An Coimisiún um
Rialáil Cumarsáide
Commission for
Communications Regulation

Spectrum Intelligence & Investigations Annual Report

2020 - 2021

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1 Introduction

1. The Commission for Communications Regulation ("ComReg") is the statutory body responsible for the regulation of the electronic communications (telecommunications, radio communications and broadcasting networks), postal and premium rate sectors in Ireland in accordance with European ("EU") and Irish law. ComReg also manages Ireland's radio frequency spectrum ("radio spectrum" or "spectrum") and the national numbering resource. Furthermore, ComReg has enforcement responsibilities in relation to radio equipment regulation, and regulation of devices relating to electromagnetic compatibility.

2. Radio spectrum is the medium by which information may be transmitted wirelessly over distances ranging from a few centimetres to thousands of kilometres. These communication services include mobile telephony, wireless broadband, radio and television broadcasting and radio communications used by commercial business and by air and maritime transport. Many services rely on wireless connectivity as part of the backbone linking mobile base stations, providing feeds to broadcast transmitters and telemetry links that allow the monitoring of disperse infrastructure such as water reservoir levels or remote power transformers.

3. Radio spectrum is also fundamental in the day-to-day operation of the emergency services and defence forces, as well as being a vital input to many other important services such as weather forecasting or scientific applications such as those used for monitoring the environment.

4. Radio spectrum underpins much of the communications services in the State but is a finite national resource, with competing uses and users. It therefore requires careful management to ensure it is used effectively and efficiently.

5. Radio Spectrum is thus integral to the ongoing economic and social well-being of the State. The wireless communications sector is estimated to account for approximately 17,000 full time equivalent Irish jobs and spectrum-dependent activities are estimated to contribute €6.2 billion to the economy which equates to 3.5% of Irish Gross National Income[1].

6. Optimised use of radio spectrum depends on appropriate management of the resource to ensure, amongst other things, that radio communications systems

[1] ComReg, Document 18118-1'Radio Spectrum Management Strategy Statement 2019 to 2021'. 20 December 2018, available at www.comreg.ie

can operate with minimum interference[2]. These systems depend on clear radio channels in order to operate effectively noting that, in some cases, clear and reliable communications are critical to protecting life, health and property.

7. ComReg, acting within its legislative remit and its budgetary and staff resources, seeks to ensure that all lawful wireless services and devices permitted in the State are free from harmful interference. The Spectrum Intelligence & Investigations (SII) Unit, within ComReg's Market Framework Division, is responsible for ensuring the integrity of the spectrum resource. Within the SII unit work is separated into four work streams:

   - Radio frequency interference investigations;
   - Market surveillance of products;
   - Compliance and Enforcement; and
   - Radio spectrum monitoring.

8. Annex 1 of this document sets out in detail the key statutory provisions under which ComReg manages the radio spectrum resource.

9. The remainder of this report is structured as follows:

   - **Chapter 2** covers radio frequency interference investigations in the reporting period and plans to July 2022;
   - **Chapter 3** focuses on market surveillance of radio communications products for the reporting period and plans to July 2022;
   - **Chapter 4** provides information on compliance and enforcement actions supporting the activities outlined in this report;
   - **Chapter 5** reports on radio spectrum monitoring activities in the reporting period and plans to July 2022;
   - **Annex 1** sets out a summary of the legal framework applicable to SII; and
   - **Annex 2** sets out the methodology for the identification of non-compliant RLAN equipment.

[2] The radio spectrum needs be managed because two or more radio signals occurring simultaneously and in the same location can interfere with each other reducing the ability of the radio spectrum to be used effectively. It is not possible for users to share spectrum indiscriminately because one user may cause interference for another user.

2 Radio Frequency Interference Investigations

10. Radio frequency interference (RFI) describes radio frequency signals that disrupt legitimate electronic communications services, whether entirely, partially, or temporarily. RFI can affect any radio communication service including but not limited to emergency services, air traffic control, mobile phone services, business radio, microwave links and broadcast services.

11. RFI is caused by one wireless communications device transmitting at or near the same frequency as another or it can be caused by electromagnetic fields generated by various electronic devices, such as lights and computers. RFI can be unintentional: for example, it can be caused by incorrectly or poorly installed radio systems or by faulty or non-compliant electrical or electronic equipment.

12. SII responds to all complaints of RFI, in accordance with our RFI complaint classification process (see section 2.1). While some work is preventative in nature (e.g. site visits), most work in this area is in reaction to complaints received. Since 2017, ComReg has outsourced the majority of the lower priority interference investigations to a contractor, currently Butler Technologies.

2.1 Revised RFI Complaint Classification Process

13. ComReg, continuously seeks to further improve its processes to reflect today's radio environment, and in that regard ComReg introduced a revised RFI complaint classification process along with revised complaint response times in July 2020, following a public consultation[3]. The previous classification process placed an undue emphasis on the identity of the complainant rather than the impact the reported interference had on the complainant's ability to provide service. ComReg sought to address this, among other things, by placing emphasis on the nature and impact of the reported interference and the complainant's ability to continue to provide services. This new process has now bedded in and is operating effectively.

14. Under this process all RFI complaints are classified into three categories, Type A, Type B and Type C dependent on the impact of interference. Further details

[3] ComReg, Document 19/108 "Consultation on the management of Radio Spectrum Interference Complaints". 5 December 2019, available at www.comreg.ie

of this classification process can be found in the Response to Consultation on the management of Radio Spectrum Interference Complaints[4].

Complaint Type	Response Time
Type A	Immediate
Type B	5 working Days
Type C	N/A

Table 1. RFI response times

15. In tandem with the introduction of the revised RFI compliant classification process and associated response times, ComReg also introduced a reporting protocol for all RFI complaints and a process for closing complaints once the investigation is complete. The reporting protocol requires complainants to provide evidence of suspected interference, and that they have taken reasonable steps to ensure that the interference is outside of their control. The focused and in-depth information required for RFI reporting assists ComReg in its triage and prioritisation of complaints.

16. This approach has improved transparency by providing feedback to a complainant once an interference complaint is concluded. Where possible, the nature of the interfering source and any actions that the complainant may need to take to remedy the situation are communicated to them by ComReg within 5 working days.

17. In parallel to the new RFI processes above, ComReg also moved to a RFI case management system using Agiloft agile business software. The RFI case management system system[5] provides a number of benefits including:

- the capability to record and track RFI complaints for both internal and outsourced work;
- a web-based portal for outsourced contractors to upload RFI reports;
- the ability to track RFI response times; and
- improved reporting of case details to identify trends and inform ComReg's future workplans for the SII Unit.

18. The re-definition of response times and the associated KPI[6] has seen an improvement in the time it takes to carry out an initial investigation. The majority of RFI complaints received in the 2020 – 2021 work year fell into the Type B

[4] ComReg, Document 20/62 "Response to Consultation and Decision on the management of Radio Spectrum Interference Complaints". 16 July 2020, available at www.comreg.ie

[5] Agiloft - Contract Lifecycle Management Software

[6] Key Performance Indicator

category which has a response time of 5 working days as outlined above. This KPI was met for 97% of Type B complaints. No Type A complaints were received during this period.

2.2 Radio Frequency Interference Statistics

19. ComReg responds to approximately 100 complaints of RFI each year. During this reporting year, ComReg responded to 94 reports of harmful interference and queries. Figure 1 illustrates the year-on-year figures of interference complaints.

20. ComReg observes a reduction in the number of RFI complaints received during the period of the Covid-19 pandemic. It is uncertain whether this reduction is due to the pandemic itself or to the revised RFI classification system, which, by placing greater reporting obligations on complainants, helps ensure that only legitimate complaints of RFI, necessitating ComReg's intervention, are reported. In any event, ComReg will continue to monitor the effectiveness of the RFI complaint classification system.

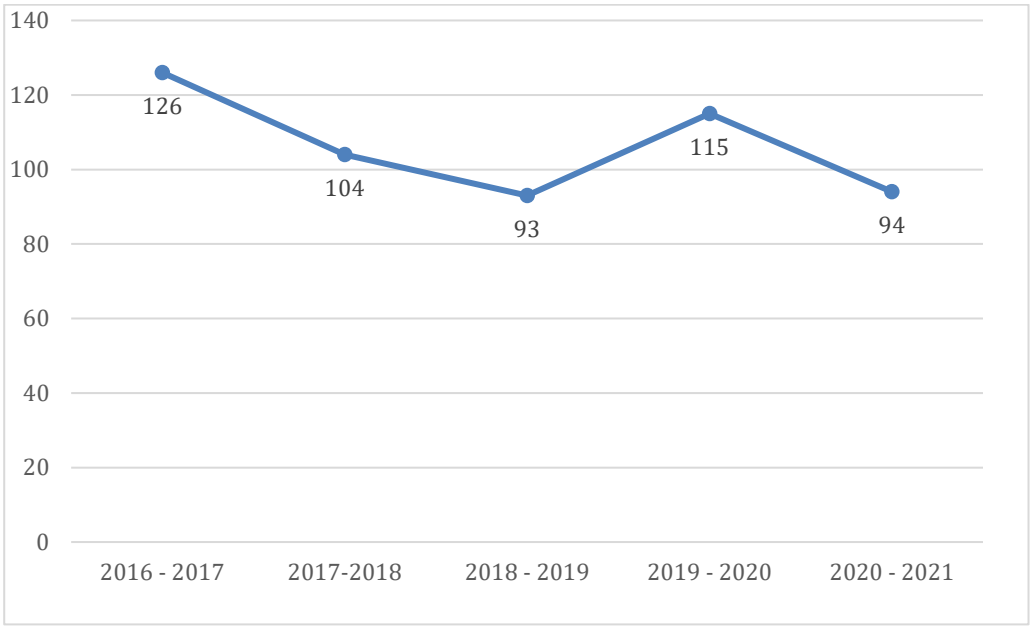

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Figure 1. Number of reported interference complaints received each year

21. Notwithstanding the reduction in the number of RFI complaints received by ComReg in the past year, the complexity of RFI complaints continues to expand and evolve. In section 2.4 of this document, ComReg sets out four case studies detailing some of the interference complaints investigated this year and the associated complications in their resolution.

22. As can be seen from Figure 2, of the 94 RFI complaints received during this period 65% fell into the Type B category.

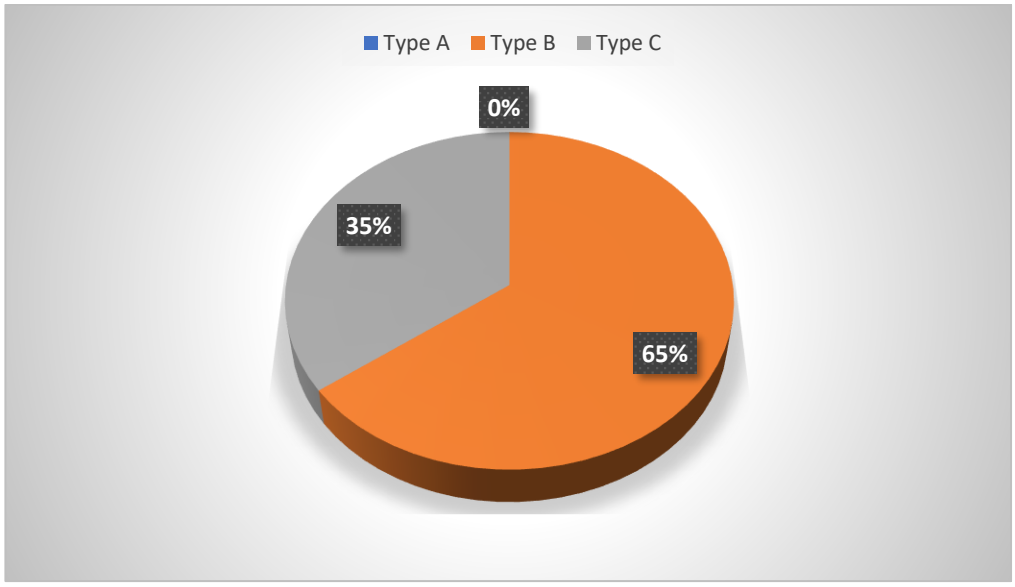

Figure 2. Interference complaints by Type

23. Further analysis of the Type B category shows that complaints from Mobile Network Operators ("MNOs") represent 93% of the RFI reports received.

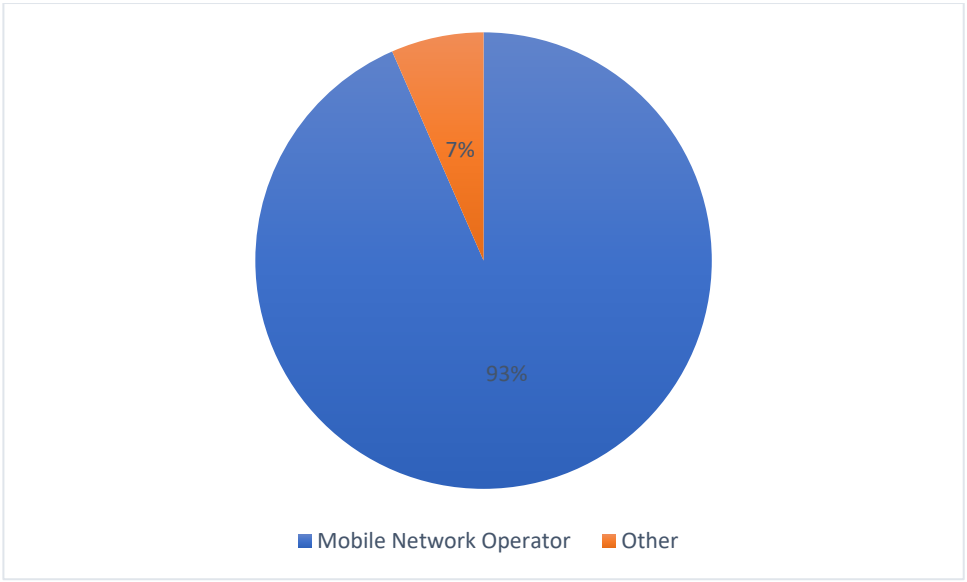

Figure 3. Breakdown of Type B cases

24. Three Ireland Hutchison Limited ("Three") remains the network operator reporting the most instances of harmful interference to its network. ComReg received 55 reports of harmful interference to mobile networks during this period, of which, 49 were reported by Three with eir and Vodafone each reporting 3 instances of harmful interference.

25. Fixed links, PMR, Aeronautical, and radio amateur services made up the remaining seven RFI complaints reported last year. A breakdown of which can be seen below in Figure 4.

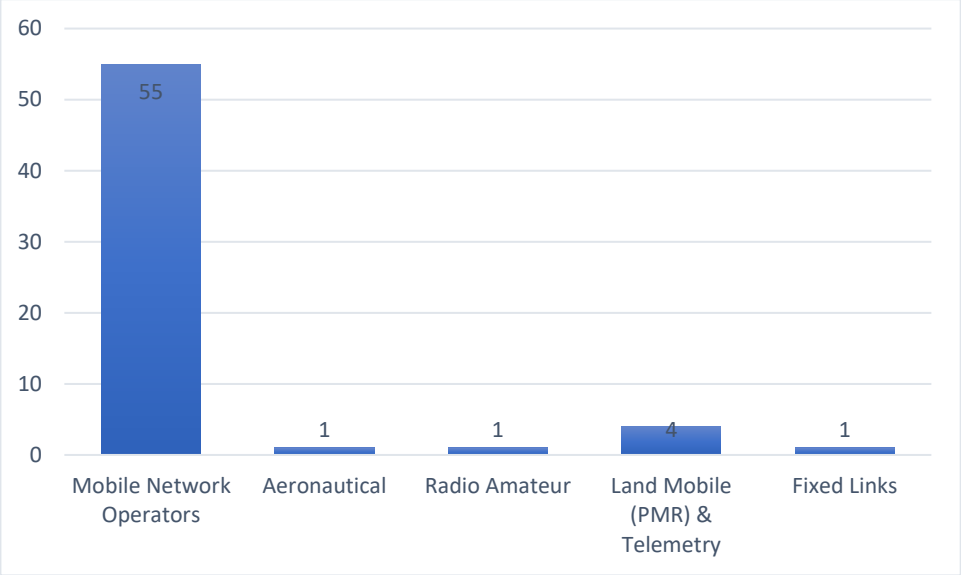

Figure 4. Harmful interference reports by service

26. Type C cases were managed by ComReg without a requirement for investigation or amount to reports of RFI that were not supported by the requisite information. ComReg received 33 Type C cases during this reporting period and Figure 5 illustrates the breadth of queries ComReg received in this reporting year.

