Commission for Communications Regulation

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Geographic Analysis of MI WHQA markets in Ireland

Final Report

Prepared for ComReg

Non-Confidential version

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Summary

1. Context

In August 2016, ComReg published a Consultation and Draft Decision[1] ('2016 Consultation') on its Market Review for Wholesale High Quality Access at a Fixed Location (Leased Lines).

In its analysis, ComReg has identified the following three, separate, WHQA markets:

(a) A Low Bandwidth Traditional Interface ('TI') WHQA Market consisting of all wholesale leased lines carried over analogue, digital and TDM technology interfaces with bandwidths ≤2Mb/s, with this market being national in its geographic scope (the 'Low Bandwidth ('LB') TI WHQA Market');

(b) A High Bandwidth TI WHQA Market which consists of all wholesale leased lines provided over a TDM interface with bandwidths >2Mb/s, with this market being national in its geographic scope (the 'High Bandwidth ('HB') TI WHQA Market'); and a

(c) Modern Interface ('MI') WHQA Market consisting of all wholesale leased lines of any bandwidth carried over modern technology interfaces such as Ethernet, xWDM and other high bandwidth interfaces, with this market being national in its geographic scope (the 'MI WHQA Market').

The above markets are collectively referred to as the 'Relevant WHQA Markets'.

In terms of the Significant Market Power ('SMP') assessment in the Relevant WHQA Markets, ComReg's preliminary findings in the 2016 Consultation were as follows:

(a) Eircom is likely to have SMP in the Low Bandwidth TI WHQA Market;

(b) No undertaking is likely to have SMP in the High Bandwidth TI WHQA Market; and

(c) No undertaking is likely to have SMP in the MI WHQA Market.

Following the SMP assessment, ComReg proposed to broadly maintain the set of remedies in place for the Low Bandwidth TI WHQA Market. With respect to the High Bandwidth TI WHQA Market and MI WHQA Market, ComReg proposes to withdraw existing regulatory obligations given its preliminary finding that no SP has SMP.

ComReg then received a number of comments from the industry on its draft decision and has decided to perform further geographical analysis regarding the level of competition in different areas of the country.

The purpose of the study carried out by Tera is to assist ComReg in its analysis of competitive conditions in the MI WHQA Market.

[1] ComReg 16/69

ComReg decided to examine the geographic homogeneity of competitive conditions, or otherwise, for the supply of MI WHQA services in Ireland having examined respondents' views on 2016 Consultation. This remit of this exercise was to

(a) Map all relevant fixed fibre networks[2];

(b) Assess the market shares of SPs for the chosen sub-national geographic market(s) based on connected premises (for provision of MI WHQA services).

Tera and Geocible were selected to assist in the completion of this exercise.

This report presents a description of the following:

(a) Data and maps (Section 2):

- The operators' input data and mapping information used (operator's networks, address databases, list of premises, maps of business parks, maps of "small areas");
- The external address databases considered and chosen and the information used in doing so;
- The candidate sub-geographic units considered and the reasons for choosing "small areas".

(b) Algorithms (Section 3):

- The algorithms, with sensitivity analysis, used in order to assess competitive conditions across different sub-geographic areas; and
- The calculations of the SP market shares based on connected customers' premises inside and outside the overall various amalgamated areas.

(c) SP reach (Section 3):

- Total counts of small areas touched by each operator's network and on a county-by-county basis.

(d) SP reach analysis of theoretical demand (Section 3):

- Total counts of 15,446 organisation locations within 100 M of each SP.

[2] Eircom was assumed to have effective ubiquity in this regard and its network was not mapped.

2. Data and maps

The first task was to upload the different sources of data available on a unique GIS tool in order to enable cross-analyses between the following sources:

- Operator's fibre networks;
- Eircode address database;
- Premises;
- Business parks;
- Small areas.

2.1 Operators' fibre networks

Fibre operators have been taken into account in the study. The following service providers ('SP(s)') identified in Table 1 have sent the cartographic description of their fibre network footprint to ComReg:

Network	File input formats
Aurora	kml/kmz
BT	MapInfo
Colt	kmz
ENET	kml ; xsls
ESBT	MapInfo
EU	MapInfo
GTT	kmz
Magnet	kmz
Siro	MapInfo
Verizon	kmz
Viatel	kml
Virgin Media	kml ; Access ; dxf
Vodafone	kml

Table 1: List of operators and mapping formats submitted to ComReg

Not all parts of the files provided by SPs (via ComReg) have been considered for the analysis of local access networks. All SPs provided maps which included their core networks, whereas only the access network is relevant in the analysis. These core elements included portions of network which were not physically or practically available for breakout and connectivity to individual customers e.g. along railway lines between towns and cities; routed cross-county on high-tension electrical pylon infrastructure or co-located with cross-country high-pressure gas pipelines. These have been disregarded for the consideration of access networks. They were however, taken into account when considering (i) if local access networks had access to alternative (other than Eircom) backhaul services and so offered an independent alternative to Eircom's local access services or (ii) were effectively stranded islands of fibre which were dependent on Eircom for backhaul services. This is referred to below specifically in relation to some portions of local access network of both Virgin Media and Enet.

These files were provided in standard formats (Refer to Table 1 above) and Geocible has translated them into three spatial formats: shp (ESRI compatible), tab (MapInfo compatible) and in a spatial database suitable for computation by various algorithms. In order to harmonize networks, Geocible created a similar table structure for each SP. Figure 1 below shows an image of the result at National level.

