



An Coimisiún um
Rialáil Cumarsáide
Commission for
Communications Regulation

ComReg information to DECC in support of JOC request of 15 November 2023

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An Coimisiún um Rialáil Cumarsáide
Commission for Communications Regulation

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1 Background: Extracts - transcript Joint Oireachtas Committee (JOC) 2023.11.15

1.1 Opening statement – Fergal Mulligan – Page 5

Mr. Fergal Mulligan: ... Eir's 5G network roll-out continues to expand, with coverage to over 70% of the population in all 26 counties. Vodafone's 5G network is currently live in selected areas across 26 counties in Ireland. Three Ireland's 5G network has 85% population coverage. In quarter 4 of 2022, there were 988,000 5G mobile subscriptions, representing a 152% year-on-year increase, and almost 18% of all mobile subscriptions.

1.2 Original Query – Page 29-30

Deputy Éamon Ó Cuív: My final question is very much directed to the Department of the Environment, Climate and Communications. It is a simple question. If I set off from Clonbur in my area towards Finny and go to Tonlegee or Glentraigue, there is no mobile signal. If I go into the Inagh Valley, which some of the witnesses will have heard of, or go around the Kylemore area – not just the abbey section of it, as Kylemore starts way before that turn – or Inishbofin, mobile signal is very poor. You can be quite deep inside a valley and be nowhere near a mobile signal. What progress has the task force made in taking in what should have been part of the contract from the very beginning – we sold the thing for a bit of extra money and sold 5% of the population short – in the past four or five years and what progress is planned to be made to cover these black spots? The map shows the situation. The witnesses all know the famous map. They can see the mountainous areas in Wicklow, Connemara and Donegal – the Cathaoirleach is lucky in Roscommon, as there are not too many mountains in east Galway – and that they still do not have mobile coverage.

An Cathaoirleach: I will ask both Departments to respond. Before I do, though, I will say that it is because of the mobile phone and broadband task force that we actually have the map with its various shades of brown. Sadly, there are some weak brown areas in my constituency. I call Mr. Mulligan, Mr. O'Brien and Mr. Whelan.

1.3 Discussion – Pages 32-33

Mr. Fergal Mulligan: Mobile would not be my area but my understanding of what ComReg has done with the licensing is it has issued the licence to get 5G coverage to 95% of the population. Population coverage does not cover national parks and the lovely parts of Roscommon and Wicklow where the Cathaoirleach and I live.

An Cathaoirleach: That is about 750,000 people.

Mr. Fergal Mulligan: The black spots mentioned, if they are in a national park, will take time to get addressed by 5G. Remote rural areas that may be behind a hill or around

mountains are very difficult to get to. We will not have a plethora of towers and masts all over the place. In fairness to the mobile companies, it is difficult infrastructure to build to get to unique, one-off housing, if that is the main issue. The new 5G licences have different criteria around them to deal with motorways and national roads and make sure coverage is on those, which did not apply under previous licensing arrangements in 4G and 3G. There have been a number of improvements under the new licensing arrangements, which were issued by ComReg only earlier this year. These are being rolled out only now by the three main companies, Vodafone, Eir and Three. As I said in my opening statement, we have got to 70% and we are getting towards 80% and 90%. They have not got there yet but that will happen over the next few years.

The target is 2030 by which to get to all populated areas with 5G. As Mr. Hendrick noted, the roll-out of the NBP is going to help with coverage because, under the NBP, as we are bringing fibre throughout these rural roads, mobile companies can go to NBI and seek coverage for fibre to towers and masts on the hills and mountains to improve the coverage and capacity as they roll out their equipment. It is organically getting better and will get better over the coming years. Through the commercial roll-out and the new licensing arrangements ComReg has put in place, it is incrementally improving this year, next year and the year after that, although there are still problems as of today.

Deputy Éamon Ó Cuív: What does the Department define as a populated area? I deal with plenty of populated areas that do not have mobile phone service, and I am not talking about just one house in a massive valley.

1.4 Request for report - Pages 33-34

An Cathaoirleach: This is an issue the committee needs to return to because it is a broader one and we do not have the relevant players in front of us, although I will come back to it later. Deputy Ó Cuív is correct about population coverage. Coverage of 70% equates to 322 towns and cities. That is all it is. Three Ireland is on 85%, which is a bit higher than that. Even so, we are ignoring 750,000 people who live in these rural areas and who will not get 5G coverage based on any of these targets. Of course, it is not just about mobile phone coverage. There is the question of emergency services as well. What happens if someone in this national park breaks a leg and has no coverage? The then Minister for Rural and Community Development, Deputy Ring, and I launched a number of years ago a service with Android phones that allowed for the emergency services to determine geographically where someone was if they had dialled 112 or 999, but that is not going to be feasible once we switch off the 3G service. If Deputy Ó Cuív thinks things are bad at the moment, it is going to get worse when the 3G service is switched off. It is an issue we need to look at.

Will the Department revert to us with a briefing note on coverage in terms of the deployment of 4G, the licensing conditions that are set in that regard, the switch-off of 3G and the implications of that, and the TETRA emergency response service, which is being decommissioned? The taxpayer is going to have to put a new network in place for our ambulances and Garda anyway, which will have to be on a geographical basis, and it would make more sense to piggyback on that. My understanding is that the industry has put forward proposals on this to the Government. We need to bring in industry representatives, the regulator and departmental officials on this, but that is a matter for another meeting. I will flag it. Mr. Mulligan might wish to comment on that.

Mr. Fergal Mulligan: *On the 3G switch-off, my understanding is that is with Vodafone at the moment in the main and it is running a pilot programme in Limerick. ComReg will oversee that transition away from 3G to ensure end users will not be negatively impacted. That will be an orderly transition away from 3G, with minimal impact on end users, as I understand.*

We will revert to the committee with a note on 4G. Again, the licence conditions were set by ComReg and are currently in a period of being complied with over the next couple of years. They are not at full coverage where they are. I understand they do, at a minimum, cover all villages, for example, in terms of when they get the full roll-out. Populated areas are, therefore, at least villages.

Deputy Éamon Ó Cuív: *Yes, but 30% do not live in villages-----*

An Cathaoirleach: *We will come back to this-----*

Mr. Fergal Mulligan: ComReg and the industry will be better placed to answer those questions.

