



An Coimisiún um  
**Rialáil Cumarsáide**  
Commission for  
**Communications Regulation**

# Coverage Obligations and Spectrum Awards

A report from DotEcon

Consultant Report

**Reference:** ComReg 19/124b

**Date:** 20/12/2019

# Coverage obligations and spectrum awards

Comments on submission by Liam Young

19 December 2019

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## 1 Introduction

### 1.1 Purpose of this report

#### *Purpose of this report*

One of the responses to the consultation (ComReg 19/59R) on the award format for the upcoming second multiband spectrum award (MBSA2) provided comments on the coverage obligations to be attached to the licenses in this auction. In this report, we respond to the specific comments raised by this respondent, Mr Young.

Our previous report (ComReg 18/103d) discusses coverage obligations in relation to spectrum awards more generally, though the conclusions are specifically relevant to the MBSA2 award process. As discussed below we consider that the conclusions of that report still apply.

### 1.2 Key points of Mr Young's response

The respondent, Mr Young, submits that ComReg should adopt an interventionist approach to setting licence obligations to ensure minimum coverage and download speeds, rather than the precautionary approach favoured by ComReg in its consultation document.

In outline, Mr Young recommends that ComReg should:

- set much more challenging network coverage and minimum download speed conditions than those set out in the consultation document; and
- not allow its approach to the spectrum award to be influenced by the National Broadband Plan (NBP).

Mr Young considers that, as ComReg's statutory objective regarding maximising the use of Ireland's radio spectrum resources for Irish consumers is unqualified, ComReg should not be constrained by overlapping plans for fixed network solutions.

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### 1.3 Key arguments in our previous report

#### *Precautionary vs interventionist obligations*

Before responding to the specific points raised by Mr Young, it is useful to restate the key points of our previous report (18/103d). In that report our primary concern was to assist the public discussion about coverage obligations by setting out the differences between:

- precautionary obligations, aimed at avoiding cherry-picking behaviour or failures of competition between network operators, but which are expected to be exceeded due to the normal forces of competition; and
- interventionist obligations, increasing coverage to levels beyond those that normal forces of competition would deliver.

#### *Interventionist obligations have a cost*

We emphasised that interventionist obligations involve some element of subsidy, though this might be implicit and occur through a reduction in the value of and, in turn, the price paid for spectrum where obligations are attached to spectrum licences. We pointed out that there was no reason why interventionist obligations had to be implemented by encumbering spectrum licences. It is also possible for governments to procure various forms of coverage increment directly, for example through a reverse auction. This approach might well be more flexible when operators would in any case be using multiple spectrum bands to meet such obligations, not solely those particular bands offered in one award process.

Given that operators have existing network assets, there is no reason why the most efficient operator to serve a coverage obligation is one and the same as the bidder with the highest value for a particular block of spectrum. Therefore, even if spectrum assignment and coverage obligations are assigned through a unified process, there needs to be sufficient flexibility to accommodate such possibilities.

#### *Advantages to procuring coverage improvements later*

In our report, we highlighted that interventionist obligations come at a cost to the State, whether through reduced revenue from a spectrum auction or the cost of procuring coverage commitments separately through a reverse auction. This gives rise to a public policy question about how much the State is willing to pay for various coverage commitments and what the likely benefits would be.

Furthermore, given that procuring coverage commitments could in principle be decoupled from any specific spectrum award, there are advantages to waiting and seeing what competition might deliver by way of coverage. Any subsequent intervention could then be made selectively to rectify any observed market failure.

## 2 Interventionist vs precautionary coverage obligations

### 2.1 Response comments

Mr Young suggests that the interests of Irish consumers, taxpayers and in particular, rural mobile broadband (MBB) users are best served by the adoption of an interventionist approach to coverage obligations, rather than the precautionary approach favoured by ComReg in its consultation document.

Mr Young says that an interventionist approach to download speeds and coverage obligations is considered by many regulators to be critical to ensuring that licence holders roll out services quickly, and that radio frequency spectrum is used efficiently and to the maximum benefit of users. The interests of users and MNOs are unlikely to coincide on this issue, and it is to be expected that MNO's would prefer to be free to rollout services and network coverage plans in a manner that suits their own operational and financial needs.

