



An Coimisiún um
Rialáil Cumarsáide
Commission for
Communications Regulation

Spectrum Lease Determination

Lease of spectrum rights in the 3.6 GHz band from Dense Air Ireland Limited to Imagine Communications Ireland Limited

NON-CONFIDENTIAL

Reference: ComReg 20/87

Date: 22/09/2020

An Coimisiún um Rialáil Cumarsáide
Commission for Communications Regulation

1 Lárcheantar na nDugaí, Sráid na nGildeanna, BÁC 1, Éire, D01 E4X0.
One Dockland Central, Guild Street, Dublin 1, Ireland, D01 E4X0.
Teil | Tel +353 1 804 9600 Suíomh | Web www.comreg.ie

Additional Information

Document No:	20/87
Date:	22/09/2020

NON-CONFIDENTIAL

Legal Disclaimer

This document contains a determination. Whilst all reasonable efforts have been made to ensure that its contents are as complete, up-to-date and accurate as possible, the Commission for Communications Regulation (“**the Commission**” or “**ComReg**”) does not make any representation or give any warranties, express or implied, in any of these respects, nor does it accept any responsibility for any loss, consequential loss or damage of any kind that may be claimed by any party in connection with this document or its contents, or in connection with any other information or document associated with this document, and the Commission expressly disclaims any liability in these respects.

Where this document expresses the Commission’s views regarding future facts and/or circumstances, events that might occur in the future, or actions that the Commission may take, or refrain from taking, in the future, such views are those currently held by the Commission, and, except in respect of the determination set out in Chapter 2 of this document or where the contrary is explicitly stated, such views should not be taken as the making of any statement or the adoption of any position amounting to a promise or representation, express or implied as to how it will or might act, or refrain from acting, in respect of the relevant area of its activity concerned, nor, in particular, to give rise to any expectation or legitimate expectation as to any future action or position of the Commission, and the Commission’s views may be revisited by the Commission in the future. No representation is made, nor any warranty given, by the Commission, with regard to the accuracy or reasonableness of any projections, estimates or prospects that may be set out herein, nor does the Commission accept any responsibility for any loss, consequential loss or damage of any kind that may be claimed by any party in connection with same, and the Commission expressly disclaims any liability in these respects.

Content

Section	Page
1 Introduction and background.....	6
1.1 Background – key aspects of framework for spectrum leases in Ireland.....	7
1.2 Background - 3.6 GHz Band, 3.6 GHz Band Award and Transition	7
1.3 Structure of document.....	9
2 Determination	10
2.1 The Notifying Parties.....	10
2.1.1 Business activities of the notifying parties.....	10
2.1.2 Existing overall spectrum holdings of the notifying parties	10
2.2 Imagine’s existing 3.6 GHz Band spectrum holdings	11
2.3 The Proposed Lease.....	12
2.4 Imagine’s 3.6 GHz Band spectrum holdings following Proposed Lease	14
2.5 Assessment.....	15

NON-CONFIDENTIAL

Annex

Section

Page

Annex 1: Imagine's spectrum holdings	18
--	----

NON-CONFIDENTIAL

1 Introduction and background

- 1.1 The procedures and guidelines for transfers and leases of spectrum rights of use for electronic communications services (“ECS”) in the RSPP¹ and 700 MHz² bands in Ireland are set out in Commission for Communications Regulation (“ComReg”) Document 14/11R.³
- 1.2 On 6 August 2020, Imagine Communications Ireland Limited (“Imagine”)⁴ submitted to ComReg a notification regarding its proposal to lease spectrum rights in the 3.6 GHz band from Dense Air Ireland Limited (“Dense Air”) (the “Proposed Lease”).
- 1.3 On 19 August 2020, ComReg published Document 20/75⁵, being a notice on the Proposed Lease and which set out:
 - by way of background and context, material regarding ComReg’s recent COVID-19 Temporary Spectrum Management Measures;
 - other existing 3.6 GHz Band Spectrum Leases (“Existing Leases”);
 - relevant technical details of the lease notification and other relevant material; and
 - the process by which interested parties could make submissions on the Proposed Lease and next steps.
- 1.4 ComReg does not repeat this background information and refers interested parties to Document 20/75.
- 1.5 ComReg did not receive any submissions in response to Document 20/75⁶.
- 1.6 This document sets out the written determination, having regard to the procedures

¹ The EU Radio Spectrum Policy Programme Decision (Decision No 243/2012/EU) (“RSPP Decision”) requires EU Member States to allow the transfer or leasing of spectrum rights of use in the 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2.6 GHz and 3.6 GHz bands (the “RSPP Bands”).

² Decision (EU) 2017/899 of 17 May 2017 on the use of the 470-790 MHz frequency band in the Union requires EU Member States to allow the transfer or leasing of spectrum rights of use in the 700 MHz (694-790 MHz) band.

³ ComReg Document 14/11R, ‘*Spectrum Transfer and Lease Framework in Ireland - Procedures and Guidelines, and Notification Form(s)*’, revised 12 October 2017.

⁴ Imagine Communications Ireland Limited provides fixed wireless ECS.

⁵ ComReg Document 20/75 – “Spectrum Lease Notification: Proposed Lease of spectrum rights in the 3.6 GHz Band from Dense Air to Imagine Communications” - published 19 August 2020.

⁶ ComReg Document 20/75 – “Spectrum Lease Notification: Proposed Lease of spectrum rights in the 3.6 GHz Band from Dense Air to Imagine Communications” - published 19 August 2020.

and guidelines set out in Document 14/11R in particular.

1.1 Background – key aspects of framework for spectrum leases in Ireland

- 1.7 In October 2017, ComReg published its response (“Document 17/82”)¹ to the public consultation (“Document 17/47”)² on its proposed framework for spectrum leases in Ireland (“Spectrum Lease Framework”). ComReg also updated its spectrum transfer procedures to reflect its decisions on the Spectrum Lease Framework in the RSPP and 700 MHz bands (“Document 14/11R”).
- 1.8 While the draft Wireless Telegraphy (Transfer of Spectrum Rights of Use) (Amendment) Regulations have yet to be made, there is no impediment to the Proposed Leases in the 3.6 GHz Band.⁷
- 1.9 In addition to Document 14/11R and S.I. No. 532 of 2016, ComReg would highlight Regulation 19 of the Framework Regulations⁸, Regulation 9(11) of the Authorisation Regulations⁹ and Article 5 of the RSPP Decision.
- 1.10 Readers are also referred to Annex 2 of Document 19/124 for a general overview of the legislative framework relevant to ComReg’s spectrum management function.

1.2 Background – 3.6 GHz Band, 3.6 GHz Band Award and Transition

3.6 GHz Band

- 1.11 The 3.6 GHz Band comprises the frequency range 3 400 – 3 800 MHz and in Ireland a total of 350 MHz is assigned to licensees for the purposes of providing ECS.¹⁰
- 1.12 The 3.6 GHz Band is one of the three “Pioneer 5G candidate bands” in Europe¹¹ and it is harmonised in Europe by way of European Commission decisions (EU)

⁷ See, in particular, the Wireless Telegraphy (3.6 GHz Band Licences) Regulations 2016 (S.I. No. 532 of 2016) at <http://www.irishstatutebook.ie/eli/2016/si/532/made/en/print#>

⁸ European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011 (S.I. No. 333 of 2011).

⁹ European Communities (Electronic Communications Networks and Services) (Authorisation) Regulations 2011 (S.I. No. 335 of 2011)

¹⁰ The remainder comprises a 10 MHz guard band (between 3 400-3 410 MHz) and spectrum used by State Services.

