5] *See* ComReg 20/109, "Review of the Fixed Radio Links Licensing Regime", 9 November 2020.

services are co-primary will not unduly hinder deployment of critical satellite ground infrastructure that will be crucial to connect all Irish consumers with quality broadband.

SpaceX particularly appreciates ComReg's commitment to transparency and spectrum efficiency in its 2022-2024 strategy.[6] While databases are not appropriate in all circumstances, such as resolving issues between a ubiquitous mobile terrestrial service and a ubiquitous fixed satellite service, a well-run database can facilitate the deployment of satellite gateways and fixed terrestrial services. The publication of annual reports and fixed links data on Siteviewer not only will aid terrestrial operators, but also will aid non-terrestrial networks by enabling more rapid gateway siting, coordination, and deployment. This facilitation is particularly important for spectrum bands that are shared on a co-primary basis between terrestrial and satellite networks. To improve spectrum management practices further, SpaceX urges ComReg to include sufficient information in the database to enable meaningful analysis, including the latitude, longitude, altitude, and azimuth of the transmitting and receiving antennas and the radiofrequency properties of each (e.g., center frequency, bandwidth, antenna input power density, antenna maximum gain, antenna gain pattern, receive noise figure, polarization). In addition, ComReg should incorporate fixed satellite gateway earth stations into the eLicensing process and adopt automated processes that streamline compliance checking, coordination, and licensing, as explained in more detail in the following section.

Response to Section 5.2.7 – Satellite Services

ComReg has taken important steps to streamline its satellite licensing regime in a manner that will radically improve connectivity for people and businesses across Ireland. SpaceX supports ComReg's proposed work plan for satellite services for the 2022-2024 period.

As an initial matter, SpaceX supports ComReg's decision to initiate a consultation on its satellite earth station regime, and looks forward to providing detailed responses when the document is released.[7] In the meantime, SpaceX proposes the following general comments for ComReg's consideration:

- ***Encourage Coordination and Cooperation Among Satellite Operators.*** ComReg should adopt earth station rules that encourage cooperation and competition among non-geostationary satellite system operators. Well-designed rules will drive rapid operator-to-operator coordination without preconceived conditions that could unintentionally undermine technical discussion. For example, ComReg could consider a spectrum-splitting backstop in the event operator-to-operator coordination is not completed by the time both operators have commenced service in Ireland. Under this approach, operators would strive to reach a coordination agreement before both systems have commenced service in the Ireland. But in the event that such an agreement is not reached, the operators will split the spectrum evenly once operational. Ideally, this backstop will never be used, specifically because spectrum splitting is not an ideal solution for either party, which means that the

[6] *See* ComReg 21/90 at 5.2.ii, iv.
[7] *See id.* at 3.140 and 5.4.i (satellite consultations).

prospect of splitting will drive both operators to find a better option through coordination. In fact, one of the only countries to formally consider this issue—the United States—adopted just such an approach and is already seeing widespread deployment of NGSO systems. To create further incentives to construct spectrally efficient systems capable of better spectrum sharing, ComReg could also consider providing first choice of spectrum in the split to the more technologically efficient, flexible, and robust system. This approach will create a "race to the top" effect that will promote innovation and competition. This race to the top will allow more systems to share the spectrum, ultimately leading to more choices for Irish consumers.

- ***Set Reasonable, Cost-Recovery-Based Satellite Earth Station Licensing Fees.*** To avoid the fundamental challenges associated with consumption-based fees while maintaining their underlying goals, ComReg should replace its current fee structure with a cost-recovery licensing fee model combined with spectrum policies—such as the one described above—that reward operators that exceed certain efficiency thresholds and can provide the most throughput to the most consumers. A cost-recovery model minimizes the cost of deploying vital services to otherwise unserved Irish consumers by basing spectrum licence fees only on the cost to recover the administrative expenses of processing the licence itself. On the other hand, a consumption-based model that determines fees based on the purported value of specific frequencies or bandwidth risks introducing market distortions that inhibit innovation, raise barriers for new entrants, and in fact raise administrative expenses by requiring continual assessment and readjustment at significant cost to the regulator and licencees. The challenge in determining these costs is due to the difficulty inherent in accurately valuing spectrum.[8] Worse, a consumption-based model creates the perverse incentive to decrease the capacity of a system, rather than optimizing service to meet consumer demands. This misallocation of resources is particularly acute in millimeter wave bands, where consumption-based fees negate the primary benefit of those bands—namely, the ability of high-gain, directional links to coexist with minimal spatial and angular separation, even when using multi-gigahertz channels.

