An Coimisiún um
Rialáil Cumarsáide
Commission for
Communications Regulation

Fixed Radio Links Annual Report

Annual Report 2020

Technical Report

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Chapter 1

1 Introduction

1.1 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 and 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.

1.2 Radio spectrum is the medium by which information may be transmitted wirelessly over distances ranging from a few centimetres to thousands of kilometres. It is a valuable national resource as it underpins nearly all communications services in the State. 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 e.g. water reservoir levels and remote power transformers.

1.3 A key service for telecommunication infrastructure development is the fixed service ("FS") which is a radio communication service between specified fixed geographic points. Some examples of FS applications are transport networks (trunking, multi-hop, etc.), mobile backhaul networks, fixed wireless access ("FWA")[1] and temporary networks (electronic news gathering and disaster relief).

1.4 On the 30 September 2019, ComReg published its first Fixed Links Annual Report as Document 19/89.[2] In that document, ComReg provided an introduction to fixed radio links and the associated licensing frameworks along with information on the demand and trends in fixed link licensing. ComReg has not repeated this here. Readers are referred to Document 19/89 if they wish to access that information.

1.5 The purpose of this report is to set out the most up to date information regarding the licensing of fixed radio links granted under S.I. 370 of 2009.[3]

[1] Fixed Wireless Access means a radiocommunication services between a base station and fixed subscriber terminals locations.
[2] ComReg Document 19/89 – Fixed Radio Links Report Annual Report for 2019 – published 30 September 2019. https://www.comreg.ie/publication-download/fixed-radio-links-annual-report-for-2019
[3] http://www.irishstatutebook.ie/eli/2009/si/370/made/en/pdf

We also provide an update on the demand and trends in fixed link licensing since our last report in 2019, information on recent improvements to the fixed radio links application process on ComReg's eLicensing website[4], along with information on the CEPT's[5] current fixed services work programme.

1.6 Separately, and as outlined in its Annual Action plan for 2020-2021[6], ComReg is reviewing the fixed radio links licensing regime and associated frequency bands. The objective of the review is to assess the current fixed radio links licensing regime and consider what, if any, changes are required to ensure that the regime is fit for purpose and capable of facilitating future use of fixed radio links and other electronic communication services. The initial consultation, scheduled for Q4 2020, will afford interested parties an opportunity to provide views on all aspects of ComReg's preliminary findings.

1.7 The remainder of this report is structured as follows:

- **Chapter 2** provides background information on the licensing of fixed radio links in Ireland.
- **Chapter 3** provides information on the frequency bands allocated for fixed radio links and usage trends up to 30 June 2020.
- **Chapter 4** provides information on ComReg's forthcoming Fixed Radio Links Consultation.
- **Chapter 5** provides information on ComReg's eLicensing application system and plans for further development of the system.
- **Chapter 6** provides information on the CEPT's work programme for fixed services.

[4] https://elicensing.comreg.ie/
[5] https://www.cept.org/
[6] https://www.comreg.ie/media/2020/07/Action-Plan-Ye-300621-.pdf

Chapter 2

2 Background

2.1 During the 2015-2020 period, the demand for fixed radio link licences in the frequency bands ranging from 1.3 GHz to 80 GHz continued to increase, notably in fixed radio link Point-to-Point ("P-P")[7]. As of the 30th June 2020, 13,649 P-P" licences (see Figure 1) and 30 Fixed Radio Link Point-to-Multipoint ("P-MP")[8] (see Figure 2) licences were live in Ireland. The number of P-P radio links has increased by 8% while the number of P-MP radio links has decreased by 17% during the same period.

2.2 The increase in the number of live P-P licences during the 2019-2020 operating year can be attributed to continued operator improvement of their backhaul and fixed/wireless broadband networks to address growing consumer demand for increased data capacity. The increase in demand for data capacity can be seen in ComReg's most recent Quarterly Key Data Report for Q2 2020[9] where fixed and mobile broadband subscriptions increased by 3.3% and 4.7% respectively and total mobile data volumes increased by 42.8% compared to Q2 2019.

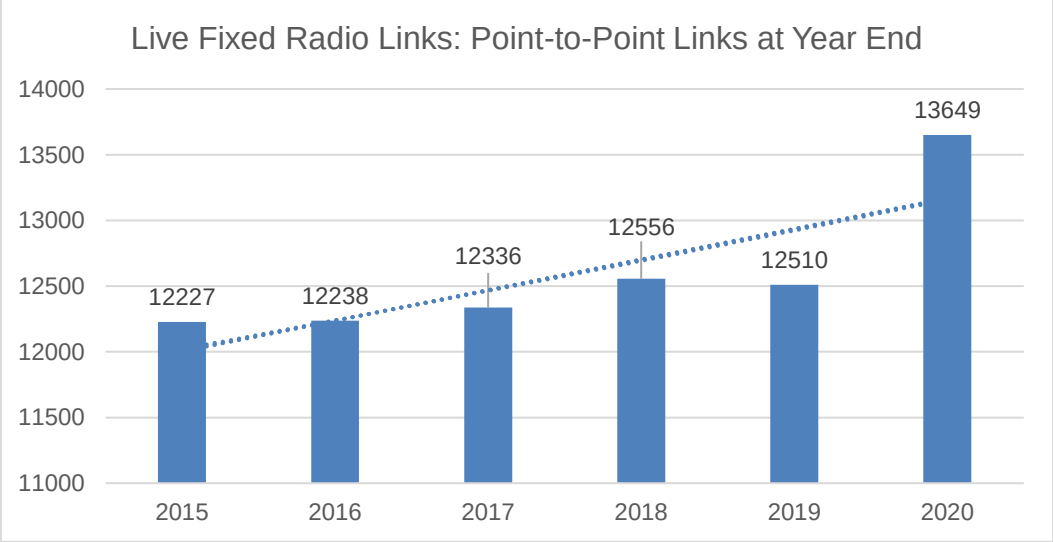


Figure 1: Live Point-to-Point Fixed Links at Year End

2.1 The number of live P-MP licences continues to decline. The notable decline during the 2018-2020 operating year was in the main due to the ESB cancelling its P-MP licences as it migrated to the SCADA[10] telemetry