He further says that a precautionary approach risks reinforcing the perception that urban communities are unfairly prioritised over rural communities. Whereas, rapid roll out of advanced mobile services to rural communities (before or at the same time as urban ones) would

- be socially beneficial as it counters this view; and
- improve national competitiveness by ensuring Irish businesses and consumers enjoy the benefits of connectivity at least as quickly as those in other countries.

### 2.2 Our assessment

MNOs will have a higher value for licenses with precautionary coverage obligations, as interventionist coverage obligations are defined as those that go beyond the levels of coverage that might be expected from well-functioning competition between these operators. We note that it is common for European regulators to use precautionary coverage obligations, while interventionist coverage obligations are typically used selectively to address specific failures of competition to deliver coverage.

*Intervention tailored to address market failure*

We made the point in our previous report that, if market failures occur that justify an interventionist coverage obligation, it is very likely that the obligation will need to be tailored to mitigate that market failure. Simply ramping up obligations to cover a certain proportion of population or of premises would unlikely be sufficient, as competition between mobile operators already creates incentives to cover locations where people cluster.

*Balance costs and benefits*

ComReg's objective is to achieve an efficient outcome for spectrum allocation and use. This requires balancing the costs and benefits of outcomes. It is only efficient to require MNOs to provide services where it is not profitable for them to do so if there are external benefits that outweigh the costs. This is not the same as simply maximising benefits for mobile users without regard to the costs of delivering that outcome. Therefore, we strongly disagree with Mr Young's suggestion (mentioned in the introduction above) that ComReg's objective of achieving efficient spectrum allocation should be interpreted as an absolute requirement to incur ancillary network investments without limit in order to realise greater coverage without regard to the relative costs and benefits of such investments.

In our report on coverage obligations and spectrum awards, we noted that external benefits of greater coverage may well exist, for example because:

- oligopolistic competition could lead to reduced incentives to provide coverage (especially because national pricing and bundled services may make it difficult to monetise coverage improvements);
- there may be coordination problems related to new services that depend on coverage; and
- there may be public safety benefits.

However, these external benefits will generally be modest and so they may not be sufficient to justify costly interventionist coverage obligations. In our previous report we did not find any credible *a priori* arguments to suppose that these external benefits would typically be large. Mr Young has not supplied any additional evidence or arguments to undermine this conclusion.

*The case for intervention could arise*

Nevertheless, we agree that it is possible that a case could arise for interventionist obligations to be procured, for example, if smart transport systems, requiring 5G coverage, become important and there is evidence that competition between MNOs cannot deliver this.

*Strong arguments to wait and see what competition can deliver*

However, such possibilities do not imply that we should necessarily attach interventionist obligations to licenses in the MBSA2 spectrum award. There is a strong argument that it would be better to wait and see what competition between network operators can deliver, subject to a precautionary coverage obligation, and then consider intervening selectively to address specific, observed coverage failures if and when they emerge. This approach is likely to give much better value for money for the taxpayer by allowing interventionist obligations to be designed to maximise benefit relative to cost. It is particularly appropriate given the high degree of current uncertainty about how 5G services might evolve and what new applications, some of which could be of significant social value,

require by way of coverage. The need to serve new 5G markets for transport applications, telemetry, agricultural applications and so on may well provide a stronger incentive for operators to extend coverage.

*Careful targeting to ensure maximum benefits*

In cases where interventionist coverage obligations might be procured, these probably would not apply as a blanket requirement to serve a greater proportion of population or premises but would more likely be structured requirements to provide services in specific 'not-spots'. Any intervention would need to be carefully targeted to ensure that maximum benefits were obtained. In any procurement exercise, this might require breaking down coverage commitments into separate lots, so that the State has the option of accepting only some subset of commitments, such that the costs of those obligations accepted are less than their external benefits.

