

Assessing whether there is a bandwidth break at 1Gbps in MI WHQA Services

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1 Background

This note presents Oxera's update to previous analysis (conducted in 2016, and based on 2016 and 2017 data) of wholesale leased line revenues in Ireland. The purpose of the analysis is to evaluate prices of different bandwidths in the Irish Modern Interface (MI) leased line market, in order to assess whether or not there is a bandwidth break (i.e. in the chain of substitution) at 1Gbps.

This updated analysis uses more recent (2017) data, which was provided to Oxera by ComReg, and therefore presents a more up-to-date analysis of MI revenues than the analysis completed in 2016.¹

In addition to using new data, this analysis makes a number of adjustments to the raw data to address a small number of underlying data issues. The result is that the new dataset provides a sound evidential basis for undertaking economic analysis based on recent data. The two specific adjustments made to the new dataset are:

- to combine physical and logical circuits revenues to reflect operational realities for the three operators with both types of circuit (BT, eircom, EU Networks);
- to remove a number of data outliers (12 observations out of 3,121).

The analysis in this note follows up on the analysis that ComReg undertook in 2016 during its regulatory review of the Wholesale High Quality Access (WHQA) market. As part of that regulatory review, ComReg assessed which products/services belong in the defined market. Oxera assisted ComReg in defining the WHQA market and analysing whether any operator has significant market power (SMP) in the relevant market(s).

Generally, leased line services are split between two markets—Traditional Interface (TI), which includes low-speed TDM circuits; and Modern Interface (MI), which includes ethernet and xWDM circuits. The focus of this analysis is on the MI market.

One piece of evidence used as part of the analysis to support the definition of the MI market (in addition to other demand- and supply-side evidence) was eircom's regulated wholesale leased line pricing for different bandwidths. This pricing information was used to analyse whether it is appropriate to include different MI bandwidths within the same relevant market on the basis of a chain of substitution.

In the 2016 analysis, only eircom data was used given that, unfortunately, wholesale revenue data available at the time from other operators was not of sufficient quality to give reliable insights. Following this, ComReg was able to acquire higher-quality data from other operators, which has been used subsequently to inform the market analysis.

Oxera's original analysis of eircom's regulated wholesale access pricing showed that, while there is a possible break in pricing conditions at 1Gbps, this concerns only a subset of services with low demand. For circuits on a traffic class of service configuration, which represented the majority of Next Generation Network (NGN) Ethernet circuits, there was no apparent discontinuity in prices.

In response to the 2016 analysis, BT in its response to ComReg's Market Review on Wholesale High Quality Access at a Fixed Location stated that it believed there is a split at the 1Gbps level, stating that; "After the 1G bearer rate different Network Terminating units

¹ Oxera (2016), 'WHQA market definition and analysis in Ireland', Appendix 1 of ComReg Document Number 16/69, Final Report, 18 August.

and network port cards are required, and the management of greater than [sic] 1Gbit services requires greater capacity management. Services greater than 1Gbit/s display different characteristics to services at or below 1Gbit/s.”²

The further analysis in this note builds on the original analysis (including providing more details on how revenues per circuit vary across bandwidths), and confirms that the original conclusions remain valid.

2 Updated analysis—based on 2017 data

2.1 Issues with the 2015/16 dataset

At the time of the 2016 consultation, ComReg raised concerns over the quality of the available (2015/16) revenue data. Notably, ComReg mentioned the difficulty of comparing the pricing of circuits of particular bandwidths, since some information was missing (i.e. circuit lengths) and pricing was unreliable because of bundling of services and significant pricing variations between service providers. Wholesale revenue data was used instead of retail data since retail sales are often sold as part of a bundle, which makes it difficult to isolate the relevant circuit revenue. In contrast, wholesale leased lines are most often sold on their own.

Our preliminary analysis based on 2015/16 operator revenue data suggests that there is heterogeneity in the wholesale services provided by various operators, as well as in the data reported by different operators, which makes it difficult to make a like-for-like comparison. This includes differentiation of services (media, technology and other characteristics); end location (and the lack of precise end-point information from some providers); and questions as to how to appropriately combine physical and logical circuit revenues into a comprehensive revenue figure.

2.2 The new (2017) dataset

Following the 2015/16 data analysis, ComReg provided us with an updated dataset of 2017 data that summarised average revenue per bandwidth and the number of corresponding observations for each bandwidth across all operators in Ireland for which data is available.