[7] A point-to-point – provides a radio communication service by a link between two stations located at specified fixed points.
[8] A point-to-multipoint provides a radio communication service by links between a single station located at a specified fixed point and a number of stations located at specified fixed points.
[9] ComReg Document ComReg 20/82R – QUARTERLY KEY DATA REPORT - Q2 2020 – published 10 September 2020.
[10] Supervisory, Control and Data Acquisition.

network utilising its national telemetry licence[11]. Of the 30 PMP fixed radio link licences, 28 are held by Eir for its Rurtel network[12] and 2 licences are held by the Office of the Government Chief Information Officer.[13]

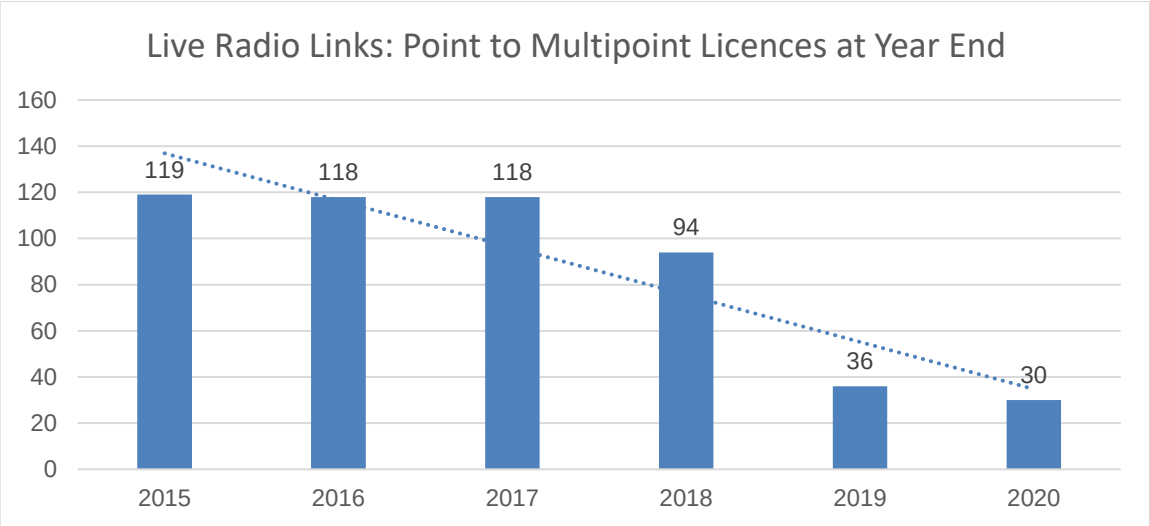


Figure 2: Live Fixed radio links: Point-to-Multipoint licences at Year End

2.2 To inform the forthcoming fixed links review, ComReg conducted interviews with several fixed links stakeholders including existing fixed radio link licensees and equipment manufacturers. In those interviews, licensees indicated that the current demand for fixed radio link licences is predominantly for fixed links with a higher capacity throughput as networks are expected to achieve data throughputs in the region of gigabit-per-second ("GBit/s") to provide services to end-users. In addition, manufacturers contended that future small cell deployments and increased macro-cell capacity requirements seems likely to have a significant bearing on backhaul capacity requirements in both existing and new fixed link frequency bands with the upper frequency bands (i.e. 50 GHz and above) in particular being potential key facilitators for such high traffic volumes.

2.3 The forthcoming initial consultation and accompanying consultant's report will contain a deeper analysis of fixed radio link trends over the past ten years and will consider existing and future use cases for the frequency bands typically allocated for fixed radio links internationally. We also outline further information regarding the fixed links review at Chapter 4.

[11] https://www.comreg.ie/industry/radio-spectrum/licensing/search-licence-type/telemetry/
[12] Eir's Rutel network is a point-to-multipoint system used to provide fixed telephony services in rural areas as part of Eir's Universal Service Obligation (USO). ComReg understands that the current customers of the Rurtel service do not have access to an alternative fixed telephony service.
[13] https://www.gov.ie/en/organisation-information/6ee40f-office-of-the-government-chief-information-officer-ogcio/

Chapter 3

3 Fixed Radio Link Frequency Bands

3.1 Sixteen frequency bands are currently available for P-P and P-MP fixed radio link licensing and the channel arrangements for those bands are based upon internationally agreed allocations made by the ITU and CEPT.[14] While the number of fixed radio links deployed in Ireland continues to grow, some frequency bands are in greater demand than others, due in part to the specific radio propagation of those bands (see figure 3 below).

3.2 As outlined in Chapter 2, there were in excess of 13,600 live fixed radio link licences in Ireland as of 30 June 2020. The continued demand for fixed radio link licences is driven by operators' increasing the capacity of their networks to address consumers' current and future demand for data, arising from the roll-out of new technology standards such as LTE and 5G-NR. Current demand is also being driven in part by the Government's National Broadband strategy, the broadband for school's programme, and by the increased broadband requirements for people working from home as a result of the impact of Covid-19.

3.3 Figure 3 below shows that the demand for fixed radio links is mainly driven by three distinct use cases, fixed and mobile backhaul and fixed wireless access[15]. ComReg's forthcoming consultation on fixed radio links will discuss these use cases in more detail.