¹¹ https://rspg-spectrum.eu/wp-content/uploads/2013/05/RPSG16-032-Opinion_5G.pdf

2019/235 and 2008/411/EC.¹²

- 1.13 3.6 GHz Band rights of use in Ireland are service- and technology neutral, and use cases include mobile broadband, fixed wireless broadband and small cells.

3.6 GHz Band Award¹³

- 1.14 On 22 May 2017, ComReg announced the results of its 3.6 GHz Band Award (“Award”) which resulted in five Winning Bidders, across over nine regions (four rural and five urban), together “Regions”) and assigned on a contiguous basis.¹⁴

- 1.15 The 9 licence regions are shown in Figure 2 in the Annex.

3.6 GHz Band Transition

- 1.16 Prior to the Award, the 3.6 GHz Band was used to provide fixed wireless broadband services (and phone services in some cases) to 21,665 existing customers, predominantly in rural areas. In those areas, the existing operators may have been the only available provider of broadband services, such as to homes and schools.

- 1.17 In order to ensure continued services for those existing customers who were at risk of losing their service while Winning Bidders prepared for the deployment of their services (e.g. trials), ComReg developed a Transition licensing framework - which it consulted upon extensively with interested parties and implemented by way of the rules of the Award - which all participants to the Award agreed to be bound by.¹⁵ Essentially, this Transition licensing framework allows existing operators to continue to provide services to their customers until such time that Winning Bidders were ready to roll-out commercial services.

- 1.18 Relevantly, as Imagine was both a Fixed Wireless Access Local Area licensee and a Winning Bidder in the Award, Imagine was eligible to apply for, and currently holds, a 3.6 GHz Band Transition Protected Licence (“TPL”)¹⁶, to facilitate the completion of its Transition Activities as provided for under Section 3.8 of the IM.

¹² Commission Implementing Decision (EU) 2019/235 of 24 January 2019 on amending Decision 2008/411/EC as regards an update of relevant technical conditions applicable to the 3400-3800 MHz frequency band (notified under document C(2019) 262) (Text with EEA relevance.)

¹³ For more information, please see:

<https://www.comreg.ie/industry/radio-spectrum/spectrum-awards/3-6ghz-band-spectrum-award/>

¹⁴ Full details of the results are set out in Document 17/38 and corresponding Media Release.

¹⁵ These rules are contained in the 3.6 GHz Band Spectrum Award Information Memorandum (Document 16/71) (“IM”).

¹⁶ See Section 2.6 of <https://www.comreg.ie/publication/3-6-ghz-band-spectrum-award-information-memorandum/>

1.19 Further details on 3.6 GHz Band Transition activities is available on ComReg's website.¹⁷

1.3 Structure of document

1.20 The remainder of this document is structured as follows:

- **Chapter 2** sets out ComReg's assessment of the Proposed Leases and determination.
- **Annex 1** is a glossary of defined terms.

NON-CONFIDENTIAL

¹⁷ See: <https://www.comreg.ie/industry/radio-spectrum/spectrum-awards/3-6-ghz-band-transition/>

2 Determination

1.21 This chapter outlines ComReg's determination and is structured as follows:

1. A brief description of the notifying parties;
2. Overall current spectrum holdings of the notifying parties;
3. Imagine's existing 3.6 GHz Band spectrum holdings;
4. Proposed Leases;
5. Imagine's post-lease 3.6 GHz Band spectrum holdings; and
6. Assessment.

2.1 The Notifying Parties

2.1.1 Business activities of the notifying parties

1.22 **Imagine** is the largest Wireless Internet Service Provider ("WISP") with circa [X] fixed broadband subscribers as at Q2 2020.¹⁸ Imagine does not provide mobile telecommunications services.

1.23 **Dense Air** is a wholesale provider of telecommunications solutions, in particular neutral-host small cells for 4G LTE and 5G networks. Dense Air provides what it refers to as "*network as a service*" on its own spectrum with optional managed services (including operational and technical support).¹⁹ Dense Air is ultimately a subsidiary of Airspan Networks a network densification solution provider with more than 1,000 customers in over 100 countries around the world²⁰.

2.1.2 Existing overall spectrum holdings of the notifying parties

1.24 The existing spectrum holdings²¹, capable of use for the provision of public wireless ECS, of the notifying parties is shown in **Table 1** below.²²

¹⁸ ComReg Unpublished Quarterly Data, Q2 2020

¹⁹ For further information, please see <https://denseair.net/our-solution/>.

²⁰ For further information, please <https://www.airspan.com/about-airspan/>.

²¹ The figures exclude leases or other temporary rights of use.

²² This excludes temporary spectrum rights issued under ComReg's Covid-19 Temporary Spectrum Management Measures, TPL and pre-existing leases.

Table 1: Spectrum holdings of parties capable of use for the provision of public wireless ECS

Band	3IRL	Vodafone	Meteor	Imagine	Dense Air
800 MHz	20 MHz	20 MHz	20 MHz	-	
900 MHz	30 MHz	20 MHz	20 MHz	-	
Total sub-1 GHz	50 MHz	40 MHz	40 MHz	-	
1800 MHz	70 MHz	50 MHz	30 MHz	-	
3.6 GHz	100 MHz nationally	85 MHz in rural regions and 105 MHz in the cities	80 MHz in rural regions and 85 MHz in the cities	60 MHz in each of the rural regions	25 MHz in rural and 60 MHz in the cities
2.1 GHz FDD	60 MHz	30 MHz	30 MHz		
Total supra-1 GHz	230 MHz	185 MHz	145 MHz	60 MHz	60 MHz
Total²³	280 MHz	225 MHz	185 MHz	60 MHz	60 MHz

2.2 Imagine's existing 3.6 GHz Band spectrum holdings

- 1.25 Imagine's existing 3.6 GHz Band spectrum holdings consist of 60 MHz in each (in the frequency range 3560 to 3620 MHz) in each of four rural licence regions (i.e. Borders, Midlands and West; South West; East and South East) held under its 3.6 GHz Band Liberalised Use Licence ("LU Licence"),
- 1.26 Imagine also holds rights in various parts of the band in 144 Transition Service Areas ("TSAs") under its TPL.
- 1.27 These TSAs correspond to local service areas in which Imagine previously operated under the 3.6 GHz Band FWALA licensing scheme prior to the Award. At the start of Transition immediately after the Award, all TSAs had a 20 km radius boundary around a defined centre point. As Transition has progressed, the area of some TSAs has been reduced to reflect completion of Transition Activities which affect only part

²³ Note that these numbers are the maximum assigned to the licensee in any given region.

of a TSA and to facilitate ongoing Transition Activities in the remainder of the TSA