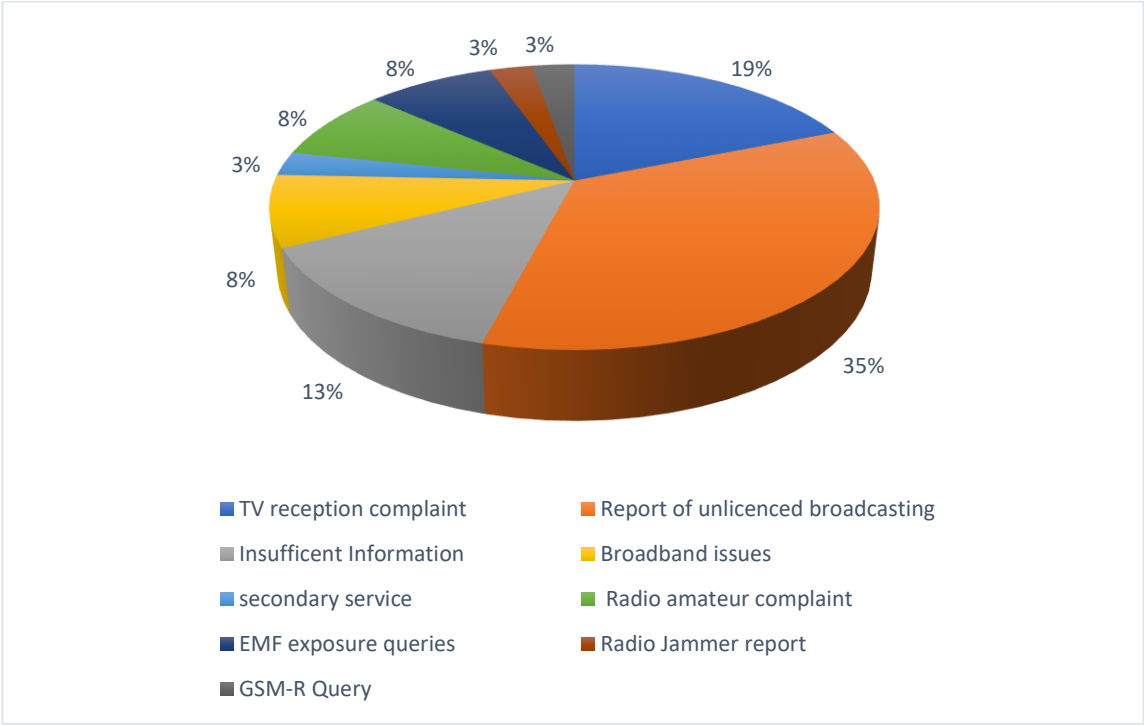

Figure 5. Types of Queries received 2020/2021

27. Of the Type B cases investigated mobile phone boosters continue to be a notable source of harmful interference to the mobile networks.

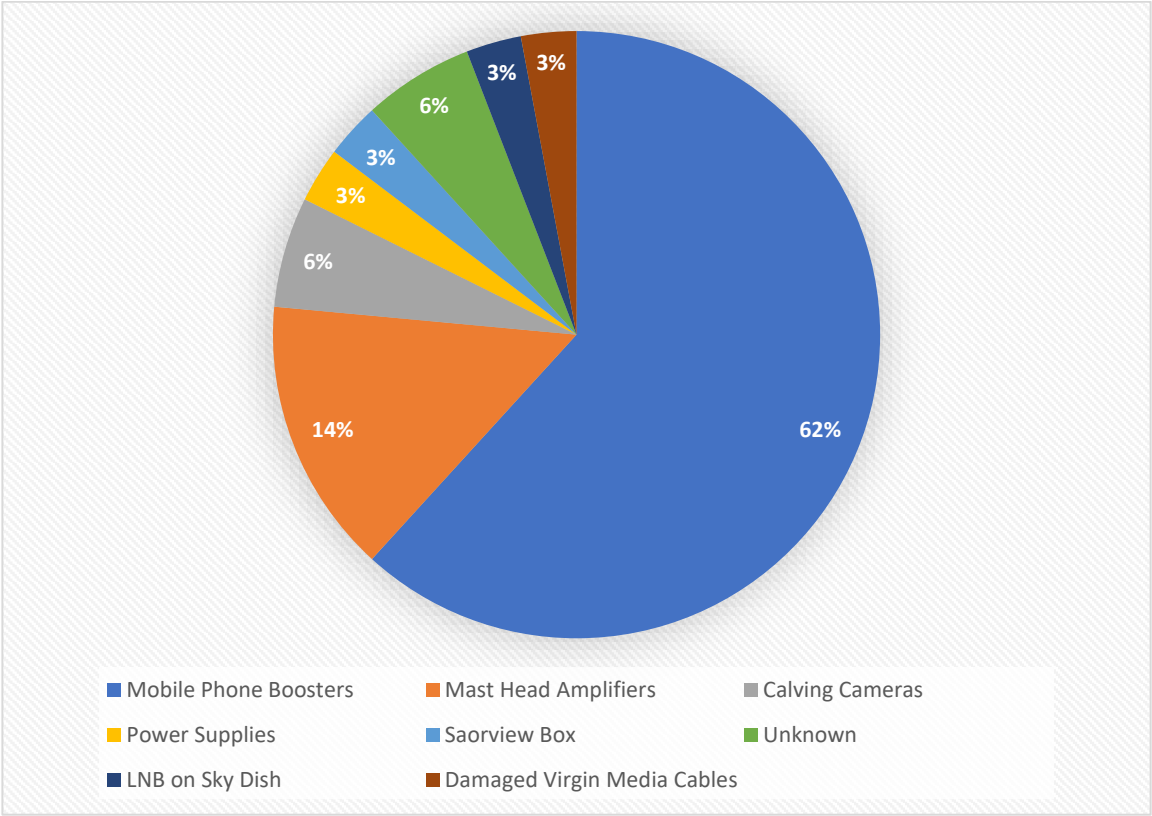

Figure 6. Harmful interference sources 2020/2021

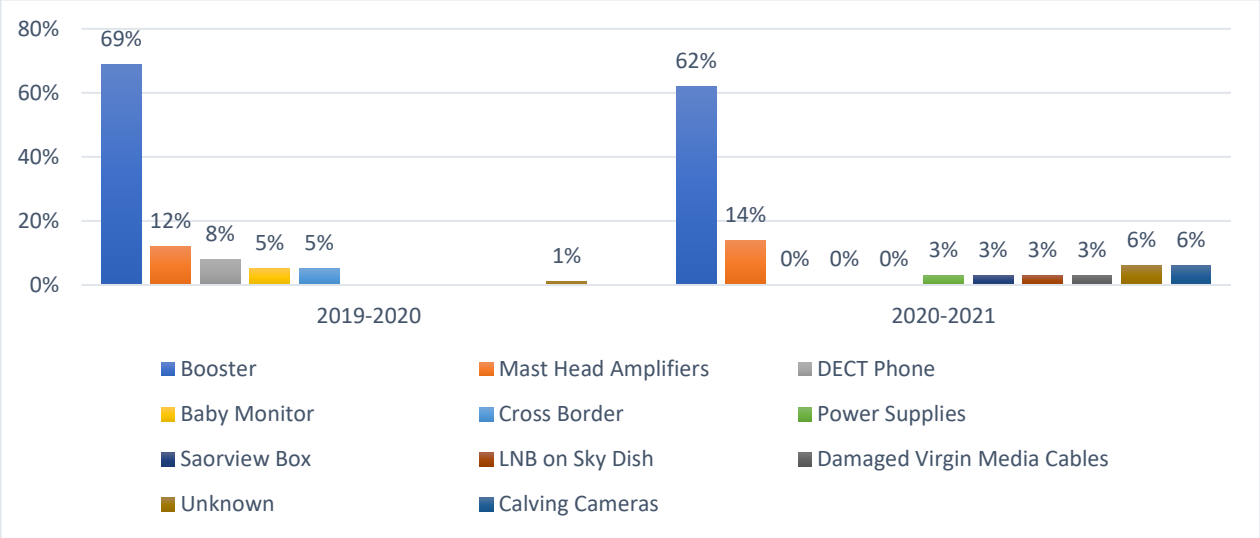

Figure 7. Harmful interference sources comparison with 2019-2020

28. ComReg observes that the RFI experience in Ireland is reflective of that elsewhere in Europe. Each year the CEPT subgroup FM22[7], which is responsible for monitoring and enforcement activities, publishes its Annual Interference Statistics Questionnaire for Reported Cases[8].

29. This report shows that in 2020 across Europe mobile networks remain the services that report most complaints of RFI as illustrated below.

[7] European Conference of Postal and Telecommunications Administrations, 'FM 22 – Monitoring & Enforcement', viewed on 11th September 2021, www.cept.org/ecc/groups/ecc/wg-fm/fm-22/client/introduction/

[8] European Conference of Postal and Telecommunications Administrations, 'Annual Radio Interference statistics and Special Interference Cases' 'FM 22 – Monitoring & Enforcement', viewed on 11th September 2021, CEPT.ORG - ECC - Groups - ECC - WG FM - FM 22 - News - Annual Radio interference statistics and Special Interference Cases

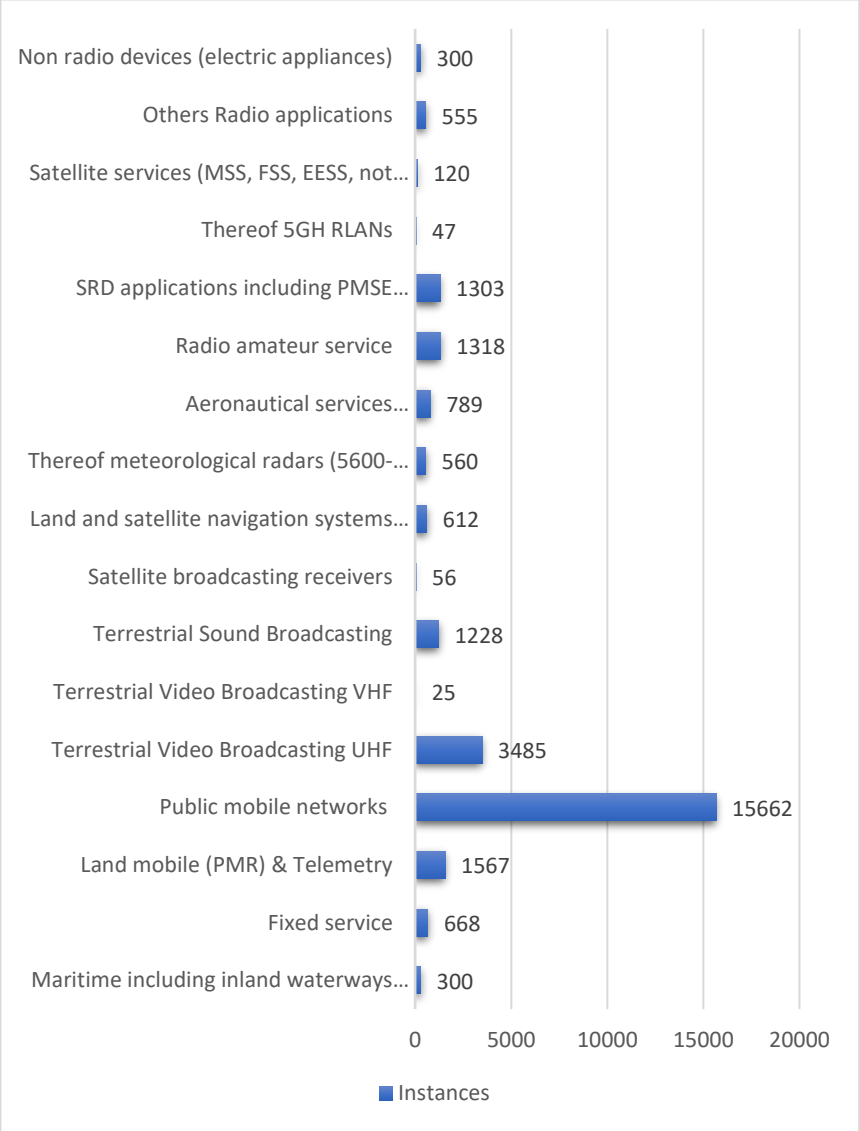

Figure 8. No of interference cases into radio services (victims) in 2020 (CEPT report)

2.3 Measures taken to prevent RFI

2.3.1 SII Operators Forum

30. Arising from the Mobile Phone Taskforce programme[9] for 2019, ComReg established a quarterly forum with providers of key electronic communications services. The forum aims to deepen engagement, increase knowledge sharing, and foster greater collaboration, by facilitating the following:

[9] Gov.ie, 'Mobile Phone and Broadband Taskforce' viewed on 11th September 2021, gov.ie - Mobile Phone and Broadband Taskforce (www.gov.ie)

- providing an opportunity to discuss and consider forward-looking topics – this will help to ensure that ComReg's Spectrum Intelligence and Investigations Unit is best prepared to ensure the continuing and effective use of the radio spectrum on a continuing basis;

- the consideration of appropriate protocols and supporting procedures for the effective reporting and subsequent investigation. as appropriate, of radio spectrum interference matters; and

- the identification, discussion, and consideration of emerging trends and issues of common interest.

31. The Forum has proved very useful and ComReg looks forward to the ongoing engagement and participation of its members. Government restrictions imposed because of the Covid-19 pandemic led to the cancelation of forum meetings scheduled for 2020/2021. However, ComReg intends to recommence meetings as soon as circumstances allow.

2.3.2 ComReg Presence at Major Events

32. Major sports and entertainment events, state visits, and other large events of a public interest rely extensively on communications, including fast broadband and public broadcasting, and those communications in turn depend on effective spectrum management. The likelihood of harmful interference arises as each event is setup and intended temporary users of the radio spectrum are installing equipment.

33. Where appropriate and warranted, SII endeavours to visit the location of a major event in the run up to its commencement, to ensure the integrity of the radio spectrum and to deal with any associated issues as may arise. In the case of certain events of national interest, SII may maintain an onsite presence during the event.

34. Due to the Covid-19 pandemic, there have been no special events over the last year that have required ComReg’s attendance. ComReg continues to monitor planned special events and carry out associated work as appropriate. ComReg will seek, where apposite, to recover costs (purely on a cost recovery basis) from organisers of special events where ComReg has had to undertake a major and enduring onsite presence.

2.4 RFI Case Studies

35. The radio environment has changed, almost beyond recognition, in recent years with the placement of an ever-growing range of wireless devices on the market utilising an ever-broader range of frequencies. This has led to far more complex RFI cases, requiring more time, increased resources, and more complex test equipment to conclude matters.

36. To provide an overview and some insight into the scope and diversity of the radio frequency interference work undertaken, ComReg has set out five case studies of RFI complaints dealt with by SII during the 2020 – 2021 period.