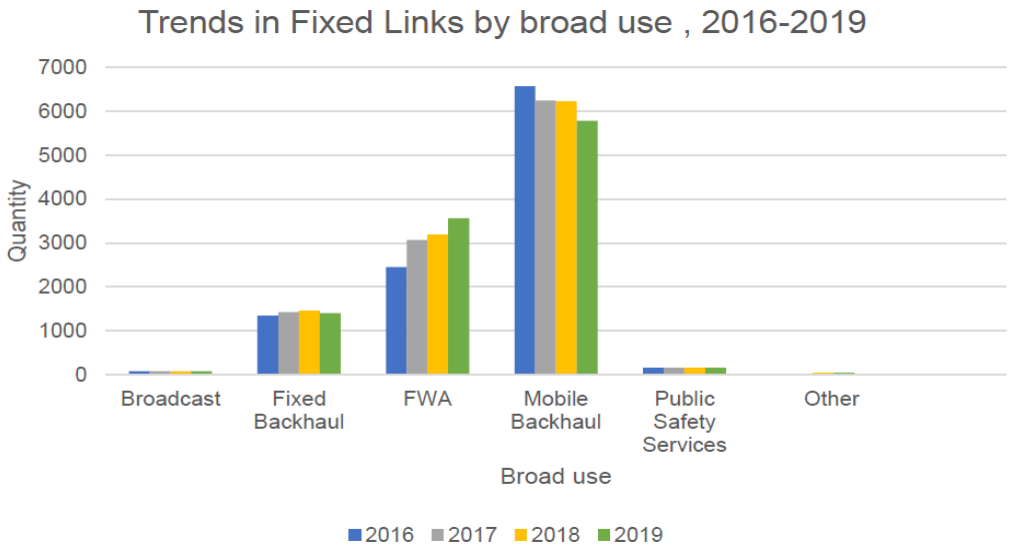


Figure 3: Trends in Fixed Links by broad use, 2016-2019

[14] https://www.ecodocdb.dk/download/2ca5fcbd-4090/ERCREP025.pdf
[15] The data shown in figure 3 was collected as part of an information request submitted to Irish fixed radio link licensees in Q1 2020.

3.1 Key Trends within Fixed Radio Link Frequency Bands

3.4 Figure 4 shows the total number of fixed radio link licences per frequency band (ranging from 1.3/1.5 GHz to 80 GHz) for the years ending 30 June 2010, 2014, 2018 and 2020. The frequency bands from 11 GHz to 23 GHz, 38 GHz and 80 GHz are the most prevalent frequency bands for fixed radio link deployment.

3.5 While the number of fixed radio links in bands below 11 GHz, and the 13 GHz and 15 GHz bands have remained relatively stable (or even fallen slightly), the number of fixed radio links in the 11 GHz band and above has increased. Of note is the strong increase in the number of fixed radio links in the 11 GHz, 18 GHz, 28 GHz and 80 GHz bands, and decreases in the number of P-P Fixed Links in 23 GHz, 26 GHz and 38 GHz in recent years. The higher bandwidths available in the 11 GHz, 18 GHz, 28 GHz and 80 GHz bands have been a driver for the increase in demand, while the decrease in the 23 GHz, 26 GHz and 38 GHz bands can likely be attributed to the mobile network operators migrating links to their 26 GHz national block licences which were awarded in 2018[16].

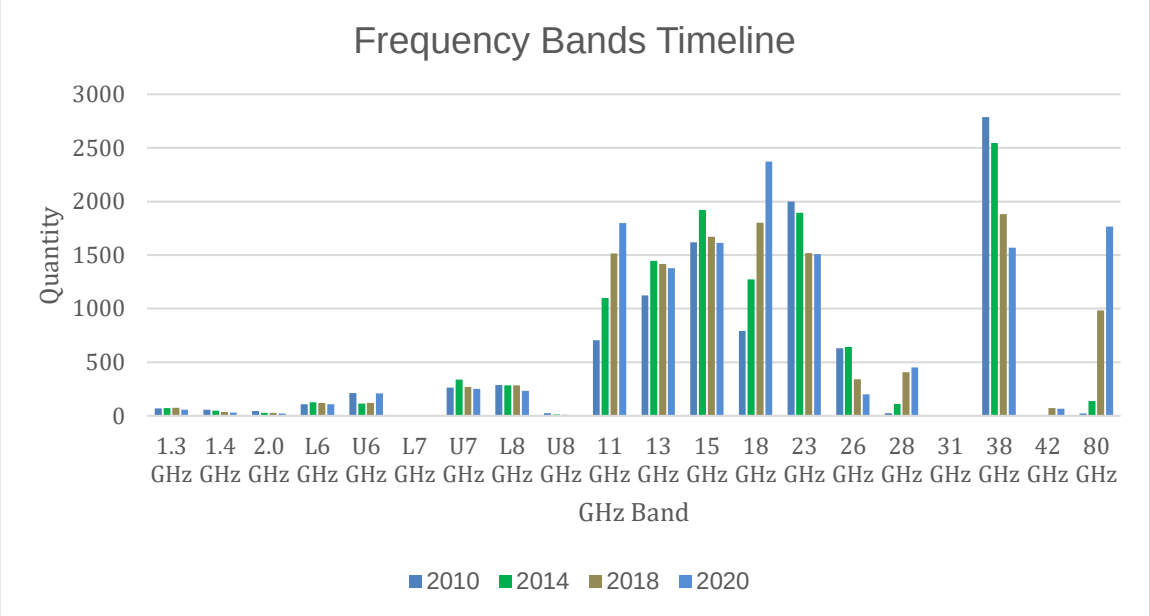


Figure 4: Number of fixed radio links per band for the years 2010, 2014, 2018 and 2020

3.6 The 80 GHz band has enjoyed the greatest increase in the number of fixed radio links licenced since 2010, virtually doubling each year. The popularity

[16] See ComReg Document 18/31 at www.comreg.ie

of the 80 GHz band seems to be due to the availability of higher bandwidths of up to 2 GHz, which can then allow throughputs of up to and beyond 3,400 Mbit/s. In other frequency bands, the highest bandwidth is currently limited to 112 MHz allowing throughputs of up to 862 Mbit/s on a single link. Many of the fixed radio links in the 80 GHz band are used in the greater Dublin area where the short propagation hop (approx. ≤ 2km) is advantageous in more densely populated urban areas.