## 3 International comparisons

### 3.1 Response comments

Mr Young argued further that while a balanced approach is required, adopting only a precautionary approach to coverage obligations could prevent MNOs from prioritising the roll-out of 5G services in Ireland. He said that MNOs and equipment manufacturers operating in many countries will consider the roll-out obligations in each of these markets when deciding where to roll-out new services. Irish 5G networks risk becoming a low priority and being developed later relative to other countries.

Mr Young said that evidence from international studies<sup>1</sup> demonstrated that Ireland lags far behind most developed nations in average mobile data download speeds and is at or below the rural population coverage average of most nations in terms of current 4G LTE coverage. This performance demonstrates that the dynamics of competition among licensees in Ireland is unlikely to address the quality of service deficit without significant intervention by ComReg.

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<sup>1</sup> See European Commission, 2019, 'Digital Economy and Society Index Report 2019 on Connectivity'; Ookla LLC, 2019, Speedtest Global Index; and OpenSignal, 2019, 'The State of Mobile Network Experience'.

## 3.2 Our assessment

*International comparisons of download speeds*

First, we note that the international comparisons mentioned by Mr Young primarily deal with mobile download speeds. It is true that these reports state that Ireland ranks relatively low among European countries in terms of download speeds. However, in other aspects of the European Commission's report, Ireland performs better relative to other EU countries than it does when looking only at data speeds. An overall measure of connectivity, which takes into account mobile and fixed broadband coverage, ranks Ireland twelfth, with a score above the average for the EU 28, even though parts of the country are particularly difficult to serve. This data needs to be considered in the light of challenging geodemographics of Ireland, with Ireland having many isolated rural dwellings.

*Average download speeds are not measure of coverage*

It is important to separate considerations of average download speeds from those of acceptable coverage. What should be at question is the proportion of the customers, whilst moving around between home, work and other locations where they spend time, who experience mobile services at or exceeding some minimum acceptable speed. Average download speeds tell us little about whether such a coverage objective has been achieved. For example, despite the performance in terms of download speeds, average 4G availability in Ireland is around the same level of the EU average of 94% of homes.

Mr Young argues subsequently (which we deal with in Section 5 below) that obligations should be set to bring mobile and fixed services into competition by requiring a significant increase in mobile speeds. We explain below that we consider that this misunderstands the likely future relationship between fixed and mobile connectivity and there are unlikely to be significant external benefits from intervening to achieve this, yet very considerable costs.

*Ireland becoming low priority for 5G without interventionist obligations*

Second, Mr Young's argument appears to be predicated on trans-national MNO groups and equipment manufacturer making choices about which countries to prioritise for 5G investment. We disagree that there is likely to be any significant trade-offs between different countries in terms of which will receive 5G networks first. Equipment manufacturers operate at global scale and as new equipment becomes available it will do so at volume; it is for MNOs to make network-by-network decisions about upgrading and adoption of 5G. Furthermore, MNOs belonging to international groups have ready access to capital. Other than in the very short-run, they are unlikely to be subject to capital constraints that would require investments in different countries to be traded-off. Therefore, deployment is not a zero-sum game across countries. Network investments will need to clear hurdles set by the cost of capital in the usual manner, which is a largely independent question for each network deployment.

In any case, we consider that Mr Young is incorrect to assert that, even if there were trans-national competition for investment or network equipment, setting a stringent interventionist coverage obligation would help Ireland garner additional resources in such a situation. To the contrary, such an obligation would tend to reduce investment returns from network expansion and so disfavour Ireland relative to countries with less onerous obligations.

## 4 Sequencing of interventionist obligations

### 4.1 Response comments

Mr Young says that ComReg's consultation document offers no rational reasoning behind the view put forward that "*interventionist obligations are ideally achieved via a sequential step in a spectrum award or through a separate process.*" He says that no stakeholders would benefit from the uncertainty this creates and it could cause potential bidders to assign less value to the licence in light of the prospect of shifting or increasing licence obligations that may or may not arise over time.