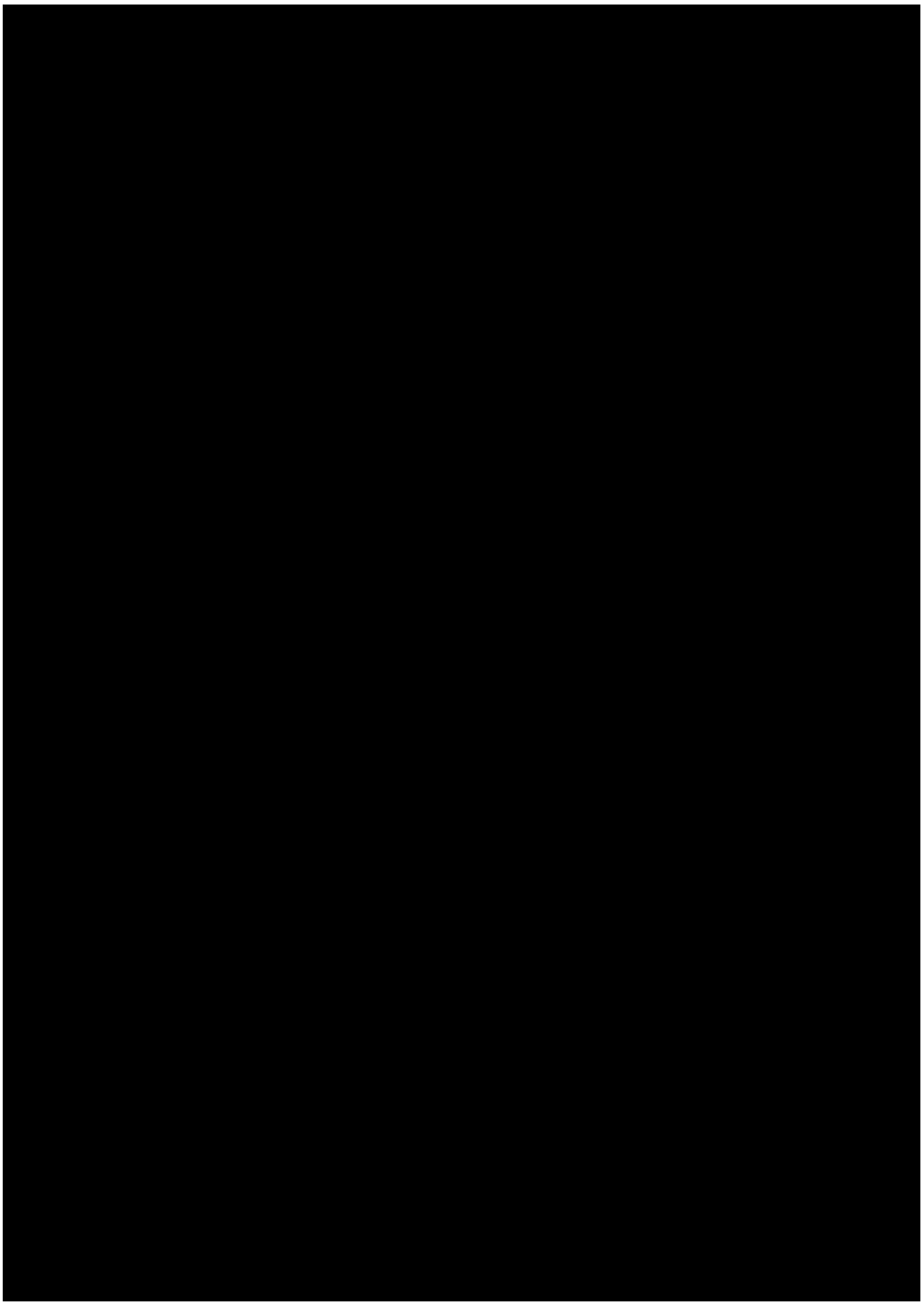

Figure 1 National Map of SP networks in-scope for analysis [✂REDACTED]

Figure 2 Alternate SP Fibre routes in Greater Dublin Area [✂REDACTED]

The majority of operator's networks were treated as unique polyline files. This was not the case for Virgin Media and so its maps were treated in a different manner.

Virgin Media:

Virgin Media has provided polygons on some areas where its network was very dense. It has been assumed that all premises contained inside these polygons were within its fibre footprint. There were some portions of its local access network which were found to be solely or partly dependent on Eircom for backhaul services so these were treated differently in the exercise.

In a number of areas its network was shown to be fully dependent on Eircom for MI WHQA to provide backhaul where there was no alternative available. Therefore, these portions of its network were considered unlikely to be capable of being present absent regulation for the delivery of HQA services[3].

[3] This was to facilitate ComReg in its "modified green-field" economic analysis whereby market shares of an operator which are entirely dependent on Eircom are attributed to Eircom i.e. the SP could not likely provide the service if Eircom inputs were not available to it.

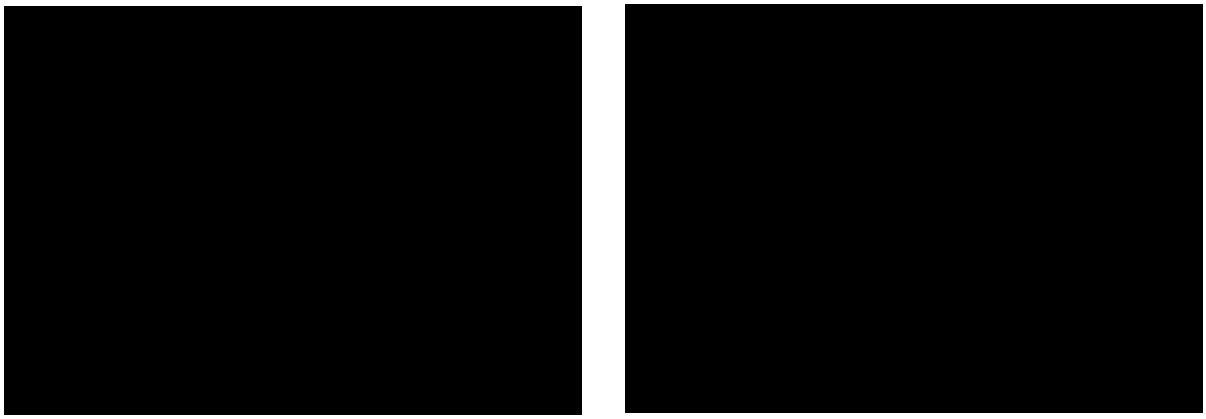

Figure 3 Virgin Media network and polygons in Greater Dublin Area [✂REDACTED]

ENET

Similar to the treatment of some of Virgins footprint, there were also some important considerations as to how the various network elements and infrastructure under the control of Enet was treated.

Firstly, in regard to the Government, publicly owned open access MANs. Enet had informed ComReg that some of its MANs had a dependency on Eircom as a backhaul provider and that it could not therefore, act independently from Eircom in these specific areas. ComReg analysed Enet's evidence and met with various stakeholders as part of this process and agreed with it some instances. The publicly owned Government owned MAN's were therefore separated into 2 categories (see 4.3):

- **Enet CMAN**: this is a publicly owned open access network with alternative backhaul available i.e. Eircom plus 2 other SPs (one of these may be Enet own backhaul network). These were weighted as being equivalent to the presence of 2 alternate SPs in the analysis as access to these network portions is regulated at maximum prices

- **Enet UMAN**: publicly owned open access network with none or limited *i.e.* alternative backhaul available, i.e. wholly or partly dependent on Eircom These UMANs were therefore treated as separate networks in the analysis and were considered to be unlikely to be present absent regulation in relation to HQA services.

Secondly, there was also an additional set of Enet operated network elements and infrastructure which are not publicly owned and are operated on a purely commercial basis. This was therefore, treated as if it were a totally separate SP network referred to as **Enet Other.**

2.2 Eircode Address Database

Two address databases were considered for the exercise, GeoDirectory and Eircode. GeoDirectory is a spatial database, based on OSI maps and An Post data. This describes every building in Ireland. Eircode is a similar database. Both provide information concerning buildings, address, location, count and types of premises. Eircode was selected due to its simpler structure as it contains the relevant information required for this exercise whereas GeoDirectory is a more complex database, oriented especially to address normalisation. The study required the acquisition of precise geocodes of organisations and companies and the Eircode database was sufficient for this purpose. ComReg used the Eircode database of Q1 2017.

This database contained the data-points listed in Table 2.

Objects	Count
Buildings[4]	1,909,884
Address points[5]	2,161,405
Non-residential	*178,129*
Residential	*1,893,088*
Mixed[6]	*90,188*
Postal addresses[7]	2,197,699
Organisations[8]	309,911

Table 2 List of Eircode database components

ComReg used organisations (non-residential premises) for coverage analysis instead of address points (residential and non-residential premises) or buildings as leased lines are products which target non-residential customers. Residential analysis was reported in the database for possible future analysis but was not used in the algorithm.

Every building is then geocoded. Address points, postal addresses and organisations are in turn linked to these buildings.

This database is used to count organisations:

- anywhere in Ireland;
- inside polygons such as business parks;
- "proximity[9]" to fibre access networks.

[4] A building may be an apartment building (several address points) or a house (one single address point).

[5] An address point record exists for every unique address within a building. A standard residential property will have one address point. Apartment buildings and multi-unit commercial buildings will have one address point for every unique address within the building. *Source: Eircode Documentation:* *https://www.eircode.ie/business/business-benefits*

[6] This is a special case where the residential and non-residential addresses in the building are essentially the same address. The typical example is a farm house on an active farm. *Source: Eircode Documentation* *https://www.eircode.ie/business/business-benefits*

[7] An address point may have several postal addresses.

