Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Special Access Rates for Price Cap Local Exchange Carriers	)	WC Docket No. 05-25
	)	
	)	
AT&T Corporation Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services	)	RM-10593

REPLY COMMENTS OF BT AMERICAS

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TABLE OF CONTENTS

I. INTRODUCTION AND SUMMARY 1

II. STRICT BUT RESPONSIBLE REGULATION OF ENDURING BOTTLENECK BUSINESS ACCESS SERVICES CORRELATES TO BETTER OUTCOMES FOR BUSINESS CUSTOMERS AND CONSUMERS 3

III. DUCT, FIBER, AND ELECTRONICS DRIVE ETHERNET COSTS, AND THESE COSTS DO NOT VARY SIGNIFICANTLY ACROSS BANDWIDTHS UP TO 1 GBPS 8

IV. THE COMMISSION SHOULD TAKE ACTION TO CURB THE INCUMBENT LECS' ABUSE OF THEIR MARKET POWER 10

A. The Commission Should Adopt Price Caps that Curtail the Incumbent LECs' Ability to Arbitrarily Set Prices 10

B. Regulations that Significantly Reduce Incumbent LECs' Ethernet and TDM Access Rates Will Benefit the U.S. Economy and Consumer Welfare 12

C. The Commission Should Determine Effective Competition in the Business Access Services Market Based on the Level of Facilities-Based Competition that Results in Discipline of Incumbent LEC Prices Today 14

D. Contrary to the Incumbent LECs' Claims, Best-Efforts Broadband Is Not a Substitute for Business Access Services 17

V. CONCLUSION 19

APPENDIX – WIK-Consult Report, Ethernet Leased Lines: An International Benchmark

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BT Americas, Inc. ("BT Americas" or "BT") submits these reply comments in response to Section IV.B of the Further Notice of Proposed Rulemaking released on December 18, 2012 in the above-referenced proceeding.[1]

I. INTRODUCTION AND SUMMARY

Twenty years after the enactment of the market-opening commitments of the Telecommunications Act of 1996, the incumbent LECs are *still* the only providers with connections into the vast majority of U.S. business locations. Public assessments of the data submitted in this proceeding, including the Commission's own summary of the data submitted in response to the mandatory data request, support this conclusion.[2] The Commission should

[1] *Special Access for Price Cap Local Exchange Carriers; AT&T Corporation Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services*, Report and Order and Further Notice of Proposed Rulemaking, 27 FCC Rcd. 16318 (2012).

[2] *See Investigation of Certain Price Cap Local Exchange Carrier Business Data Services Tariff Pricing Plans*, Order Initiating Investigation and Designating Issues for Investigation, 30 FCC Rcd. 11417, ¶ 3 (2015).

therefore adopt regulations to curb the incumbent LECs' abuse of their market power in the provision of business access services.[3]

In the face of overwhelming evidence to the contrary, the incumbent LECs persist in their attempts to convince the Commission that the U.S. market for business access services is competitive.[4] They argue that the market for business access services must be competitive because certain census blocks contain fiber deployed by a provider other than an incumbent LEC, and they claim that the relevant market includes best-efforts broadband. But neither of these arguments can withstand scrutiny, as a group of commenters that includes BT Americas has powerfully demonstrated.[5]

In order to supplement the record in this proceeding, BT commissioned the internationally-renowned consulting firm WIK-Consult (hereafter "WIK") to analyze (1) the steps that regulators in four EU countries (the United Kingdom ("U.K."), France, the Netherlands, and Germany) have taken to measure incumbent carrier market power over last-mile business access connections and prevent the exercise of such market power where it was identified, and (2) the consequences of these actions for consumer welfare. The measures that these regulators have taken to analyze and promote competition in the provision of business access services offer helpful guidelines for the Commission. Indeed, if the Commission adopts

[3] As used herein and in the WIK Study, "leased line access for businesses" and "business access services" refer to the services known in the U.S. as "special access." WIK-Consult Report, Ethernet Leased Lines: An International Benchmark, at 1 (Jan. 2016) ("WIK Study") (attached hereto as an Appendix).

[4] *See generally* AT&T, Inc. Comments, WC Docket No. 05-25, RM-10593 (filed Jan. 28, 2016) ("AT&T Comments"); Verizon Comments, WC Docket No. 05-25, RM-10593 (filed Jan. 28, 2016) ("Verizon Comments"); CenturyLink Comments, WC Docket No. 05-25, RM-10593 (filed Jan. 28, 2016) ("CenturyLink Comments").

[5] *See generally* Comments of Birch, BT Americas, EarthLink, and Level 3, WC Docket No. 05-25, RM-10593 (filed Jan. 28, 2016) ("Joint CLEC Comments").

effective constraints on the incumbent LECs' exercise of market power in the provision of business access services, U.S. businesses and consumers will likely experience the substantial benefits that have been experienced in the countries analyzed in the WIK Study.