We considered ethernet services in our average revenue calculations on the 2017 data, and we focused on higher-bandwidth fibre circuits. In addition, the majority of operators offer services across a wide spectrum of bandwidths. Furthermore, of the 11 operators for which we had data, only three [redacted] do not offer bandwidths above 1Gbps.

We used a summary table as the main input for the update to the analysis (see Table 3.1 and Table 3.2 below). Table 3.1 shows some variation in average revenue across bandwidths. We also observe that bandwidths are not continuously distributed. Furthermore, for some bandwidths there are very few observations, and sometimes only one. In contrast, there are a number of very popular bandwidths. For example, the 100Mbps, 1Gbps and 10Gbps services account for 77.9% of the total observations.³

² BT (2018) 'BT Communications Ireland Ltd ["BT"] Response to ComReg's Market Review on Wholesale High Quality Access at a Fixed Location Response to Consultation, Further Consultation and Draft Decision', 25 April, page 6-7

³ 3,121 observations in Table 4.1, 2,431 of which relate to 100Mbps, 1Gbps and 10Gbps circuits. (2,431/3,121 = 77.9%)

Table 3.1 Average revenue per circuit in 2017

Bandwidth	Volume of circuits	Average revenue per circuit (€)
100	1,264	9,220
110	3	4,629
120	2	10,921
130	1	6,000
150	35	12,012
155	3	5,842
160	12	9,308
180	2	11,242
200	193	10,091
220	1	4,585
250	15	9,249
260	5	16,642
300	123	11,617
350	1	12,000
400	52	13,716
450	12	8,026
460	4	16,642
500	72	14,110
540	2	16,642
550	1	5,490
600	18	14,680
700	11	14,511
750	9	7,527
760	1	16,642
800	1	16,642
900	1	16,642
990	1	8,402
1,000	800	16,852
1,500	26	15,188
2,000	34	17,283
2,500	22	21,047
3,000	15	17,605
4,000	5	18,133
5,000	3	21,336
7,000	1	25,299
8,000	1	29,328
10,000	367	23,808
100,000	2	13,566

Note: Revenue data from 11 operators in Ireland (BT, eircom, Colt, GTT, Enet, ESBT, EUnet, Magnet, SIRO, VM, VZB) is aggregated.

Source: ComReg.

Table 3.2 shows the same underlying data as Table 3.1, but summarised into one possible relevant set of bandwidth buckets. This process highlights that the average revenues for the group of services at or above 1Gbps (i.e. 1–2.5Gbps) are only slightly higher (5%) than for the group of services just below 1Gbps (i.e. 0.5–0.99Gbps). This evidence suggests that there is no bandwidth break around the 1Gbps level.

Table 3.2 Average revenue per circuit in 2017 (summarised)

Bandwidth range (Mbps)	Volume of circuits	Average revenue per circuit (€)
100–249	1,516	9,380
250–499	212	11,976
500–999	117	13,715
1000–2,499	860	14,464
2,500+	416	23,319

Note: Revenue data from 11 operators in Ireland (BT, eircom, Colt, GTT, Enet, ESBT, EUnet, Magnet, SIRO, VM, VZB) is aggregated.

Source: ComReg.

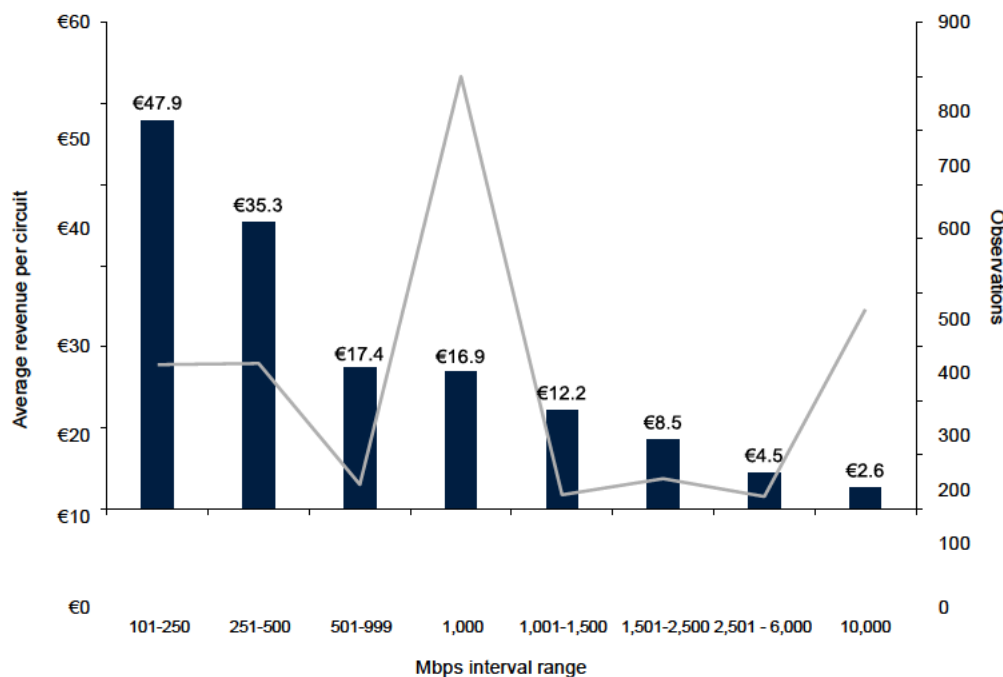
2.3 Updated analysis using the new (2017) dataset