Case Study 1 – RFI caused by Industrial Microwave Ovens

ComReg investigated a complaint of harmful radio frequency interference (RFI) into licensed mobile services operating in the 880 – 915 MHz frequency band. This is part of the 900 MHz band, all of which is assigned to MNOs. More specifically, this is the portion of the band in which the MNO base stations are ***listening*** to transmissions from handsets.

The interfering signal has a bandwidth of approximately 5 MHz, is not aligned with the raster used by the recognised mobile technologies (UMTS, LTE or 5G NR), has a constant amplitude and no discernible modulation. This harmful interference into the receivers of the mobile base station desensitises the receivers thereby blocking consumers connected to or attempting to connect to these base stations thereby severely constraining the availability of voice and data services available to consumers served by the interfered sites.

ComReg's Radio Frequency Plan for Ireland[10], sets out the national usage of the band 880 – 915 MHz, which is paired with 925 – 960 MHz, as allocated exclusively for mobile services. The bands in question are assigned for use to the three mobile network operators.

The source of the harmful radio frequency interference was identified as emanating from a food processing plant in Co. Kildare, and within that plant identified as emitting from a large industrial microwave oven. These types of ovens are typically used in the food processing industry to temper or partially thaw frozen food on a large scale. In one instance the harmful interference was reported by a mobile network operator as affecting 2 sites

[10] ComReg, Document 20/58R2 'Radio Frequency Plan for Ireland', 18 June 2021, available at www.comreg.ie

and a total of 8 cells in an area of approximately 3 km radius of the processing plant.

In Ireland the use of industrial microwave ovens is only permitted in the frequency bands that are designated for industrial, scientific, and medical (ISM) applications. These are detailed in footnote 5.150 of Article 5 of the International Telecommunications Union (ITU) Radio Regulations – see page 312 of ComReg doc. 20/58R2. The use of the band 880 – 915 MHz is not permitted to be used for ISM.

This case was resolved by the plant operator replacing the microwave oven with alternative RF heating equipment operating in an ISM band. Since then, similar complaints have emerged, indicating that these types of ovens, operating unlawfully in the 880 – 915 MHz frequency band, may be in operation in other food processing plants. ComReg is currently engaging with the relevant stakeholders to resolve these matters.

Case Study 2 – RFI COMPLAINT FROM Amateur Station Licensee

During this reporting period ComReg dealt with a complaint of RFI from an amateur station licensee in Co. Cavan**.** The amateur station licensee reported a constant broad band interference across five high frequency (HF) bands. These five bands are allocated internationally on a primary basis for the use of the Amateur service.

According to the complainant, interference was constant, generally severe during the day and increased further after 6:00 pm each evening.

ComReg staff visited the area twice, on the first occasion (between 17:00 and 18:00 on a weekday evening). Staff conducted detailed background scans in the immediate vicinity of the complainants address on all of five bands using spectrum analysers with handheld antenna. No harmful interference was detected. On the second occasion, staff arranged to call to the complainant's address. Staff took measurements in the complainant's house looking for sources of harmful interference and connected into the complainant's antenna line to scan for interference – again no harmful interference could be detected.

While no harmful interference was detected, this case study highlights the recurring problem when attempting to identify the source of intermittent harmful interference; the interfering source must be active for it to be found. This is further complicated in the HF bands where the propagation characteristics permit local and/or distant interfering sources to be picked up.

ComReg as a statutory body with finite resources, must prioritise complaints and invariably does not have the resources that would be required to respond to every complaint of this nature.

Case Study 3 – RFI COMPLAINT from MNO IN THE 3.6 GHz Band

In this instance, ComReg received a MNO complaint of RFI on a licensed 3.6 GHz 5G network in Dublin.

The MNO reported a considerable increase in uplink interference into its 5G network, which was affecting all of its sites in Dublin, but which appeared to be centred on a specific building in Dublin 4. ComReg deployed a team to the location to investigate the continuous interference. On arriving on site ComReg staff immediately identified 3 antennas, each transmitting an unmodulated 10 MHz carrier, on three different frequencies in the complainants allocated frequency range. These three antennas and the associated equipment cabinet were badged as the property of a Fixed Wireless Operator.

Following contact, the Fixed Wireless Operator stated that the equipment had formed part of a legacy network based on WiMAX technology for which the licence had expired and, it believed it had decommissioned in 2017. It was clear however, that that power was still being supplied to the equipment and that in fact, no effort had been made to decommission this site.

Notwithstanding the waste of ComReg's limited resources in investigating this matter, this case study serves to illustrate that the possession and operation of equipment without a relevant licence is in contravention of the 1926 Wireless Telegraphy Act. Furthermore, it is also an offence under the 1926 Wireless Telegraphy Act to cause harmful interference to the operations of an Authorised Undertaking.

Besides the possession of unlicensed equipment and the causing of harmful interference ComReg has raised two issues for the Fixed Wireless Operator to address:

- To provide a full list of sites where it cannot guarantee that all equipment has been decommissioned; and
- How it intends to deal with any sites where satisfactory guarantees cannot be provided.

The Fixed Wireless Operator confirmed that there were likely to be a number of similar sites where old WiMAX equipment had been left in situ without being

decommissioned in the Dublin area and, it committed to undertake a detailed survey on each site to confirm that there were no active legacy WiMAX transmitters in operation.

In February 2021, the Fixed Wireless Operator confirmed that power to all legacy equipment had been permanently disconnected or disabled on all sites and that there was no possibility of a recurring interference incident. ComReg has received no further complaints.

Case Study 4 – RFI COMPLAINT reveals self inflicted interference

In this instance, a MNO submitted an RFI complaint in July 2020 regarding harmful radio frequency interference in the 2100 MHz Band to its network in the Thomastown area of Co. Kilkenny.

ComReg duly deployed a field team to investigate this complaint and found that the source of interference was a faulty repeater commissioned by the complainant and installed in the home of one of its executives.

While the equipment was itself compliant with the relevant legislation it had developed a fault. ComReg expressed a number of concerns to the MNO:

- The equipment in question had not been included in the appropriate schedule of its 3G licences;
- The licence conditions require, on each anniversary of the issue of the licence, that all WT apparatus installed in the preceding year be added to the equipment schedule; and
- Failure to do so is in a contravention of the 1926 Wireless Telegraphy Act.

The MNO's contractors had no knowledge of the apparatus being on its customers own network and, as such did not consider that the harmful interference could have been generated by the MNO itself.

As a consequence of being unaware of the existence of the repeater, the MNOs contractors were unable to identify the source of interference as being part of the MNO's own network. This resulted in ComReg staff expending time and resources to resolve what turned out to be a self-interference issue. In subsequent correspondence, the MNO provided a list of current repeaters

and stated that the incident in Kilkenny was an exception that was unlikely to re-occur.

However, in October 2020, the same MNO submitted a report of harmful radio frequency interference in the 900 MHz Band to its network in the Enniskerry area of Co. Wicklow. ComReg identified the source of interference as another compliant but malfunctioning repeater that had been, commissioned and installed by the same MNO.

To avoid any repetition going forward, ComReg now requires all MNOs to first rule out any of their own repeaters, within a 20km radius, as a possible source of harmful interference and confirm same before submitting an RFI complaint to ComReg.

2.5 Mobile Phone Boosters

37. As Figure 7 illustrates, illegal mobile phone boosters continue to be a significant source of harmful interference to the mobile networks accounting for c. 62% of all interference cases investigated by ComReg during this reporting year.

38. Mobile phone boosters are usually cheap amplifiers that do not have any form of intelligence and hence offer no protection to the operation of licensed mobile networks. Typically, these devices simply amplify and retransmit all signals received, thereby causing harmful interference in particular to the mobile networks. These devices are strictly illegal and may not be possessed, used, or sold anywhere in Ireland.

39. In contrast, and as detailed in the infographic in Figure 9, mobile phone repeaters, while also amplifying signals, do so in such a way as to detect the radio spectrum environment in which they operate in and take steps to prevent harmful interference to other services. More information on mobile phone repeaters is available on the ComReg website[11].

40. Encouragingly, there has been some reduction in harmful interference arising from mobile phone boosters and ComReg will monitor this trend in the coming period, taking appropriate action as necessary. Such actions may include further information campaigns to raise awareness among manufacturers, distributer, suppliers, installers, and the general public with regard to mobile phone repeaters.

[11] ComReg, 'Mobile Phone Repeaters' viewed on 11th September 2021, Mobile Phone Repeaters | Commission for Communications Regulation (comreg.ie)

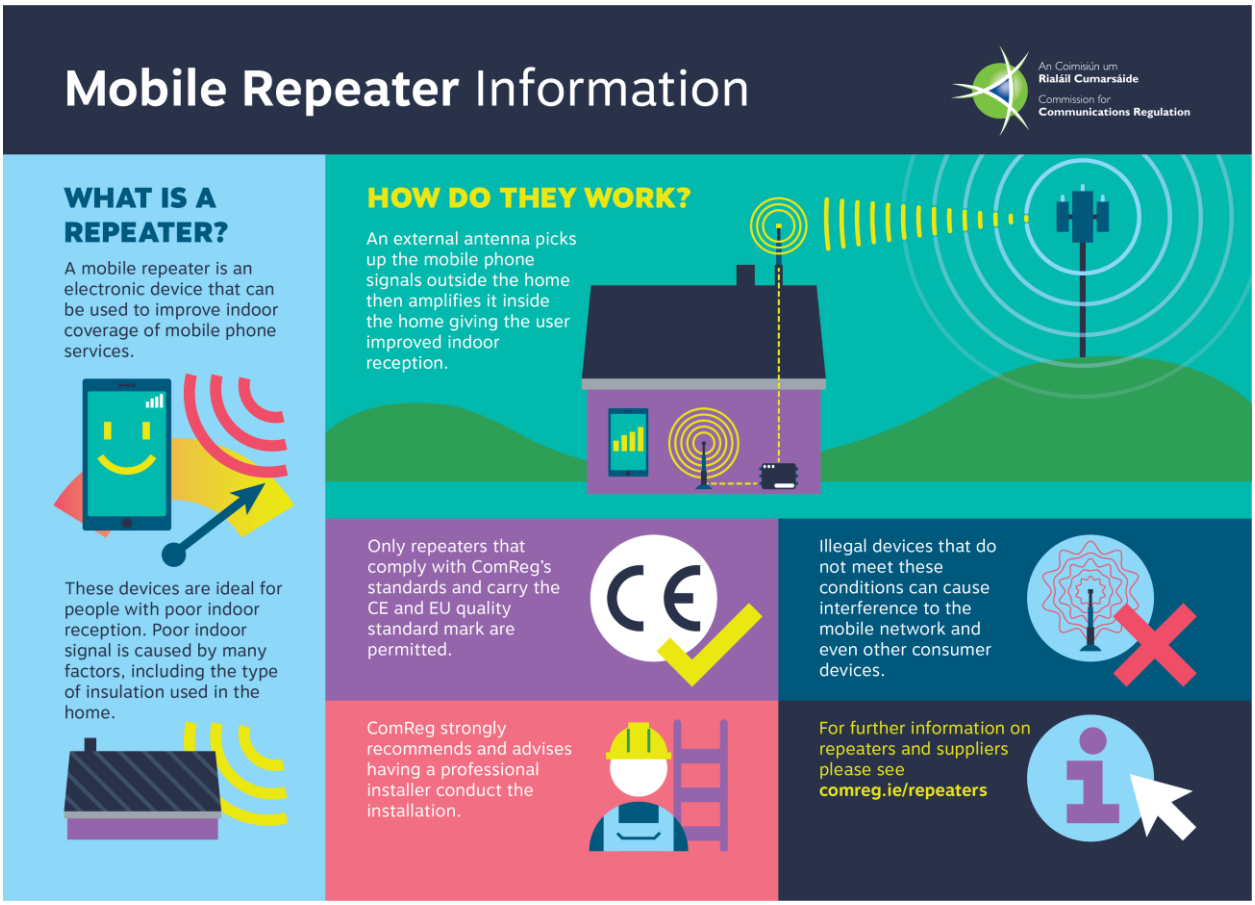

Figure 9. Mobile Repeater Infographic

41. The following case study provides some useful insight into addressing the matter of non-compliant mobile phone boosters.

Case Study 5 – RFI caused by non-compliant Mobile Phone Boosters

During this reporting period ComReg closed out two complaints of RFI received from a MNO relating to interference into its base station receivers operating in both the 800 MHz and 900 MHz bands. Subsequent investigations by Butler Technologies (ComReg's contractor) revealed four non-compliant mobile phone boosters installed at four different addresses in a particular housing estate near the affected base stations.

When contacted, residents using these mobile phone boosters were extremely co-operative, and ownership of all the non-compliant devices was renounced and handed over to ComReg's contractor. Following further enquiries as to the origins of the device's, residents revealed that all four devices had been supplied and installed by an individual resident in the same housing estate. Residents were provided with ComReg literature on compliant mobile phone repeaters and where they might purchase a fully compliant model.

ComReg staff called to the supplier of the non-compliant mobile phone boosters who confirmed that he had supplied and installed the devices to the four houses in question and in addition had also installed one in his own residence which he duly surrendered. Staff explained that these devices were illegal and that they had caused harmful interference to a MNO network.

ComReg took no further action against the four residents who did not understand the illegality of non-compliant boosters and had, on good faith, purchased and had these devices installed.

The supplier and installer of the equipment was genuinely ignorant of the problems such installations cause and was happy to confirm that he had not installed any further devices and signed an undertaking to not install or supply such devices in the future.

No further action was taken in this instance.

2.6 Update to Exemption Orders

42. In March of this year, following a review of the existing exemption orders for mobile phones[12], ComReg determined that an updated Exemption Order was required to reflect the frequency allocation, assignment and technological changes that have taken place over the last number of years.

[12] S.I 158 of 2003 – "Exemption of mobile telephones (Amendment)", 24th April 2003, available at http://www.irishstatutebook.ie/
S.I 107 of 1999 – "Exemption of DCS 1800 Mobile Terminals", 21st April 1999, available at http://www.irishstatutebook.ie/
S.I 409 of 1997 – "Exemption of mobile telephones", 1st October 1997, available at http://www.irishstatutebook.ie/

43. In particular, it was necessary to add to the list of exempted devices and equipment that is used in spectrum bands awarded by ComReg since the implementation of the current exemption orders, as well as to make provision for current and future spectrum award processes.

44. The previous exemptions were limited to Mobile Telephones[13] but there are now many other devices that access mobile networks exclusively for the provision of data services. This means that devices currently on the market that use SIM cards to access the mobile networks but are not Mobile Telephones were not encompassed by the existing exemption(s). Typically, this would include devices such as LTE routers and dongles.

45. Many such devices also use external passive antennas to improve the indoor signal reception and such devices were encompassed by the previous exemptions. However, and in order to be legally compliant, such systems could only be bought or sold in Ireland as part of an overall mobile phone repeater solution[14]. Additionally, certain antenna systems have built in SIM card routers to provide LTE broadband and these too were beyond the scope of the previous exemptions. Provided that all such devices connected to the external passive antennas are compliant with the Radio Equipment Directive (RED)[15] and the device's gain can be controlled by the Network Operator[16], ComReg deems the risk of interference from such devices to be very low.

46. Consequently, ComReg adopted a single exemption order which repealed all three previous exemption orders[17] for Mobile Telephones/Terminals and placed all the relevant requirements into a single exemption order. This exemption order includes all frequency bands allocated for electronic communications services from 700 MHz to 3.6 GHz[18].