He highlights that the likelihood that MNOs will accept new "sequential" obligations voluntarily once the licence agreement is in place is very low, and suggests the imposition of new licence obligations post the award process is likely in any case to be too late to address a market failure once it occurs. From a contractual point of view, it seems unlikely that ComReg could unilaterally impose new conditions on a licence that has already been granted, and which would at best, be open to legal challenge.

Mr Young says he is not aware of ComReg engaging in post-award changes in licence conditions to address deficits in quality of service performance, despite the evidence of such deficits from international comparisons.

### 4.2 Our assessment

#### *Reserve auctions for coverage commitments*

While the matter of amending licences is an issue for ComReg to consider in accordance with the relevant legal framework, we note that ComReg could, for example, *procure* commitments after the award of licenses, and operators would be paid for taking them on. Such a procurement would involve operators submitting bids specifying how much they would need to be paid to accept increased coverage requirements on existing licenses. Therefore, no significant uncertainty is created for bidders that the value of spectrum will be undermined by obligations being imposed *ex post*.



*Interventionist obligations would likely need to be asymmetric*

Policy makers have a large number of options when deciding how to implement coverage obligations, but a consistent difference between precautionary and interventionist obligations is that the former are likely to be symmetric and apply to all operators, while the latter are likely to be asymmetric and apply to one, or a subset, of operators. This is because precautionary measures are based on protecting what will be achieved in a competitive market; they must protect competition from tacit collusion, cherry-picking of profitable areas, or geographic segmentation of markets. In contrast, because there will likely be strong economies of scale in serving areas that would not be served in a competitive market, it is efficient to only apply interventionist obligations to some operators. Therefore, it is highly unlikely that a well-designed interventionist obligation would take the form of a uniform requirement on all operators to cover a certain proportion of population or premises.

*The case for separate procurement of coverage commitments*

This has implications for spectrum awards that may make it preferable for interventionist coverage obligations to be procured separately. For example, if there are coverage lots in an auction (because interventionist coverage obligations are being applied asymmetrically), bidders who can serve the incremental coverage area at a lower cost may be at an advantage. This leads to an asymmetric level of competition for the lot, which would reduce the likelihood of the auction achieving an efficient outcome, whatever format was used for the award. Our previous report lays out further examples of how including coverage obligations inflexibly within a spectrum auction could distort the auction process.

In particular, bundling spectrum and interventionist coverage obligations into coverage lots risks not assigning the spectrum if coverage obligations have been set too harshly and coverage lots go unsold which result in lower levels of coverage compared to using a well-designed precautionary obligation. Given the likely value of the spectrum and the cost of extending coverage, we consider that the risk of this would be quite high in ComReg's proposed award.

Therefore, we believe it is preferable for ComReg to only impose precautionary coverage obligations on the licenses in the award, but to consider having a separate procurement process for interventionist obligations, if there are sufficient external benefits to justify doing so. While such a procurement exercise would come at a cost to the State, so would imposing interventionist coverage obligations within a spectrum award, as this would lead to lower valuations and therefore lower revenue. This is not an argument to never intervene, instead it is purely a recommendation on sequencing, aimed at promoting an efficient outcome in the auction and ensuring that such an obligation is suitably designed and kept to the minimum necessary to remedy a coverage gap that competition alone cannot achieve.

In light of the fact that obligations would be *procured* and not imposed, we do not think that this would introduce any additional uncertainty around the value of the license. Successful bidders would be compensated for committing to additional coverage obligations, if they chose to do so. Whether or not it is appropriate to use such a procurement mechanism later will depend on a consideration of the external benefits from having interventionist obligations in place.

## 5 Competition between fixed and mobile operators

### 5.1 Response comments

#### *EU competition law*

Mr Young says that ComReg may need to ensure that its approach is compatible with EU State Aid and EU Competition Rules, since the adoption of a strategy that is perceived to be taking a less than optimal approach to the spectrum licence award, in an effort to avoid or discourage licensees from encroaching on the objectives of the NBP may be problematic. Irrespective of this issue, he believes a rapid rollout and coverage of both fixed and mobile high-speed broadband infrastructure is in the Irish rural consumers' best interests.