2 ComReg information

2.1 Existing 4G and 5G coverage of the mobile network operators.

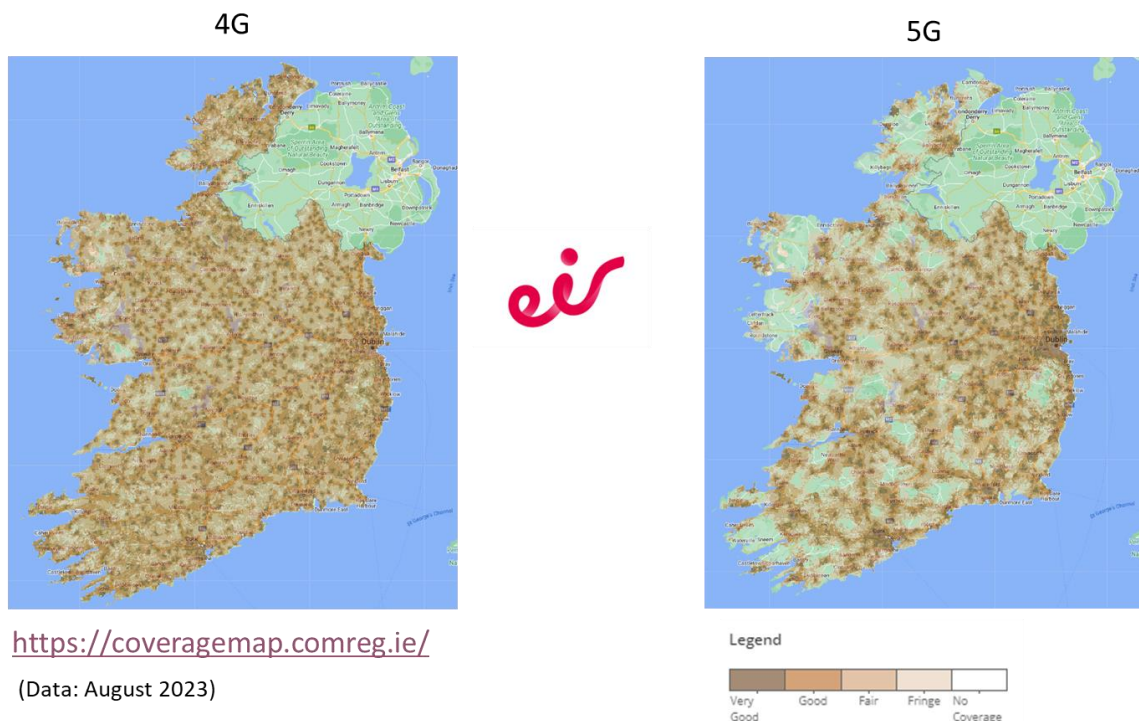
2.1 Information is set out below on the existing 4G and 5G coverage of the three mobile network operators (MNOs), eir, Three and Vodafone. This is based on information taken from each of the MNO's website. In addition, maps of the MNO's 4G and 5G coverage are presented below based on ComReg's outdoor mobile coverage tool¹.

2.1.2 Eir's 4G and 5G coverage

2.2 Eir claims that it has Ireland's largest 5G network offering **5G coverage to over 70% of the population**, and that it currently offers 5G coverage in 322 towns and cities in all 26 counties of Ireland². In relation to 4G, Eir claims that it has **99% 4G coverage** and 99% population coverage across Ireland³.

2.3 A map of Eir's existing 4G and 5G outdoor mobile coverage is shown below.

Eir's 4G and 5G outdoor mobile coverage



¹ Source: <https://coveragemap.comreg.ie>

² Source: <https://www.eir.ie/5G/> (accessed 24 January 2024)

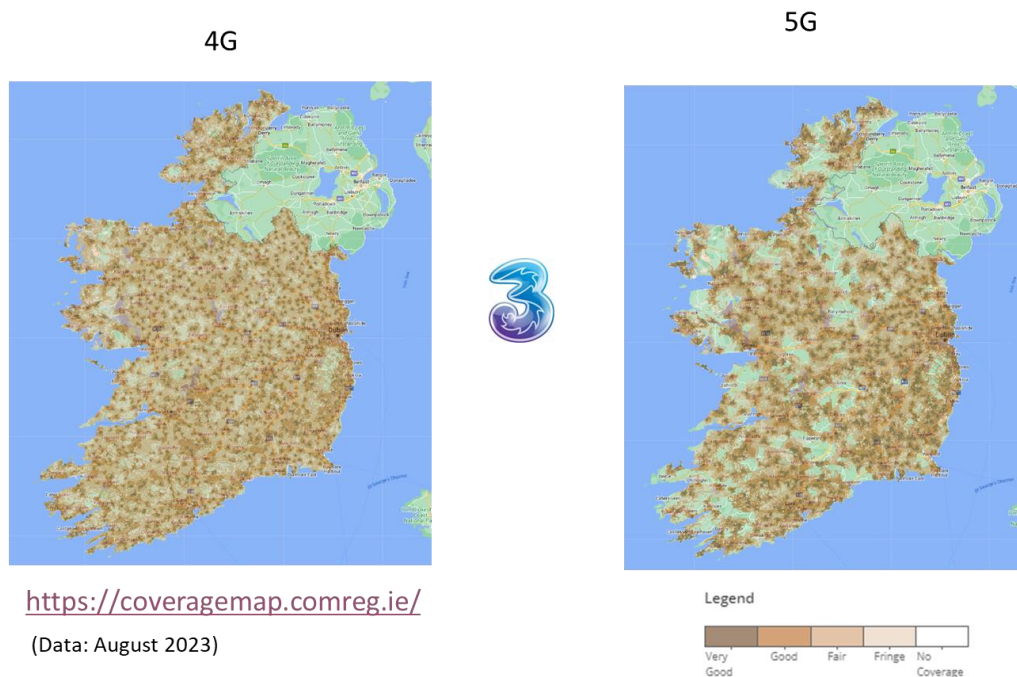
³ Source <https://www.eir.ie/ourmobilenetwork/> (accessed 24 January 2024)