[8] The ORGANISATION table contains a record for every non-residential address. *Source: Eircode Documentation* *https://www.eircode.ie/business/business-benefits*

[9] 50, 100 or 200 Metres -the algorithm can be run at each distance for sensitivity analysis

Geocible has also flagged in the list of organisations the list of top 15,000 organisations[10] provided by ComReg in order to enable analyses. This list has been clashed with the Eircode organisation table but is not used in the algorithm.

2.3 Premises

In response to a statutory information request[11], operators provided a list of premises connected with fibre and Modern Interface (MI) LLs (both wired and wireless). This is a list of 12,932 premises that have been received and loaded (to be used in step 1 of the algorithm detailed in 1.1 whereas the list of 309k organisations is used in step 2).

Before their geocoding, all addresses have been restructured manually to facilitate the geocoding. As for the operator network step, Geocible created a common structure into an Access database.

For each premise, Geocible has extracted the following fields:

- The SP's name;
- The premise's name;
- The first and second address[12];
- The name of the business park (if available or applicable);
- The town or city;
- The ZIP[13] code, and
- The county.

Depending on the input information level made available, each premise does not have every field filled, except for the SP's name. Also, all duplicated records have been excluded from the study by Tera/Geocible. The results are listed in Table 3 below.

[10] These 15,000 organisation locations were obtained by interrogating the non-residential organisation list with the name of multi-site customers which were identified from the operators' lists of retail leased lines customers. This is a yardstick for potential demand.

[11] Issued 12 April 2017 for data pertaining to end of year 2016

[12] The "first" and the "second" address are two distinct views of the same location. E.g. First address = "Talbot Mall", Second address = "1 Talbot St".

[13] Standard labels were used. This refers to the building Eircode.

	All			After removing duplicated[14] inputs		
OPERATOR	Counts	Fixed	Wireless	Counts	Fixed	Wireless
Airspeed	✂[					
BT						
COLT						
EIRCOM RETAIL						
EIRCOM WHOLESALE						
ENET CMAN						
ENET UMAN						
ENET OTHER						
ESBT						
EU						
GTT						
Host Ireland						
Magnet						
Three Ireland						
Verizon						
Viatel						
Virgin Media						
Vodafone						]
Total	**12 932**	**10 202**	**2 730**	**12 413**	**9 791**	**2 622**

Table 3 List of SPs and counts of connected premises including duplicates [✂PARTIALLY REDACTED]

In order to geocode each premise, Geocible used the Google geocoding API tool.

A Google result is mainly based on a POI (point of interest) which describes an accurately geocoded premise. However, in some instances all the address information was not available as it was not provided by the SP and so there were gaps in the final database. For instance, when the end customer name is not available (e.g. for a wholesale provision where the retail customer cannot be identified by the SP or where the customer name was not provided), the Google API tool can resolve the location from a reasonably accurate street address. This can also work in the contrary manner, e.g. when the customer name is available but the address is imprecise e.g. "*Macs Pharmacy. Athenry, Co. Galway*" would facilitate an accurate return for this unique location i.e. there is only one Macs Pharmacy in this town. Therefore, attributing precise coordinates depends on the accuracy and/or uniqueness of the data. Furthermore, in order to increase the possibility of resolving a geocode from the data, up to 5 combinations of the various address fields were inspected. This was to avoid the situation where one element - for instance - "street" was not provided and a null result was therefore returned. It also

[14] This is where SPs included duplicate entries on its list of customer premises i.e. listed the same address multiple times. On these 12,413 addresses, 267 were ruled out from the calculations because of an absence of coordinate in the geocoding return. Either only 12,146 used for the next of process

resolved the situation where even if different forms of addresses were provided a unique address could be identified

Irish Biscuits, Belgard Road;

Tyre Factors, 25 Belgard, Tallaght, or

Olympic Cars, 102 Belgard Road, Tallaght, Dublin 24.

5 combinations of information were selected by Geocible:

- Addresse1 + Addresse2 + Town + County
- Name + Addresse1 + Addresse2 + County
- Name + Addresse1 + Addresse2 + Town
- Name + Addresse1 + Addresse2 + Town + County
- Name + Addresse1 + Town + County

The following table (Table 4 below) demonstrates how Geocible formatted the data before loading it into the Google geocoding API tool for inspection by the algorithm to yield an accurate and unique geocode.

		Found
1	Name + Addresse1 + Addresse2 + Town + County	POI ? => OK Not POI: next line
2	Name + Addresse1 + Addresse2 + Town	POI ? => OK Not POI: next line
3	Name + Addresse1 + Addresse2 + County	POI ? => OK Not POI: next line
4	Name + Addresse1 + Town + County	POI ? => OK Not POI: next line
5	Addresse1 + Addresse2 + Town + County	Conserve the best accuracy code (Street Address, Route, locality…)

Table 4 Details of information loaded into API tool

If no relevant POI has been found with the first combination, the second one is tried, then the third etc… until a POI type is recognised. If it is still not recognised at the end, the best accuracy code obtained is conserved.

At the end of the geocoding process, 12,413[15] premises connect by MI WHQA were geocoded and whose 12,146 were afterward used. The 4% of records that have not been geocoded were disregarded in the rest of the analysis as they were unusable and could not be reconciled even by manual inspection

[15] This included wired and wireless connected premises.

2.4 Candidate Geographic Units

In order to undertake the geographical market assessment, a geographic unit had to be selected. The following criteria were the key factors as required by ComReg:

- The area needs to be sufficiently small to be considered as homogeneous in terms of competition;
- The boundaries of the areas must be transparent and non-arbitrary;
- The operator networks can be mapped onto them.

A possible option was to assess the market shares for each road section supplied by OSI and to determine for each road section whether it is competitive or not. This does not satisfy the criteria listed above as a road section can be either very long (and could imply areas with heterogeneous levels of competition) or very short (and would imply many very small areas). Also, whether a given building belongs to a given road section or to another can also imply a level of subjectivity.

Accordingly, the preferred theoretical method was to assess the level of competition based on specific areas or polygons. Several set of polygons exist that cover Ireland and that are in theory suitable candidates to describe competitive area and non-competitive areas. For these reasons, the following administrative and commercial boundaries were considered.

- **Business Parks**: As a follow-on from the 2016 consultation a list of candidate business parks was compiled by ComReg on the basis of the presence of at least 2 alternative networks. This list was composed following a detailed visual inspection of maps containing all alternate network and their proximity to business parks, however, this approach was discounted for a number of reasons: The boundary of many of these parks were not all stable and ambiguous; numerous candidate commercial / industrial areas were found to non-contiguous and/or composed of many smaller intertwined business parks owned by different developers; the naming convention for many of these parks was confused and vague and finally, some business parks were intersected by small areas, the eventual choice of geographic unit and was therefore a potential source of possible erroneous or conflicting results.
- **Counties**: These are very large areas and are unlikely to be homogeneous in terms of the presence of alternative infrastructure. This was clearly evident from a simple visual inspection of the combined networks map.
- **EDs** (electoral divisions) were another option. This division is supplied by the Central Statistics Office of Ireland. Initially published from the Census, it covers the country with 3,440 polygons. Again, these were considered to be too large for any reasonable homogeneity of presence of alternative networks and again was disregarded following a visual inspection of the “combined networks” map.
- **small areas**: Created in 2011 by the National Institutes of Regional and Spatial Analysis on behalf of the Ordnance Survey Ireland. The small areas, of which there

are 18,641, constitute the smallest level of geography used by the CSO. They gather sets of population comprising between 50 and 200 dwellings.