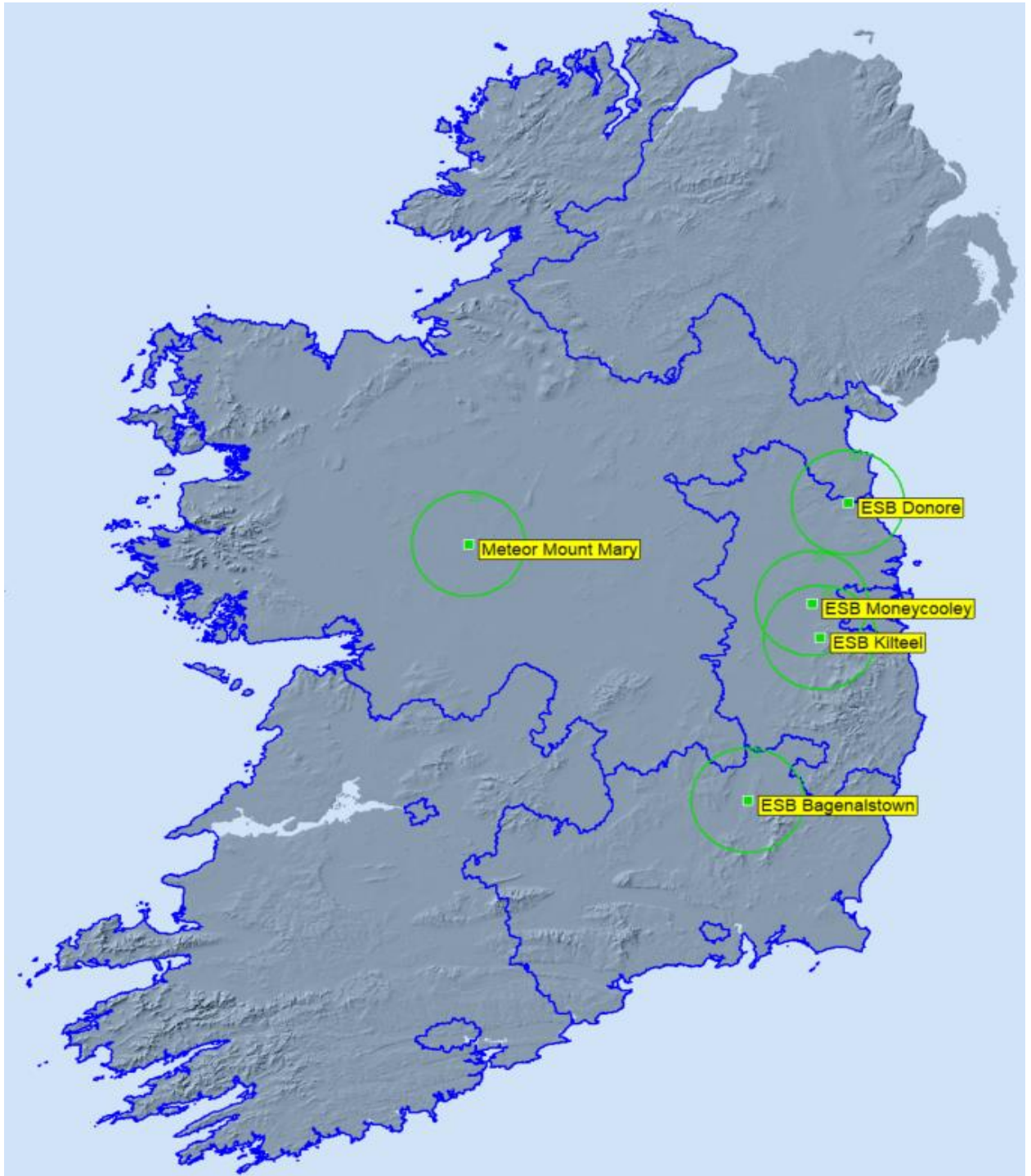
- 1.28 In addition to having a defined geographic area, TSAs are assigned frequency ranges which derive from the previous channel plan for 3.6 GHz Band FWALA licensing from before the Award, which included a number of paired and unpaired channels. In many cases, the frequency ranges of Imagine's TSAs have reduced as Transition has progressed.
- 1.29 Further details of Imagine's TPL holdings, including the locations of same, are set out in the **Annex**
- 1.30 In addition, Imagine currently leases spectrum in 3.6 GHz Band from each of Meteor Mobile Communications Limited ("Eir"), Three Ireland (Hutchinson) Limited ("Three"), and Vodafone Ireland Limited ("Vodafone") at 15 locations ("Existing Lease Areas" or "ELAs"). At a high level, Imagine is currently leasing:
- 20 MHz of 3IRL's 3.6 GHz Band spectrum at 1 location (see Annexes 3 and 4 of Document 20/30);
 - 20 MHz of Meteor's 3.6 GHz Band spectrum rights at 11 locations, and 40 MHz at one further location (see Annexes 1 and 2 of Document 20/30); and
 - 20 MHz of Vodafone's 3.6 GHz Band spectrum at 3 locations, 40 MHz at a further location; and 60 MHz at another further location (see Annexes 5 and 6 of Document 20/30).

2.3 The Proposed Lease

- 1.31 Details of the Proposed Lease are set out in Annexes 1 to 2 of Document 20/75 and readers are referred to same.
- 1.32 At a high level, the Proposed Lease entail Imagine leasing 20 MHz (in the frequency range 3410 to 3430 MHz) at five locations.
- 1.33 Each location consists of an area of 20 km radius around an existing Imagine base station ("Proposed Lease Area" or "PLA"). The Proposed Lease Areas are shown at **Figure 1** below.
- 1.34 The Proposed Leases are for three months initially, followed by a further three-month period subject to the prior agreement by the relevant parties, and approval by ComReg. The following assessment has been conducted on the basis of a potential 6-month lease.

- 1.35 The Proposed Leases do not entail any amendments to the conditions of the 3.6 GHz Band Liberalised Use Licences of Dense Air²⁴.

Figure 1: Map of Proposed Lease Areas



²⁴ Awarded to the Airspan Spectrum Holdings Ltd, which later was renamed.

2.4 Imagine's 3.6 GHz Band spectrum holdings following Proposed Lease

- 1.36 As noted above, the Proposed Lease would increase Imagine's 3.6 GHz Band spectrum holdings by 20MHz in the 5 PLAs.
- 1.37 It is not, however, a straightforward task to assess Imagine's current spectrum holdings in the PLAs because:
- only two of the five PLAs correspond directly to any of Imagine's TSAs and only one of them corresponds to one of Imagine's ELAs (i.e. they are not concentric in most cases);
 - in many cases, PLAs are overlapped by multiple TSAs and/or ELAs in a particular frequency range, but not necessarily across the entire area of the PLA;
 - TSAs and ELAs in different frequency ranges often overlap different parts of PLAs; and
 - in the frequency range 3560 - 3620 MHz, where Imagine holds spectrum rights in the four rural Regions under its LU Licence, two PLAs²⁵ are partly overlapped by urban Regions where Imagine does not hold 3.6 GHz Band ²⁶ spectrum rights.
- 1.38 Therefore, if a PLA is not entirely overlapped by one or more TSAs and/or ELAs in a particular frequency range, the question arises as to whether the TSA/ELA frequency range should constitute part of Imagine's current spectrum holdings for that PLA and, in particular, where the geographic overlap may be relatively small (e.g. 20%).
- 1.39 Therefore, ComReg has assessed Imagine's current spectrum holdings in each quadrant²⁷ of each of the PLAs - rather than in the entirety of each PLA – which should provide sufficient granularity to capture the contributions of significant TSA overlaps within the PLAs. The average increase in Imagine's spectrum across all site quadrants is 18%.

²⁵ KE008 ESB Kiltel and KE014 ESB Moneycooley..

²⁶ A detailed discussion of the issues and ComReg's approach, including examples of same, are detailed in the Annex.

²⁷ i.e. North East, South East, South West and North West Quadrants

1.40 As a result of Imagine's spectrum holdings under its TPL (which vary across different parts of the State), Imagine's post-lease spectrum holdings in the relevant areas will rise by 20 MHz as shown in **Table 2**: This results in Post-Lease holdings of a maximum²⁸ of:

- 139 MHz in 1 PLA;
- 140 MHz in 1 PLA;
- 165 MHz in 1 PLA; and
- 185 MHz in 2 PLAs.