#### *Mobile as an alternative*

It appears to Mr Young that ComReg is of the view that fixed high-speed rural broadband services require Government intervention in Ireland, while mobile high-speed rural broadband services do not. He suggests that, from a rural user's perspective, both technologies should be enabled and incentivised, partly because their use cases and applications are often different, and also because EU Competition Law is based on the premise that the consumer is best served by promoting fair competition between vendors offering different but competing solutions to the fullest extent possible.

#### *Single market for fixed and mobile services*

He believes that ComReg must therefore consider not just the extent of competition between mobile operators, but between all operators offering high speed connectivity solutions, both fixed and mobile, including those offering fixed wireless solutions. It seems logical to Mr Young that an interventionist approach by ComReg to the issue of network coverage and download speeds in the forthcoming awards process best serves this objective, since this matches the approach taken in respect of fixed broadband services, and provides the best means of ensuring rapid delivery of high speed MBB services to all parts of the country, and not just those in urban and semi-urban areas.

In Section 8.86 of the consultation document (19/59R), ComReg seeks to assess whether 30Mbit/s or 50Mbit/s is an appropriate download speed obligation and concludes that 30Mbit/s is sufficient.

This conclusion is partly based on DotEcon's comment that "*mobile coverage obligations should not be seeking to replicate the speeds and consumer experience deliverable over fixed broadband*". Mr Young disagrees with this statement and says that it should be rigorously tested by ComReg, because it is important in forming policy relating to MBB in Ireland.

#### *Switching*

In support of his position that fixed broadband and mobile operators are in competition, Mr Young claims that, since the mid-1980s, mobile network technologies have challenged and become a direct replacement for services that were traditionally delivered over fixed networks, progressively replacing fixed voice telephony services, messaging services, email download services, and more recently, data download and internet access services. Live video streaming and other data-intensive services are already gaining popularity over mobile networks using 4G LTE, and, while perhaps not quite matching the quality of fixed alternatives, he suggests they will very likely meet and even exceed the fixed network experience with the launch and maturing of 5G services.

#### *Bundled services*

Mr Young says it remains unclear whether MBB will become a direct replacement for fixed broadband, but ComReg should ensure the roll-out of both technologies to their full potential. Mr Young further suggests that users do not only switch away from fixed line telephone services for quality of service reasons, but also consider convenience and the possibility of purchasing bundled services to one device, from one operator.

He says that, despite the arguably higher quality and reliability of fixed line voice services compared to mobile, users have predominantly chosen mobile because it delivers an acceptable solution in both home and mobile scenarios, and it makes more sense to use and pay for one service rather than two.

#### *Mobile-only households*

According to the Digital Economy and Society Index Report 2019 on Connectivity prepared for the European Commission, the proportion of households using MBB alone to deliver their home broadband needs has grown rapidly over the past few years (the average among EU Member States remains under 10%), and the trend is expected to continue. This is partly driven by the relatively high fixed rental element of both fixed and mobile services and Mr Young believes that it may continue even if the standalone fixed broadband solution is superior in terms of download speeds and reliability.

## 5.2 Our assessment

At the outset, it is relevant to note that some of the issues raised by Mr Young, particularly those around State aid and Competition Law, somewhat betray a lack of understanding of those rules.

Notwithstanding, we address below the points raised by Mr Young to the extent possible and appropriate.

*Assumptions behind the NBP*

First of all, it is important to note that State aid is, in principle, prohibited under the EU Treaty, subject to some limited exceptions, and any grant of State aid will be closely scrutinised by the European Commission to ensure that it is, amongst other things, limited to the minimum necessary to remedy a clearly defined market failure.

The NBP has been informed by an extensive mapping analysis, leading to the conclusion that intervention is necessary as adequate broadband connectivity for future needs will not be delivered to all areas without intervention. It targets areas that are not profitable to serve even by a single provider of next generation access (NGA) services, let alone competing providers. By definition, it is not efficient to sustain multiple networks in these areas as the NBP is predicated on there being natural monopoly conditions in rural areas.