3.7 Figure 5 below illustrates the licensees that currently hold most fixed radio link licences, with mobile network operators and FWA operators having deployed circa 80% of all licensed fixed radio links in Ireland.

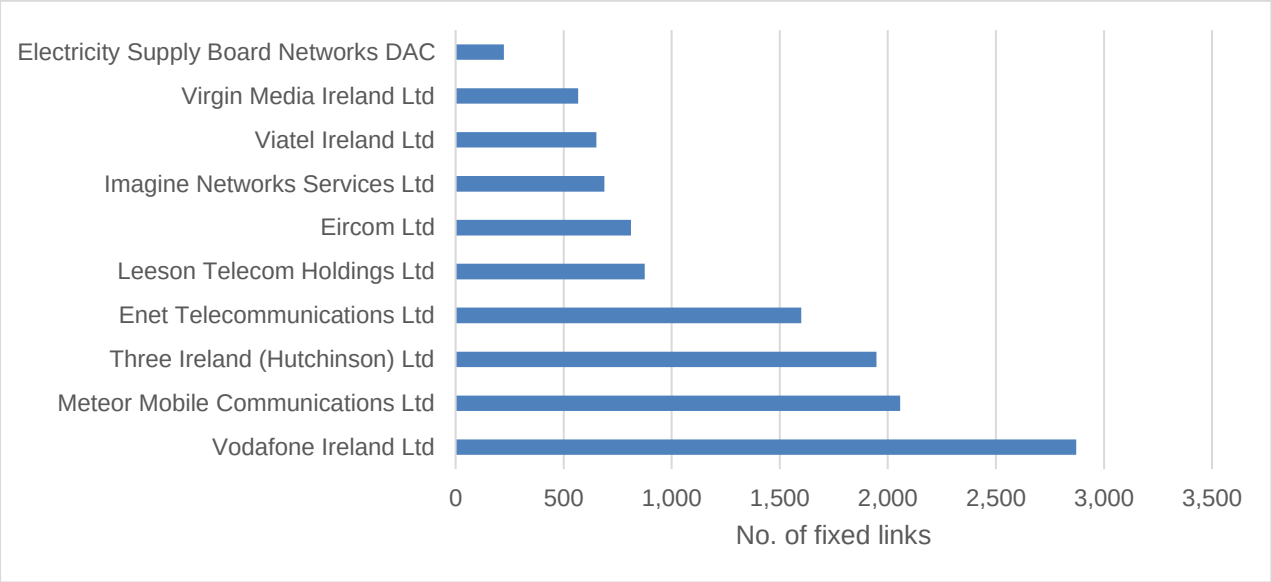


Figure 5: Fixed Link Licensees at 30 June 2019

3.8 The high demand for and usage of fixed radio links has also resulted in a rise in the number of rejected fixed radio link applications. Figure 6 below shows the number of new processed applications each year compared with the number of rejected applications. Figure 7 shows the number of new links each year that are processed against those rejected by band. The frequency bands 11 GHz, 13 GHz, 15 GHz, and 18 GHz bands have the largest number of applications rejected in recent years. This is a result of several factors including:

- Applications being applied for in high demand bands and in areas with high usage paths with limited channel availability;
- Applications for channels with higher capacity rates and bandwidths which are not available due to high demand for those channels in specific areas; and
- Applications not meeting the minimum technical requirements as set out in ComReg Document 09/89R2.

3.9 In order to further assist applicants, provide more information and improve turnaround times in the application process, ComReg has introduced further functionality to its eLicensing system and this is discussed in more detail in Chapter 5.

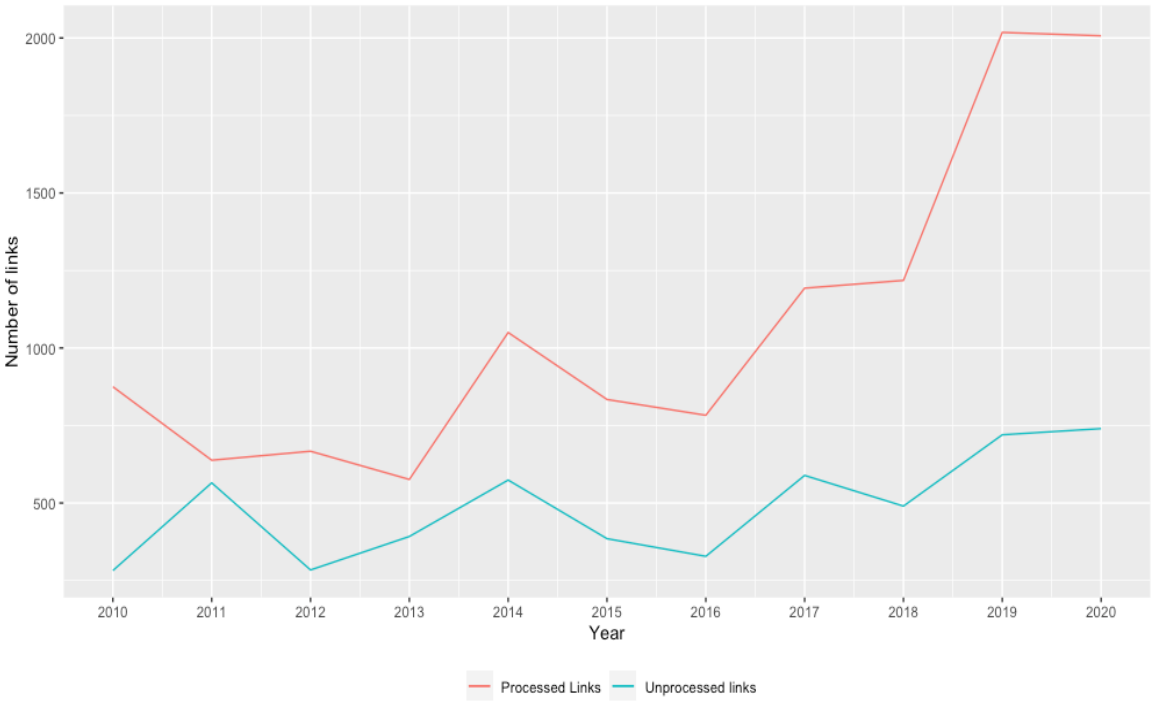


Figure 6: Number of new processed applications each year compared to number of rejected applications each year