2.1.3 Three's 4G and 5G coverage

2.4 Three claims that it has **99% 3G/4G coverage** throughout Ireland and **85% 5G population coverage**⁴.

2.5 A map of Three's existing 4G and 5G outdoor mobile coverage is shown below.

Three's 4G and 5G outdoor mobile coverage

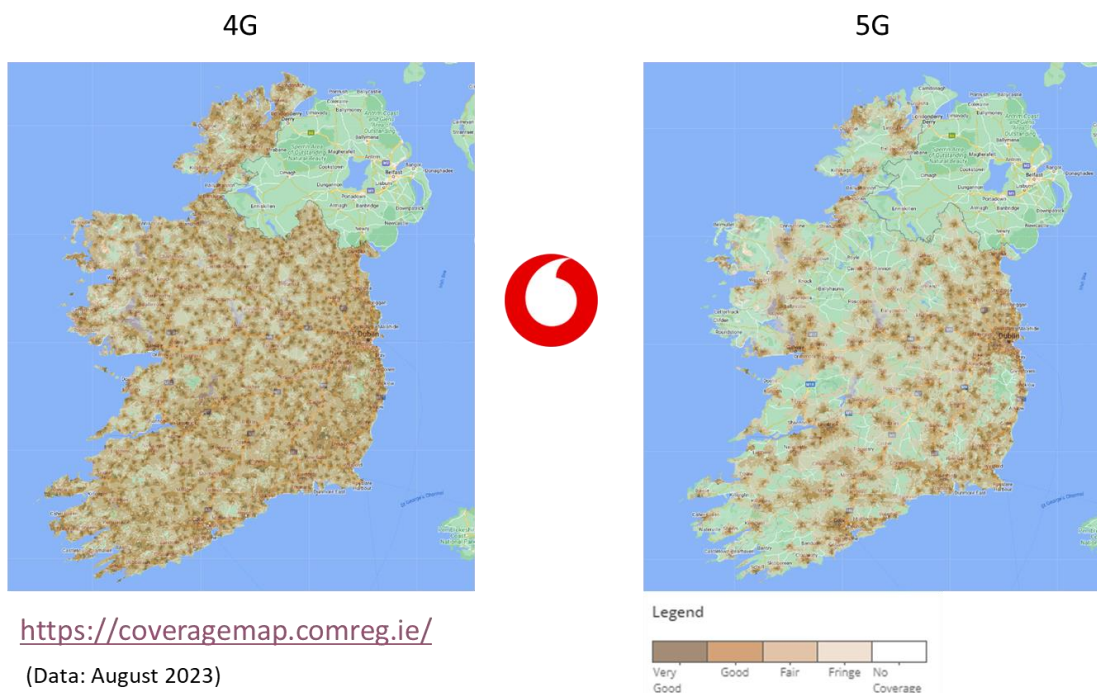


⁴ Source: <https://www.three.ie/coverage-checker/> (accessed 24 January 2024)

2.1.4 Vodafone's 4G and 5G coverage

- 2.6 Vodafone claims that it has over **99% 4G population coverage**⁵ and that its **5G network is currently live in selected areas across the 26 counties** in Ireland and is continuing to be expanded *“as quickly as possible without compromising on quality”*⁶.
- 2.7 A map of Vodafone's existing 4G and 5G outdoor mobile coverage is shown below.

Vodafone's 4G and 5G outdoor mobile coverage



2.2 Ireland's existing 5G coverage is above the EU average.

- 2.8 As stated in the European Commission's (EC) 2023 country report for Ireland on the state of the Digital Decade, **Ireland's overall 5G coverage is 84% of households and above the EU average of 81%**⁷.

“On the overall 5G coverage, at 84% it is above the EU average of 81% and is making good progress towards achieving the EU 2030 target of 100% coverage. At 56%, Ireland performs better than the EU average concerning 5G coverage on the 3.4-3.8 GHz spectrum band.”

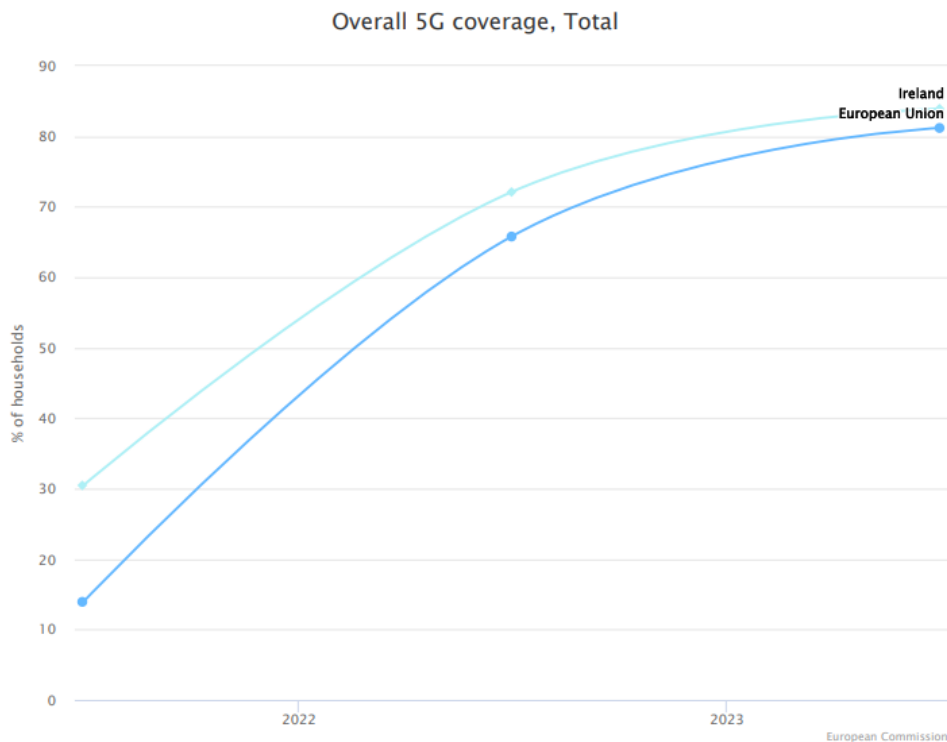
- 2.9 The EC also presents information on overall 5G coverage for the years 2021 to 2023. The figure below plots Ireland's overall 5G coverage versus the EU average for these

⁵ Source: <https://n.vodafone.ie/network.html> (accessed 24 January 2024)

⁶ Source: <https://n.vodafone.ie/network/5g.html> (accessed 24 January 2024)

⁷ Source: <https://digital-strategy.ec.europa.eu/en/library/2023-report-state-digital-decade>

years.⁸



2.3 Coverage obligations in the 2nd Multi-Band Spectrum Award (MBSA2) Liberalised Use Licences

2.10 In the most recently issued radio spectrum licences for mobile and wireless broadband, namely the “MBSA2 Liberalised Use Licences” which commenced on 20 January 2023 and run for a period of circa 20 years until 2042⁹, ComReg set out a comprehensive suite of coverage obligations which obliges the three MNOs, as licensees, to expand their current networks to provide and maintain:

- a 3 Mbit/s service to 99% of the population within 3 years and 92% of the geographic area of Ireland within 7 years;
- a 30 Mbit/s service to 95% of the population, 90% of motorways, and 80% of primary roads within 7 years; and
- a 30 Mbit/s service to 345 specific locations (see annex for specific details) within 7 years, consisting of 40 business and technology parks (including

⁸ Source: https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/compare-countries-progress?indicator=desi_2b2&breakdown=total_pophh&unit=pc_hh_all&country=EU,IE

⁹ Information on the mobile & wireless broadband licences issued to the MNOs is available on the ComReg website at the following address: <https://www.comreg.ie/industry/radio-spectrum/licensing/search-licence-type/mobile-licences-3/>

“strategic sites”¹⁰), 65 hospitals, 24 higher education campuses, 14 air and seaports, 160 train and bus stations, and 42 top visitor attraction information points.