2.7 The Year Ahead

47. In the 2021 -2022 work period, in addition to its normal programmatic work, ComReg intends to take the following actions:

- to further facilitate easier access to interference complaint reporting by making an online form available;

[13] "mobile telephone" means apparatus for wireless telegraphy capable of originating and receiving a call, being digital apparatus that stands approved under the European Communities (Radio Equipment and Telecommunications Terminal Equipment) Regulations 2001 (S.I. 240 of 2001)
[14] S.I 283 of 2018 – "Exemption of Mobile Phone Repeaters", 18th July 2021, available at http://www.irishstatutebook.ie/
[15] European Commission – Radio Equipment Directive (RED), viewed on 13th September 2021, available at https://ec.europa.eu/growth/sectors/electrical-engineering/red-directive_en
[16] A Network Operator is a company that provides its subscribers with internet and/or telecommunications services via telecommunications network
[17] S.I. 409 of 1997, S.I. 107 of 1999 & S.I. 158 of 2003,
[18] 700 MHz, 800 MHz, 900 MHz, 1400 MHz, 1800 MHz, 2100 MHz, 2.3 GHz, 2.6 GHz and 3.6 GHz.

- to monitor the instances of mobile phone boosters being the source of harmful interference to the mobile networks and to take appropriate action; and

- to engage with owners/operators/suppliers of industrial microwave ovens to remind them of their legal obligations under the Wireless Telegraphy Act and related legislation.

3 Market Surveillance

48. Market surveillance of products entering Ireland is a requirement of the EU Single Market. It refers to "*the activities carried out and measures taken by public authorities to ensure that products comply with the requirements set out in the relevant Community harmonisation legislation and do not endanger health, safety or any other aspect of public interest protection*"[19].

49. The purpose of market surveillance is to prevent non-compliant products from entering the market, in Ireland or indeed anywhere in the EU, and to seek out and remove non-compliant products which have already entered the market. Market surveillance can include actions such as product withdrawals, recalls and the application of sanctions to stop the circulation of non-compliant products and/or bringing any such products into compliance.

50. To support this principle, all products produced in, or imported into, the EU must meet certain identified and harmonised standards. This includes all devices that utilise radio spectrum. The standards which apply to such devices are of a technical and administrative nature. Their core purpose is to ensure that the integrity of the radio spectrum resource is maintained and to prevent harmful interference.

51. It is a criminal offence for a product to breach the essential requirements of the relevant product safety legislation. In addition, non-compliant products endanger a vital national resource- Ireland's radio spectrum Moreover, non-compliant products raise competition concerns and results in consumer harm: non-compliant products erode the level playing field that should exist between market players and raises costs for compliant economic operators.

52. ComReg is the designated Market Surveillance Authority in respect of two EU Directives, the Electromagnetic Compatibility Directive 2014/30/EU ("EMCD") and the Radio Equipment Directive 2014/53/EU ("RED").

53. The EMCD is transposed into Irish law by way of the European Union (Electromagnetic Compatibility) Regulations 2016 and 2017 (S.I. No. 145/2016 and 69/2017, respectively) ("EMC Regulations") and establishes a regulatory framework for placing equipment on the market by setting essential requirements for all relevant equipment.

54. The RED is transposed into Irish law by way of the European Union (Radio Equipment) Regulations 2017 (S.I. No. 248/2017) ("RE Regulations"), which

[19] European Commission – Market Surveillance for products, viewed on 13th September 2021, available at https://ec.europa.eu/growth/single-market/goods/building-blocks/market-surveillance

establishes a regulatory framework for placing radio equipment on the market (e.g. radio-frequency identification tags, and any consumer goods with radio functionality such as Bluetooth or Wi-Fi) by setting essential requirements for all radio equipment. The essential requirements as set out in Part 2 of SI. No. 248 of 2017 are as follows:

- to protect the health and safety of persons and domestic animals and to protect property and to comply (other than in relation to voltage limits) with the safety requirement of the European Union (Low Voltage Electrical Equipment) Regulations 2016;

- to have an adequate level of electromagnetic compatibility in compliance with the European Communities (Electromagnetic Compatibility) Regulations 2017 (S.I. No. 69 of 2017); and

- to both effectively use, and support the efficient use of, radio spectrum in a manner that avoids harmful interference.

55. ComReg notes that the new regulations on market surveillance and compliance of products – Regulation (EU) 2019/1020[20] have full applicability from 16 July 2021. Regulation (EU) 2019/1020 increases co-operation between Market Surveillance Authorities not only within Ireland but throughout the EU. One of the key areas of focus of the new legislation is to better facilitate cross border assistance and exchanges of intelligence. ComReg looks forward to engaging with other Market Surveillance Authorities in this regard.

56. As the designated sole Market Surveillance Authority for the RE and EMC Directives, ComReg undertakes market surveillance on products to ensure that non-compliant products are identified, tested, seized and either removed from sale or not placed on the market as the circumstances allow.

57. ComReg adopts a multi-faceted approach to its market surveillance activities. Proactive measures include close co-operation with Customs to prevent non-compliant products entering the market as well as information campaigns such as that conducted in respect of mobile phone repeaters. Reactive measures include the purchase and testing of products available for sale in store and online to assess compliance as well as responding to user queries regarding suspected non-compliant equipment.

58. To further develop its approach ComReg has recently appointed a Product Safety Manager, primarily tasked with establishing a Product Safety Unit. This

[20] Regulation (EU) 2019/1020 of the European Parliament and of the Council of 20 June 2019 on market surveillance and compliance of products and amending Directive 2004/42/EC and Regulations (EC) No 765/2008 and (EU) No 305/2011

will be a market surveillance, product compliance and enforcement unit and this area of activity is discussed in more detail in section 3.4 of this document.

59. This chapter details the progress made by ComReg in respect of its market surveillance activities during the 2020 - 2021 work period.

3.1 Proactive Interventions

3.1.1 Desktop Market Surveillance

60. Desktop market surveillance is focussed on identifying non-compliant products offered for sale via online platforms. During the 2020 – 2021 work period ComReg considerably increased its desktop market surveillance activity with consistent and strategic monitoring of all the major online platforms including Alibaba, AliExpress, Wish, eBay, Done Deal/Adverts and Amazon.

61. During this work period ComReg was provided with access to eBay's new regulatory portal, which has been created for government and regulatory agencies to report illegal, prohibited, or non-compliant items safely and efficiently to eBay. This allows ComReg to track key offenders and to enact a faster response from eBay as regards the removal of products being sold by these offenders.

62. In 2020 ComReg broadened its online platform investigation by establishing relevant contacts in Alibaba, AliExpress and Wish for reporting devices that can potentially cause interference. These new relationships have been beneficial in removing over 5,000 non-compliant products from the Irish marketplace.

63. Many of the devices were mobile phone boosters, along with non-compliant external passive antennas[21] and one wireless camera. In this reporting year, ComReg arranged to have approximately 5,089 non-compliant devices removed from online platforms compared to 58 the previous year. The majority (93%) of these actions coming from new relationships with AliBaba, AliExpress and Wish. ComReg also experienced the notable benefits of the new eBay reporting portal with 320 devices removed from the eBay website in this reporting period.

64. In recent times, the radio products removed from online platforms were exclusively mobile phone signal boosters. However, in the last year, 5% of the products removed were external passive antennas and there was one wireless

[21] External passive antennas are considered to be Radio Equipment Products and not covered by any exemptions deeming them illegal apparatus for wireless telegraphy. These have now been made licence exempt under S.I 282 of 2021.

camera removed. In June 2021, ComReg updated its licence exemptions[22] regarding Customer Premises Equipment and User Equipment. The updated exemption included external passive antennas that must be compliant with the RED to be bought and sold in Ireland.

65. Due to the increase in the number of non-compliant radio products that are available online, ComReg is striving to improve its IT capabilities including, databases, reporting features and use of web crawling software to address this.

66. Figure 10 provides details of the number of non-compliant products removed from each online platform over the last 12 months. Figure 11 provides a breakdown of the non-compliant products removed from online platforms over the last 12 months.

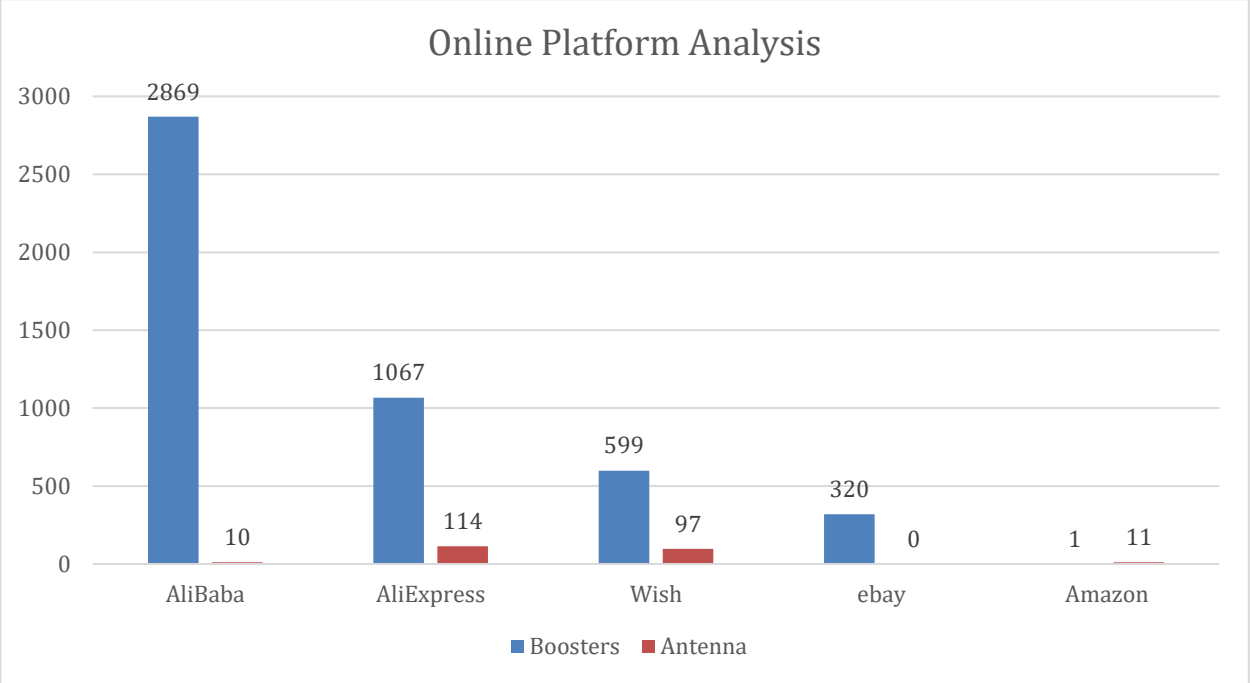

Figure 10. Online platform analysis of non-compliant devices taken down

[22] S.I. No. 282 of 2021, "Exemption of Customer Premises Equipment and User Equipment, 9th June 2021, available at http://www.irishstatutebook.ie

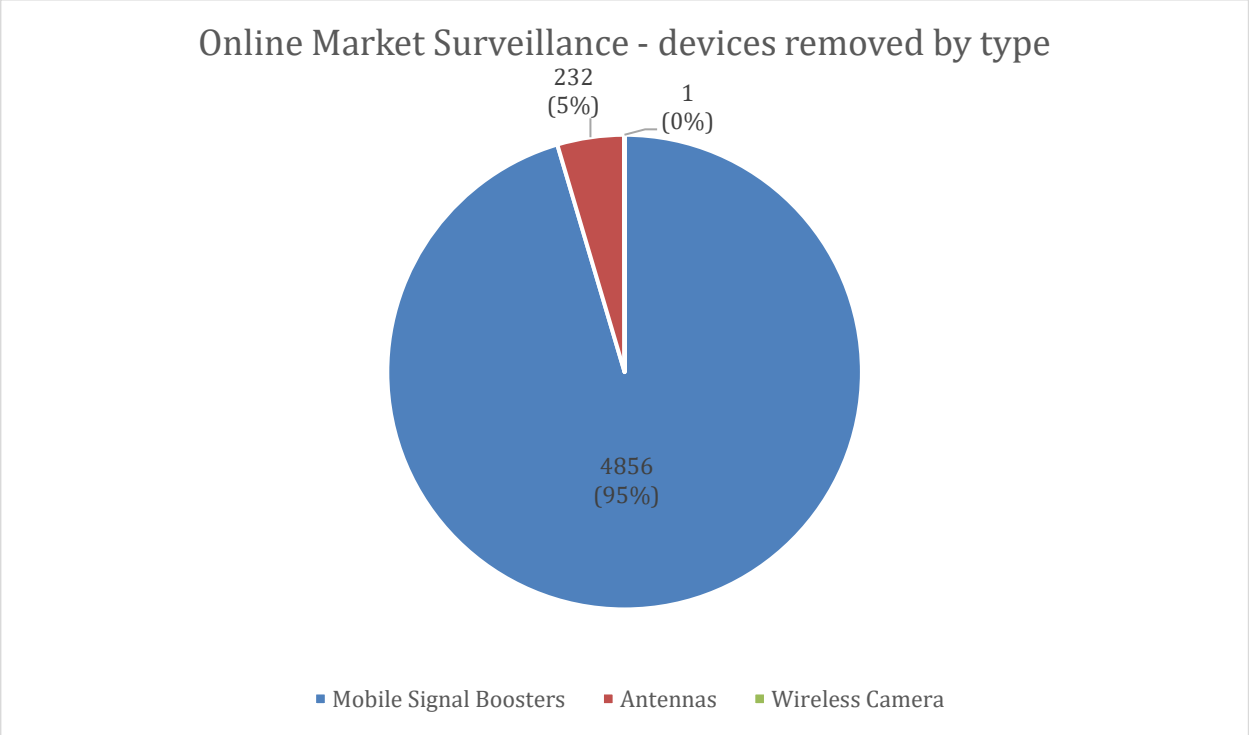

Figure 11. Analysis of devices by type removed from online platforms

67. Throughout the year, ComReg also engaged with Google, to request removal of adverts for devices that were non-compliant with the RE and EMC Regulations. Google content can include paid advertisements, search results and YouTube videos. Google provides a useful web form for authorities to request content removal. ComReg requested Google to 'disapprove' two websites selling non-compliant radio equipment from its search results and four websites whose owners had paid Google for advertising - which it did. Both approaches continue to be effective methods of preventing noncompliant products from entering the market.

68. Another method used to prevent non-compliant products from entering the market is to request the removal of websites by the Irish website domain registry authorities. This method was utilised for one website that was selling non-compliant radio equipment.

3.1.2 Engaging with Stakeholders

69. A key component of ComReg's proactive market surveillance work is maintaining existing relationships and developing new ones with relevant stakeholders.

70. To engage with and, inform stakeholders on a regular basis, a number of meetings were held during this reporting period to develop and improve our stakeholder relationships with other authorities. For example:

- ComReg staff had two meetings with key personnel in the Competition & Consumer Protection Commission (CCPC) to discuss the roles and responsibilities of each agency, possible areas of collaboration and the potential development of a formal co-operation agreement between the two agencies;

- In early 2021, ComReg staff met with Revenue/Customs staff to discuss a number of topics, including ongoing cooperation regarding non-compliant products entering the State, and the possibility of entering into a Memorandum of Understanding and Data Exchange Agreement; and

- ComReg staff met with Ofcom, the UK's communications regulator, to discuss a number of topics including the implications of Brexit and our approaches to addressing certain non-compliant products such as mobile phone signal boosters.

71. European cooperation on market surveillance takes place through informal groups of market surveillance authorities, called **Administrative Cooperation Groups (AdCos).** The members of these groups represent national authorities competent for market surveillance in a given sector. They meet several times per year to discuss market surveillance issues in their area of competence, and to ensure efficient, comprehensive, and consistent market surveillance.