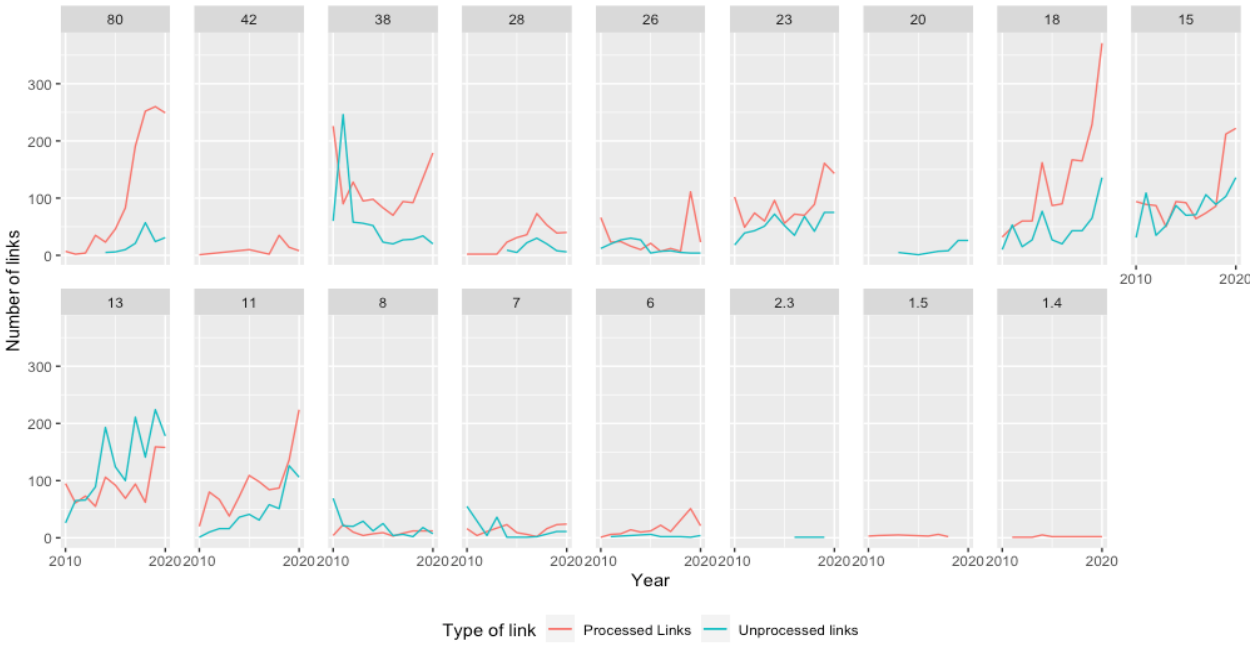


Figure 7: Number of new links each year that are processed versus unprocessed by band

Chapter 4

4 Forthcoming Fixed Radio Links Review

4.1 In its Radio Spectrum Management Strategy Statement for 2019 to 2021 (ComReg Document 18/118[17]), ComReg set out its plans regarding fixed radio links licensing and committed to:

- review the technical guidelines to enable longer fixed link path lengths with lower modulation and availability requirements;
- examine the opening new frequency bands for fixed radio links; and
- review the current fixed radio links licensing regime, which would include considering the future use of certain frequency bands and the current fixed radio links regulations[18].

4.2 ComReg plans to review the current fixed radio links licensing regime and associated frequency bands. This will be a multi-year project which ComReg intends to commence with an initial consultation later this year.

4.3 This consultation will also take account of wider spectrum management matters regarding the frequency bands used for fixed radio links considering, among other things, market, technology and international changes. The fixed links review will:

- review the current use of the existing frequency bands allocated for fixed radio links, understand how this has evolved, and consider the future demand for the existing and future frequency bands;
- assess the different current use cases provided by fixed radio links, and consider potential alternative/future use cases;
- assess the market and technology trends affecting future demand for frequency bands from those use cases;
- consider proposed changes to the technical guidelines for fixed radio links (for example allowing longer link path lengths with lower modulation and availability requirements); and

[17] https://www.comreg.ie/publication/radio-spectrum-management-strategy-statement-2019-to-2021/
[18] S.I. No. 370/2009 - Wireless Telegraphy (Radio Link Licence) Regulations, 2009

- review the current licensing regime for fixed links and consult on any proposed changes to licence duration, conditions, fees etc. including new regulations to replace S.I. no. 370 of 2009[19] as necessary.

4.4 This initial consultation and accompanying consultant's report will examine in particular:

- the existing and potential use cases (i.e. those with the potential to evolve and/or emerge over the foreseeable future) for the current fixed link bands, and potential use cases for new fixed link bands in Ireland;
- recent trends in demand for all use cases identified nationally and internationally, and forecast the likely demand for each use case over the foreseeable future in Ireland; and
- the need for any of the current and/or new fixed links bands to be made available for, or reallocated from, some or all of the use cases identified.

4.5 This stage of the review and the accompanying consultation is informed by, amongst other things:

- Interviews conducted by ComReg and DotEcon[20], our expert advisors, with several fixed links stakeholders including existing users and equipment manufacturers (the "Stakeholder Interviews");
- responses received to a voluntary request for information (RFI) issued in March 2020 to current fixed link licensees[21] (the "Licensee RFI")[22]; and
- responses received to an RFI sent by ComReg issued in March 2020 to members of the Independent Regulators Group[23] (the "IRG RFI")[24].