Following careful consideration and based on the criteria outlined above, it was decided to undertake the analysis using small areas. They are sufficiently small to allow a reasonable homogeneous analysis within each one; the areas are accurately defined with stable boundaries and the mapping information is independently produced and publicly available[16]. Table 6 below lists the small area maps available and the preferred choice used in the analysis.

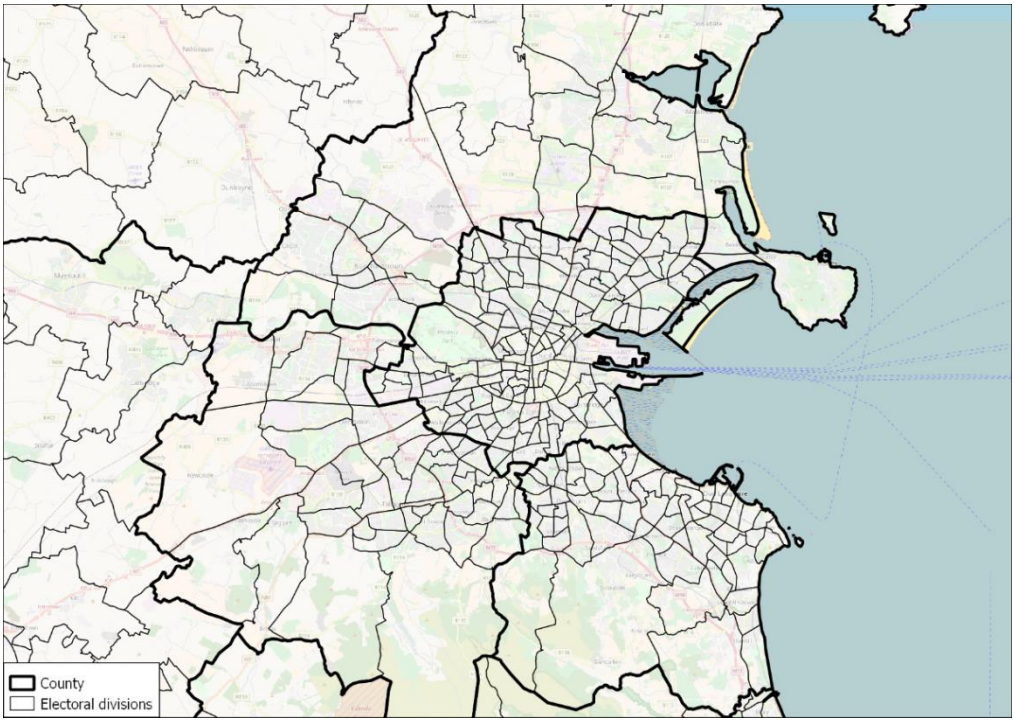

Figure 4 Map of EDs and administrative areas in Greater Dublin Area

[16] https://data.gov.ie/dataset/small-areas-ungeneralised-osi-national-statistical-boundaries