- ***Leverage Software-Driven Spectrum Management Practices.*** ComReg should leverage software-driven spectrum management practices wherever possible to accelerate application processing and licensing of satellite earth stations, building on the success of its eLicensing and Siteviewer tools. To that end, ComReg should consider adopting best practices and emerging models from fixed service light-licensing to enable semi-automated compliance checks, coordination, and approval of fixed satellite gateways. For example, ComReg could consider a spectrum management system for higher frequencies under which operators would register terrestrial fixed links and satellite gateways on a first-come, first-served basis through a common light-licensing database. This technology neutral approach would require only minor changes to currently available software tools and has several important benefits. Specifically, a multi-service light-licensing approach in higher frequency bands speeds review and approval time by automating basic compliance and

[8] *See* OECD/IDB (2016), Broadband Policies for Latin America and the Caribbean: A Digital Economy Toolkit, OECD Publishing, Paris, https://doi.org/10.1787/9789264251823-en, 71.

coexistence checks; reduces administrative cost and labor associated with manual reviews for all but the most complex interference scenarios; facilitates coordination between different co-primary services through a common platform; and promotes rapid deployment of ground equipment for high-speed, low-latency wireless networks, benefitting people and businesses alike. This model could dramatically improve the satellite earth station licensing process in Ireland.

With respect to Terminals for Satellite Services, SpaceX supports ComReg's proposal to continue facilitating exemption of individual licensing for terminals by updating ComReg 20/47.[9] Document 20/47 is a welcome development that will provide considerable certainty and flexibility for satellite service providers while reducing equipment costs and time to market for next-generation user terminals, meaning more people can be connected, faster. SpaceX particularly appreciates ComReg's decision to adopt technical requirements from ECC DECISION 17(04) and ECC DECISION 18(05) for fixed satellite terminals and earth stations in motion ("ESIMs"), respectively. SpaceX agrees that ComReg should continually seek opportunities to streamline its licensing requirements, and that more can still be done to facilitate deployment of innovative user terminals and ESIMs. For example, SpaceX encourages ComReg to explicitly reference ETSI standard 303 981 in its exemption for ESIMs communicating with NGSO fixed satellite systems. Adopting this standard for ESIMs would be consistent with ComReg's decision to reference the standard in its exemption for fixed satellite terminals, and would ease regulatory burdens on ComReg while enabling the rapid deployment of services such as Starlink to Irish consumers and businesses.

Conclusion

SpaceX appreciates ComReg's commitment to developing a forward-looking and flexible spectrum strategy that will drive rapid deployment of much-needed connectivity to people and businesses across Ireland.

Respectfully submitted,

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[9] *See* ComReg 21/90 at 5.4.iii; ComReg 20/47R2, "Permitted Licence Exemptions for Terminals for Satellite Services", 9 July 2021.

SPACEX

December 9, 2021

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Re: *Proposed Strategy for Managing the Radio Spectrum 2022 to 2024 (ComReg 21/90) – Supplemental Response*

To Whom It May Concern:

Starlink Internet Services Ltd. ("SpaceX") appreciates the opportunity to provide these supplemental comments on the Commission for Communications Regulation's ("ComReg") Proposed Strategy for Managing the Radio Spectrum 2022 to 2024 ("ComReg 21/90").[1]

Background

The current COVID-19 pandemic has demonstrated that too many households in rural and remote areas remain on the wrong side of the digital divide. Powerful next-generation satellite systems supported by robust backhaul connectivity will enable consumers across Ireland to use the sorts of bandwidth-intensive, real-time applications that have become so essential to accessing remote work, school, and public services. To meet these evolving consumer needs, SpaceX's next iteration of its Starlink commercial satellite service will use 71-76 GHz and 81-86 GHz frequencies (the "70/80 GHz bands") for gateway communications. SpaceX is not alone in its interest in the 70/80 GHz bands—a number of satellite operators are actively developing services that leverage the unique properties of the bands.[2]

Supplemental Response to Section 5.2.5 – Terrestrial Fixed Services

In its initial comments, SpaceX noted that "[s]everal bands allocated to fixed services are critical for SpaceX's current and planned satellite network," identifying the 70/80 GHz bands, which are allocated on a co-primary basis to fixed-satellite services and fixed services at the ITU and European level.[3] To clarify its comments, SpaceX requests that ComReg ensure that deployment of fixed links in the 70/80 GHz bands will not unduly hinder future deployment of

1 *See* ComReg 21/90, "Proposed Strategy for Managing the Radio Spectrum 2022 to 2024", 10 September 2021.