72. ComReg attends and contributes to the RED and EMC AdCo meetings with market surveillance authorities of the European Economic Area ("EEA") and Switzerland. These meetings provide ComReg with an invaluable contact network and opportunity to exchange market surveillance knowledge and experience, and interpretation of legislation.

73. ComReg staff attend these meetings and, where appropriate, take part in Joint EU Market Surveillance campaigns. Campaign scope is agreed by the relevant AdCo group, i.e. RED AdCo or EMC AdCo.

74. The recently commenced 14th EMC joint market surveillance campaign will focus on targeting USB hubs for compliance assessment. This type of electrical product was proposed in the November 2020 EMC AdCo meeting and agreed by the members. USB hubs are devices that increase the number of USB devices that can attach to a computer without having to add additional hardware. There are a number of different types - they can be externally powered or draw power from the computer. The campaign commenced on the 1 July 2021. ComReg intends to participate in this campaign.

75. The Department of Enterprise, Trade and Employment chairs the quarterly National Market Surveillance Forum which brings together all market surveillance authorities in Ireland, across all sectors. This broad and diverse

forum includes ComReg in its capacity as the Market Surveillance Authority for the RED and EMCD. Matters such as statistical updates, handling procedures and forecasts from Revenue/Customs are regularly shared along with up-to-date information regarding Brexit and Regulation (EU) 2019/1020. The forum also provides the very useful opportunity to share challenges and learnings with other Market Surveillance Authorities.

3.2 Reactive Interventions

76. During its market surveillance activities, SII invariably receives intelligence from several sources regarding potential non-compliant products and where appropriate, prepares and executes a plan of action to address same.

77. ComReg continues to work closely with the Customs Division of the Office of the Revenue Commissioners ('Customs') at Dublin Airport and the Dublin Mail Centre. SII has provided training and presentations to Customs staff regarding the types of non-compliant devices to be detained for further inspection by ComReg.

78. SII maintains a good working relationship with Customs authorities who regularly provide details on potential non-compliant products being imported. The objective is to ensure that as many non-compliant devices as possible are intercepted by Customs for assessment by ComReg so as to determine their compliance or otherwise with the relevant legislation and take the appropriate action.

79. In the coming year ComReg will continue to work closely with Customs to remove as many non-compliant products from entering the Irish market as possible.

3.2.1 Statistics on non-compliant products seized

80. With reference to Figure 12 ComReg has seized a total of 2,804 non-compliant products with assistance of Customs officials since 1 July 2020, up from 695 non-compliant products the previous year.

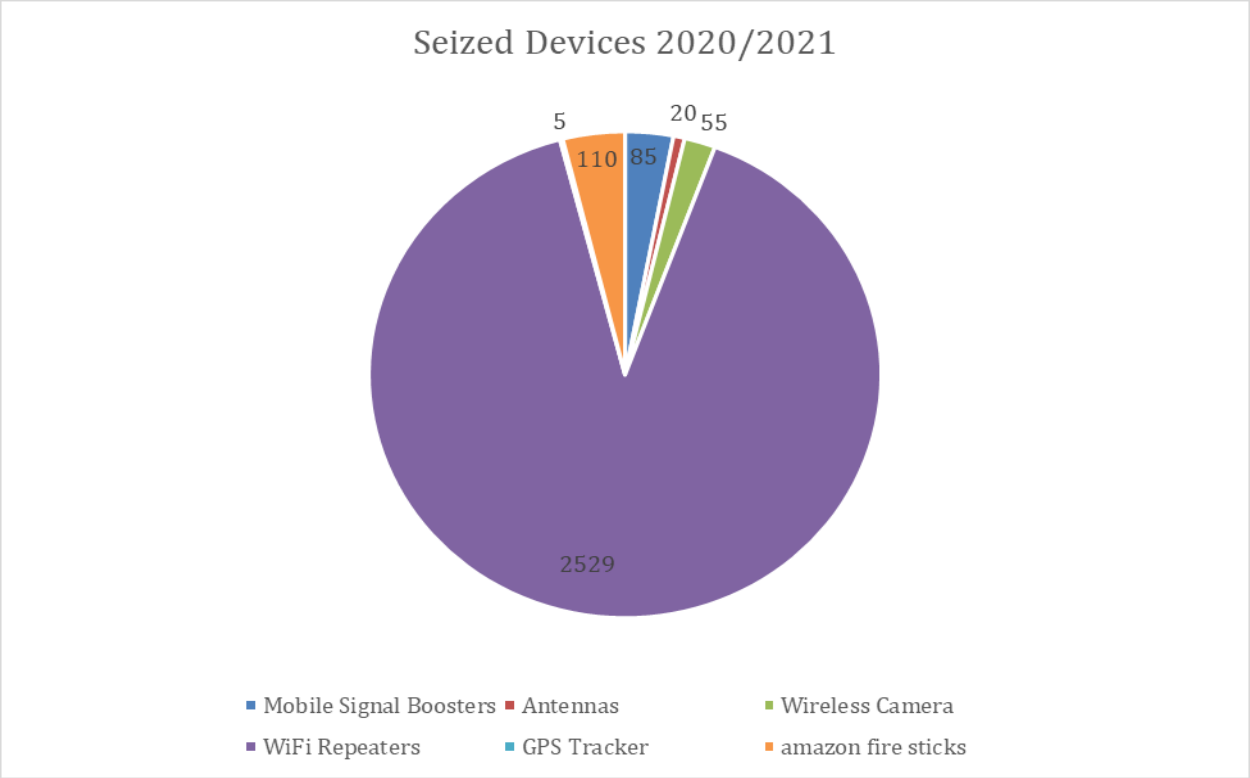

Figure 12. Breakdown of items seized with the assistance of customs (2020/2021)

81. Wi-Fi repeaters still represent the largest volume (90%) of non-compliant products entering the market with 2,529 Wi-Fi repeaters seized this year, up from 612 devices the previous year.

82. This exponential increase in the number of non-compliant Wi-Fi repeaters seized is likely as a result of the increase in home working, arising from the public health advice regarding the Covid-19 pandemic. Figure 13 shows examples of non-compliant Wi-Fi repeaters seized by ComReg.

Figure 13. Example of Non-Compliant Seized Products

83. With the growth of e-commerce, an increasing number of consumers now order cheap electronics directly from outside the EU. Often however, consumers are not aware of their obligations as importers of products – to ensure the manufacturer has completed a conformity assessment. It is clear from inspecting these products, that many have not been through conformity assessments and are therefore non-compliant with the relevant product legislation.

84. Over the last 4 years, there has been a steady increase in the number of non-compliant products seized and removed from the market by ComReg staff with the assistance of Customs. This is due to improved communication and training

between ComReg and Customs and ongoing refinement and improvement of systems used by both parties.

85. In the year under review, Customs brought ComReg's attention to several consignments with multiple products that are suspected of being non-compliant with the RE Regulations. This included large consignments of mobile phone boosters, Wi-Fi repeaters and wireless cameras, addressed to both businesses and personal addresses.

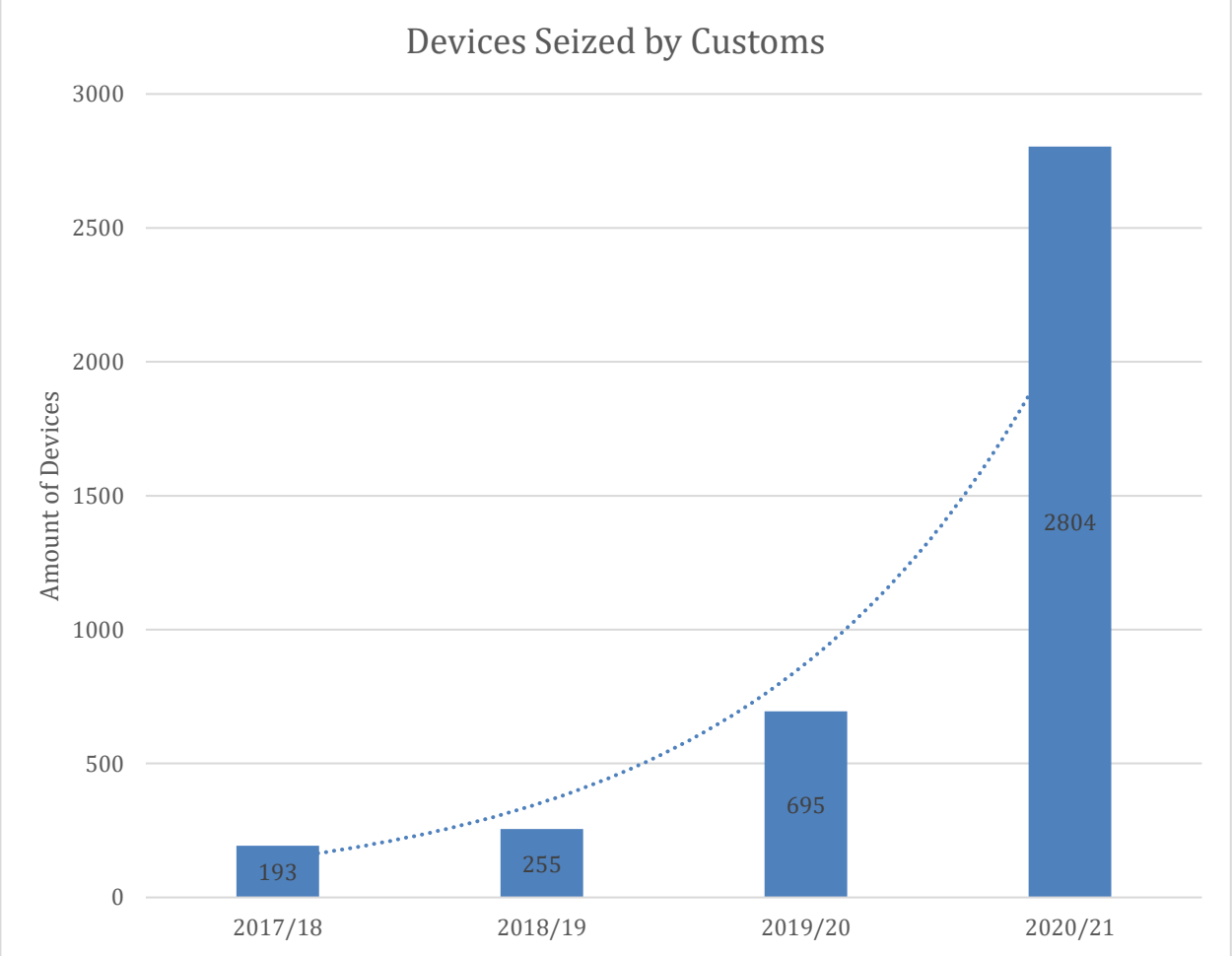

Figure 14. Total Number of devices seized by customs over the last 4 years

86. Arising from its close work with Customs, ComReg personnel investigated a number of radio devices being imported into Ireland. ComReg worked with the importer/distributors of these devices to make determinations of compliance with the RE Regulations. The details of these investigation are outlined below.

3.2.2 Examples of Customs Assistance

Mobile Phone Boosters

Customs detained 30 mobile phone boosters which were then investigated by ComReg staff. Customs personnel had been informed by ComReg in advance about mobile phone boosters – what they look like, and what to look out for in terms of initial assessments it was determined by visual inspection of the devices that they were administratively non-compliant with the RE Regulations as there was no CE marking on the product and the Declaration of Conformity ("DoC") was not included in the packaging. The devices were seized and sent for technical compliance testing under the RED. The devices failed the out of band gain limits set by ETSI standard EN 303 609, and therefore were deemed to be non-compliant with the RE Regulations.

A notice letter was sent to the distributor of these devices, outlining the administrative and technical issues with the devices and its potential breaches with the WT Act and mobile phone exemption order. ComReg informed the distributor of its responsibilities as an importer and distributor of radio products under the RED. ComReg also made clear the technical conditions set out in the exemption order that all mobile phone repeaters must comply with to be legal to use in Ireland (as discussed in Chapter 2 of this document).

Through correspondence with the distributor, it became apparent that the distributor had previously distributed other mobile phone boosters. The distributor agreed to work with ComReg to retrieve the relevant documentation for these devices. Following a review of the documentation, ComReg determined these devices to be non-compliant also. The distributor accepted these findings and signed an undertaking not to distribute or install devices that are not in compliance with the exemption order.

WiFI Repeaters

Customs authorities brought to ComReg's attention a consignment of 100 Wi-Fi repeaters. On inspection, the radio equipment was found to lack the necessary technical documentation (DoC), instructions including safety instructions, intended use, etc) and markings for compliance with the RE Regulations (CE mark).

From February 2021, ComReg engaged in correspondence with the importer. pursuant to the European Union (Radio Equipment) Regulations

2017. In April, the company agreed to renounce ownership of the equipment. The equipment was detained and destroyed by ComReg and the case closed.

Other

One consignment of 40 Wi-Fi cameras was stopped by Customs authorities and brought to ComReg's attention.

The products were found to be lacking any CE marking on the product, or manufacturer's address on either the product or the packaging. They were also lacking a DoC.

The consignee was asked to provide ComReg with a DoC and given the opportunity to rectify the non-compliance, i.e. to include the manufacturer's name and address, along with the relevant technical documentation (including the DoC) with the products but failed to do so. In May, on analysis, ComReg detained the consignment for destruction and closed the case.

3.3 Product Inspections

3.3.1 Retail Inspections

87. ComReg purchases products from retail stores including nationwide retailers, independent wholesalers, and small high-street shops. These purchases often include items that form part of a targeted campaign, for example smart plugs and powerline adaptors for home broadband in the year under review. Other items inspected were Bluetooth speakers, wireless chargers, and Wi-Fi repeaters. This is an important aspect of ComReg's market surveillance activities as it permits a physical examination of products, allowing full administrative and technical checks, where appropriate, to be undertaken.

88. This approach also provides an opportunity to engage with retailers who may not be fully aware of their obligations as importers and distributors under the RE and EMC Directives/Regulations. In addition, this interaction often informs ComReg of consumer demand for certain radio products and buying patterns and trends.

89. During this reporting period ComReg purchased several products from nationwide retailers to assess compliance with the RE Regulations. The outcome of these product assessments is detailed below.

3.3.2 Examples of Actions Taken

Department Store

A number of radio equipment products were purchased at a nationwide department store. These were a Wi-Fi repeater (2 samples), a smart plug, two different wireless speakers, a wireless phone charger and a smart watch.

These products were assessed initially for administrative compliance with the RE Regulations and found to be lacking technical documentation and names and addresses of manufacturers. Economic operators have an obligation to ensure that the manufacturer has fulfilled its obligations as set out in the RE Regulations. These include the provision of technical documentation, CE marking on the product and the name and address of the manufacturer on the product and the packaging.

All the products failed the administrative assessments as they lacked a DoC and the names and addresses of the manufacturers were not printed on the product or the packaging.

The products were all sent for technical assessments to Compliance Engineering Ireland, Ltd. Non-compliance was suspected as it appeared the manufacturer had not completed the necessary conformity assessments.

The products were all compliant with the relevant technical standards except for the Wi-Fi repeater. Products that comply with harmonised standards that have been published in the EU Official Journal enjoy a presumption of conformity with the relevant product legislation.

The standard used for testing all the products except the wireless charger was:

- ETSI EN 300 328 V.2.1.1 (2016-11) – Wideband transmission systems; Data transmission equipment operating in the 2.4 GHz ISM band and using wide band modulation techniques. Harmonised standard covering the essential requirements of Article 3.2 of Directive 2014/53/EU.