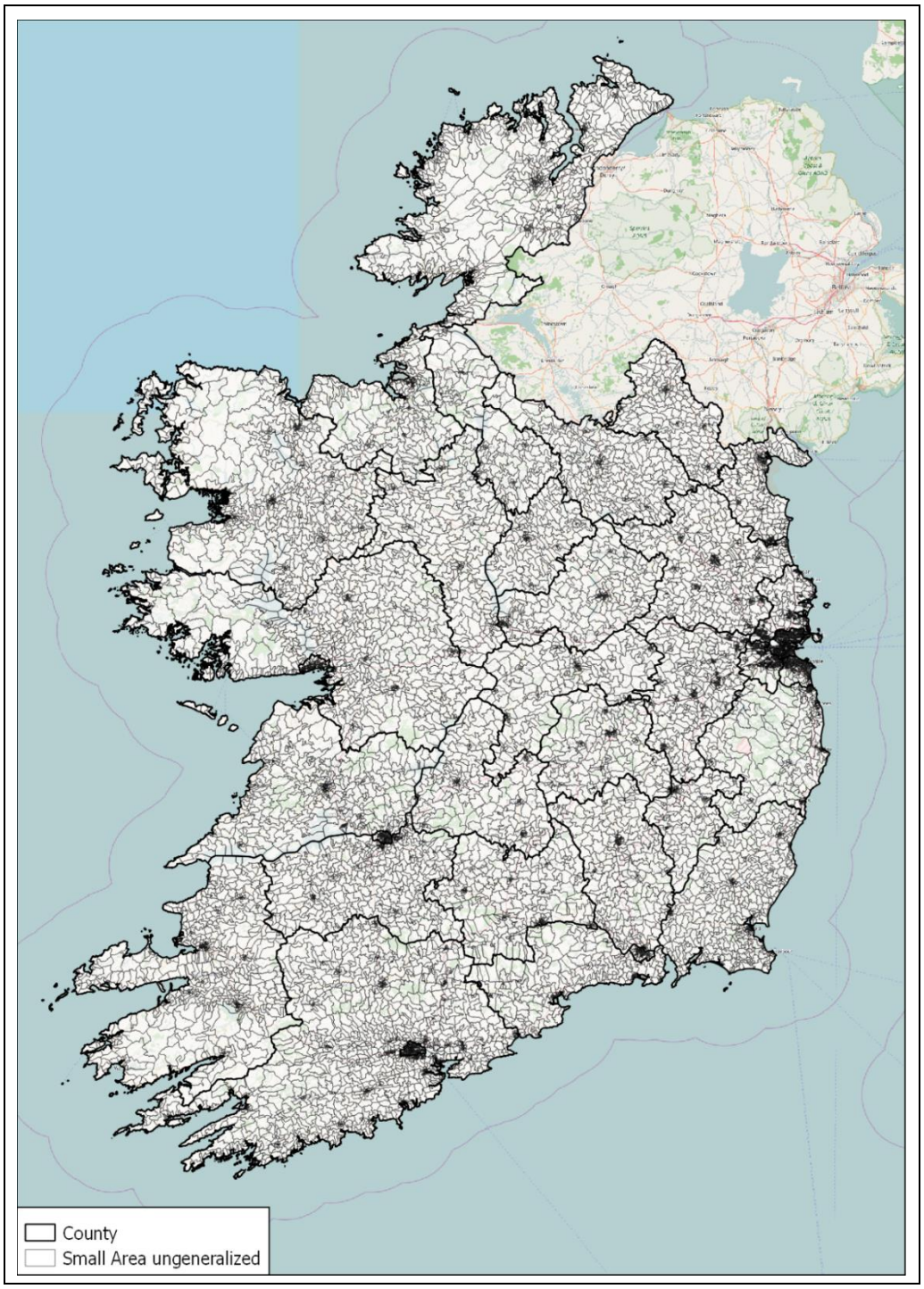

Figure 5 National map of small areas and Counties

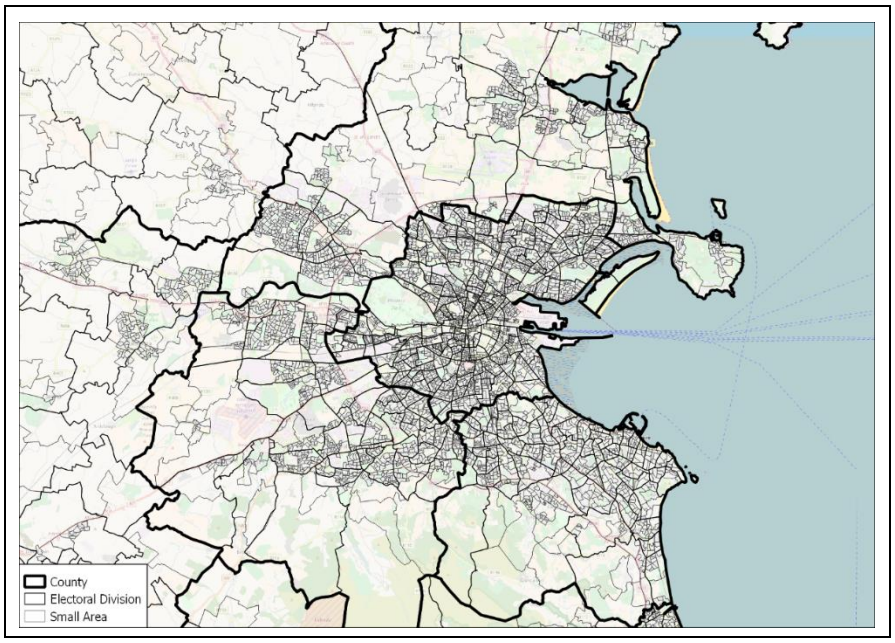

Figure 6 Map of small areas and administrative areas in Greater Dublin Area

Several versions of small areas, corresponding to different accuracy level were available as listed in Table 6. For the analysis, it was decided to use the most accurate variant: the ungeneralised one which is accurate to 1 metre.

small areas ungeneralised *(more precise available definition)*	Final Choice
small areas generalised 20m *(less precise map where two consecutive points used to define the area are not closer than 20m)*	Excluded
small areas generalised 50m *(less precise map where two consecutive points used to define the area are not closer than 50m)*	Excluded
small areas generalised 100m *(less precise map where two consecutive points used to define the area are not closer than 100m)*	Excluded

Table 5 Summary of small area maps

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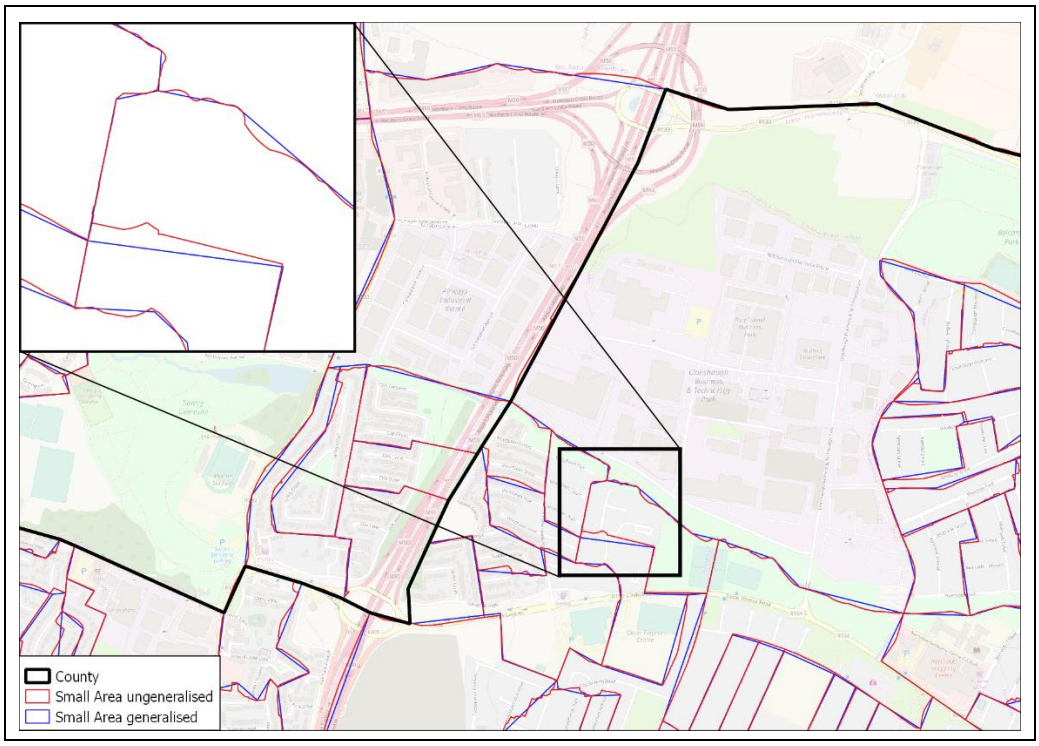

Figure 7 Map showing difference between generalised and ungeneralised small areas

3. Algorithms

3.1 Spatial queries

It is important to note that the network mapping information was of varied accuracy at street level. Some maps were offset slightly from the carriageway on which they were run but still clearly indicated the streets and roads through which the relevant networks were routed. It was not feasible to distinguish which side of the carriageway the duct was on or if it was routed along the centre of the road or on the footway. For this reason, each network was allocated a "thickness" or effective width of 20 Metres. This has more implications than display or visual purposes and purposely impacts on the analysis below. For instance, a network which is routed on a carriageway which bounds 2 geographic areas is assumed to provide access to both areas.

Prior to the implementation of the algorithm used to determine the areas that are competitive and the areas that are not, a number of spatial queries have been performed in order to:

- Calibrate the most suitable algorithm (e.g. in order to assess if connection organisations connected to a given network are within 50, 100[17], 200 Metres radial reach from another alternate fixed network in order to allow for a sensitivity analysis…);
- Identify whether organisations meet the criteria of having 2 or more networks within a specific distance of their location and flag appropriately

Spatial queries were run such as:

- For each small area,
  - count how many networks intersect or touch the small area
  - count how many business parks intersect it (though this was removed from later computations as explained above in Section 2.4);
  - count how many premises of each operator are contained inside the small area.

- For each premises of each operator (total: 12,146),
  - Determine in which small area it is situated;
  - Determine which networks - if any - closer than 50 Metres, 100 Metres, 200 Metres and.

- Same routine was run for each organisation (total: 309k),

- Same routine was run for each building[18] (total: 239k).

[17] ComReg noted that here are varying rules across Local Authority areas for wayleave notification periods for dig distances.100 Metres was chosen by ComReg as a reasonable reflection for the operation of SPs in practice having contacted a sample of Local Authorities.

[18] List of non-residential entities

All this information and all different “objects” (small areas, organisations, buildings…) were stored in a unique access database. A unique file allows routes to easily run spatial queries and perform other data manipulations and figure 7 below lists the datasets generated and stored for each

Below in Table 7 are the details of the different datasets produced and loaded into an Access Database.

Organisations	List of organisations including the 15,446[+] organisation locations of possible demand
Buildings	List of buildings with the circa 239K address points provided by Eircode
Premises	List of Premises by operator and with restructured addresses
small area Ungeneralised	List of OSI small area with count of intersected operator

Table 6 Details of stored datasets

[+]The 15K Organisations

ComReg compiled a list of all SP’s retail on-net customer circuits. All multi-site retail customers (> 2 sites) were identified from this list and clashed against the Eircode list of 300K organisations. This yielded a result of 15,446 possible locations of demand though not all of these locations may actually require a leased line.

This list of “15K organisations” was used in the algorithm described in Section 3.2 and in the proximity analysis in Section 3.4.

This was chosen by ComReg as the proxy by which to reasonably measure potential demand for leased line, whereas the 300K organisation locations provided by Eircode included locations of all types of businesses. This list incorporated farms, sole traders, micro businesses and other small SMEs which are unlikely to ever require leased line services and so the qualified list of 15K lines was considered to be a more reasonable assessment of likely demand for HQA services.