2.5 Assessment

1.41 By way of background, ComReg recalls that its guidelines for the determination of whether a spectrum transfer or lease would likely distort competition - as set out in Chapter 3 Document 14/11R - are to be interpreted and applied flexibly having regard to the specific circumstances of each case.²⁹ For example and other things being equal, a transfer or lease with *prima facie* greater potential to raise competition concerns (such as in terms of quantum of spectrum rights involved, the relative existing spectrum holdings of the notifying and other relevant parties before and following the proposed transfer or lease, and/or the duration of lease etc.), would likely involve a more exhaustive assessment of the matters identified in the guidelines, including a likely corresponding higher burden on the notifying parties in terms of the information required to inform such an assessment.

1.42 In the present matter, ComReg would particularly note the quite limited duration of the Proposed Lease (i.e. 3 months initially, and up to 6 months overall), the relative spectrum holdings of the relevant parties (both pre- and post-lease) and the broader context in which the Proposed Lease is occurring (i.e. COVID-19 and the impact of the measures to address same (e.g. tele-working) on electronic communications networks).

1.43 In light of the above context, ComReg outlines out its assessment below.

1.44 **First**, and in the context of market definition, ComReg recalls paragraph 39 of Document 14/11R which states:

"It is not always necessary to reach a firm conclusion on market definition - for example, where it is clear that the proposed spectrum transfer or lease

²⁸ Represented by the quadrant in each PLA with the greatest quantum of spectrum holdings.

²⁹ Paragraph 33 of Document 14/11R.

is not likely to raise competition concerns on any reasonable definition of the market.”

- 1.45 In the present case, it appears sufficient to consider the Proposed Lease in the narrow context of the relative distributions of holdings in the relevant spectrum band, noting, of course, the potential for other competitive constraints when viewed more broadly, such as in terms of alternative spectrum bands (e.g. fixed wireless access services provided using licence-exempt spectrum) and alternative technologies (e.g. mobile broadband and fixed broadband etc).
- 1.46 **Second**, and in that context, ComReg does not consider that the post-lease 3.6 GHz Band spectrum holdings of Imagine are likely to distort competition noting, among other things:
- that Imagine presently holds 60 MHz under its LU Licence out of a total of 350 MHz assigned in rural regions in the 3.6 GHz Band (or circa 17%), noting also the service- and technology-neutral rights in this band;
 - Imagine’s existing holdings under its TPL (as detailed in the Annex), whilst being counted according the methodology described herein and accounting for a considerable proportion of Imagine’s post-lease spectrum holdings, are nevertheless ultimately temporary as Imagine holds them subject to the Transition Rules and, in particular, the commercial deployment plans of the relevant Winning Bidder/s;
 - the very short-term nature of the Existing Leases; and
 - the very short-term nature of the Proposed Lease itself (see further below).
- 1.47 The very short-term nature of the Proposed Lease limits the potential for material competitive distortions to arise because, among other things:
- the Proposed Lease is stated to be for use in providing FWA services to Imagine’s pre-existing customers only;³⁰ and
 - the benefits to Imagine from the Proposed Lease (i.e. additional capacity and better quality of service) are short-lived, thereby reducing the ability and incentive to seek to increase its prices (or reduce its output) on foot of same without concern as to the reactions of its competitors and/or customers.

³⁰ See page 4 of the lease agreement between Imagine with Dense Air in ComReg Document 20/75.

- 1.48 **Third**, ComReg recalls the broader context in which the Proposed Lease is occurring (i.e. COVID-19 and the impact on measures to address same on electronic communications networks)
- 1.49 For the reasons outlined above, ComReg considers that the Proposed Lease would not be likely to distort competition and determined that the Proposed Lease may be put into effect for a period of six months from 22/09/2020.

NON-CONFIDENTIAL

Annex 1: Imagine’s spectrum holdings

The increase in Imagine’s spectrum holdings as a result of the Proposed Lease

A 1.1 The impact of the Proposed Lease on Imagine’s spectrum holdings in each PLA on a per quadrant basis is shown in **Table 2** below.³¹

Table 2: Summary of the accumulation of spectrum by Imagine on a PLA basis

Proposed Lease Area	Proposed Lease Arrangement	Freq Range (MHz)	Imagine's Spectrum Holdings before Lease (MHz)				Additional Quantum of Spectrum (MHz)	Imagine's Spectrum Holdings during Lease (MHz)				%Increase of Imagine's Spectrum Holdings - Lease Period/Current (within each quadrant)			
			NE	SE	SW	NW		NE	SE	SW	NW	NE	SE	SW	NW
GY041 Meteor Mount Mary	Dense Air/Imagine	3410 - 3430	60	60	119	80	20 MHz	80	80	139	100	+33%	+33%	+17%	+25%
LH002 ESB Donore Drogheda	Dense Air/Imagine	3410 - 3430	120	80	120	120	20 MHz	140	100	140	140	+17%	+25%	+17%	+17%
KE014 ESB Moneycooley	Dense Air/Imagine	3410 - 3430	155	155	165	165	20 MHz	175	175	185	185	+13%	+13%	+12%	+12%
KE008 ESB Killeel	Dense Air/Imagine	3410 - 3430	155	114	165	165	20 MHz	175	134	185	185	+13%	+18%	+12%	+12%
CW006 ESB Bagenalstown	Dense Air/Imagine	3410 - 3430	145	60	145	145	20 MHz	165	80	165	165	+14%	+33%	+14%	+14%

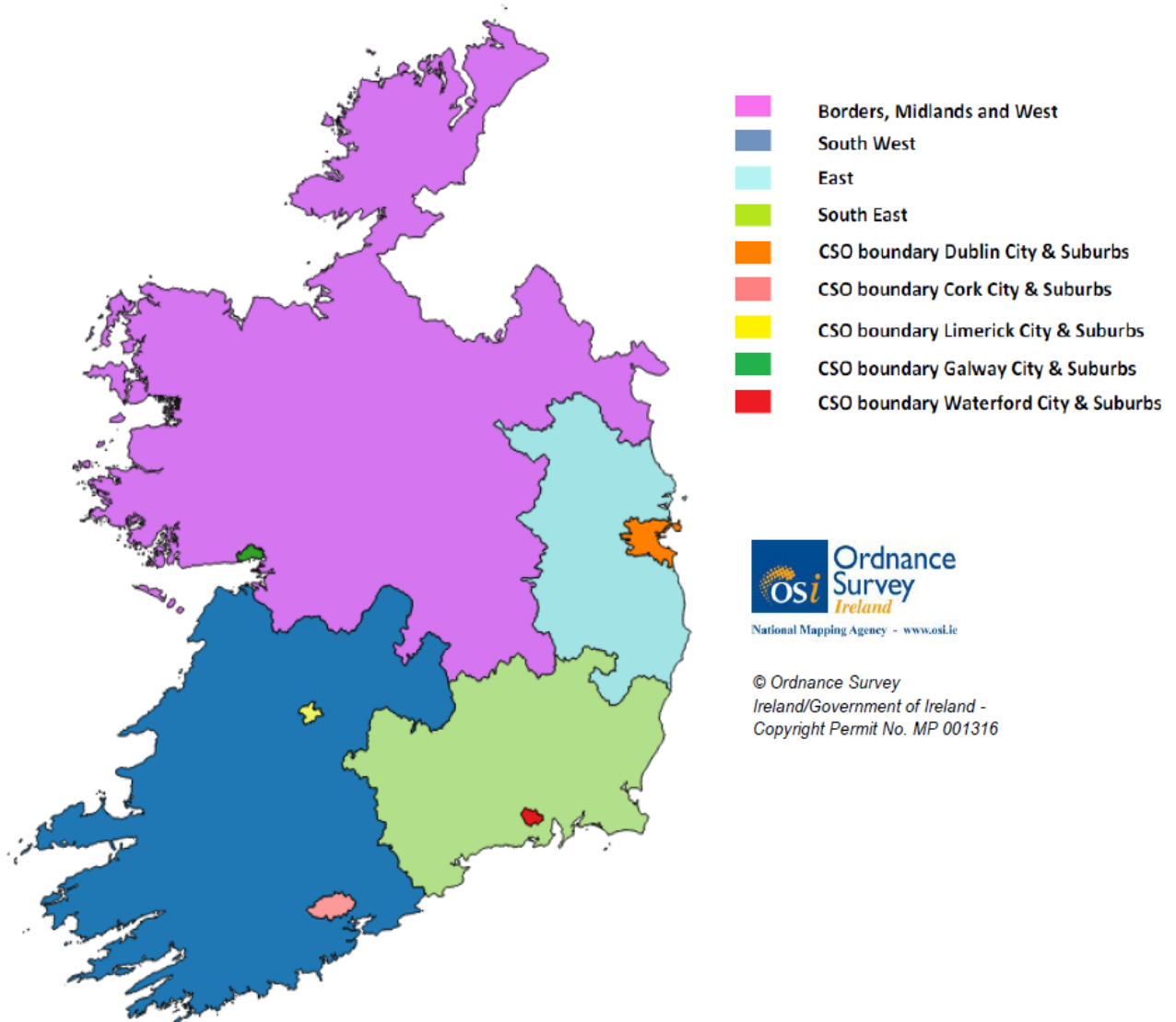
³¹ ComReg’s rationale for this approach is explained below.