- 2.11 Details on these coverage obligations, including their milestone dates, are set out in the tables below, and the full list of the 345 specific locations is set out in Annex 1.

Table 1: Outdoor coverage obligations in the MBSA2 Liberalised Use Licences of the MNOs

Outdoor coverage service (Single User Throughput Cell Edge)	Coverage dimension	Coverage % levels to be met in ¹¹ :		
		3 Years	5 Years	7 Years
30 Mbit/s	Population	85%	92%	95%
30 Mbit/s	Motorways	75%	85%	90%
30 Mbit/s	Primary Roads	60%	75%	80%
3 Mbit/s	Population	99%	99%	99%
3 Mbit/s	Geographic area	90%	91%	92%

¹⁰ See Table A4:1 in Annex 1 for a list of these “strategic sites”

¹¹ From the earliest commencement date of the 700 MHz Duplex Block(s).

Table 2: Outdoor coverage obligations at specific locations in the MBSA2 Liberalised Use Licences of the MNOs

Outdoor coverage service	Location	Coverage % levels and milestones ¹²
30 Mbit/s (Single User Throughput Cell Edge)¹³	<p><i>Specific locations as particularised in the Information Memorandum which include:</i></p> <ul style="list-style-type: none"> • Business and technology Parks: Business and technology Parks (including strategic sites): Industrial Development Agency (IDA) Ireland provides a list of 31 Business and Technology Parks and 9 Strategic Sites. The obligation also includes adjacent business and technology parks to those of IDA Ireland; • Hospitals: the Health Service Executive (HSE) identifies a list of the 48 public and 17 private hospitals; • Higher Education Campuses: The Higher Education Authority (HEA) identifies a list of 8 Universities, 11 Institutes of Technology and 5 other colleges; • Air and Sea Ports: the Department of Transport Tourism and Sport (DTTAS) identifies a list of the 7 main airports and the Irish Maritime Development Office (IMDO) identify a list of the 7 passenger sea ports; • Train and bus stations: the National Transport Authority (NTA) identifies the busiest 144 train stations and Bus Éireann identifies a list of the main 16 bus stations; and • Top visitor attraction information points: Fáilte Ireland identifies a list of the top 21 fee charging and 21 free entry visitor attractions. 	<p><i>For each category</i></p> <p>70 % in 3 years</p> <p>90 % in 5 years</p> <p>100 % in 7 years</p>

2.4 Switch-off of 3G

2.12 In accordance with the principles of European¹⁴ and National¹⁵ Law regarding the management of radio spectrum, in Ireland, and similar to elsewhere in Europe, the

¹² From the earliest commencement date of the 700 MHz Duplex Block(s).

¹³ Single User Throughput at Cell Edge is a technical term used in the coverage modelling of mobile networks and is defined as the downlink bit rate that can be successfully delivered to a single active user at cell edge.

¹⁴ See for example:

- Article 3 “General Objectives”, Regulation (4)(b) of the EEC Directive [\(EU\) 2018/1972](#)
- Article 2 “General Regulatory Principles”, Regulation (1)(e) of the RSPP Decision [243/2012/EU](#) and
- Article 2 “General Regulatory Principles”, Regulation (2)(a) of the RSPP Decision [243/2012/EU](#).

¹⁵ See for example:

- Regulation 4(5)(c) of the EEC Regulations ([SI 444 of 2022](#))

radio spectrum licences for mobile & wireless broadband are **technology and service neutral**, meaning that the MNOs (as licensees) may use the radio spectrum as they see fit provided that they comply with applicable harmonised standards.

- 2.13 Technology and service neutral licensing gives the MNOs (as licensees) the freedom to continue to provide services on existing technologies (e.g. 2G, 3G, 4G) and the flexibility to provide new services on new technologies (e.g. 5G), when ready to do so.
- 2.14 Given that 3G networks rely on older, less efficient technology, MNOs across Europe and further afield have taken steps or are planning to take steps to switch-off 3G networks to make room for the more advanced 4G and 5G networks, giving customers better, faster and more reliable services.
- 2.15 For example, information from Cullen International¹⁶ indicates that:
- in 27 out of the 31 researched countries in Europe, at least one MNO has plans to switch-off 3G or has already completed 3G switch-off. The 4 countries where no MNO has plans for 3G switch-off are Bulgaria, Croatia, Cyprus and North Macedonia;
 - in 5 out of the 31 researched countries in Europe, the Czech Republic, Germany, Greece, Hungary and Norway, all MNOs in those country have completed their 3G switch-off; and
 - in the UK, the 4 MNOs have plans for 3G switch-off: Vodafone UK in early 2024; EE (BT) in early 2024, Three Hutchison by end 2024, and O2 in 2025¹⁷.

2.4.1 3G switch-off in Ireland

- 2.16 Given that licensees may cease the use of a particular technology (or terrestrial system)¹⁸ during the lifetime of a licence, ComReg has placed an obligation in the licences for mobile and wireless broadband¹⁹ for the MNO (as licensee) to:

¹⁶ <https://www.cullen-international.com/client/site/documents/CTTEEU20230120> (accessed 25 January 2024)

¹⁷ [Switching off the UK's 3G mobile networks: what you need to know - Ofcom](#)

¹⁸ In the context of licences issued for mobile and wireless broadband, a technology (or terrestrial system) refers to technologies such as 2G, 3G, 4G, 5G etc.

¹⁹ Specifically in relation to the use of the 3G technology in the 900 MHz and 2100 MHz band this obligation is set out:

- Regulation 6(12)(a) and (b) of the Wireless Telegraphy (Liberalised Use and Preparatory Licences in the 800 MHz, 900 MHz and 1800 MHz bands) Regulations, 2012, S.I. [251 of 2012](#); and
- Regulation 6(1)(k)(i) and (ii) of the Wireless Telegraphy (Liberalised Use and Related Licences in the 700 MHz Duplex, 2.1 GHz, 2.3 GHz and 2.6 GHz Bands) Regulations 2021), S.I. [264 of 2021](#).

- notify ComReg, not less than 6 months prior to the proposed cessation of use of any terrestrial system to which the licence relates; and
- use all reasonable endeavours, to ensure that any adverse effects on users caused by the cessation of use of a terrestrial system are minimised.