Algorithm to choose zones of high and low Alternative Network infrastructure density

STEP 1

A small area is deemed to be an area of high alternative network infrastructure or density) if:

> it is intersected by at least 2 operator's networks which can act independently of Eircom in this area
> or
> it is intersected by CMAN Enet network,[19]

whereas all other small areas are deemed to be areas of low alternative network infrastructure (or density).

4,752 small areas were considered as 'high intensity' at the end of step 1 and were the basis for the second part of the process.

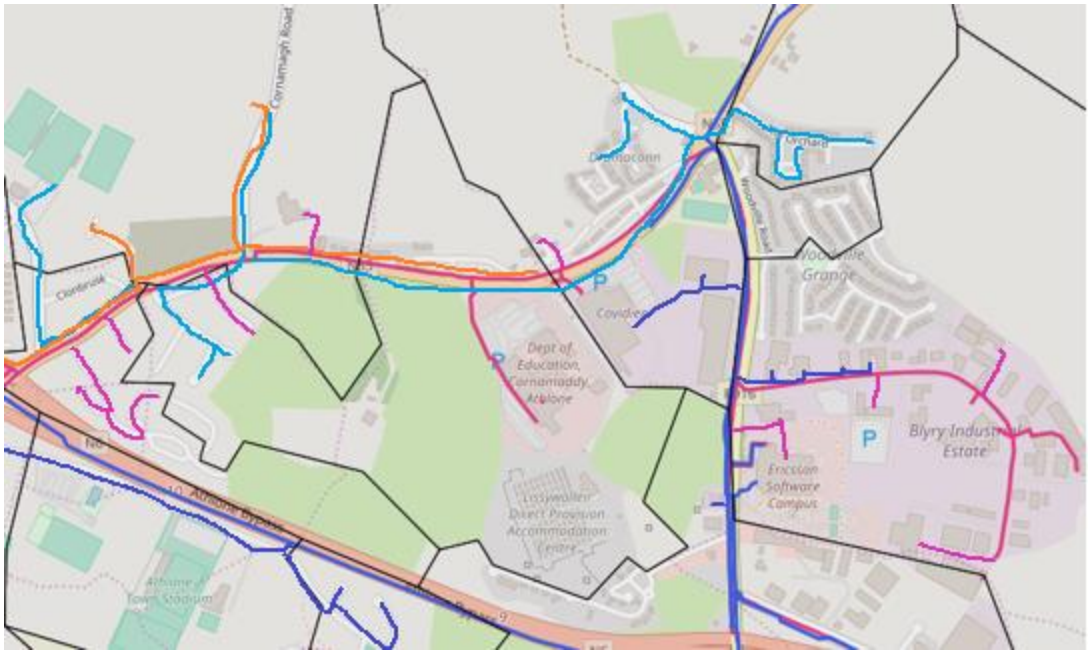

Figure 8 Map showing stylised example of intersections of alternative networks and small areas (black lines)

STEP 2

2 cases occur depending on the number of fixed network MI connected premises inside the small area:

- The first case is for small areas which contain 4 of more connected premises:
  => 465 small areas identified
  - If 75% or more of those premises (not wireless) are within 100 metres of 2 networks or from ENET CMAN then the small area is considered as 'high density'

[19] A CMAN is an Enet managed MAN publicly owned open access network connected by 'competitive' backhaul networks

=> 394 small areas identified

- All other small areas in this category are considered low density i.e. if more than 25% of those premises are not within 100m of 2 networks or from an ENET CMAN, then the small area is deemed 'low density'

  => 71 small areas identified

- The second case is for small area which contain less than 4 premises

  => 4,287 small areas identified

  - If the small area contains zero organisation, the small area is considered as 'high density'

    => 817 small areas identified

  - If the small area contains 1 or more organisations, and if 75% or more of them are within 100 meters of 2 networks or from ENET CMAN then the small area is definitively considered as 'high density'

    => 1,837 small areas identified

  - If the small area contains 1 or more organisations, but if more than 25% of them are not within these 100 meters, the small area is considered as 'low density'

    => 1,633 small areas identified

Finally, 394 + 817 + 1,837 = 3,048 small areas are deemed 'high density' in total

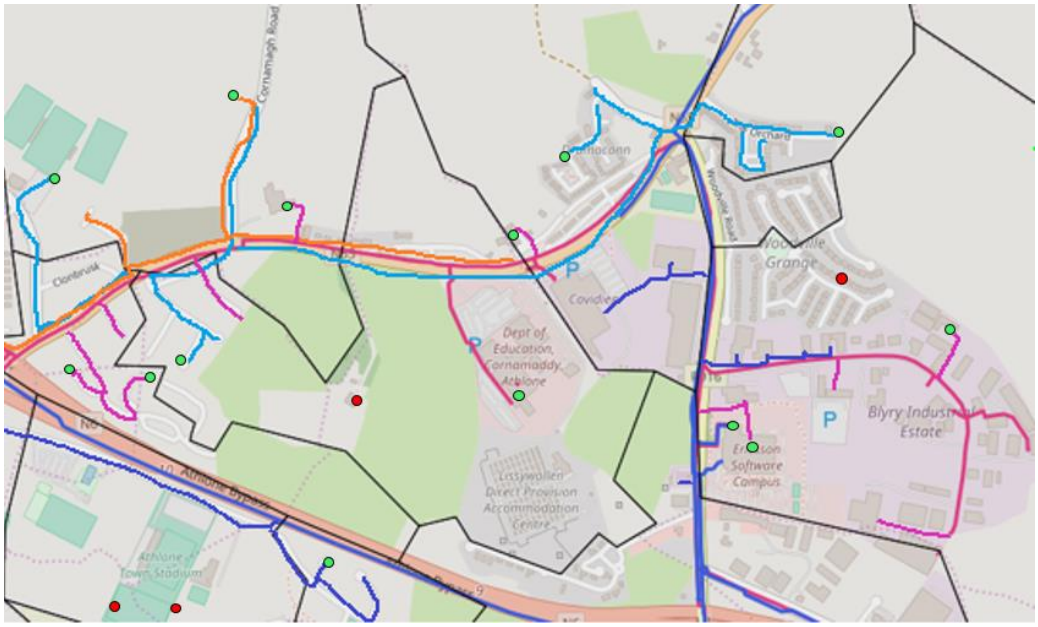

Figure 9: Showing stylised examples[20] of location of premises within (green) and further (red) than 100M

[20] These are not actual customers or networks and this representation is for illustrative purposes only