Imagine's current 3.6 GHz Band spectrum holdings

Imagine's LU Licence Spectrum Holdings

A 1.2 Under the 2017 3.6 GHz Band Spectrum Award³², ComReg made 3.6 GHz Band spectrum available in nine Regions of the State as identified in **Figure 2**.

Figure 2: Regions in the 3.6 GHz Band Award



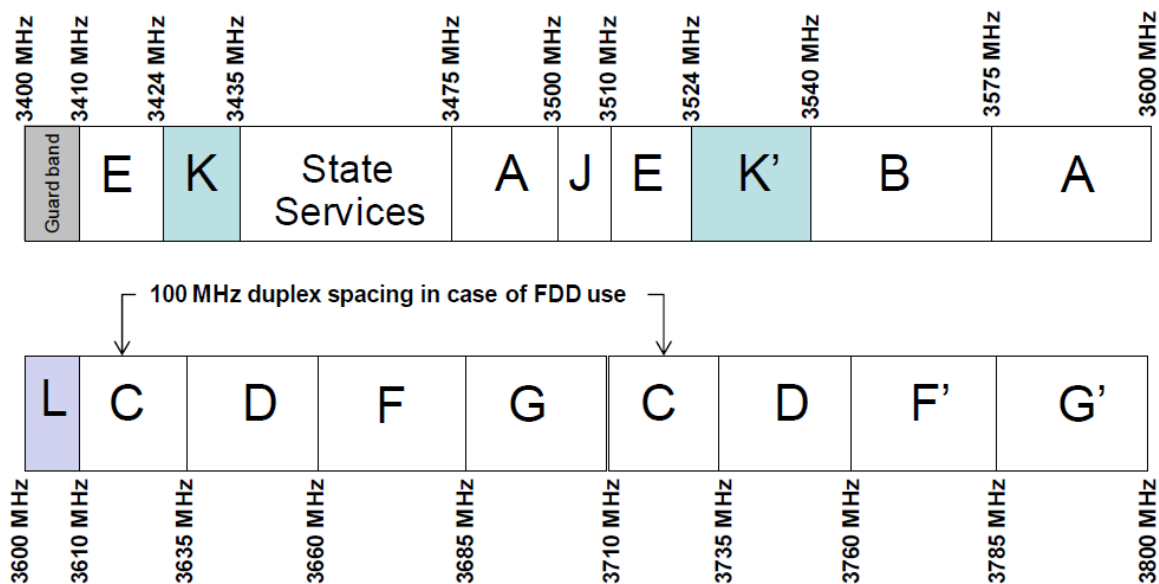
³² For more information, please see:

<https://www.comreg.ie/industry/radio-spectrum/spectrum-awards/3-6ghz-band-spectrum-award/>

Imagine's TPL Spectrum Holdings

- A 1.3 Imagine currently holds rights of use to spectrum in various parts of the 3.6 GHz Band in 144 Transition Service Areas ("TSAs") under its TPL.
- A 1.4 These TSAs correspond to local service areas where Imagine previously operated under the 3.6 GHz Band FWALA licensing scheme prior to the 3.6 GHz Band Award. At the start of Transition immediately after the Award, all TSAs had a 20 km radius boundary around a defined centre point. As Transition has progressed, the area of some TSAs has been reduced to reflect completion of Transition Activities which affect only part of a TSA and to facilitate ongoing Transition Activities in the remainder of the TSA.
- A 1.5 In addition to having a defined geographic area, TSAs are assigned frequency ranges which derive from the previous channel plan for 3.6 GHz Band FWALA licensing from before the Award, which included a number of paired and unpaired channels as shown in **Figure 3**.

Figure 3: Previous FWALA channel arrangements in the 3.6 GHz Band



- A 1.6 In many cases, the frequency ranges of Imagine's TSAs have reduced as Transition has progressed and Imagine has vacated parts of the spectrum in those TSAs to make that spectrum available for other Winning Bidders to roll out new services.

A 1.7 Having originally held spectrum rights in 241 TSAs under its TPL, Imagine now has 144 TSAs which are licensed in respect of the frequency ranges identified in **Table 4**.