It is, therefore, not true that the upcoming award is designed to prohibit MNOs from infringing on the work of the NBP, but rather that the NBP is in place because it has been judged (as part of the design of the NBP process) that it is not viable for the target areas to be served adequately by mobile operators providing services of the required speed on a commercial basis.

*Are fixed and mobile substitutes?*

The idea that it is possible to promote competition between fixed and mobile connectivity is based entirely on the assumption that the two can reasonably be described as substitutes, but this is not likely to be the case in the future (and is probably not the case at present).

First, mobile in-building penetration, especially in rural areas, cannot be a substitute to fixed broadband. Thermal insulation blocks external signals, an effect that will become more significant over time, as more buildings become subject to modern building standards when built or renovated. Building standards can only be expected to become tighter over time to promote decarbonisation. For this reason, we do not think it is reasonable to expect mobile coverage to be sufficiently strong indoors for it to constitute a genuine substitute to fixed access. It is not even clear whether, given the very high levels of attenuation that may be caused by thermal insulation, it is feasible to increase mobile signal strength to the point that mobile speeds in-building are comparable to fixed speeds. To the extent it is possible for some buildings, it would require a very dense cellular network and appropriately dimensioned backhaul networks, which would be extremely costly.

Mr Young's assumption that mobile and fixed networks should be brought into direct competition fails to consider how we are moving rapidly towards a world in which consumers will experience connectivity and be largely unaware of the underlying network being

used to deliver it. 5G standards enable seamless transition between networks, from indoor WIFI connections to outdoor mobile ones. Different networks, therefore, become complementary in contributing to the delivery of seamless connectivity. Given these expected developments, costly intervention to extend mobile networks in order to promote additional switching between fixed and mobile access is not justifiable. As noted above, given the high degree of current uncertainty about how 5G services might evolve there is a strong argument that it would be better to wait and see what competition between network operators can deliver, subject to a precautionary coverage obligation.

Consumers may have incentives (notably price) to purchase bundles which include fixed and mobile access, if the same providers offer them, but we do not expect the two to be substitutes. Our report on the award format (19/59a) also explains that fixed wireless access and mobile services should not be thought of as being in the same market as we do not expect them to impose significant competitive constraints on one another.

## 6 Methodology in reports commissioned by ComReg

### 6.1 Response comments

*Reports should be more forward looking*

While Mr Young agrees that the consultants' reports provide useful analysis in weighing up the costs and implications of an interventionist approach to drive coverage and download speeds, he considers that they ultimately reach overly pessimistic conclusions in their estimates of the ability and incremental cost to operators of delivering higher coverage rates and download speeds.

He suggests some of the reports suffer from being retrospective rather than forward looking, and often fail to recognise all of the of potential for improved coverage and download speeds that are possible using available new technologies which are both 5G and non-5G related.

None of the reports commissioned by ComReg appear to Mr Young to adequately consider the strategic and competitive issues facing MNOs in formulating their approach to the forthcoming spectrum awards process, other than the basic financial and economic considerations. He suggests that mobile operators and their shareholders, like most businesses, have a range of issues to consider in deciding on their business strategy, and that are not captured by a straight economic analysis.

*The German auction*

Mr Young says this is best exemplified by studying the outcome of the recent German 5G spectrum award process, where higher than

expected bids were made by the incumbent MNOs, despite the inclusion of very demanding licence obligations, which included

- 98% household coverage nationally within three years; and
- a commitment to deliver a 100M/bits download speed capability.

Despite the very high bids, totalling €6.5 bn, he notes that all of the successful bidders subsequently complained about both the licence obligations and the cost of the licences. The bidding process was entered into by each bidder voluntarily, they knew the license conditions in advance, and they had the option to bid differently, but still chose to submit these large bids.