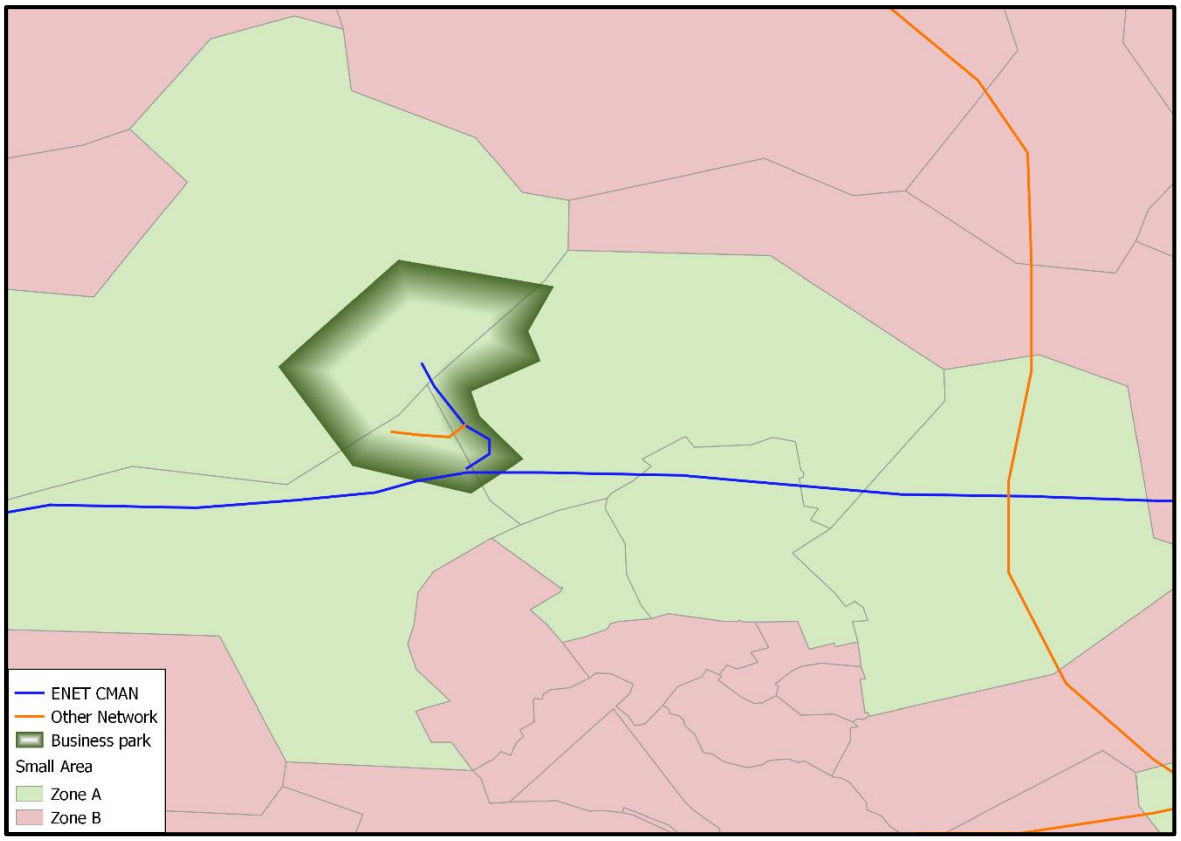

Figure 10 Stylised example of results showing Zone A and Zone B designated small areas

Sensitivity analyses were performed on the percentages and distances used in the algorithm. The distance criteria (from 2 alternate networks) for connected premises and then organisations could be adjusted for distances of 50, 100 and 200 Metres. Similarly, the algorithm could also be adjusted for each of these cases to adjust the threshold of percentage of connected premises and then organisations (25, 50 and 75%) of the respective totals which met the initial distance criterion and this used to declare whether each individual small area was competitive or otherwise. The criteria were set at 100 Meters and 75% respectively by ComReg to produce the final results which were run by Geocible. The distance criterion was chosen as explained previously, based on local authority wayleave information and notification periods and the percentage criterion was assumed on the basis of alternate networks being able to cover the majority of connected premises/organisations within each small area. These were also checked in a manual fashion in a number of areas to confirm that results were reasonable and fair.

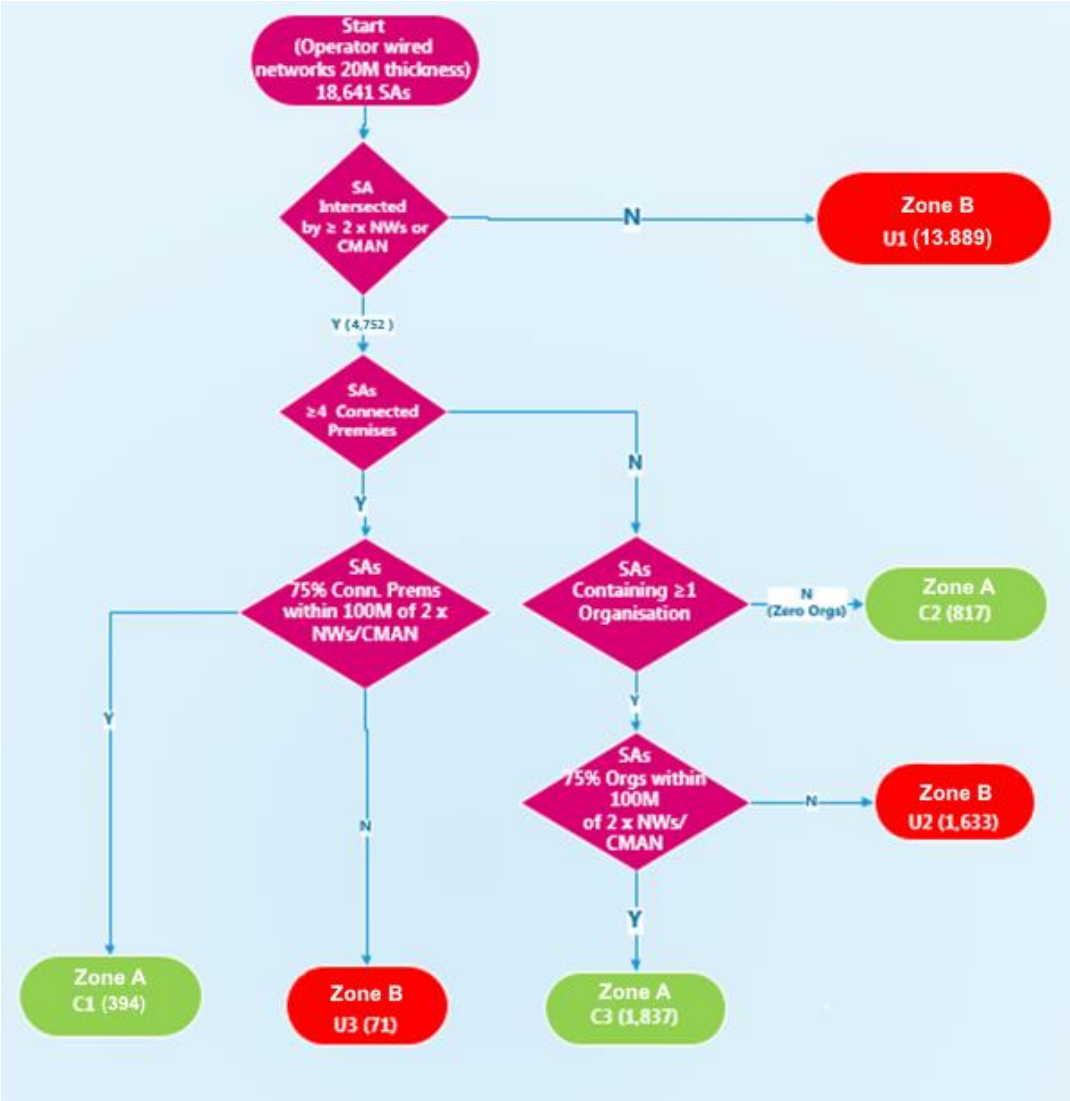

Figure 11 Flowchart of SA algorithm

3.2 Market share calculations for Zone A and Zone B

The amalgamation of all "high density" small areas constituted the overall "high density" zone, called Zone A, for which market shares were calculated for each SP. Shares for the remainder "low density" zone, called Zone B, was also calculated. The results are show in Table 7 & 8 below.