2 *See, e.g.*, Sam Morrar, "Using E-Band for Wideband Satcom: Opportunities and Challenges", *Microwave Journal*, 6, 13 August 2021, *available at* https://www.hughes.com/sites/hughes.com/files/2021-08/Microwave-Journal-Aug-2021.pdf.

3 *See* SpaceX Comments on ComReg 21/90, 2, 22 October 2021; ComReg 20/109, "Review of the Fixed Radio Links Licensing Regime", 9 November 2020; ComReg 20/58R2, "Radio Frequency Plan for Ireland", 274-80, 18 June 2021.

satellite ground infrastructure that will be important to connect all Irish consumers with quality broadband.

To that end, SpaceX recommends that ComReg adopt policies and processes for fixed links in the 70/80 GHz bands that promote transparency to facilitate efficient network planning, coordination, coexistence, and deployment, including for co-primary services such as fixed-satellite service gateways. For example, SpaceX urges ComReg to include sufficient information in its public database for 70/80 GHz links to enable meaningful analysis and self-coordination, including the latitude, longitude, altitude, and azimuth of the transmitting and receiving antennas and the radiofrequency properties of each (e.g., center frequency, bandwidth, antenna input power density, antenna maximum gain, antenna gain pattern, receive noise figure, polarization).

Supplemental Response to Section 5.2.7 – Satellite Services

As it stated in its initial comments, SpaceX supports ComReg's decision to initiate a consultation on its satellite earth station regime, and looks forward to providing detailed responses when the document is released.[4] In order to fully capture prospective spectrum uses for fixed-satellite service gateways, ComReg should take this opportunity to include the 70/80 GHz bands in its consultation.

The 70/80 GHz bands are critical for fixed-satellite service operators to meet the growing demands of consumers for high-speed, low-latency broadband connectivity. Fixed-satellite service gateways in the 70/80 GHz bands can operate using the same type of pencil-beam links as fixed services, with high minimum elevation angles and low power toward the horizon that can meet or exceed terrestrial limits in the bands. These technical and operational characteristics will result in small, predictable coordination zones and a low risk of interference to incumbent and future links that can be efficiently managed using available coexistence techniques and further enhanced through software-driven processes.

To maximize the value of these bands for Irish consumers and businesses, ComReg should extend its existing process for the 70/80 GHz bands to accommodate both fixed links and "pencil beam" fixed-satellite service gateways in a common light-licensing framework. This framework would allow operators to register ground equipment on a first-come, first-served, site-by-site basis under a single set of technical rules, and would only require a minor adaptation of current rules and online processes.[5]

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4 *See* ComReg 21/90 at 3.140 and 5.4.i (satellite consultations).

5 In the United States, the 70/80 GHz database manager Comsearch has noted that its system could accommodate non-terrestrial ground stations with only "minor," "straightforward" changes. *See* Comsearch, Aeronet Aviation and Maritime Communications Systems; Compatibility with Incumbent E-band Fixed Services and Link Registration System, at 4, 42 (May 2, 2019), attached to Letter from Samuel L. Feder, Counsel to Aeronet Global Communications Inc. to Marlene H. Dortch, Secretary, FCC, RM-11824 and RM-11825 (filed May 10, 2019); Comsearch, Loon E-Band Backhaul; Analysis of Compatibility with Incumbent Fixed Services, Use of the Link Registration System, and Review Versus Passive

This technology neutral approach would have several important benefits. Specifically, a multi-service light-licensing approach in higher frequency bands such as the 70/80 GHz bands speeds review and approval time by automating basic compliance and coexistence checks; reduces administrative cost and labor associated with manual reviews for all but the most complex interference scenarios; facilitates coordination between different co-primary services through a common platform; and promotes rapid deployment of ground equipment for high-speed, low-latency wireless networks, benefitting people and businesses alike. This model could dramatically improve the satellite earth station licensing process in Ireland while providing better connectivity for Irish consumers.

Conclusion

SpaceX appreciates ComReg's commitment to developing a forward-looking and flexible spectrum strategy that will drive rapid deployment of much-needed connectivity to people and businesses across Ireland.

Respectfully submitted,

Jameson J. Dempsey
Principal, Government Affairs

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Services, attached to Letter from Julie M. Kearney, Loon, to Marlene H. Dortch, FCC, WT Docket No. 20-133, at 38 (Jan. 12, 2021).