The standard used for testing the wireless charger was:

- ETSI EN 303 417 V1.1.1 (2017-09) – Wireless power transmission systems, using technology other than radio frequency beam in the 19 – 21 kHz, 59 – 61 kHz, 79 – 90 kHz, 100 – 300 kHz, 6765 – 6795 kHz

ranges; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.

At a meeting between ComReg, the department store and its suppliers, the requirements of the legislation, the failings of the products and the reasons for ComReg issuing a Direction were explained. The retailer agreed it would issue an undertaking to ComReg not to sell the product until it complies with the RE Regulations. The other products were also rectified to achieve compliance by including manufacturers' names and addresses and DoC.

Supermarket

ComReg also extended its surveillance to certain products sold by an international supermarket chain. Two products, a USB hub and a kettle were purchased and assessed for administrative compliance; both were compliant in this regard and one product (a USB hub) is currently in the process of being technically assessed.

Electrical Retailer

A number of TP-Link powerline adaptors were assessed for compliance with the Radio Equipment Regulations. The devices tested were:

- TP Link Deco AC1200
- Deco Router E4R, Serial number 2196202A00145
- Deco Extender M3W, Serial Number 2196202B00145

The standards used for testing all the products were:

- ETSI EN 300 328 V2.1.1 (2016-11) – Wideband transmission systems; Data transmission equipment operating in the 2.4 GHz ISM band and using wide band modulation techniques. Harmonised standard covering the essential requirements of Article 3.2 of Directive 2014/53/EU.
- ETSI EN 301 893 V2.1.1(2017-05) – 5 GHz RLAN; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.

The devices passed both the administrative and technical tests and were deemed to be in compliance with the RE Regulations.

3.4 Product Safety Unit

90. ComReg observes that there has been a step change increase in non-compliant products seized and withdrawn from sale both online and instore by ComReg during the last year. Furthermore, ComReg notes that Ericsson predicts that around 29 billion connected devices are forecast worldwide by 2022, of which around 18 billion will be related to the internet of things ("IoT")[23]. Scaled for Ireland, this equates to approximately 57 million devices, all of which would fall under ComReg's remit under the RE Regulations (and may also be subject to the Low Voltage Directive[24]). Consequently, ComReg considers it likely that there will be considerable increase in the number and range of products that will fall under its remit.

91. In order to ensure its preparedness to meet this expected increase in the number and range of radio products ComReg has recently commenced work on the establishment of a Product Safety Unit. This unit will be tasked with responsibility to:

- develop and drive a comprehensive risk-based product safety and national market surveillance strategy consistent with the relevant legislation;
- monitor and control the entry of relevant products into the State through engagement with relevant economic operators (e.g. manufacturers, importers, distributors and retailers) and relevant State authorities (e.g. Customs authorities, An Post etc.);
- carry out, or commission the carrying out of, product evaluations and risk assessments;
- develop and maintain relationships with relevant stakeholders such as the Competition and Consumer Protection Commission (CCPC) and other

[23] Ericsson, "Ushering In A Better Connected Future", available at https://www.ericsson.com/en/about-us/company-facts/ericsson-worldwide/india/authored-articles/ushering-in-a-better-connected-future

[24] Low Voltage Directive (LVD) 2014/35/EU on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits, available at https://ec.europa.eu/growth/sectors/electrical-engineering/lvd-directive_en

relevant authorities in Ireland and other Member States, including customs authorities, economic operators, and industry; and

- where appropriate, engage with the relevant economic operator/s (e.g. manufacturers, importers, distributors, retailers) to bring about timely and effective compliance, such as requiring corrective action, product withdrawals or product recalls etc.

3.5 Looking Ahead

92. In the coming year ComReg will, in addition to its normal programmatic activities:

- continue to conduct market surveillance to remove non-compliant products from the market;
- participate in EMC and RED Market Surveillance Campaigns;
- continue to work with the Customs to deepen our relationship and strategy regarding the seizing of non-compliant devices;
- advance the resourcing of the new Product Safety Unit; and
- work on improving its IT capabilities to tackle the increasing number of non-complaint devices coming from online platforms as discussed above.

4 Compliance & Enforcement

93. ComReg's Strategic Goal 4.2 is aimed at ensuring that compliance and enforcement activities are targeted and prioritised appropriately[25].

94. Market Framework takes a risk-based, graduated response to all its enforcement activities and the use of any legal power is dependent on the circumstance of each individual case. These activities are underpinned by robust internal processes and procedures which are reviewed and updated on an ongoing basis to ensure alignment with Goal 4.2.

95. Whenever illegal activity affecting the radio spectrum resource is identified, the SII Team in ComReg considers what compliance and enforcement actions under the Wireless Telegraphy Act 1926 are appropriate.

96. At a minimum, spectrum compliance involves checking that licensees are complying with the conditions of their respective licences.

97. Potential enforcement action arises in the event of any finding of non-compliance or unlicensed operation. Where justified, and exercised in a proportionate manner, enforcement may include the removal of unlicensed apparatus via a search and seize operation.

98. Most of this work by the SII Team is reactive in its nature (having been lessened by the proactive interventions outlined earlier in this report) and supports related activities in the areas of market surveillance, RFI investigations and spectrum monitoring.

99. ComReg's powers in exercising its compliance and enforcement function include the following:

- Seizing of non-compliant equipment;
- Verbal warnings to those carrying out or supporting illegal activities;
- Written warnings to those carrying out or supporting illegal activities;
- Regulation 25(1) under EMC mandates ComReg to inspect apparatus and fixed installations, where appropriate – see Annex 1 for details;

[25] ComReg, Document 21/70 'Electronic Communications Strategy Statement 2021-2023', 30 June 2021, available at www.comreg.ie

- Authorised Officer visits as part of an investigation to find the source of the RFI or the illegal use of the radio spectrum;
- Search warrant executions to access premises to search for and seize equipment; and
- Ultimately, criminal prosecutions to seek court mandated sanctions to compel compliance with the law.

4.1 Enforcement Activities

100. The government restrictions imposed by the Covid-19 pandemic has limited ComReg's ability to carry out several planned search and seize operations within this reporting period. Notwithstanding this, ComReg adopted a multistranded approach to its enforcement activities during this reporting period.

4.1.1 Section 7 Notices

101. Under Section 7 of the Wireless Telegraphy Act 1926, ComReg can serve a notice on a person or persons requiring a declaration to be signed stating, amongst other things, "*whether he or she does or does not keep or has or has not in his or her possession any apparatus for wireless telegraphy (other than a television set)*". It is an offence to fail or neglect to complete and give or send the declaration or make in the declaration any statement that is to your knowledge false or misleading and is liable on summary conviction to a Class D fine not exceeding €1,000.

102. ComReg has issued Section 7 notices where it had reason to believe that unlicensed FM broadcasting was taking place at a number of residential dwellings and surrounding outbuildings. During this period, ComReg issued a total of 24 Section 7 notices in respect of suspected unlicensed apparatus for Wireless Telegraphy.

103. Two of the Section 7 notices were not responded to and ultimately were escalated to search and seize operations which are discussed further below. The remaining Section 7 notices were responded to and all were found to be in compliance.

4.1.2 Section 5 Notices

104. Under Section 5 of the Broadcasting and Wireless Telegraphy Act 1988, it is an offence to advertise on an unlicensed radio station.

105. A total number of 21 letters were sent to advertisers who were advertising on unlicensed FM broadcasting stations.

106. The purpose of these letters is to ensure that the advertiser is aware that the station on which the advertisement has been placed is unlicensed, and the advertiser may, as a consequence be liable for prosecution.

107. In the majority of cases, advertisers were unaware that they were advertising on unlicensed broadcasting stations and informed ComReg that they had ceased the advertising forthwith on foot of the receipt of a Section 5 notice from ComReg.

108. In a number of the cases, advertising that had been placed on a number of websites run by unlicensed broadcasters had also been removed subsequent to the Section 5 notices being issued.

4.1.3 Search and Seize Operations

Over the past year ComReg, following assistance from Ofcom[26], the U.K. communications regulator, carried out two search and seize cases in Counties Louth and Donegal.

In each case an illegal FM broadcast was transmitting over the border into Northern Ireland but had its base station situated in the Republic of Ireland.

Figure 15 provides an example of one unlicensed transmitter site investigated by ComReg. These types of structures are often poorly installed.

In each case Ofcom and ComReg worked closely together to bring about an end to the harmful interference to services in Northern Ireland, which were emanating from the Republic of Ireland.

In March 2021, Comreg carried out a search and seize operation on an unlicensed broadcast in Cork. The broadcast was emanating from within a flight restricted zone close to Cork airport. The unlicensed broadcast had been the source of harmful interference to IAA communications operating within Cork Airport.

[26] www.ofcom.org.uk

In this case the transmit frequency of the unlicensed broadcast was mixing with the transmit frequencies of two commercial stations causing intermodulation distortion which resulted in a spurious signal appearing on one of the emergency frequencies in the air traffic control band at Cork airport.

Figure 16 provides an example of a home-made FM transmitter. Often these transmitters are poorly made and are not fit for purpose.

Figure 15. Unlicensed transmitter site

Figure 16. Home-made transmitter

109. Additionally, ComReg has two criminal prosecution cases pending involving unlicensed FM broadcasts. In both cases a search and seize operation was conducted on property where unlicensed apparatus for wireless telegraphy were found transmitting without a licence. Covid-19 restrictions have delayed the hearing of both cases, but ComReg is committed to pursuing its prosecutions in respect of these cases, and any similar cases that may arise.

4.2 Non-Ionising Radiation (NIR) Surveys

110. Licensees with a Wireless Telegraphy Licence and those operating under a General Authorisation[27] for the provision of an electronic communications networks and/or services must ensure that public exposure to non-ionising radiation (NIR) emissions from transmitters are within the limits set by the International Commission on Non-Ionising Radiation Protection (ICNIRP)[28], as endorsed by the World Health Organisation (WHO), the European Commission and the Environmental Protection Agency (EPA).

[27] ComReg, Document 03/81R6 "General Authorisation for the Provision of Electronic Communications Networks and Services", 1st June 2018, available at www.comreg.ie
[28] www.icnirp.org

111. Each year ComReg measures NIR levels in public areas at circa 80 different sites, located throughout Ireland. These are chosen based on demographic and geographic factors. In this reporting period, 80 sites were surveyed. ComReg publishes quarterly reports on the NIR site surveys[29].

112. To date, over 1600 sites have been surveyed and NIR levels at all sites have been found, without exception, to fall well below the international limits for public exposure set by ICNIRP.

113. ComReg has revised the methodologies by which it conducts NIR surveys to take account of the new ICNIRP guidelines published in 2020. The revised methodologies were published in ComReg Document 08/51R4[30].

114. ComReg makes all its NIR measurement reports available online at: www.comreg.ie/nir-reports-2/ and viewable on its map at www.siteviewer.ie

115. Further information regarding NIR, ComReg's role in relation to NIR, along with information on the roles of other public bodies, can be found on ComReg's website[31].

4.3 Looking Ahead

116. In the coming year ComReg will:

- continue to monitor and maintain the integrity of the radio spectrum regarding the illegal use of radio stations broadcasting in AM, MW, FM and DAB and take enforcement action as appropriate; and
- Continue to conduct NIR surveys at circa 80 sites.

[29] ComReg, Document 20/34 "2020 Programme of Measurement of Non-Ionising Radiation – First Interim Report", 14th May 2020, available at www.comreg.ie
ComReg, Document 20/92 "2020 Programme of Measurement of Non-Ionising Radiation – Second Interim Report", 30th September 2020, available at www.comreg.ie
ComReg, Document 20/126 "2020 Programme of Measurement of Non-Ionising Radiation – Third Interim Report", 18th December 2020, available at www.comreg.ie
ComReg, Document 21/26 "2020 Programme of Measurement of Non-Ionising Radiation – Fourth Interim Report", 26th March 2021, available at www.comreg.ie
[30] ComReg, Document 08/51R4 "Programme of Measurement of Non-Ionising Radiation: Methodology for the Conduct of Surveys to Measure Non-Ionising Radiation from Transmission Sites", 25th September 2020, available at www.comreg.ie
[31] https://www.comreg.ie/industry/radio-spectrum/site-viewer/non-ionising-radiation-information/

5 Radio Spectrum Monitoring

117. Radio spectrum monitoring serves as the eyes and ears of spectrum management and is necessary because authorising the use of the radio spectrum resource of itself does not ensure that it is being used as intended.

118. Any discrepancy in use may be due to several factors including the complexity of the equipment, interaction with other equipment, a malfunction of equipment, or, on occasion, deliberate misuse. This problem can be further exacerbated due to the accelerating proliferation of terrestrial wireless and satellite systems and of equipment that may cause harmful interference. A spectrum monitoring system provides a method of verification and “closes the loop” on the spectrum management process.

119. The purpose of spectrum monitoring is to support the spectrum management process in general, including frequency assignment and spectrum planning functions. Specifically, the goals of monitoring are to:

- assist in the resolution of electromagnetic spectrum interference, so that radio services and stations may coexist, reducing and minimizing the resources associated with installing and operating these telecommunication services while providing economic benefit to the spectrum users through access to interference- free telecommunication services;

- provide valuable data for the spectrum management process in respect of the actual use of frequencies and bands (e.g., channel occupancy and band congestion), verification of proper technical and operational characteristics of transmitted signals (licence compliance), detection and identification of illegal transmitters and potential interferers, and the generation and verification of frequency records;

- gather intelligence in relation to unlawful spectrum usage; and

- certify the proper technical and operational characteristics of transmitted signals i.e. assists in the assessment of compliance with conditions of the rights of use of the radio spectrum resource.

120. The task of radio spectrum monitoring is complementary to, and supportive of, other aspects of spectrum management including, Radio Frequency Investigations (RFI).

121. In 2008 ComReg established a network of remote radio spectrum monitoring nodes strategically located in key urban areas throughout the State. This enables ComReg to conduct proactive monitoring of the radio spectrum.

However, this remote monitoring network has reached end of life. ComReg expects to advance the tendering for a new replacement network during the coming work year.

122. It is anticipated that this may consist of both fixed and mobile monitoring nodes which would enable ComReg to monitor the radio spectrum from 10 kHz up to 6 GHz in strategically important locations such as the airports. Additionally, ComReg could deploy mobile monitoring stations to locations where there is a short-term requirement for monitoring the radio spectrum such as in support of Head of State visits to Ireland or to monitor intermittent instances of harmful interference to ECS/ECN.

123. During the period under review ComReg focused its spectrum monitoring activities on the harmful interference caused by non-compliant RLANs operating in the 5.8 GHz frequency band to the Met Eireann weather radars at Dublin and Shannon airports which is discussed further below.

5.1 Activities this year

5.1.1 5GHz RLAN interference to Meteorological Radars

124. A radio local access network (RLAN), or wireless access system (WAS) is a radio access system used to provide wireless access to the internet. This can be an access point at home, to have wireless access to a broadband connection. It can also be an access point at a hotspot, such as an airport lounge or a cafe, and it is often used in data transfer for CCTV applications.

125. The 2003 World Radio Conference (WRC) allocated the 5 150 MHz-5 350 MHz and 5 470 MHz – 5 725 MHz frequency band (referred to as the 5GHz band) on a secondary basis[32] to the RLANs, WAS and High-Speed Radio LAN (HIPERLAN) on a secondary basis in Europe.