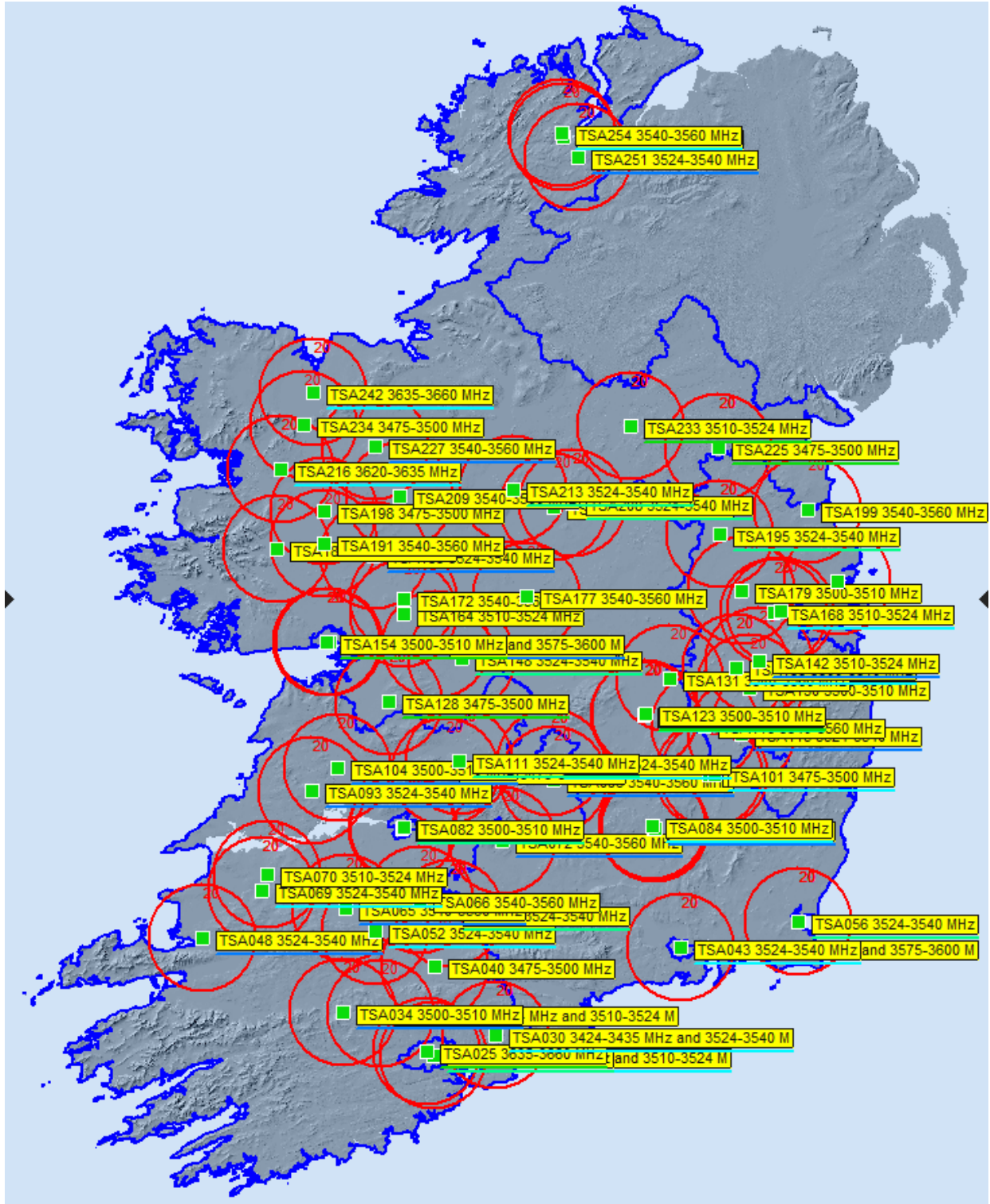
Table 3: Number of Imagine TSAs by Frequency Range³³

Frequency Range/s Licensed in TSA	No. TSAs
3410-3424 MHz and 3510-3524 MHz	3
3424-3435 MHz and 3524-3540 MHz	2
3475-3500 MHz	27
3475-3500 MHz and 3575-3600 MHz	2
3475-3500 MHz and 3580-3600 MHz	1
3500-3510 MHz	24
3510-3524 MHz	22
3524-3540 MHz	23
3540-3560 MHz	31
3540-3575 MHz	2
3620-3635 MHz	2
3635-3660 MHz	5
Total TSAs	144

A 1.8 Together, Imagine's current TSAs cover most of the geographic area of the State as can be seen in **Figure 4**.

³³ As of 7 September 2020.

Figure 4: Locations of Imagine's TSAs



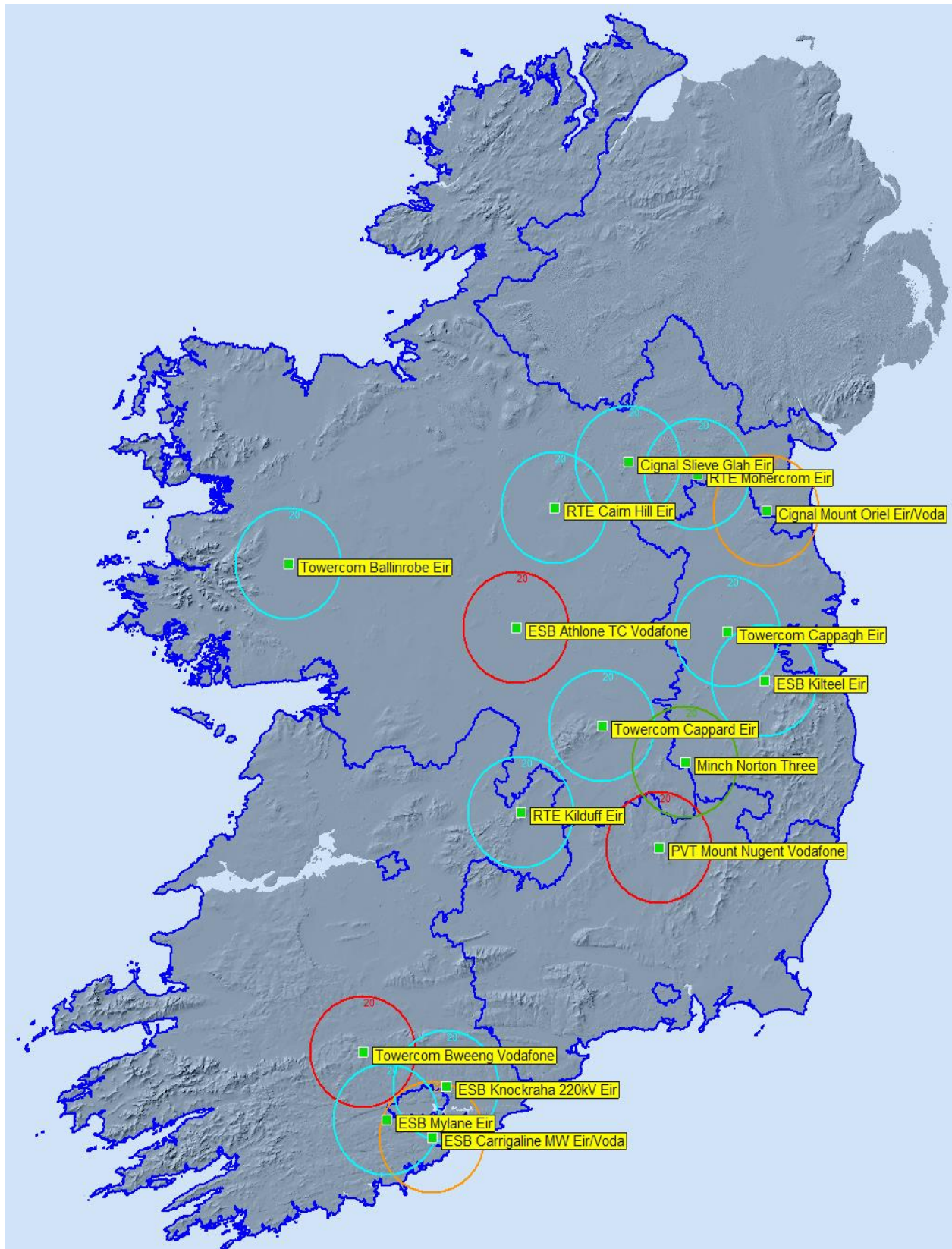
Imagine's spectrum holdings under ELAs

1.50 Imagine currently leases spectrum rights in the 3.6 GHz Band from each of Eir, Three and Vodafone in 15 ELAs. The spectrum leased by Imagine in each of these ELAs is shown in **Table 4**, while the locations of the ELAs are identified on the map in **Figure 5**.