41 Three

Spectrum Strategy 2022 to 2024

Response to Document 21/90 from Three

22nd October 2021

1. Introduction

Three is pleased to provide comments on ComReg's "Strategy for Managing the Radio Spectrum – 2022 to 2024". ComReg's consultation document sets out in detail why the radio spectrum is so important to the day to day functioning of society and we agree with this position. We also agree generally with ComReg's approach to quantification of the value of spectrum to the economy and look forward to the updated output from this evaluation. Like ComReg, we are of the view that the Gross Value Added by spectrum has increased since the previous period (2019-2012) and that €4.5bn is a reasonable working assumption of the current value. Regardless of the final value though it cannot be denied that use of spectrum makes a significant contribution to the functioning of our economy.

Many aspects of the importance of radio based services are never counted in Gross National Income and during the last two years we have been reminded in stark terms of the importance of radio-based services when measures were introduced to restrict transmission of Covid-19. Electronic communications networks played a vital role in allowing society to continue to function in some way while everyone was restricted to near their home location and radio-based services were a very important component of this. ComReg's own statistics demonstrate this, with 69% of surveyed consumers using their mobile phone service to work from home/work remotely (including tethering), and 87% believing that their mobile phone service is adequate for voice calls to allow them to carry out work while at home. We can also see the impact of increased use of mobile and fixed wireless services for data-based services, as demonstrated in Figures 15 and 26 of the consultation document.

The above illustrates why It is so important that access to and use of the radio spectrum is well managed for the benefit of all. ComReg's functions in managing the radio spectrum are specified in various legal instruments, however we agree that some of the principal requirements can be summarised as a requirement to ensure that any measures adopted must also objectively be justified, transparent, non-discriminatory and proportionate in relation to their intended purpose. ComReg should always consult with relevant stakeholders and take their views into consideration when forming its decisions.

ComReg must also remain agile so as it can respond quickly to unfolding circumstances. We believe the temporary licences issued in response to the Covid-19 measures are a good example of why this is necessary, and how it can be done. We provide further comments on this item and other aspects of the consultation below.

2. Specific Comments

Temporary Licences

We would like to commend ComReg for the way it reacted during Covid-19 to introduce temporary spectrum licences. A detailed and comprehensive consultation process was completed in a very short time, and it led to cooperation across different types of spectrum user (Broadcasting, Communications, and Transport) in addition to ComReg to deliver a

benefit for end-users. This was the right reaction during an extraordinary time and demonstrated how a dynamic approach to spectrum management can benefit its users.

During the last 18 months we saw the importance of radio-based services, with large peaks in voice call minutes at certain defining moments – the announcement of changes to restrictions brought about peaks in the volume of voice calls, whereas data demand rose rapidly in a more sustained way. This is demonstrated clearly in figure 26 of the consultation document.

We are currently witnessing a further surge in daily Covid-19 cases and there is significant uncertainty about the path of return to normal. There is firm evidence that working patterns will not return as they were in early 2020 in the short term, and perhaps not at all. At this time, ComReg has consulted on a further extension of this licensing scheme which Three supports.

We also take this opportunity to highlight that operators have had the 700MHz band in use on their networks for over 18 months now, and customers have become used to the service that it delivers. For Three alone, we estimate that [✂ Confidential] customers benefit from the use of the 700 MHz band. We believe there is a requirement for a transition from the current use under the Covid-19 temporary scheme to the long-term assignments that will be in place following the MBSA. This transition must avoid any unnecessary interruption of services that consumers have come to rely on.

Coverage Maps

Three notes that ComReg has made its mobile coverage maps available during the current spectrum strategy. We encourage ComReg to quickly add a 5G coverage layer as it is a notable absence from the current maps.

SII Operators Forum

We note the establishment of the SII forum by ComReg in 2019. This is a welcome forum, and unfortunately it was unable to continue meeting during Covid-19. We suggest that it could re-convene with on-line rather than in-person meetings as a way to restart this forum.

Retirement of Legacy Technology

Mobile network operators are currently supporting multiple technologies from 2G to 5G. This is beginning to detract from the efficiency with which operators can use their networks and assigned spectrum. During the upcoming strategy period, plans will most likely be laid for the retirement of legacy mobile technologies.

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42 Tom Linden Memorial Club

Tom Linden Memorial Club, Cork

Clubsign: [✂ [redacted] [redacted] ✂]

Dear ComReg

In response to your latest consultation reference ComReg 21/90, and on behalf of the members of Tom Linden Memorial Club [✂ [redacted] ✂], we wish to confirm our support for theproposed request by the "The Marconi Radio Group" for an amendment to the Radio Amateur power allocation as printed in Annex 5.

Our club has a mixture of interests in both radio contests and also DX-Chasing. We would like to see everyone afforded the same opportunity.