2.17 To date, only one MNO, Vodafone, has notified ComReg that it proposes to switch-off its 3G network. As detailed on Vodafone's website²⁰, Vodafone:

- aims to move its entire 3G service onto its 4G and 5G networks,
- started phase 1 of this project in February 2023 by switching off its 3G network in Limerick City; and
- will communicate in relation to further phases.

2.18 The other two MNOs, Three and Eir, have not provided any formal notifications or indications to ComReg of any plans to switch-off their 3G networks.

2.19 In relation to any implications that the switch-off of 3G services may have for emergency services and the question about a user that needs to call the emergency services in a remote area with no coverage, it should be noted that in such a case, the user will be able to place the call using any available mobile network, greatly reducing the likelihood of no coverage whatsoever being available²¹.

2.20 The Advanced Mobile Location (AML) service that was referred to at the Joint Oireachtas Committee (JOC) meeting of 15 November 2023, the ability for Android phones to determine the caller's location and pass it to the emergency services, has in recent years been extended to Apple phones and has become an important tool for all links in the Emergency Services call chain. The AML service will continue to operate in the absence of a 3G network. Furthermore ComReg has recently launched a consultation with industry stakeholders on Emergency Caller Location methods with a view to further improving this vital service for 4G/5G calls.

2.21 Finally, for clarity it should be noted that the emergency services provided by the Terrestrial Trunked Radio (TETRA) network²² referred to at the JOC meeting of 15 November 2023 are services provided to emergency responders and are not services used by the general public to make an emergency call. The TETRA services

²⁰ Source: <https://n.vodafone.ie/network/3G-upgrade.html> (accessed 25 January 2024)

²¹ For example, if a user is with Vodafone and has no Vodafone mobile coverage in an area, then this user would still be able to dial 999 / 112 if there is mobile phone coverage on another network, e.g. using Three or Eir's mobile network.

²² In Ireland, TETRA Ireland Communications Limited, is the provider of Ireland's National Digital Radio Service (NDRS). The TETRA network delivers mission-critical voice and data land mobile radio communications to thousands of first responders and frontline workers from national security and enforcement agencies, health and emergency services, state utilities and volunteer organizations across the country. <https://www.tetraireland.ie/>

are provided using the TETRA network, which is a separate network to the 3G networks and is thus unaffected by 3G switch-off.

Annex 1: Coverage obligation at specific locations in MBSA2 Liberalised Use licences

The following sets out information on the coverage obligation at specific locations as set in the MBSA2 Liberalised Use licences of the mobile network operators. This information is taken from Annex 4 of ComReg Document 21/40²³.

Business and Technology Parks

A 1.1 IDA Ireland provides a list of 31 Business and Technology Parks and 9 Strategic Sites these locations are used to identify the locations of business and technology parks. The obligation thus includes adjacent business and technology parks to those of IDA Ireland.

A 1.2 Table A4.1 below contains a list of the IDA Ireland Business and Technology Parks and strategic sites. However the coverage obligation also applies to the outdoor areas around buildings, and adjacent car parks and thoroughfares within, as well as adjacent to IDA Ireland Business and Technology Parks and Strategic Sites, where large green areas of no development have been removed.

Table A4.1: IDA Ireland Business and Technology Parks

Business and Technology Parks	Location	Business and Technology Parks	Location
IDA Ireland Business and Technology Park			
1. Dublin/East - College Park Dublin	College Park, Dublin	17. South East - Clonmel Business & Technology Park	Ballingarrane, Clonmel, Tipperary
2. Dublin/East - Grange Castle Business Park	Grange Castle, Dublin	18. South East - Dungarvan Business & Technology Park	Lisfennel, Dungarvan, Waterford
3. Mid East - Arklow Business & Technology Park	Ballynattin, Arklow, Wicklow	19. South East - Kilkenny Business & Technology Park	Loughboy, Kilkenny
4. Mid East - Navan Business & Technology Park	Athlumney, Navan, Meath	20. South East - Waterford Business & Technology Park, Butlerstown	Butlerstown, Waterford
5. Mid West - National Technology Park (NTP), Limerick	Plassey, Limerick	21. South East - Wexford Business & Technology Park	Sinnottstown, Wexford
6. Midlands - Athlone Business & Technology Park	Dublin Road, Athlone, Westmeath	22. South West - Carrigtwohill Business & Technology Park	Carrigtwohill, Cork

²³ ComReg Document 21/40, "Multi Band Spectrum Award – Information Memorandum and Draft Regulations", published 16 April 2021

Business and Technology Parks	Location	Business and Technology Parks	Location
7. Midlands - Mullingar Business & Technology Park	Ardmore, Mullingar, Westmeath	23. South West - Cork Business & Technology Park	Model Farm Road, Cork
8. Midlands - Portlaoise Business & Technology Park	Mountrath Road, Portlaoise, Laois	24. South West - Fermoy Business & Technology Park	Fermoy, Cork
9. Midlands - Tullamore Business & Technology Park	Srah, Tullamore, Offaly	25. South West - Kerry Business & Technology Park	Tralee, Kerry
10. North East - Cavan Business & Technology Park	Killygarry, Cavan	26. South West - Kilbarry Business & Technology Park	Kilbarry, Cork
11. North East - Drogheda Business & Technology Park	Donore Road, Drogheda, Louth	27. West - Ballinasloe Business & Technology Park	Roscommon Road, Ballinasloe, Galway
12. North East - Dundalk Business & Technology Park	Finnabair, Dundalk, Louth	28. West - Castlebar Business & Technology Park	Drumconlan, Castlebar, Mayo
13. North East - Knockaconny Monaghan Business & Technology Park	Knockaconny Monaghan	29. West - Galway Business & Technology Park	Parkmore, Galway
14. North West - Carrick-on-Shannon Business & Technology Park	Keenaghan, Carrick-on-Shannon, Leitrim	30. West - Roscommon Business & Technology Park	Gallowstown, Roscommon
15. North West - Letterkenny Business & Technology Park	Lisnennan, Letterkenny, Donegal	31. West - Tuam Business & Technology Park	Dunmore Road, Tuam, Galway
16. North West - Sligo Business & Technology Park	Finisklin, Sligo		
IDA Ireland Strategic Site			
1. Mid East - Strategic Site Greystones	Charlesland, Greystones, Wicklow	6. South West - Strategic Site Carrigtwohill	Ballyadam, Carrigtwohill, Cork
2. Mid West - Strategic Site on the National Technology Park, Limerick	Plassey, Limerick	7. South West - Strategic Site Ringaskiddy, County Cork	Ringaskiddy, Cork
3. Mid West - Strategic Site, Raheen Business Park, Limerick	Raheen Business Park, Limerick	8. West - Strategic Site Athenry	Athenry, Galway
4. North East - Strategic Site Dundalk - Dundalk Science & Technology Park	Mullagharlin, Dundalk, Louth	9. West - Strategic Site Oranmore	Oranmore, Galway
5. South East - Strategic Site, Belview, Co. Kilkenny	Belview, Waterford Port, Kilkenny/Waterford		

Source: IDA Ireland November 2019, <https://www.idaireland.com/how-we-help/property>.