Using the average revenue summary table, we analysed the hypothesis that there is a meaningful break in average revenue at the 1Gbps mark.

As shown by Figure 3.1 below, average revenue per Mbps steadily decreases as bandwidth increases. The graph shows no evidence of a break at 1Gbps, as the trend does not appear to change at that level. However, we note that there are many observations at the 1Gbps level.

As set out in Table 3.1, for other individual bandwidths (such as 800Mbps) there is only one observation that can reduce the accuracy of average revenues. When we have only a few observations for an individual bandwidth, we cannot infer a reliable average. In order to overcome that challenge, we have grouped bandwidths together.

Figure 3.1 Average revenue per Mbps and number of observations by bandwidth interval



Note: Average revenue per Mbps calculated based on dividing the per circuit revenues by the bandwidth of the circuit (based on the data set out in Table 3.1). Low bandwidth observations (lower than 100Mbps) were excluded as they are not relevant for the consideration of the bandwidth break at 1Gbps.

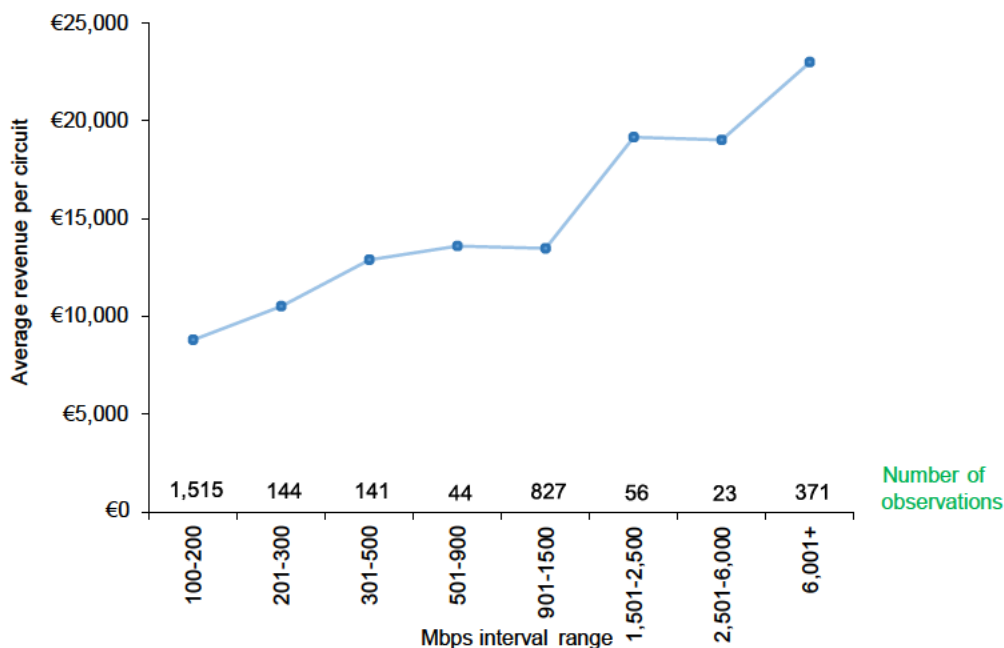
Source: Oxera analysis of ComReg data.

Following our initial assessment of this revised dataset, we looked at different ways to meaningfully present the information, including by grouping together various bandwidths in

order to assess broad trends in average revenues across the full bandwidth spectrum. As seen in the example in Figure 3.2 below, the average revenue line is almost flat between the 500–900Mbps and 900–1,500Mbps bandwidth buckets, which includes 1Gbps.