Table 4: Spectrum currently held by Imagine in its ELAs

Existing Lease Area	Existing Lease Arrangement	Freq Range (MHz)
MO007 Towercom Ballinrobe	Meteor/Imagine	3620 - 3640
LD001 RTE Cairn Hill	Meteor/Imagine	3620 - 3635
CN008 Cignal Slieve Glah	Meteor/Imagine	3620 - 3640
CN004 RTE Mohercrom	Meteor/Imagine	3620 - 3640
LH004 Cignal Mount Oriel	Vodafone/Imagine	3480 - 3500
	Meteor/Imagine	3620 - 3640
KE022 Towercom Cappagh	Meteor/Imagine	3620 - 3640
KE008 ESB Killeel	Meteor/Imagine	3620 - 3640
LS010 Towercom Cappard	Meteor/Imagine	3620 - 3660
TY017 RTE Kilduff	Meteor/Imagine	3620 - 3640
CK025 ESB Mylane	Meteor/Imagine	3620 - 3640
CK048 ESB Knockraha 220kV	Meteor/Imagine	3620 - 3640
CK024 ESB Carrigaline MW	Vodafone/Imagine	3540 - 3560
	Meteor/Imagine	3620 - 3640
KE006 Minch Norton	Three/Imagine	3700 - 3720
CK042 Towercom Bweeng	Vodafone/Imagine	3520 - 3540
WH001 ESB Athlone TC	Vodafone/Imagine	3480 - 3540
KK001 PVT Mount Nugent	Vodafone/Imagine	3500 – 3540

Figure 5: Locations of Imagine's ELAs



Difficulty of assessing Imagine's current spectrum holdings within a PLA

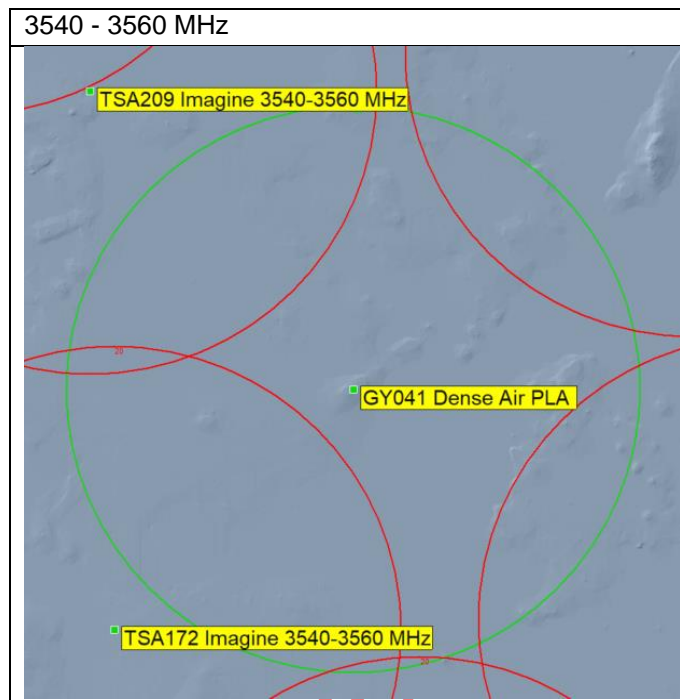
- A 1.9 It is not a simple task to assess the current spectrum holdings in each of the PLAs, given that:
- (a) only two of the five PLAs are concentric with any of Imagine's TSAs and only one of them is concentric with any of Imagine's ELAs;
 - (b) in many cases PLAs are overlapped by multiple TSAs and/or ELAs in a particular frequency range, but not necessary across their entire areas;
 - (c) TSAs and ELAs in different frequency ranges often overlap different parts of PLAs; and
 - (d) in the frequency range 3560 - 3620 MHz, where Imagine holds spectrum rights in four rural Regions under its LU Licence, two PLAs³⁴ are partly overlapped by urban Regions where Imagine does not hold 3.6 GHz Band spectrum rights.
- A 1.10 If a PLA is not entirely overlapped by TSAs or ELAs in a particular frequency range, the question arises as to whether that frequency range constitutes part of Imagine's current spectrum holdings within that area, in particular if it overlaps only a small portion (e.g. 20%) of that area.
- A 1.11 This problem can be better understood by way of example. The PLA around Mount Mary³⁵ is overlapped by Imagine TSAs in five frequency ranges.
- A 1.12 In one of those frequency ranges³⁶, most of the geographic area of the PLA is overlapped by Imagine TSAs, as shown in
- A 1.13 Figure 6. In these cases, it might be reasonable to assume that the current spectrum holding within the PLA includes these three frequency ranges.

³⁴ KE008 ESB Kiltel and KE014 ESB Moneycooley.

³⁵ GY041 Meteor Mount Mary.

³⁶ 3540 - 3560 MHz.

Figure 6: Frequency ranges where Mount Mary PLA is mostly overlapped by Imagine TSAs³⁷