Hospitals

A 1.3 Table A4.2 below contains a list of public and private hospitals obtained from the Health Service Executive. Where a hospital is located in more than one location, the coverage obligations apply to each of these locations.

A 1.4 The coverage obligations apply to the hospital's buildings, adjacent car parks and key thoroughfares.

Table A4.2: Public and Private Hospitals

Hospitals	Location	Hospitals	Location
Public Hospital			
1. Bantry General Hospital	Cork	25. National Maternity Hospitals, Holles Street	Dublin
2. Beaumont Hospital	Dublin	26. Nenagh Hospital: UL Hospitals	Tipperary
3. Cappagh National Orthopaedic Hospital	Dublin	27. Our Lady Of Lourdes Hospital, Drogheda	Louth
4. Cavan Monaghan Hospital	Cavan, Monaghan	28. Our Lady's Hospital, Navan	Meath
5. Children's University Hospital, Temple Street	Dublin	29. Our Lady's Children's Hospital	Dublin Crumlin
6. Connolly Hospital Blanchardstown	Dublin	30. Portiuncula Hospital, Ballinasloe	Galway
7. Coombe Women's Hospital	Dublin	31. Roscommon County Hospital	Roscommon
8. Cork University Hospital	Cork	32. Rotunda Hospital	Dublin
9. Cork University Maternity Hospital	Cork	33. Royal Victoria Eye & Ear Hospital, Dublin	Dublin
10. Croom Hospital: UL Hospitals	Limerick	34. Sligo General Hospital	Sligo
11. Ennis Hospital: UL Hospitals	Clare	35. South Infirmary-Victoria Hospital, Cork	Cork
12. Galway University Hospitals	Galway	36. South Tipperary General Hospital	Tipperary
13. Kerry General Hospital	Kerry	37. St Columcille's Hospital, Loughlinstown	Dublin
14. Letterkenny University Hospital	Donegal	38. St James's Hospital	Dublin
15. Lourdes Orthopaedic Hospital, Kilcreene	Kilkenny	39. St John's Hospital Limerick	Limerick
16. Louth County Hospital, Dundalk	Louth	40. St Luke's General Hospital Carlow / Kilkenny	Kilkenny
17. Mallow General	Cork	41. St Luke's Hospital, Rathgar (Cancer Services)	Dublin
18. Mater Misericordiae University Hospital	Dublin	42. St Michael's, Dun Laoghaire	Dublin
19. Mayo General Hospital	Mayo	43. St Vincent's University Hospital, Elm Park	Dublin
20. Mercy University Hospital, Cork	Cork	44. Tallaght Hospital	Dublin
21. Midland Regional Hospital Mullingar	Westmeath	45. University Hospital Limerick	Limerick
22. Midland Regional Hospital Portlaoise	Laois	46. University Maternity Hospital: UL Hospitals	Limerick

Hospitals				Hospitals		Location
Hospitals				Location		
23.	Midland Regional Hospital	Tullamore	Offaly	47.	University Hospital Waterford	Waterford
24.	Naas General Hospital		Kildare	48.	Wexford General Hospital	Wexford
Private Hospital						
1.	Aut Even Hospital		Kilkenny	10.	Mount Carmel Hospital	Dublin
2.	Barringtons Hospital		Limerick	11.	Mater Private Hospital	Dublin, Cork
3.	Beacon Hospital		Dublin	12.	St. Joseph's Hospital	Sligo
4.	Blackrock Clinic		Dublin	13.	St John of God Hospital	Dublin
5.	Bon Secours Health System		Cork, Dublin, Galway, Kerry	14.	St Patrick's University Hospital	Dublin
6.	Clane General Hospital		Kildare	15.	St Vincent's Private Hospital	Dublin
7.	Galway Clinic		Galway	16.	Sports Surgery Clinic	Dublin
8.	Hermitage Medical Centre		Dublin	17.	Whitfield Clinic	Waterford
9.	Highfield Healthcare		Dublin			

Source: HSE, <https://www.hse.ie/eng/services/list/3/acutehospitals/hospitals/hospitallist.html>,
<https://www.hse.ie/eng/services/list/1/schemes/cbd/acchealthcareireland/>.

Higher Education Campuses

A 1.5 Table A4.3 below contains a list of higher education institutions encompassing: universities, institutes of technology and other colleges as identified by the Higher Education Authority. Where an institution is located in more than one location, the coverage obligations apply to each of these locations.

A 1.6 The coverage obligations apply to the institution's buildings (including accommodation), adjacent car parks and key thoroughfares.

Table A4.3: Higher Education Campuses

Higher Institution	Education Location	Higher Institution	Education Location
University			
1. Dublin City University	Dublin	5. Trinity College Dublin	Dublin
2. University College Cork	Cork	6. University College Dublin	Dublin
3. National University of Ireland, Galway	Galway	7. University of Limerick	Limerick
4. Maynooth University - Kildare	Kildare	8. TU Dublin	Dublin
Institute of Technology			
1. Athlone Institute of Technology	Westmeath	7. Institute of Technology Sligo	Sligo
2. Cork Institute of Technology	Cork	8. Institute of Technology Tralee	Kerry
3. Dun Laoghaire Institute of Art and Design	Dublin	9. Letterkenny Institute of Donegal Technology	Donegal
4. Dundalk Institute of Technology	Louth	10. Limerick Institute of Technology	Limerick
5. Galway-Mayo Institute of Technology	Galway	11. Waterford Institute of Technology	Waterford
6. Institute of Technology Carlow	Carlow		
Other College			
1. Royal College of Surgeons in Ireland	Dublin	4. National College of Art and Design	Dublin
2. Royal Irish Academy	Dublin	5. Mary Immaculate College	Limerick
3. St Angela's College	Sligo		

Source: HEA, <http://hea.ie/higher-education-institutions/?v=l>.

Ports (Air and Sea)

A 1.7 Table A4.4 below contains the list of passenger focussed transport provided by airports and seaports. The list of airports is as set out by the Department of Transport, and the list of passenger seaports is as set out by the Irish Maritime Development Office (“IMDO”). Where a port as listed below contains more than one location, the coverage obligations apply to each of these locations as detailed in the Specific Location Boundary Files. For airports, the coverage obligations apply to areas where passengers will be waiting, embarking or disembarking, adjacent short term car parks and key passenger thoroughfares.