As modern radio equipment is produced to a very high standard and must meet strenuous testing prior to receiving its CE or FCC approval, so the chances of spurious emissions is greatly reduced. Designers of today's radios and amplifiers are focused on the need for better filtering and distortion reduction as they look for any area to improve their market presence.

With regards to meeting the terms of our licence, our members feel we have always measured up to these requirements. As was stated in section A3 of your report, we are also not aware of any interference been caused.

A small selection of test equipment will provide the details necessary for maintaining station compliance:

- PEP meters in line to ensure limits are maintained
- Spectrum analysers could be used to check for spurs or out of band problems
- Sniffers with oscilloscopes to note levels
- Field strength meter for EMF Radiation

On the question of how often measurements should be taken, we feel it sufficient to test upon installation and as changes are made to the station setup.

Regarding the issue of entry-level or novice-level licencing, we are also extremely keen to see this introduced into the country. This is something which is required for the future development of the hobby.

Finally, we hereby give our full support to all proposals/submitted documentation by "National Radio Society of Ireland" (NRSI).

43 Ulster Radio Club

Ulster Radio Club [✂

✂]

Dear ComReg

In response to your latest consultation reference ComReg 21/90, and on behalf of the members of Ulster Radio Club, we wish to confirm our support for the proposed request by the "The Marconi Radio Group" for an amendment to the Radio Amateur power allocation as printed in Annex 5.

Our club has a mixture of interests in both radio contests and also DX-Chasing. We would like to see everyone afforded the same opportunity.

As modern radio equipment is produced to a very high standard and must meet strenuous testing prior to receiving its CE or FCC approval, so the chances of spurious emissions is greatly reduced. Designers of today's radios and amplifiers are focused on the need for better filtering and distortion reduction as they look for any area to improve their market presence.

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- Spectrum analysers could be used to check for spurs or out of band problems
- Sniffers with oscilloscopes to note levels
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On the question of how often measurements should be taken, we feel it sufficient to test upon installation and as changes are made to the station setup.

Regarding the issue of entry-level or novice-level licencing, we are also extremely keen to see this introduced into the country. This is something which is required for the future development of the hobby.

Finally, we hereby give our full support to all proposals/submitted documentation by "National Radio Society of Ireland" (NRSI).

Signature: Patrick Thompson

44 Vilicom

Vilicom Engineering Group Limited,
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Dublin D12 FK7C.

21 October 2021

Re: Proposed Strategy for Managing the Radio Spectrum 2022 to 2024

To whom it may concern,

Thank you for the opportunity to respond to ComReg's proposed strategy for managing the radio spectrum. I wish to address section 3.7 on Private Mobile Radio Services.

Private mobile radio spectrum enables a range of services for industrial, commercial and utility users. Traditionally this spectrum has been used for low bandwidth services such as voice and data telemetry. A large number of new industry and enterprise applications are increasing the demand for private spectrum.

Many of these applications require the strong security, high quality of service, fast response times, large bandwidth, high device density and resilience that can only be enabled by dedicated private spectrum. Smartphone applications relying on public cellular 3G/4G/5G networks have transformed industries as diverse as entertainment, travel and food. Internet of Things applications are poised to do the same in industry and enterprise. Sometimes this is called In

These applications include video analytics requiring high data volumes, augmented reality requiring fast response times and smart manufacturing requiring many thousands of sensors in a small area.

Private networks can be based on a variety of technology architectures including 4G, 5G and Wi-Fi standards. These networks are deployed inside buildings, across campuses, in underground mines and offshore.

It would be of great benefit if ComReg's spectrum strategy could:

- Enable mobile operators to deploy high-performance private networks that can be heavily loaded without affecting their public subscribers and protecting the spectrum assigned to public cellular networks
- Be aligned with the local licensing regime of Ofcom and BnetzA or with the CBRS regime in the US
- Support the existing roadmap of devices in existing public mobile bands including bands 1, band 3, n77 and n78
- Allow the licensing of private spectrum offshore outside the 12 nautical mile limit of the Territorial sea but within 200 nautical mile Exclusive Economic Zone
- Allowing downlink power levels of 69dBm EiRP and facilitating MIMO and massive MIMO configuration
- Setting uplink EiRP power limits taking into the consideration the use of high gain antennas connected to terminal equipment
- Make several 10MHz blocks of spectrum available
- License durations of five to fifteen years to reflect the capital investment cycles and minimise the burden of administration

Thank you again for allowing us to participate in this consultation, I look forward to hearing the results.

Yours faithfully,

Seán Keating,
CEO.