126. The 5 470 – 5 570 MHz portion of the band is also allocated for use by meteorological radars on a secondary basis. RLANs are obliged to utilise Dynamic Frequency Selection (DFS) and Transmitter Power Control (TPC) to prevent harmful interference to meteorological radars. The technical conditions for RLAN use are set out in ComReg document 02/71R[33] and are as follows:

- The 5.15 - 5.35 GHz frequency band is for indoor use only. DFS and TPC must be enabled;

[32] Secondary basis means the service cannot cause interference to other services or claim protection from interference by other services.
[33] https://www.comreg.ie/media/2021/07/ComReg02_71-R13-1.pdf

- The 5.470 – 5.725 GHz –frequency band is for outdoor only. DFS and TPC must be enabled and adequately working.

- Users in the 5.725 – 5.875 GHz portion of the band should endeavour to implement adequate spectrum sharing mechanisms. Users in this band are required to register[34] with ComReg and obtain a general authorization for use.

127. RLANs are also required to comply with obligations of the RED, and it is an offence under the RED to disable the DFS and TPC capability of an RLAN.

128. In Ireland MET Eireann operate two meteorological radars in the 5 470 – 5 570 GHz frequency band, one in Dublin and one in Shannon (see Figure17), that are used for weather forecasting purposes.

129. Harmful interference to meteorological radars caused by non-compliant RLANs operating in the 5 GHz band is a Europe wide issue that is being addressed by CEPT and AdCo RED. The non-compliance generally arises when RLAN operators disable the DFS and TPC modes of the RLAN equipment to enable them to access additional channels of operation or to increase the power and thereby the range of operation of their equipment. Consequently, the RLAN equipment can be detected by meteorological radars often tens of kilometres away. This can result in the radar being overpowered by the RLAN signal such that it cannot detect the weather conditions.

130. To mitigate the impact of the harmful interference from RLANs MET Eireann must apply filtering to its radars which reduces the sensitivity of the radars and consequently the accuracy of the forecasting ability of the radars.

131. During the 2020 – 2021 work period ComReg staff engaged extensively with MET Eireann to identify how both parties can co-operate to address the on-going harmful interference issues arising from non-compliant RLAN equipment adversely affecting the radars at both Shannon and Dublin airports.

132. A methodology for the identification of non-compliant RLAN equipment was agreed by both parties (and is discussed further at Annex 2). The first trial of the methodology took place at the Shannon radar where the level of harmful interference is less than at the Dublin radar and as such the probability of identifying and locating an interferer was considered greater.

[34] https://www.comreg.ie/industry/licensing/5-8-ghz-registration/

Figure 17. Met Radar at Shannon Airport

5.1.2 Working with Met Eireann

133. To date 15-20 RLANs that were causing harmful interference to the radars at Dublin and Shannon airports have been removed with a consequent improvement in the operation of the radars.

134. This is good example of the benefits of close co-operation between two public bodies and how long-standing issues can be tackled with tangible improvements achieved in a reasonably short space of time.

5.1.3 Working with WISPS

135. In parallel to developing the methodology for the identification and removal of non-compliant RLANs, ComReg has engaged with wireless internet service providers ("WISP") and their industry representatives to raise awareness of the requirements for the use of RLAN in Ireland and the impact that non-compliant RLAN equipment has on met radars.

136. ComReg has produced an infographic, as shown in Figure 18 below, which sets out the technical conditions attached to the operation of 5 GHz RLANs in Ireland. In addition, ComReg has compiled a mailing list of all WISPs authorised to provide services in Ireland. ComReg uses this mailing list to remind service providers of their obligations, provide details of RLANs found to be causing harmful interference to meteorological radars and require service providers to confirm to ComReg that they have checked equipment to ensure that it is operating correctly.

137. As a result of the engagement with Met Eireann and the WISPs it has come to ComReg's attention that the 5 GHz band is also extensively used by CCTV companies and WISPs for data transfer.

138. ComReg plans to engage with the Private Security Authority ("PSA")[35] with a view to further how it might educate and make users aware of their obligations.

[35] The Private Security Authority (PSA) is the statutory body with responsibility for licensing and regulating the private security industry in Ireland. The PSA is an independent body under the aegis of the Department of Justice. See https://www.psa-gov.ie/

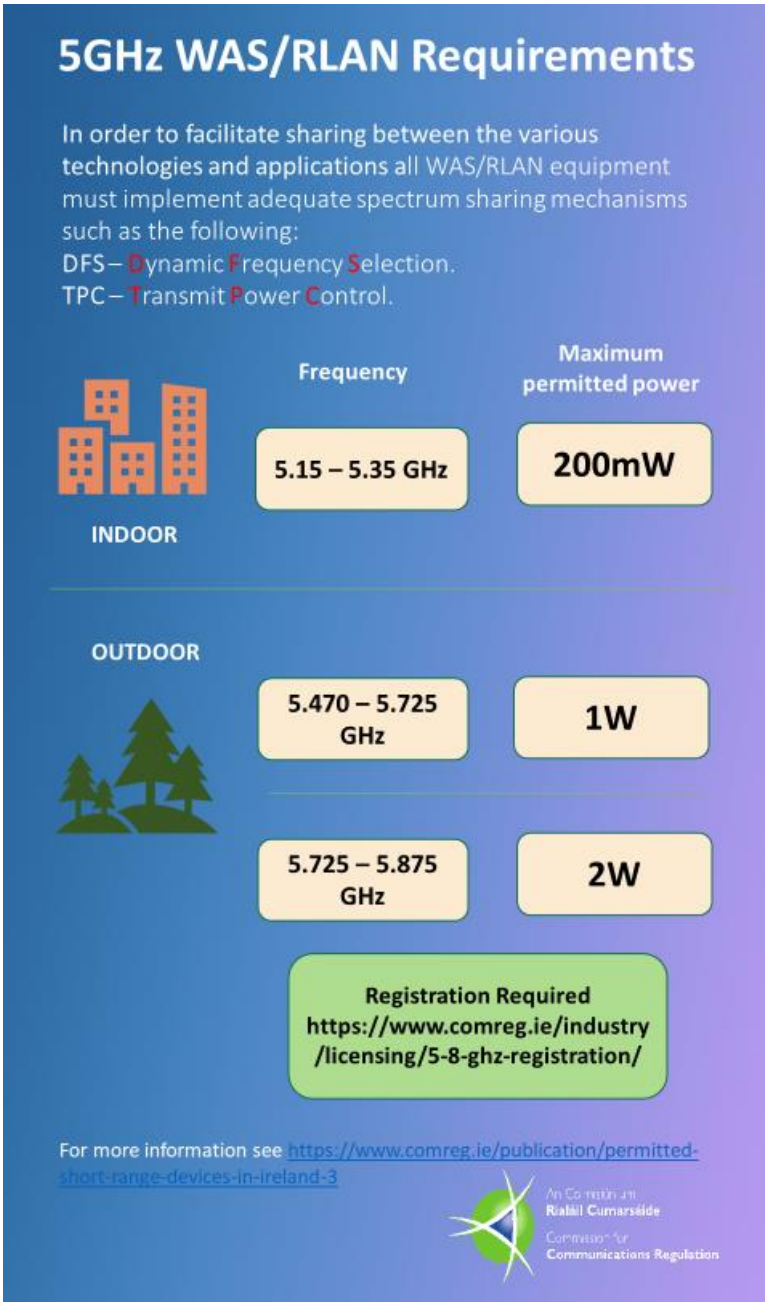

Figure 18. Infographic of RLAN technical requirements

5.2 Radio Frequency Monitoring Network

139. As set out in Chapters 2 and 4 above, ComReg is responsible for investigating complaints of radio interference to licensed users of the radio spectrum, and for enforcing the wireless telegraphy legislation where appropriate.

140. In order to investigate cases of interference to licensed spectrum and to facilitate spectrum occupancy analysis, ComReg's SII Unit has a Legacy Spectrum Monitoring Network (LSMN) based on fifteen fixed receivers in strategic locations in Ireland. The LSMN has reached end of life and ComReg

intends to shortly tender for a replacement modern Radio Frequency Monitoring Network (“RFMN”).

141. The new RFMN is expected to comprise of five fixed remote monitoring stations deployed at critical locations such as airports and three mobile vehicle mounted monitoring stations, all stations would be controlled by a management suite of software.

142. This new RFMN would bring about many benefits, including:

- it would greatly reduce the time to locate single source emitters for SII engineers and offer enhanced features to monitor and analyse radio spectrum;
- it would have the ability to analyse AM/FM signals in accordance with ITU recommendations in real time, including the ability to record and demodulate other digital signals;
- each monitoring station would have the capability for direction finding and geo-location of signals from 20MHz-6GHz;
- each monitoring station would be capable of monitoring signals from 10GHz-6GHz; and
- remote and fixed stations would interconnect over the internet, thus enhancing the capabilities of tracing any signal of interest

5.3 Looking ahead

143. ComReg is planning to undertake the following actions relating to spectrum monitoring in the next year:

- Following the completion of its public tender, begin the process of replacing the existing end of life National Monitoring Network. It is expected that the new network would be made up of both fixed and mobile monitoring stations and its implementation would be a multi-year project;
- Continue to work with Met Eireann and the relevant industry stakeholders to identify and remove non-compliant equipment causing harmful interference to meteorological radars; and
- Assess the use, both legally and illegally (if any), of the 700 MHz, the 2.3 GHz and the 2.6 GHz bands. These three bands are scheduled for release as part of ComReg's proposed Multi Band Spectrum Award ("MBSA2")[36].

[36] www.comreg.ie/industry/radio-spectrum/spectrum-awards/proposed-multi-band-spectrum-award/

Annex: 1 Legal Framework Relevant to Spectrum Intelligence & Investigations (SII)

A 1.1 The core statutory functions of the Commission for Communications Regulation ("ComReg") are set out in section 10 of the Communications Regulation Act 2002, as amended ("2002 Act")[37] while its objectives, in the exercise of those functions, are set out in section 12 of the 2002 Act and in Regulation 16 of the Framework Regulations 2011.[38] ComReg functions under the 2002 Act that are particularly relevant to this report include the following:

(a) to ensure compliance by undertakings with obligations in relation to the supply of and access to electronic communications services, electronic communications networks and associated facilities and the transmission of such services on such networks …

(b) to manage the radio frequency spectrum and the national numbering resource …

(d) to carry out investigations into matters relating to—

(i) the supply of, and access to, electronic communications services, electronic communications networks and associated facilities and the transmissions of such services on such networks …

(e) to ensure compliance, as appropriate, by persons in relation to the placing on the market of communications equipment and the placing on the market and putting into service of radio equipment.

A 1.2 ComReg's relevant objectives in exercising those functions are, in summary, to promote competition, to contribute to the development of the internal market, to promote the interests of users within the Community, and to ensure the efficient management and use of the radio frequency spectrum and numbers. Section 12 of the 2002 Act expands upon each of these objectives and section 12(2a) sets out various reasonable measures that ComReg shall take to achieve its objectives. In addition, Regulation 16(2) of the Framework Regulations 2011 requires ComReg, in pursuit of its objectives, to apply objective, transparent, non-discriminatory and proportionate regulatory principles and describes various means by which ComReg may apply those principles.

[37] COMMUNICATIONS REGULATION ACT 2002 (lawreform.ie)
[38] European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011 (S.I. 333/2011) transposing Directive 2002/21/EC

A 1.3 ComReg is also the designated surveillance and enforcement authority in the State in respect of the following legislation:

- European Union (Radio Equipment) Regulations 2017[39] ("RE Regulations")
- European Communities (Electromagnetic Compatibility) Regulations 2016 and European Communities (Electromagnetic Compatibility) Regulations 2017[40] (together the "EMC Regulations"

A 1.4 ComReg is the authority charged with the authorisation of wireless telegraphy equipment in Ireland for the purposes of the Wireless Telegraphy Act 1926, as amended ("1926 Act").

A 1.5 ComReg recognises that the current European Common Regulatory Framework for electronic communication networks and services will be superseded in due course by the European Electronic Communications Code[41] ("EECC"), as transposed into Irish law. Among other things, the EECC will consolidate, update and replace the various directives under the existing framework (i.e. the Framework, Authorisation, Access and Universal Service directives). The EECC entered into force on 20 December 2018. The Department of the Environment, Climate and Communications ("DECC") is in the process of transposing the EECC into Irish law, and ComReg is assisting DECC as appropriate.

Wireless Telegraphy Act 1926, as amended

A 1.6 The 1926 Act requires a person to hold a valid licence in order to possess or use, anywhere in the State, any type of "apparatus for wireless telegraphy", as defined therein. Such licences are granted by ComReg on foot of regulations made by ComReg pursuant to section 5 and 6 of the 1926 Act.[42] A wireless telegraphy licence is also the legal instrument for assigning right of use for radio frequencies to authorised undertakings who apply for the same, in accordance with applicable provisions of the Framework Regulations 2011 and Authorisation Regulations 2011[43]. Amongst other things, a licence sets out the specific radio frequencies that the licensee may use and attaches conditions to the use of those frequencies, subject to list of possible conditions set out in Part B of the Schedule to the Authorisation Regulations 2011.

A 1.7 ComReg has the power to declare, by order, a class or description of apparatus for wireless telegraphy to be exempt from the requirement to hold a licence.

[39] S.I. 248/2017, transposing Directive 2014/53/EU
[40] S.I. 145/2016 and S.I. 69/2017, both transposing Directive 2014/30/EU
[41] Directive (EU) 2018/1972 of the European Parliament and of the Council of 11th December 2018 establishing the European Electronic Communications Code.
[42] Subject to the required consent of the Minister under section 37 of the 2002 Act.
[43] European Communities (Electronic Communications Networks and Services) (Authorisation) Regulations 2011 (S.I. 335/2011) transposing Directive 2002/20/EC
European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011 (S.I. 333/2011) transposing Directive 2002/21/EC

A 1.8 The 1926 Act makes it an offence to interfere, deliberately or otherwise, with lawful wireless telegraphy and ComReg's investigatory powers include the power to enter and search premises, if necessary by force, with a warrant granted by a Judge of the District Court.

European Union (Radio Equipment) Regulations 2017

A 1.9 The RE Regulations define "radio equipment"[44] and Regulation 4 requires all radio equipment to comply with the following "essential requirements":

(a) to protect the health and safety of persons and domestic animals and to protect property and so to comply (other than in relation to voltage limits) with the safety requirements of the European Union (Low Voltage Electrical Equipment) Regulations 2016;

(b) to have an adequate level of electromagnetic compatibility in compliance with the European Communities (Electromagnetic Compatibility) Regulations 2017 (S.I. No. 69 of 2017);

(c) to both effectively use, and support the efficient use of, radio spectrum in a manner that avoids harmful interference.

A 1.10 The essential requirements apply to all relevant undertakings in the chain for the manufacture and supply of radio equipment. The RE Regulations define "manufacturer", "importer", and "distributor". Hence a manufacturer must build radio equipment to required standards. Before placing radio equipment on the market, the manufacturer of the equipment shall, for example, draw up the EU declaration of conformity and affix the CE marking.[45] Importers and distributors, in turn, must ensure that such equipment complies with the relevant standards set out under the RE Regulations.

A 1.11 Regulation 30 of the RE Regulations designates ComReg as the market surveillance authority in the State for the purposes of market surveillance, compliance and enforcement under the RE Regulations and RE Directive.