A 1.8 For passenger seaports, the coverage obligations apply to areas where passengers will be waiting, embarking or disembarking, adjacent car parks and key passenger thorough fares

Table A4.4 Ports (Air and Sea)

Ports	Location	Ports	Location
Airport			
1. Dublin Airport	Dublin	5. Ireland West Airport Knock	Mayo
2. Cork Airport	Cork	6. Kerry Airport	Kerry
3. Shannon Airport	Clare	7. Waterford Airport	Waterford
4. Donegal Airport	Donegal		
Passenger Seaport			
1. Bantry Bay Port Company	Cork	5. Port of Galway	Galway
2. Dublin Port Company	Dublin	6. Rosslare Europort	Wexford
3. Dun Laoghaire Port Company	Dublin	7. Port of Waterford	Waterford
4. Port of Cork	Cork		

Source: DTTS, <http://www.dttas.ie/aviation/airports>; IMDO, <http://www.dttas.ie/aviation/airports>

Principal Bus Stations

A 1.9 Table A4.5 below contains a list of Bus Éireann's 16 principal bus stations which also include information offices.

A 1.10 The outdoor coverage obligations apply to areas where passengers will be waiting, embarking or disembarking, and adjacent carparks.

Table A4.5: Principal Bus Stations

Bus Station	Location	Bus Station	Location
1. Athlone	Southern Station Road, Athlone	9. Galway	Ceannt Station, Eyre Square, Galway
2. Ballina	Kevin Barry Street, Ballina	10. Killarney	Fairhill, Killarney
3. Cavan	Farnham Street, Cavan	11. Letterkenny	Port Road, Letterkenny
4. Cork	Parnell Place, Cork	12. Limerick	Colbert Station, Parnell Street, Limerick
5. Drogheda	Donore Road, Drogheda	13. Monaghan	North Road, Monaghan
6. Dundalk	Long Walk, Dundalk	14. Sligo	Lord Edward Street, Sligo
7. Dublin	Busáras Central Station, Store Street, Dublin	15. Tralee	Casement Station, Tralee
8. Ennis	Clonroad More, Ennis	16. Waterford	The Quay, Waterford

Source: Bus Éireann, <https://www.buseireann.ie/pdf/1473240111-Network-Map.pdf>

Train Stations

A 1.11 Table A4.6 below contains a list of 144 train stations by descending passenger numbers²⁴ as obtained from the NTA.

A 1.12 The outdoor coverage obligations apply to each station including areas where passengers will be waiting, embarking or disembarking (platforms), and adjacent carparks.

Table A4.6: Train Stations

Train Station	Location	Train Station	Location
1. Connolly	Dublin	73. M3 Parkway	Dublin
2. Pearse	Dublin	74. Sligo	Sligo
3. Heuston	Dublin	75. Longford	Longford
4. Tara Street	Dublin	76. Killarney	Kerry
5. Grand Canal Dock	Dublin	77. Kilcock	Kildare
6. Dun Laoghaire	Dublin	78. Dunboyne	Meath
7. Cork	Cork	79. Adamstown	Dublin
8. Bray	Wicklow	80. Glounthaune	Cork
9. Lansdowne	Dublin	81. Navan Road Parkway	Dublin
10. Malahide	Dublin	82. Wicklow	Wicklow
11. Maynooth	Kildare	83. Tralee	Kerry
12. Blackrock	Dublin	84. Waterford	Waterford
13. Greystones	Wicklow	85. Manulla Junction	Mayo
14. Sydney Parade	Dublin	86. Enfield	Meath
15. Coolmine	Dublin	87. Ennis	Clare
16. Balbriggan	Dublin	88. Ballinasloe	Galway
17. Howth Junction and Donaghmede	Dublin	89. Hansfield	Dublin
18. Raheny	Dublin	90. Oranmore	Galway
19. Clontarf Rd	Dublin	91. Wexford	Wexford
20. Portmarnock	Dublin	92. Castlebar	Mayo
21. Limerick Junction	Tipperary	93. Clondalkin Fonthill	Dublin
22. Galway	Galway	94. Ballybrophy	Laois
23. Dalkey	Dublin	95. Carrick-on-Shannon	Leitrim
24. Docklands	Dublin	96. Muine Bheag	Carlow
25. Glenageary	Dublin	97. Edgeworthstown	Longford
26. Booterstown	Dublin	98. Carrigtwohill	Cork
27. Sallins and Naas	Kildare	99. Arklow	Wicklow
28. Skerries	Dublin	100. Clara	Offaly
29. Drumcondra	Dublin	101. Roscommon	Roscommon
30. Clonsilla	Dublin	102. Westport	Mayo
31. Kilbarrack	Dublin	103. Gorey	Wexford

²⁴ By number of passengers boarding and alighting on 16 November 2017 as published in NTA's 'National Heavy Rail Census Report 2017'.

Train Station	Location	Train Station	Location
32. Howth	Dublin	104. Dromod	Leitrim
33. Mallow	Cork	105. Gormanston	Meath
34. Bayside	Dublin	106. Monasterevin	Kildare
35. Donabate	Dublin	107. Kilcoole	Wicklow
36. Newbridge	Kildare	108. Ballymote	Sligo
37. Shankill	Dublin	109. Ballina	Mayo
38. Harmonstown	Dublin	110. Boyle	Roscommon
39. Salthill and Monkstown	Dublin	111. Charleville	Cork
40. Clongriffin	Dublin	112. Templemore	Tipperary
41. Sandycove and Glasthule	Dublin	113. Claremorris	Mayo
42. Limerick	Limerick	114. Ballyhaunis	Mayo
43. Drogheda	Louth	115. Millstreet	Cork
44. Killester	Dublin	116. Enniscorthy	Wexford
45. Sandymount	Dublin	117. Rushbrooke	Cork
46. Ashtown	Dublin	118. Castlerea	Roscommon
47. Portlaoise	Laois	119. Collooney	Sligo
48. Leixlip Louisa Bridge	Kildare	120. Rathdrum	Dublin
49. Killiney	Dublin	121. Woodlawn	Galway
50. Sutton	Dublin	122. Thomastown	Kilkenny
51. Castleknock	Dublin	123. Sixmilebridge	Clare
52. Rush and Lusk	Dublin	124. Rathmore	Kerry
53. Kildare	Kildare	125. Banteer	Cork
54. Athlone	Westmeath	126. Nenagh	Tipperary
55. Seapoint	Dublin	127. Craughwell	Galway
56. Carlow	Carlow	128. Carrigaloe	Cork
57. Portarlington	Laois	129. Farranfore	Kerry
58. Leixlip Confey	Kildare	130. Clonmel	Tipperary
59. Thurles	Tipperary	131. Fota	Cork
60. Tullamore	Offaly	132. Rosslare Strand	Wexford
61. Midleton	Cork	133. Foxford	Mayo
62. Mullingar	Westmeath	134. Roscrea	Tipperary
63. Littleisland	Cork	135. Attymon	Galway
64. Dundalk	Louth	136. Gort	Galway
65. Hazelhatch and Celbridge	Kildare	137. Rosslare Euro Port	Wexford
66. Broombridge	Dublin	138. Castleconnell	Limerick
67. Cobh	Cork	139. Cahir	Tipperary
68. Athenry	Galway	140. Birdhill	Tipperary
69. Kilkenny	Kilkenny	141. Carrick-on-Suir	Tipperary
70. Athy	Kildare	142. Ardahan	Galway
71. Parkwest and Cherry Orchard	Dublin	143. Cloughjordan	Tipperary
72. Laytown	Meath	144. Tipperary	Tipperary