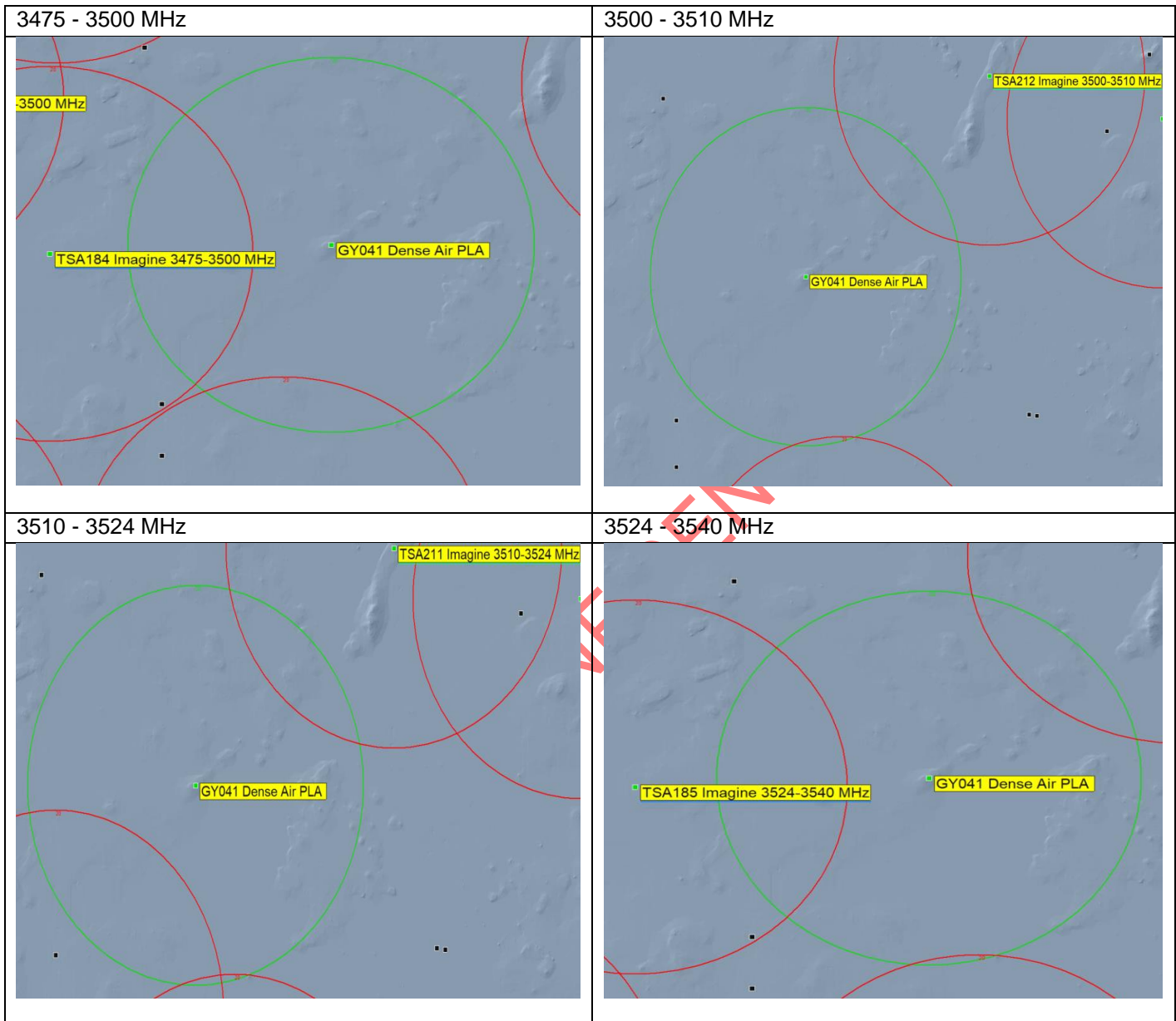


A 1.14 However, in the other four frequency ranges³⁸, the area of the PLA overlapped by Imagine TSAs is less than 50%, as shown in **Figure 7**. In these cases, it does not seem reasonable to assume that the current spectrum holding within the entire PLA includes these two frequency ranges, as they only relate to relatively small portions of the PLA. However, the areas overlapped within the PLAs do not appear to be insignificant in terms of geographic extent.

³⁷ Light green circles represent PLA boundaries, while red circles represent TSA boundaries.

³⁸ 3475 - 3500 MHz, 3500 - 3510 MHz, 3510 - 3524 MHz and 3524 - 3540 MHz.

Figure 7: Frequency ranges where Mount Mary PLA is only partially overlapped by Imagine TSAs

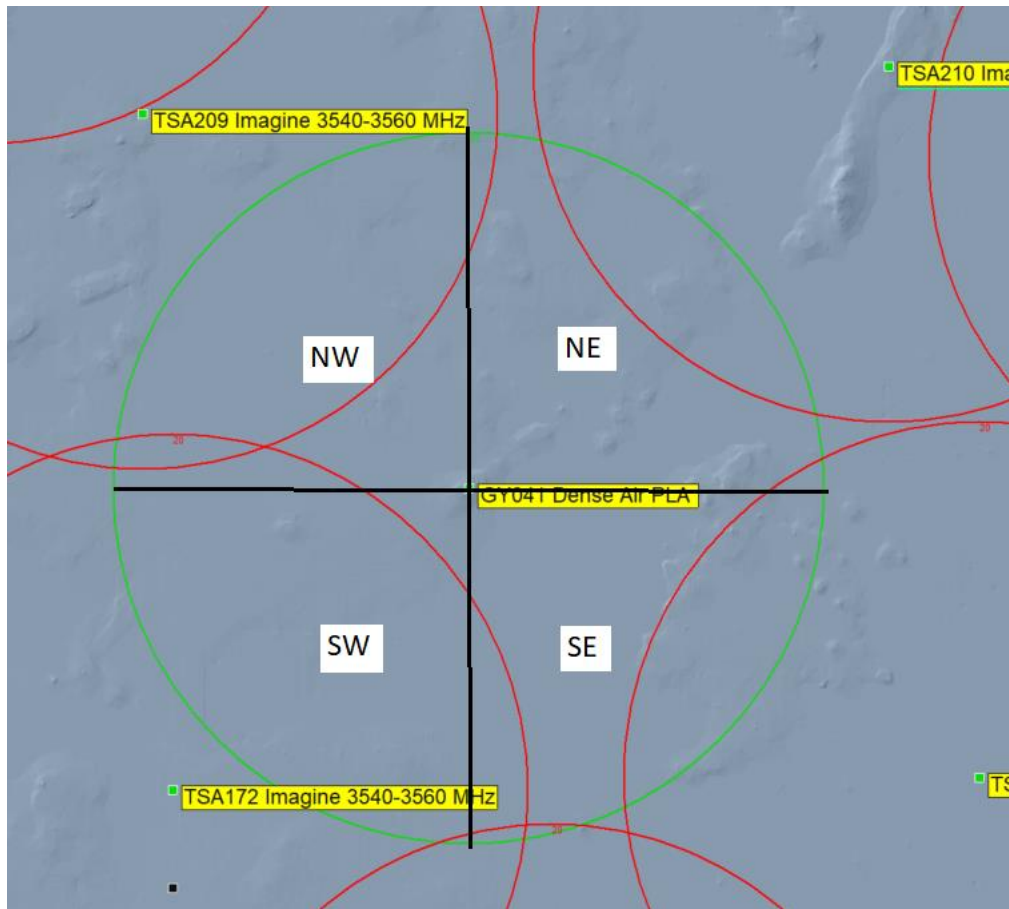


Approach to assessing Imagine’s 3.6 GHz Band spectrum holdings

A 1.15 In light of the above, ComReg considers that an approach is required which takes into account that, while Imagine TSAs in a particular frequency range might not overlap a PLA to a significant enough extent that it could reasonably assumed that that frequency range constitutes part of Imagine’s overall spectrum holdings associated with the PLA, the overlapped area might nevertheless be significant enough to take into account when assessing Imagine’s spectrum holdings.

A 1.16 Therefore, ComReg has assessed Imagine's current spectrum holdings in each quadrant³⁹ of the PLAs rather than in the entirety of each PLA, as shown in the example in **Figure 8**. ComReg considers this to be a practical approach which gives sufficient granularity to capture the contributions of significant TSA overlaps within the PLAs to Imagine's current spectrum holdings in those areas.

Figure 8: Example Assessment of Imagine's Spectrum Holdings in PLA Quadrants for Frequency Range 3540 - 3560 MHz – Mount Mary



A 1.17 In that regard, ComReg's approach to assessing Imagine's 3.6 GHz Band spectrum holdings within a PLA quadrant is as follows:

- I. If the area of a quadrant is greater than or equal to 50% overlapped by Imagine TSAs in a particular frequency range, the overlap is considered to be significant and therefore that frequency range is counted as part of Imagine's 3.6 GHz Band spectrum holdings within that quadrant; and

³⁹ i.e. North East, South East, South West and North West Quadrants

- II. If the area of a quadrant is less than 50% overlapped by Imagine TSAs in a particular frequency range, the overlap is considered as not significant and therefore that frequency range is not counted as part of Imagine's 3.6 GHz Band spectrum holdings within that quadrant.

A 1.18 Additionally, with regard to the frequency range 3560 - 3620 MHz, where Imagine holds spectrum rights on a quasi-national basis in four rural Regions, but not in urban Regions, under its LU Licence, that frequency range is only discounted from Imagine's current spectrum holdings within a quadrant where the area of the quadrant is greater than or equal to 50% overlapped by an urban Region, in similar manner to overlapping TSAs as described above.

Assessment of Imagine's 3.6 GHz Band spectrum holdings during lease period

A 1.19 It should be noted that spectrum to be leased within a PLA may not necessarily entail an increase in Imagine's spectrum holdings by the same quantum in any quadrant of that area during the period of the Proposed Lease. For example, if the quantum of spectrum to be leased in a PLA quadrant is 20 MHz, but 5 MHz within the frequency range of that 20 MHz is already currently assigned to Imagine in a TSA which significantly overlaps that quadrant, then the quantum of spectrum within that quadrant will only increase by 15 MHz due to lease. Indeed, it will be the case that the quantum of spectrum in a PLA quadrant will not increase at all under a lease if the full range to be leased is already currently assigned to Imagine within a TSA which significantly overlaps that quadrant.