4.6 ComReg will seek the views of interested parties in respect of its preliminary findings, and those views will help inform ComReg's future consideration of

[19] S.I. No. 370/2009 - Wireless Telegraphy (Radio Link Licence) Regulations, 2009
[20] DotEcon Ltd provides strategy and consulting advice to networked industries, offering analytical and empirical support to public sector bodies and private sector companies. See www.dotecon.com
[21] In March, ComReg issued the Licensee RFI to 82 of the 153 licence holders (as of 30 June 2019), selected to cover firms of all user types and broad use cases. ComReg issued the Licensee RFI to a further 12 relevant stakeholders (e.g., vendors and firms providing installation services). The RFI included a questionnaire and a request for the provision of data. ComReg received a response rate of 56% accounting for 35% of licensees and 94% of Fixed Link licences. In light of the disruption caused by Covid-19 to businesses, ComReg extended the deadline for providing responses by over 8 weeks. ComReg welcomes any non-respondent or non-recipient wishing to provide data to contact ComReg, which can issue further of the Licence RFI.
[22] ComReg is satisfied that a representative sample of Licences responded, with responses received from firms with varying business types, numbers of Fixed Links licences and increasing/declining number of Fixed Links licences.
[23] The Independent Regulators Group ("IRG") a group of European National Telecommunications Regulatory Authorities (NRAs) that functions as a forum for exchange of best practices and discussions on regulatory challenges in communications between NRAs.
[24] In total 22 members of the IRG provided responses to the IRG RFI.

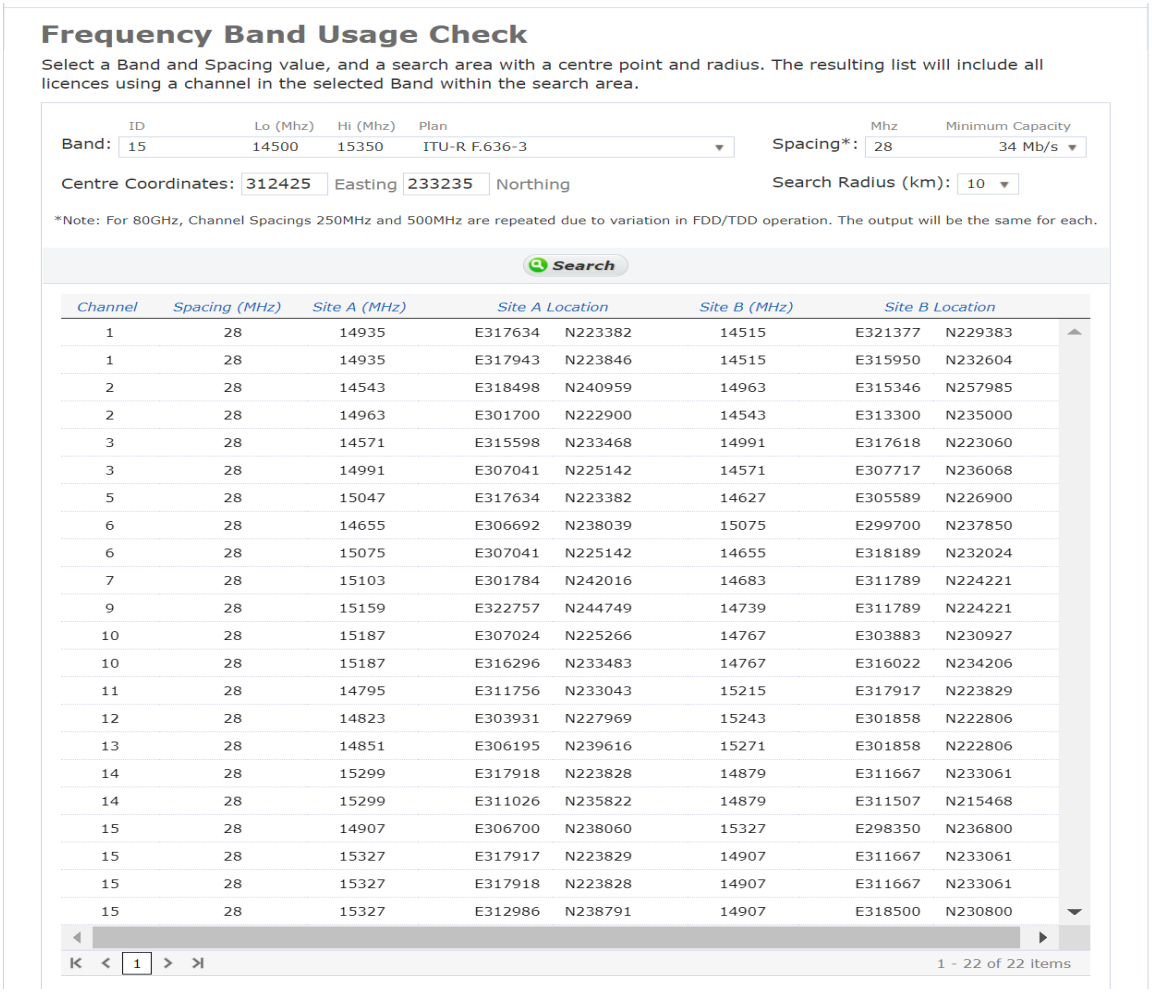
a licencing framework (including any fees) for fixed radio links in further project steps.

Chapter 5

5 eLicensing Application Process

5.1 As part of ComReg's commitment to continually improving its application, ComReg, in early 2020, introduced a Frequency Band Usage Checker as part of its fixed radio link application process on https://elicensing.comreg.ie/ to address application processing issues. The purpose of the checker is to enable applicants to view the number of links by band and bandwidth within a 1km, 5km or 10 km radius of a proposed site before applying for a licence.