Zone A		
Operators	Percentage Connected Premises	Vol Connected Premises
Airspeed	✂[	
BT		
COLT		
EIRCOM RETAIL		
EIRCOM WHOLESALE		
ENET CMAN		
ENET UMAN		
ENET OTHER		
ESBT		
EU		
GTT		
Host Ireland		
Magnet		
Three Ireland		
Verizon		
Viatel		
Virgin Media		
Vodafone		]
Total		**6,303**

Table 7 Market shares of connected premises in 'high density' zone (Wired MI & fibre connected premises) [✂PARTIALLY REDACTED]

Zone B		
Operators	Percentage Connected Premises	Vol Connected Premises
Airspeed	✂[	[redacted]
BT	[redacted]	[redacted]
COLT	[redacted]	[redacted]
EIRCOM RETAIL	[redacted]	[redacted]
EIRCOM WHOLESALE	[redacted]	[redacted]
ENET CMAN	[redacted]	[redacted]
ENET UMAN	[redacted]	[redacted]
ENET OTHER	[redacted]	[redacted]
ESBT	[redacted]	[redacted]
EU	[redacted]	[redacted]
GTT	[redacted]	[redacted]
Host Ireland	[redacted]	[redacted]
Magnet	[redacted]	[redacted]
Three Ireland	[redacted]	[redacted]
Verizon	[redacted]	[redacted]
Viatel	[redacted]	[redacted]
Virgin Media	[redacted]	[redacted]
Vodafone	[redacted]	[redacted]
Total		3,322

Table 8 Market shares in "low density" zone (Wired MI & fibre connected premises) [✂PARTIALLY REDACTED]

3.3 SP coverage analysis

In addition to this analysis above Geocible has provided 2 additional geographical analyses for ComReg in relation to the coverage of alternate fixed infrastructure. Firstly, the coverage of each SP and infrastructure provider was interrogated and clashed against the small areas maps in order to provide information on the scope and scale of each SP footprint.

The resultant statistics for network coverage in terms of small areas touched or intersected by individual SP networks are provided in Table A1 on a county basis in terms of percentages and volumes.

Secondly, the locations of the "15K organisations" which are used to describe the proxy demand for leased lines as outlined in Section 3.1, was interrogated for proximity to alternate SP networks. The results of this analysis are provided in Table A2 and demonstrates that circa 50% of this demand is over 100 M from any alternate network. It should be noted that this proxy is for retail demand only and could contain locations for which leased lines will not be required.

4. Annexes

4.1 Counts of small areas covered by operators –Table A1 [✂PARTIALLY REDACTED]

County Name	AURORA	BT	COLT	ENET UMAN OTHER	ENET CMAN	ESBT	EU	GTT	MAGNET	S RO	VERIZON	VIATEL	V RGIN MEDIA	VODAFONE	Total All	%
Carlow County	[redacted]														102	1,0%
Dublin City															2 224	22,2%
South Dublin															912	9,1%
Fingal															859	8,6%
Dún Laoghaire-Rathdown															768	7,7%
Kildare County															478	4,8%
Kilkenny County															147	1,5%
Laois County															119	1,2%
Longford County															37	0,4%
Louth County															286	2,9%
Meath County															288	2,9%
Offaly County															55	0,5%
Westmeath County															194	1,9%
Wexford County															125	1,2%
Wicklow County															198	2,0%
Clare County															173	1,7%
Cork City															524	5,2%
Cork County															579	5,8%
Kerry County															175	1,7%
Limerick City															259	2,6%
Limerick County															173	1,7%
North Tipperary															46	0,5%
South Tipperary															137	1,4%
Waterford City															182	1,8%
Waterford County															17	0,2%
Galway City															306	3,1%
Galway County															193	1,9%
Leitrim County															16	0,2%
Mayo County															76	0,8%
Roscommon County															58	0,6%
Sligo County															117	1,2%
Cavan County															49	0,5%
Donegal County															110	1,1%
Monaghan County															46	0,5%
Total	[redacted]														10 028	53,8%

Table 9 Small areas by counties covered by fixed alternative SPs

4.2 Counts of organisations near alternate SP networks [✂PARTIALLY REDACTED]

The "15K organisation" locations of possible demand have been split depending on their proximity of 100 Metres to each operator's network. The results are listed as follows:

Operator	Vol Organisations near alternative SP[21]	% Organisation near Alternative SP
Aurora	✂[redacted]	[redacted]
BT	[redacted]	[redacted]
Colt	[redacted]	[redacted]
Enet UMAN/Other	[redacted]	[redacted]
Enet CMAN	[redacted]	[redacted]
ESBT	[redacted]	[redacted]
EU	[redacted]	[redacted]
GTT	[redacted]	[redacted]
Magnet	[redacted]	[redacted]
Siro	[redacted]	[redacted]
Verizon	[redacted]	[redacted]
Viatel	[redacted]	[redacted]
Virgin Media	[redacted]	[redacted]
Vodafone	[redacted]	[redacted]
Total Near	**7,427**	**48,1%**
Total Far	**8,019**	**51,9%**
Total	**15,446**	

Table 10 Counts of organisation near alternative networks [✂REDACTED]

e.g. 5.7 % of top 15,446 organisations are considered close to (within 100 Metres) of [✂[redacted]] network. 48.1% of top 15,446 organisations are considered as being close to at least 1 alternate network.

[21] One organisation may be near several networks

4.3 ENET CMAN and UMAN list [✂PARTIALLY REDACTED]

TOWN	#	U or C
Abbeyfeale	1	✂[
Ardee	2	
Athenry	3	
Athlone	4	
Bailieborough	5	
Ballina	6	
Ballinasloe	7	
Ballinrobe	8	
Ballybofey-Stranorlar	9	
Ballyshannon	10	
Banagher	11	
Bantry	12	
Belmullet	13	
Birr	14	
Blarney	15	
Blessington	16	
Buncrana	17	
Bundoran	18	
Cahir	19	
Carlow	20	
Carndonagh	21	
Carrickmacross	22	
Carrick-on-Shannon	23	
Carrick-on-Suir	24	
Carrigaline/Ringaskiddy/Passage West	25	
Cashel	26	
Castleblayney	27	
Castleisland	28	
Cavan	29	
Charleville	30	
Claremorris	31	
Clifden	32	
Clones	33	
Clonmel	34	
Cootehill	35	
Cork City	36	
Donabate/Portrane	37	
Donegal Town	38	
Drogheda	39	
Dunboyne/Clonee	40	
Dundalk	41	
Dungarvan	42	
Dunmanway	43	
Dunshaughlin	44	

TOWN	#	U or C
Edenderry	45	
Fermoy	46	
Galway City	47	
Gort	48	
Gweedore (Bunbeg)	49	
Kanturk	50	
Kells	51	
Kilkenny	52	
Killarney	53	
Kilrush	54	
Kiltimagh	55	
Kingscourt	56	
Kinsale	57	
Knock	58	
Letterkenny	59	
Limerick City	60	
Listowel	61	
Longford	62	
Loughrea	63	
Lusk/Rush	64	
Manorhamilton	65	
Midleton	66	
Mitchelstown	67	
Monaghan	68	
Mullingar	69	
Navan	70	
Nenagh	71	
Newcastle West	72	
Newtownmountkennedy/Kilcoole	73	
Portlaoise	74	
Roscommon	75	
Roscrea	76	
Skerries	77	
Skibbereen	78	
Sligo	79	
Templemore	80	
Thomastown	81	
Tipperary	82	
Tralee	83	
Trim	84	
Tullamore	85	
Waterford City	86	
Wexford	87	
Youghal	88	]