This is strong evidence to suggest that there is no bandwidth break at the 1Gbps level. Above 1.5Gbps there are fewer observations (only 22 observations for 2.5Gb and 15 for 3Gb), and revenues for these brackets with few observations are quite high (€21,047 for 2.5Gb up from €17,283 for 2Gb), which drives up the average. The greater price variations above 1.5Gb show average revenues becoming less precise due to a few observations with high revenues.

Figure 3.2 Average revenue per circuit and number of observations by bandwidth interval



Note: Average revenue on the line chart (left-hand axis) and number of observations for each bandwidth range on the bar chart (right-hand axis).

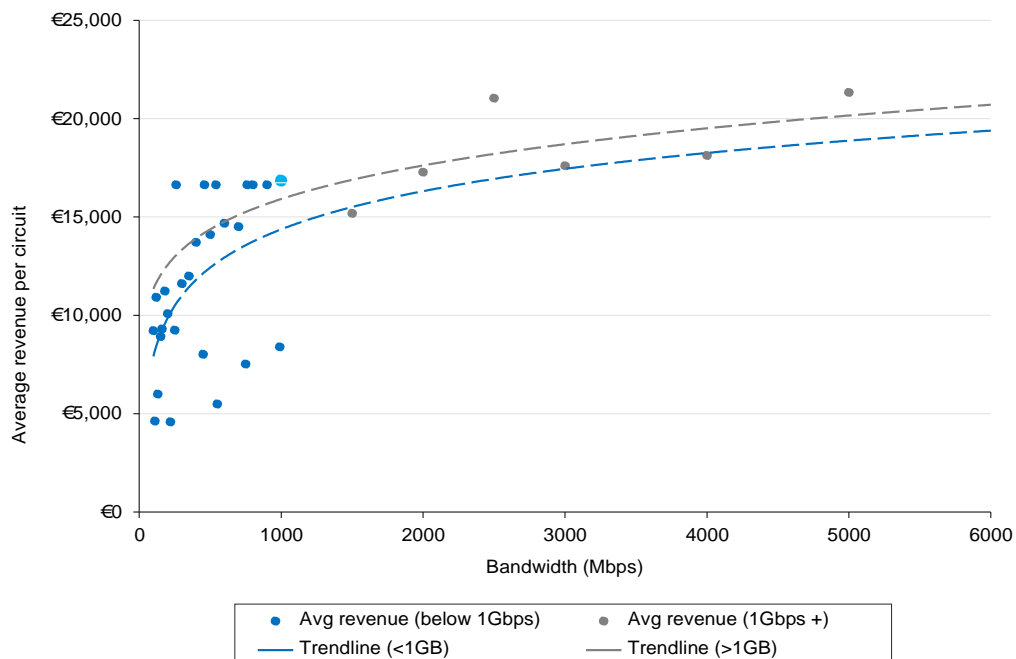
Source: Oxera analysis of ComReg data.

An issue with this approach is the subjective nature of selecting the bandwidth groupings. While some bandwidth splits result in a ‘smoother’ variance in revenue, none of the possible groupings were based on any objective criteria. Furthermore, the resulting graphs were somewhat difficult to interpret, given the non-linear x-axis with varying sizes of bandwidth buckets.

To overcome these challenges, we decided to present the data in a linear fashion, showing all data points below, above and equal to 1Gbps. This is shown in Figure 3.3 below. The linear bandwidth x-axis enables us to see the scale difference between individual observations in our dataset. The resulting figure enables us to more clearly observe whether there is a clear bandwidth break.

The figure shows that the average circuit revenues across different bandwidths follow a fairly smooth trend, and that they are not characterised by sudden jumps. For clarity, the data point at 1Gbps (1,000Mbps) is highlighted in blue.

Figure 3.3 Average revenue per circuit; broken down by bandwidth



Note: Each scatter point represents average revenues within a 10Mbps interval in the source data. Each trend line is calculated using only observations either above or below 1Gbps.

Source: Oxera analysis of ComReg data.

3 Conclusion

We have analysed the most recent available data, in a number of ways, to assess whether the evidence suggests that there is a bandwidth break at the 1Gbps level.

The evidence, such as the flat revenue per circuit line across bandwidths below and above 1Gbps (as shown in Figure 3.2), suggests that there does not appear to be a discernible break in the chain of substitution at the 1Gbps levels for MI products.