#### *Sunk costs and bidders' objectives*

He says that, while it remains to be seen whether the bidders have overpaid for the spectrum licences, there are clearly a number of underlying factors at work in driving experienced MNOs to not only accept the challenging licence obligations, but also bid higher than predicted amounts to secure the licences. Mr Young suggests this does include financial and economic considerations, but also includes the need to ensure that their business model for growth and competitiveness remains intact and sustainable. He does not believe that a mobile operator that has already invested heavily in previous generations of infrastructure, intellectual property and customer acquisition can easily decide to change or abandon its course.

Mr Young points out that these previous investments are largely sunk investments, even if they are still very valuable. A mobile network operator without radio spectrum availability into the future risks its sunk investments becoming stranded investments. Consequently, Mr Young's submission strongly recommends that ComReg takes into account his view that the business case for an incumbent MNO to invest in new spectrum does not just involve the economics of an investment relative to its associated return, as analysed by the various reports commissioned by ComReg, but also involves other important MNO considerations aimed at protecting and continuing to extract returns from all previous investments, often expressed as goodwill, which he says stretch back in time to the acquisition of its first customer.

## 6.2 Our assessment

### *The German auction*

The results of the recent German 5G auction are provided as evidence that the reports commissioned by ComReg are in some way wrong, because they do not seem consistent with the high revenues raised in that award. However, the circumstances of that award offer an explanation of why bids were higher than expected and this does not suggest that the advice provided to ComReg in

relation to the effect of coverage obligations on bidders' valuations was inappropriate.

Drillisch Netz, an MVNO prior to the auction, was a successful bidder and competition between Vodafone and T-Mobile for an additional spectrum block continued for much longer than expected, resulting in 497 rounds of bidding. In addition, some spectrum was reserved for regional applications, reducing the overall supply available in the award to the MNOs. This was an auction which featured an unusually high level of competition for a restricted amount of spectrum, so it is unsurprising that this resulted in relatively high bids.

*The German coverage obligations were not duly onerous*

Taking a closer look at the details of the coverage obligations in that award, the requirement was for 98% of premises to be covered by the end of 2022, as well as federal highways, major roads and railways. Other main roads need to be covered by 2024. This is not actually a geographic coverage obligation, but is instead broadly similar to a requirement for 98% population coverage. The demographics of Germany are such that higher obligations are more likely to be commercially viable compared to Ireland<sup>2</sup>. Further the German obligation of 100 Mbps is not an individual premises or household obligation (as in the NBP), but instead is an obligation for 100 Mbps per antenna sector, where this bandwidth will be shared by all users in the sector.

In many of the places that need to be covered, such as business premises, and major roads or railways, competition would drive coverage in this time frame anyway. Therefore, the coverage obligations were not that dissimilar (in terms of the burden placed on operators) to the precautionary ones being considered by ComReg, meaning that they were unlikely to have a significant negative effect on valuations. Taken together with the high level of competition, the relatively high bid amounts are not overly surprising, and they are certainly not evidence that interventionist coverage obligations will have no effect on bidding behaviour.

*Basis for spectrum valuation*

Incumbent MNOs will have established customer bases that they wish to maintain, which in turn requires them to have a certain amount of spectrum. This is not the same as saying that they make decisions based on extracting returns over what they have paid for spectrum in the past. Their ability to recover these sunk costs of past spectrum acquisitions will depend on them maximising profit from this point onwards, and the existence of these sunk costs does not alter bidding incentives for additional spectrum. Bidders will form

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<sup>2</sup> For example, Germany has a population density over 3 times that of Ireland (70 persons per Km<sup>2</sup> v 234 per Km<sup>2</sup>)

<https://ec.europa.eu/eurostat/databrowser/view/tps00003/default/table?lang=en>

valuations based on the profitability of using the spectrum available in this award and these valuations set their maximum willingness to pay for spectrum. What successful bidders *end up* paying is determined by the level of competition, so it is perfectly possible that the presence of an entrant in this award leads to relatively high bid amounts, as in the German example.

Coverage obligations that include the need to serve unprofitable customers will necessarily lower valuations (which are based on anticipated profit). The extent of this effect was limited in the German 5G auction because the nature of the obligations did not imply a substantial loss of profit.