5.2 The checker assists applicants in determining the likelihood of an application for a channel being successful, thus informing the prospective applicant in advance of it proceeding with its request or whether it should instead consider alternative frequencies for its needs. This enables a more streamlined application process by making more information available to applicants when engineering their networks and positively impacts ComReg's turnaround times for processing fixed radio link applications.



Frequency Band Usage Check

Select a Band and Spacing value, and a search area with a centre point and radius. The resulting list will include all licences using a channel in the selected Band within the search area.

	ID	Lo (Mhz)	Hi (Mhz)	Plan		Mhz	Minimum Capacity
Band:	15	14500	15350	ITU-R F.636-3	Spacing*:	28	34 Mb/s

Centre Coordinates: 312425 Easting 233235 Northing Search Radius (km): 10

*Note: For 80GHz, Channel Spacings 250MHz and 500MHz are repeated due to variation in FDD/TDD operation. The output will be the same for each.

Search

Channel	Spacing (MHz)	Site A (MHz)	Site A Location		Site B (MHz)	Site B Location	
1	28	14935	E317634	N223382	14515	E321377	N229383
1	28	14935	E317943	N223846	14515	E315950	N232604
2	28	14543	E318498	N240959	14963	E315346	N257985
2	28	14963	E301700	N222900	14543	E313300	N235000
3	28	14571	E315598	N233468	14991	E317618	N223060
3	28	14991	E307041	N225142	14571	E307717	N236068
5	28	15047	E317634	N223382	14627	E305589	N226900
6	28	14655	E306692	N238039	15075	E299700	N237850
6	28	15075	E307041	N225142	14655	E318189	N232024
7	28	15103	E301784	N242016	14683	E311789	N224221
9	28	15159	E322757	N244749	14739	E311789	N224221
10	28	15187	E307024	N225266	14767	E303883	N230927
10	28	15187	E316296	N233483	14767	E316022	N234206
11	28	14795	E311756	N233043	15215	E317917	N223829
12	28	14823	E303931	N227969	15243	E301858	N222806
13	28	14851	E306195	N239616	15271	E301858	N222806
14	28	15299	E317918	N223828	14879	E311667	N233061
14	28	15299	E311026	N235822	14879	E311507	N215468
15	28	14907	E306700	N238060	15327	E298350	N236800
15	28	15327	E317917	N223829	14907	E311667	N233061
15	28	15327	E317918	N223828	14907	E311667	N233061
15	28	15327	E312986	N238791	14907	E318500	N230800

1 - 22 of 22 items

Figure 8: ComReg's Frequency Band Usage Checker

5.3 This enhancement has been favourably received, and so ComReg will further develop the elicensing system to show fixed radio links on a mapping graphical user interface ("GUI") similar to https://siteviewer.comreg.ie/. This will allow applicants to view the direction of licensed links at sites prior to applying. While the current Frequency Band Usage Checker provides applicants with information that can assist them with planning, a graphical representation of that information could be most beneficial as applicants would then no longer need to plot coordinates to determine the direction of an existing fixed link at a site. Figures 9 and 10 below illustrate these developments.