Source: National Transport Authority, 'National Heavy Rail Census Report 2017', published July 2018, https://www.nationaltransport.ie/wp-content/uploads/2018/08/National_Heavy_Rail_2018_V8_Web.pdf

Visitor Attractions - Information Centres

A 1.13 Table A4.7 below contains a list of the top 21 visitor attractions (fee charging and free of charge) by visitor numbers in 2017, as obtained from Fáilte Ireland.

A 1.14 The outdoor coverage obligations apply to the information centre at each attraction.

Table A4.7: Visitor Attraction – Information Centres

Visitor Attraction	Location	Visitor Attraction	Location
Fee Charging			
1. Guinness Storehouse	Dublin	12. Blarney Castle and Gardens	Cork
2. Cliffs of Moher Visitor Experience	Clare	13. Kilmainham Gaol	Dublin
3. Dublin Zoo	Dublin	14. Kilkenny Castle	Kilkenny
4. National Aquatic Centre	Dublin	15. Rock of Cashel	Tipperary
5. Book of Kells	Dublin	16. Dublin Castle	Dublin
6. Tayto Park	Meath	17. Bunratty Castle and Folk Park	Clare
7. St Patrick's Cathedral	Dublin	18. Old Jameson Distillery	Dublin
8. Kylemore Abbey & Gardens	Galway	19. Brú na Bóinne Newgrange	Meath
9. Muckross House Gardens and Traditional Farm	Kerry	20. Christ Church Cathedral	Dublin
10. Powerscourt Gardens and Waterfall	Wicklow	21. Glenveagh Castle and Grounds	Donegal
11. Fota Wildlife Park	Cork		
Free of Charge			
1. National Gallery of Ireland	Dublin	12. National Museum of Ireland - Natural History, Merrion St	Dublin
2. Castletown House Parklands	Kildare	13. Kilkenny Castle Parklands	Kilkenny
3. Glendalough Site	Wicklow	14. Chester Beatty Library	Dublin
4. National Botanic Gardens	Dublin	15. National Museum of Ireland - Decorative Arts and History, Collins Barracks	Dublin
5. DLR Lexicon1	Dublin	16. Connemara National Park	Galway
6. Irish Museum of Modern Art	Dublin	17. The National Library of Ireland	Dublin
7. Doneraile Wildlife Park	Cork	18. Crawford Art Gallery	Cork
8. National Museum of Ireland - Archaeology, Kildare St	Dublin	19. Malin Head Viewing Point	Donegal
9. Science Gallery at Trinity College Dublin	Dublin	20. Dublin City Gallery The Hugh Lane	Dublin
10. Farmleigh	Dublin	21. Sliabh Liag Cliffs	Donegal
11. Newbridge Silverware Museum of Style Icons	Kildare		

Source: Fáilte Ireland, 'TOURISM FACTS 2017', published July 2018, http://www.failteireland.ie/Failteireland/media/WebsiteStructure/Documents/3_Research_Insights/5_International_Tourism_Trends/Tourism-Facts-2017_2.pdf?ext=.pdf

Geographic Coordinates

A 1.15 For the purposes of assessing compliance with the Coverage obligation at specific

Locations, ComReg provides the geographic coordinates and Specific Location Boundary Files for each specific location across the 7 categories on its Multi Band Spectrum Award webpage²⁵.

A 1.16 The Geographic coordinates of the specific locations and the Specific Location Boundary files were derived using the following methodology:

- *Locations for each of the categories were obtained from the authoritative sources referenced in the above tables.*
- *Satellite images were obtained for each specific location using Google maps.*
- *Areas encompassed by the outdoor coverage obligations were identified using the criteria tabled below:*

Table A4.8: Criteria (Outdoor coverage at/around)

Category	Criteria (outdoor coverage at/around)
<i>Business and Technology Parks</i>	<i>Buildings, the adjacent carparks and thoroughfares within, as well as those adjacent to IDA Ireland Business and Technology Parks and Strategic Sites.</i>
<i>Hospitals</i>	<i>Hospital's buildings, adjacent car parks and key thoroughfares.</i>
<i>Higher Education Campuses</i>	<i>Institution's buildings (including accommodation), adjacent carparks and key thoroughfares.</i>
<i>Ports</i>	<i>Airports - areas where passengers will be waiting, embarking or disembarking, adjacent short term car parks and key passenger thoroughfares.</i> <i>Passenger seaports - areas where passengers will be waiting, embarking or disembarking, adjacent car parks and key passenger thoroughfares.</i>
<i>Principal Bus Stations</i>	<i>Areas where passengers will be waiting, embarking or disembarking, and adjacent carparks.</i>
<i>Train Stations</i>	<i>Areas where passengers will be waiting, embarking or disembarking (platforms), and adjacent carparks</i>
<i>Visitor Attractions – Visitor Centres</i>	<i>Visitor Centre</i>

- *Coordinates for the identified areas were mapped using visuals from the satellite images and [Quantum Geographic Information System] (QGIS). Due to the angle from which the satellite images may have been projected, the coordinates may vary slightly from the actual coordinates (e.g. mapped boundaries produced by the coordinates may vary from the actual physical boundaries).*

A 1.17 The Specific Location Boundary Files for each location included in the coverage obligations can be downloaded in .shp or shape files from

²⁵ <https://www.comreg.ie/industry/radio-spectrum/spectrum-awards/proposed-multi-band-spectrum-award/>

<https://www.comreg.ie/industry/radio-spectrum/spectrum-awards/proposed-multi-band-spectrum-award/>.