A 1.12 Regulation 31 provides that where ComReg, as the market surveillance authority, has sufficient reason to believe that any radio equipment presents a risk to health and/or safety then ComReg shall, without delay, evaluate that equipment in respect of all relevant requirements of the RE Regulations. The economic operator (i.e. manufacturer, importer, or distributor) concerned must co-operate with any such evaluation. Where ComReg finds that radio equipment does not comply in

[44] Defined therein as "*an electrical or electronic product, which intentionally emits or receives radio waves for the purpose of radio communication or radiodetermination, or an electrical or electronic product which must be completed with an accessory, such as antenna, so as to intentionally emit or receive radio waves for the purpose of radio communication or radiodetermination.*"

[45] "CE marking" under the Regulations means a marking by which a manufacturer indicates that the radio equipment is in conformity with the applicable requirements set out in Union harmonisation legislation providing for its affixing. The "EU declaration of conformity" under the Regulations means a declaration of conformity drawn up in accordance with the requirements of Regulation 17.

all respects, it shall notify the economic operator concerned. Where ComReg believes that action is required to prevent a risk to health or safety, it may direct the economic operator concerned, within a period specified, to do any of the following: take all appropriate corrective action to bring the equipment into compliance; withdraw the equipment from the market; or recall equipment already placed on the market. Such a direction must be complied with by the economic operator concerned. Where ComReg is of the opinion that urgent action is required because of public health or safety requirements it may issue an urgent direction without advance notice.

A 1.13 Regulation 39 empowers ComReg, in its capacity as market surveillance authority, to carry out inspections of radio equipment, where appropriate, on its entry into the State (where the State is the equipment's point of entry into the EU), or at any site in the State where radio equipment is stored or manufactured. ComReg shall also perform appropriate surveillance of radio equipment made available on the Irish market or put into service in Ireland.

A 1.14 Regulation 40 provides that ComReg, as market surveillance authority, may appoint members of its staff or other persons considered suitably qualified to be Authorised Officers for the purpose of the RE Regulations and RE Directive. Regulation 41 empowers an Authorised Officer, at all reasonable times, to enter and search any place where there are reasonable grounds to believe that radio equipment is being kept or which has, for example, been manufactured, stored, distributed, supplied, or placed on the market. Regulation 42 provides that for the purposes of entering a premise by force, an Authorised Officer must first obtain a warrant from a Judge of the District Court.

European Communities (Electromagnetic Compatibility) Regulations 2016 and 2017

A 1.15 Under the EMC Regulations a person shall not *inter alia* make available on the market equipment to which these Regulations apply or put into service equipment to which these Regulations apply, unless that equipment complies with these Regulations when it is properly installed, maintained and used for its intended purpose.

A 1.16 Such equipment must also, for example, meet the essential requirements as set out in Annex I to the EMC Directive. ComReg is the designated competent authority and market surveillance authority in the State for the purposes of market surveillance, compliance and enforcement under the EMC Regulations.

A 1.17 As with the RE Regulations, the obligations imposed under the EMC regulations apply to all economic operators in the chain for the manufacture and supply of equipment – i.e. manufacturers, importers, and distributors. ComReg may carry out evaluations as to whether equipment complies with the requirements of EMC

Regulations and relevant economic operators must as necessary with such evaluations. If, in the course of such an evaluation, ComReg finds that equipment does not comply with the Regulations, ComReg shall issue a "risk compliance notice" requiring the economic operator concerned to do any of the following: take all appropriate corrective actions to bring the equipment into compliance; withdraw the equipment from the market, or recall the equipment from the market. Where ComReg is of the opinion that urgent action is required it may issue an urgent direction without advance notice.

A 1.18 Regulation 25(1) mandates ComReg to inspect apparatus and fixed installations, where appropriate, and ComReg may require economic operators to provide such information as it requires. Regulation 25(2) tasks ComReg with carrying out surveillance of equipment made available on the Irish market having regard to the requirements of these Regulations. Regulations 26 and 27 set out the search and entry powers very similar to those under the RE Regulations. Appointed Authorised Officers, with or without a District Court warrant as relevant and necessary, may at all reasonable times enter and search any premises, place, vehicle, vessel, or aircraft at or in which the officer has reasonable grounds for suspecting that there is equipment present or that records relating to equipment are kept.

Annex: 2 Methodology for the identification of non-compliant RLAN equipment

A 2.1 Prior to ComReg's visit to Shannon airport MET Eireann identified five radar bearings of interest that caused prolonged and significant harmful interference.

A 2.2 ComReg in turn used this information to research likely points along these bearings with Line of Sight (LOS) to the radar that might be possible locations of non-compliant equipment causing harmful interference.

A 2.3 Met Eireann identified the several radar bearings with significant harmful interference which are shown in Figure A 2.1 below:

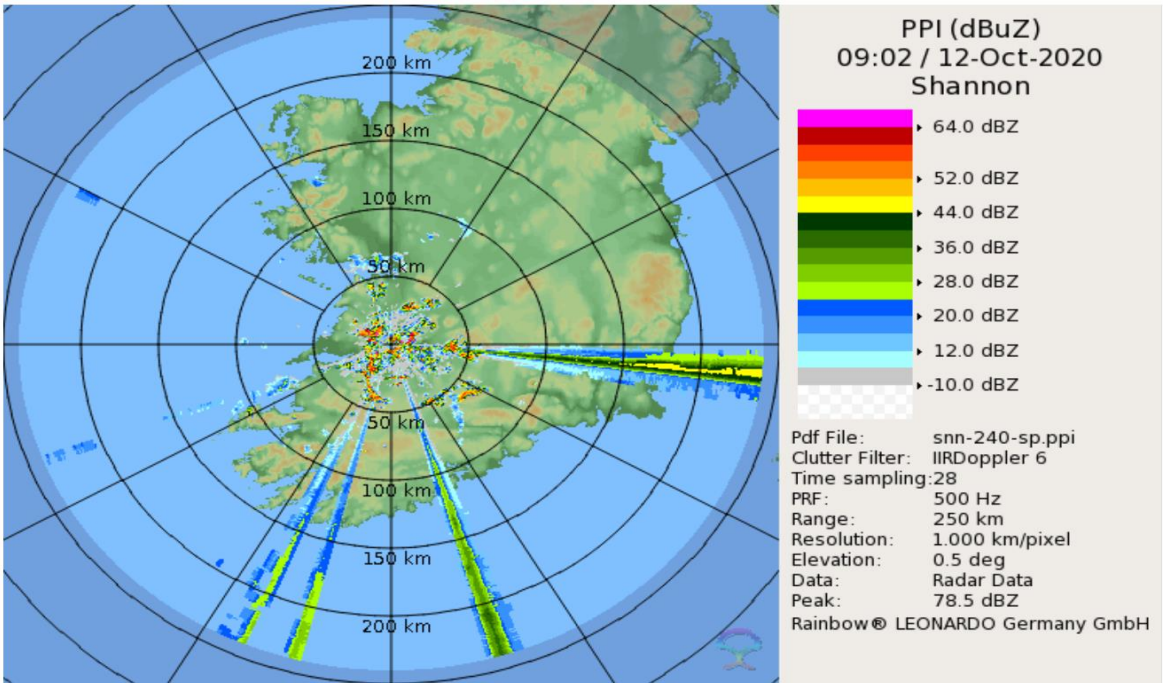

Figure A 2.1: Harmful interference on bearing

Measuring the Interference

A 2.4 For ComReg to identify and locate the source of harmful interference to the Shannon airport met radar when onsite it is necessary to power down the radar.

A 2.5 This is only carried out when no weather warnings are in place.

A 2.6 A handheld receiver is connected to a test port on the radar allowing the receiver to receive signals without being overloaded by the large radar antenna gain.

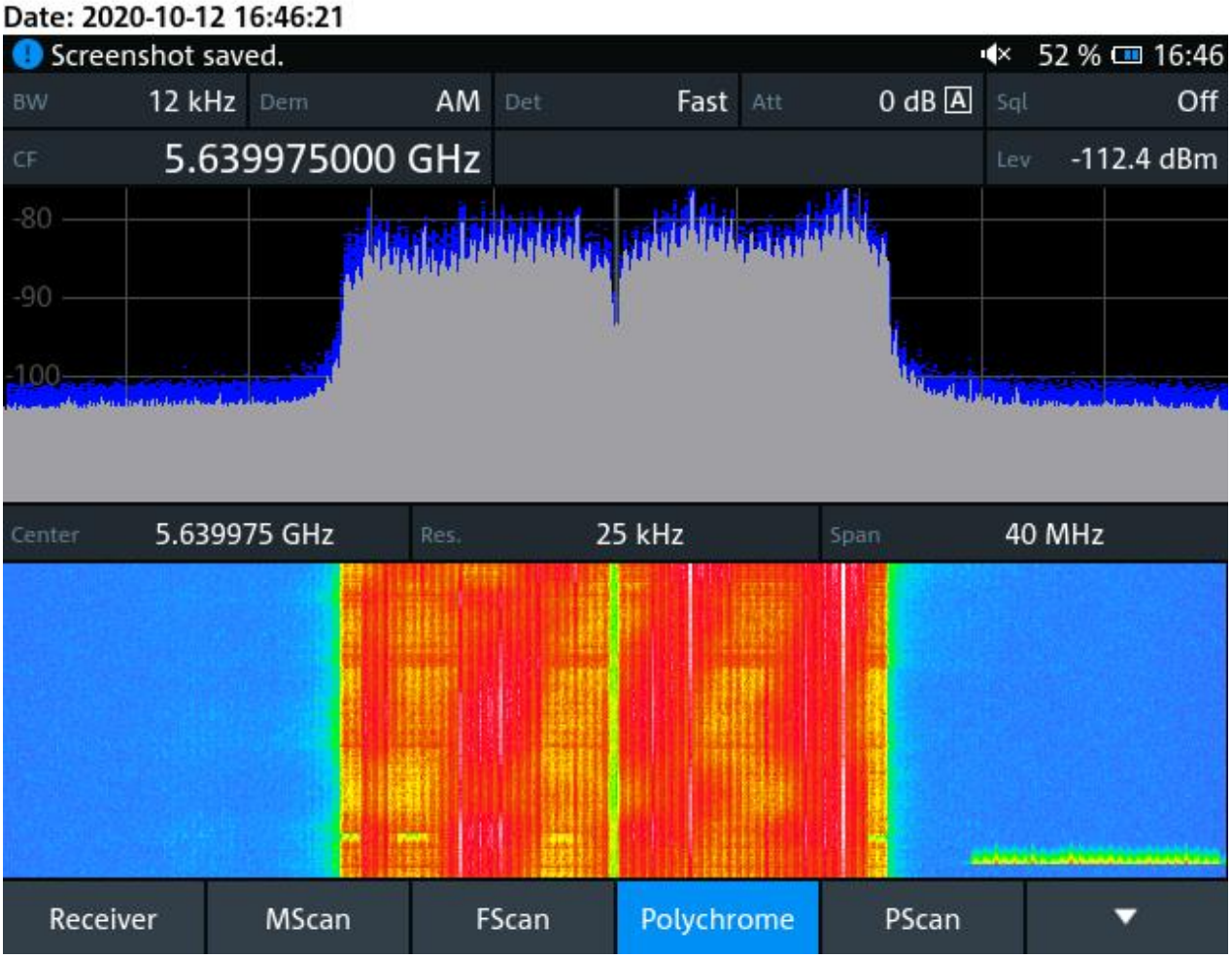

Figure A 2.2: Sample of Spectrum 1

A 2.7 Figure A2.2 above is a screen shot of a sample on spectrum with a centre frequency of 5 640 MHz. The upper portion of the Figure in grey represents the signal of an interfering RLAN in terms of the width of the signal and the amplitude or signal strength. The span or viewing window of the instrument is 40 MHz wide.

Figure A 2.3. Above are examples of outdoor RLAN used in the licensed exempt 5 GHz Band

Identifying the Interfering RLANs

A 2.8 Once a coherent interfering carrier was identified on the receiver at a frequency of interest it was then possible to use a 802.11ac wireless device to interrogate and identify the interfering network using the built-in scanner on the wireless device.

A 2.9 A MAC address[46] can be obtained from the interfering RLAN, the SSID and its radio Name. It should also be possible to see the signal strength, frequency, and channel bandwidth.

Removing interference – an example

A 2.10 At a bearing of 96 degrees the 802.11ac wireless device identified an interfering RLAN with a centre frequency of 5640MHz and an SSID[47] of a known WISP located more than 30 km from the radar. ComReg engineers traced the interfering RLAN 36km away from the radar.

A 2.11 ComReg engineers contacted the service provider who managed the RLAN and then it was re-tuned to an alternative frequency. Once the re-tune was complete MET Eireann confirmed that the harmful interference on this bearing ceased.

A 2.12 The image in Figure A 2.4 below shows the radar picture after removing several interfering RLAN's.

[46] MAC address - Media access control address is a unique identifier assigned to network interface controller. MAC addresses are primarily assigned by each device manufacturer
[47] SSID – Service set identifier, a user set name on a network.

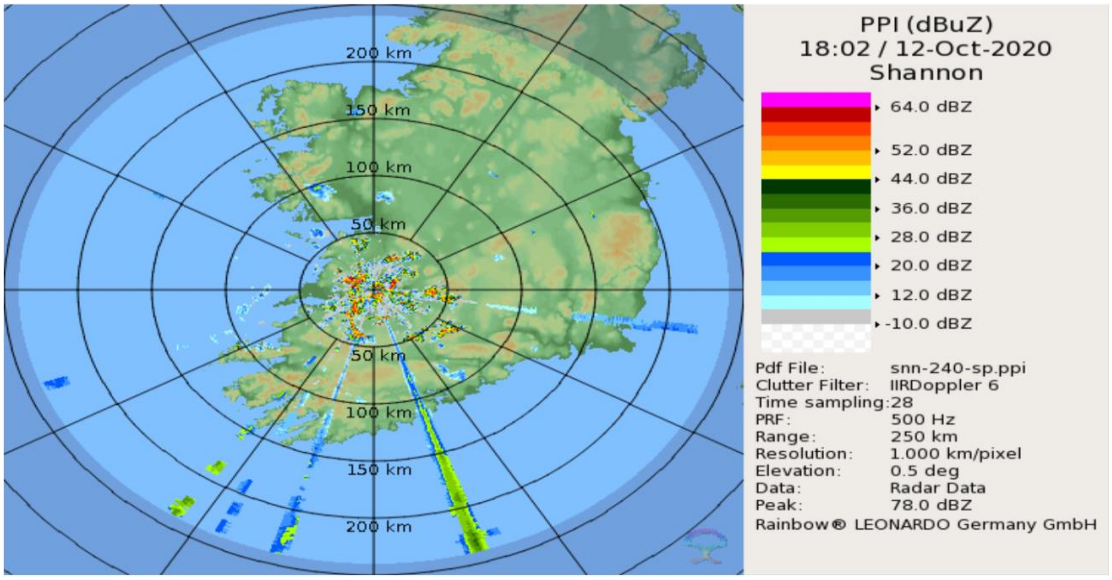

Figure A 2.3. Post visit Radar interference

A 2.13 The significant interferers at 96, 127 and 203 degrees have been removed and the absence of interference can be clearly seen in comparison to Figure A 2.1.

A 2.14 The interferers identified did not have DFS activated when contact was made with service providers. Service providers were informed that DFS must be activated and to turn it off is an offence under the RED.

A 2.15 Where the SSID and Radio name are not known or are not obviously identifiable as belonging to a particular service provider or operator it is much harder to identify the operator and the radio may have to be physically located using the MAC Address only. ComReg is considering how best to address such instances.

Working with Met Eireann

A 2.16 Following this initial exercise Met Eireann have invested in its own equipment to allow it to detect harmful interference to the Dublin and Shannon radars. ComReg staff have assisted Met Eireann staff to develop a methodology to track and locate the sources of harmful interference to the radars.

A 2.17 Met Eireann now conducts periodic scans for harmful interferers on both radars and this information is then forwarded to ComReg to disseminate on a mailing list for distribution to relevant parties.

A 2.18 ComReg will continue to engage and co-operate with Met Eireann as part of a broader multipronged approach to dealing with the on-going issue of RLAN non-compliance in the 5GHz band, which also includes engagement with WISPs, PSA, suppliers, and manufacturers among others.