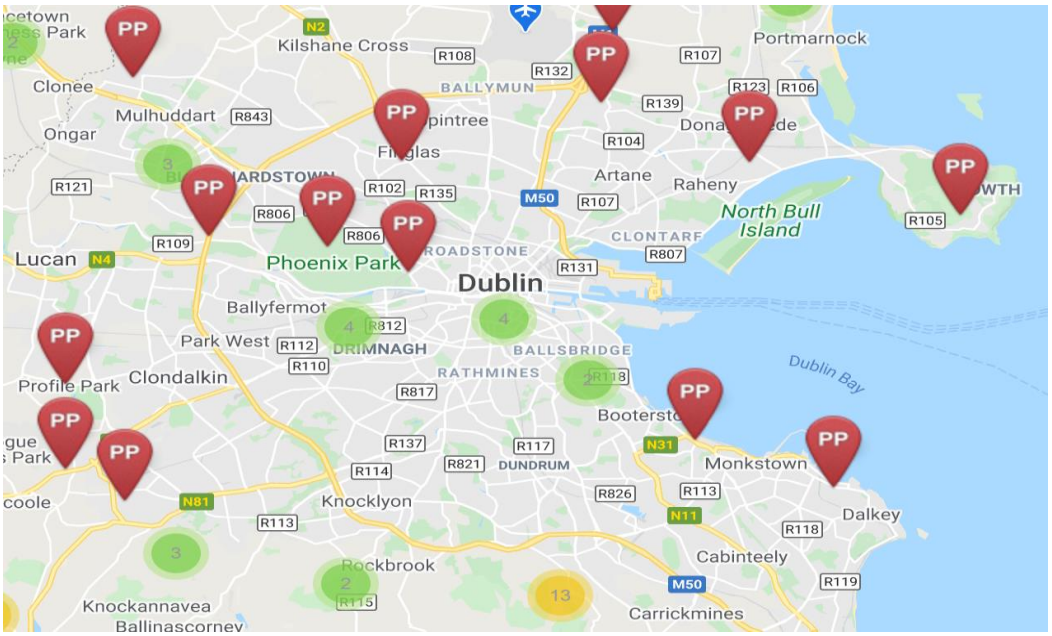


Figure 9: ComReg's proposed future Frequency Band Usage Checker

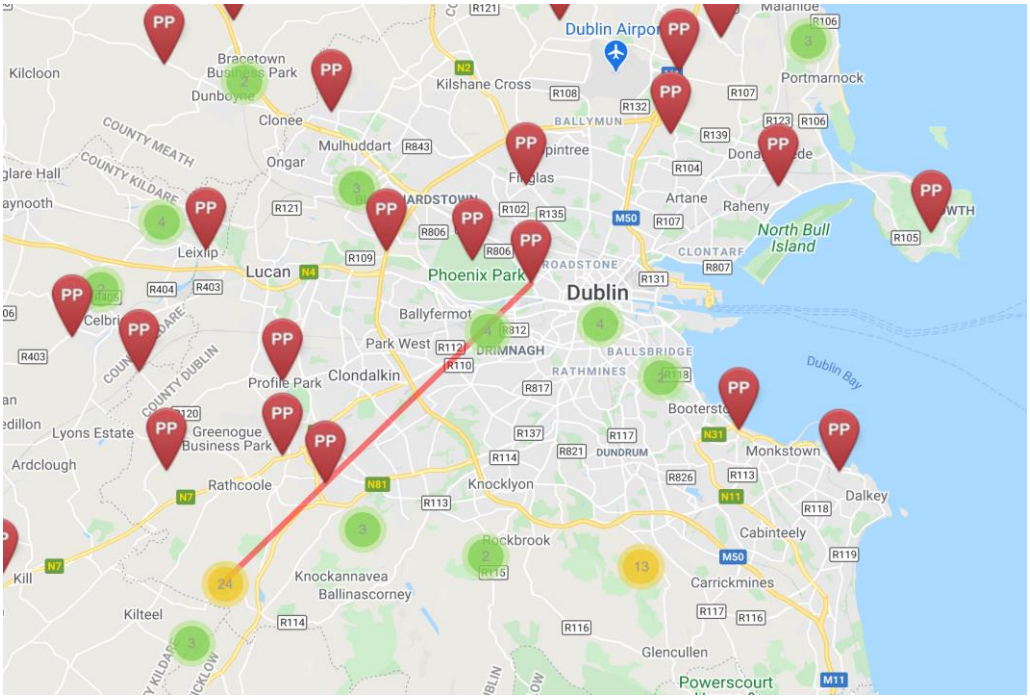


Figure 10: ComReg's proposed future Frequency Band Usage Checker

5.4 ComReg expects that the proposed new mapping GUI will be available in the coming months following testing.

5.5 In its Radio Spectrum Management Strategy Statement for 2019 to 2021 (Document 18/118[25]), ComReg committed to making fixed radio links information *publicly* available on https://siteviewer.comreg.ie/. For fixed radio link applicants this would provide more flexibility for their outsourced service providers in terms of accessing the information rather than having to formally seek passwords to access the applicants' eLicensing accounts. In addition, by making the information available in a downloadable format, applicants would be able to import that information into their own planning tools. For stakeholders in general, having access to fixed radio link information would provide greater transparency regarding what services are deployed in particular areas, and would enable, for example, operators of wind turbines to understand which fixed radio links licensees they need to engage with as part of any planning process. ComReg proposes to complete that task following the roll out of the new mapping GUI in eLicensing and will provide further updates as matters progress.

[25] https://www.comreg.ie/publication/radio-spectrum-management-strategy-statement-2019-to-2021/

Chapter 6

6 CEPT's Fixed Services Work Programme

6.1 The CEPT and ITU, in consultation with administrations, determine which frequency bands should be allocated for fixed services, and publish recommendations on the channel arrangements for those bands. As part of that role, CEPT also has a Spectrum Engineering project team (SE 19)[26] which considers matters regarding fixed services and regularly publishes reports and recommendations on the use of P-P and P-MP fixed radio links.

6.2 SE 19 has several current work items on the future use of the fixed service and ComReg will take these into account as part of the fixed radio links review.

6.3 ComReg actively monitors SE 19 meetings and plans to have a representative attend those meeting on a regular basis going forward. ComReg welcomes any views that interested parties may have regarding the SE 19 work items listed below. Any such views may be sent to licensing@comreg.ie or as part of any views submitted in response to the forthcoming fixed radio links consultation.

Subject	Scope	Start / Target dates	Deliverable
To consider the doubling of maximum channel width for some selected FS bands in the range from 11 to 38 GHz (11 GHz, 18 GHz, 28 GHz, 23GHz, 32 GHz, 38 GHz).	To address the interest for wider channels as a viable solution for the future to meet the increasing demand for capacity, as expressed by number of administrations. (See ECC Report 173) SE19 will consider an additional ECC Report in addition to the approved revised recommendations.	S: 27-04-2018 T: 30-09-2020	ECC Report
Guidelines on how to plan Bands and Channels (Carriers) Aggregation (BCA) Fixed Service Links	Develop guidelines for the proper planning of BCA FS links to meet the 5G backhaul needs in terms of network capacity. Aspects connected to link budget, e.g. the different payload availability of the link and the use of dual band antennas must be considered	S: 25-01-2019 T: 30-09-2020	ECC Report

[26] https://www.cept.org/ecc/groups/ecc/wg-se/se-19/client/introduction/

Subject	Scope	Start / Target dates	Deliverable
Considerations of FS use within CEPT administrations towards introduction of 5G in the 26 GHz band.	The questionnaire concern the possible future options regarding the FS currently in the 26 GHz band due to future usage of this band by 5G. The purpose of the questionnaire is to provide a comprehensive overview on the spectrum strategy for the FS currently in the 26 GHz band envisaged by the CEPT countries.	S: 25-01-2019 T: 30-09-2020	Questionnaire
To derive a methodology for protection criteria for FS except long term	To derive a general methodology for “short term” criteria for Fixed service and evaluate the relationship between "long term" and "short term" protection criteria and FDP (Fractional Degradation of Performance).	S: 02-10-2019 T: 30-09-2021	ECC Report
New microwave PMP technologies based on active antennas for 5G backhaul above 27.5 GHz	To assess the technical feasibility of a new microwave transport network PMP system based on active antennas, beamforming and interference cancellation techniques. To evaluate coordination as well as aspects of planning with existing FS including suitable frequency bands / approaches for these new PMP systems in the bands already allocated to the FS above 27.5 GHz.	S: 02-10-2019 T: 31-05-2021	ECC Report
Revision of ECC Report 173	To study and gather up to date information related to developments in the FS in CEPT.	S: 20-05-2020 T: 31-05-2022	ECC Report