II. STRICT BUT RESPONSIBLE REGULATION OF ENDURING BOTTLENECK BUSINESS ACCESS SERVICES CORRELATES TO BETTER OUTCOMES FOR BUSINESS CUSTOMERS AND CONSUMERS

As the WIK Study explains, regulators in the U.K., France, the Netherlands, and Germany have all conducted regular market reviews over the last decade to determine where providers are dominant in the provision of Ethernet leased line access.[6] In the U.K., Ofcom has found the incumbent telecom provider dominant with respect to the most popular business access services outside West, East, and Central London. In France, ARCEP has found the incumbent to be dominant with respect to fiber-based business access services outside a limited set of communes. In the Netherlands, ACM has found the incumbent to be dominant throughout the country with respect to fiber-based leased line access services on the basis of its market share. Finally, in Germany, BNetzA has found the incumbent to be dominant with respect to non-native Ethernet and TDM leased line access services of up to 155 Mbps. Each of these regulators has adopted regulations governing the incumbent's provision of Ethernet leased lines in the geographic areas where the incumbent has been found to be dominant. As the WIK Study demonstrates, the prices for Ethernet leased lines in these countries generally are significantly lower than in the U.S., where rack rates charged by incumbent LECs far exceed rack rates charged by EU incumbents. This in turn results in substantial consumer welfare benefits as compared to the U.S.

[6] Western European regulatory authorities generally do so at least every three years. WIK Study at 1.

Of the regulatory regimes examined in the WIK Study, the U.K.'s regulation of Ethernet business access services generally is the most restrictive in terms of remedies imposed in order to promote competition and curb incumbent dominance, followed in descending order by the Netherlands, France, and, lastly, Germany. The U.S. sits at the opposite end of the spectrum because *ex ante* economic regulation is not applied to the vast majority of Ethernet access services sold in the U.S. Notably, this spectrum of regulatory intervention largely correlates to business customer outcomes observed. Countries that employ strict but responsible Ethernet regulation in areas where the incumbent is found to have market power exhibit lower Ethernet service prices paid by business customers, the absence of onerous terms and conditions, higher entry level speeds, faster adoption of and migration to advanced technologies, and higher bandwidths.

In conducting its analysis, WIK relies in part on data from research firm Ovum[7] as well as a comparison of the standard rack rates charged by incumbent carriers. The Ovum data show that the U.S. generally has higher-priced Ethernet services than the other countries studied.[8] The differences in Ethernet revenues are especially apparent at bandwidths equal to and above 100 Mbps, where U.S. providers earn more per Ethernet services end point than providers in the other countries examined. In other words, business customers are being charged more per Ethernet access end point in the U.S. than in the countries studied.

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[7] For years Ovum has been tracking Ethernet leased line revenues (both access and transport) at various bandwidths in metro areas across many countries. Ovum's revenue data, when divided by two end points per leased line, provides a proxy for metro Ethernet leased line access and transport pricing across many countries. Ovum applies the same methodology to gathering its revenue data across all of the countries it studies, and over all of the years for which it has collected this data. *See id.* at 40.

[8] According to the Ovum data, the U.K. has the lowest priced Ethernet services, followed by France, the Netherlands, Germany, and, lastly, the U.S. *Id.* at 41 & fig.15.

The WIK Study's comparative examination of the rack rates charged by incumbents demonstrates the striking degree to which U.S. incumbents overcharge business customers for Ethernet business access services.[9] Even if U.S. incumbents were to discount their rack rates by 50 percent, their rates would still be higher than the rates charged by incumbents in many of the countries studied.[10]

The comparison filed by COMPTEL (now INCOMPAS) in this proceeding of the published switched Ethernet services rates charged by major U.S. incumbent LECs and Ethernet service rates offered by rural incumbent LECs in NECA Tariff #5 also shows how incumbent LECs set their rack rates far above the levels that a competitive market would allow.[11] According to COMPTEL, the prices charged by the major U.S. incumbents were "substantially greater, sometimes by an order of magnitude"[12] than the prices charged by rural incumbent LECs in the NECA pool, even though the major incumbent LECs enjoy significantly higher economies of scale and scope than the rural incumbent LECs. It is clear the major U.S. incumbents leverage their market power to use extortionate rack rates as the starting point in negotiations that result in still-exorbitant "discounted" rates.

In exchange for reducing their stratospheric rack rates, U.S. incumbents extract volume and term commitments, unreasonable penalties, and other onerous terms and conditions that lock up the Ethernet market. U.S. business customers get a worse deal on Ethernet access pricing than their counterparts in EU countries with responsibly strict regulatory regimes because

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[9] *See id.* at 5 & fig.4.

[10] *Id.* at 43.

[11] *See* Letter from Karen Reidy, COMPTEL, to Marlene H. Dortch, FCC, WC Docket No. 05-25, RM-10593, Attach. B (Dec. 20, 2013).

[12] *Id*. at 5.

incumbents in those countries charge rack rates for Ethernet that are lower than the rates charged by U.S. incumbents, and they do not subject purchasers to onerous conditions such as excessive volume commitments and penalty provisions in exchange for discounts off of rack rates.

The WIK Study also shows that business customers in several EU countries are migrating to higher-bandwidth advanced technologies much more rapidly than business customers in the U.S.[13] Among the countries that are the focus of the study, Ethernet leased line migration in the U.K. is highest (as measured by number of Ethernet leased lines per enterprise with >10 employees), followed by the Netherlands, which is in turn followed by France.[14] Business customer migration to Ethernet in the U.S., where the Ethernet services of major incumbents are not price-regulated, trails the U.K., the Netherlands, and France.[15] Adoption in Germany lags behind the U.S., likely because Germany does not have as effective a regime for regulating Ethernet access services as the other countries studied.[16] As the WIK Study explains, a possible reason for accelerated Ethernet migration in the U.K., the Netherlands, and France is "the positive effect of regulation on wholesale prices and service levels for Ethernet leased lines, which feed through to more competitive retail markets."[17]

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[13] *See* WIK Study at 41-42.

[14] *See id.* at 31 & fig.11.

[15] *See id.*

[16] *See id.* For example, BNetzA does not regulate native Ethernet access services offered by the incumbent. In setting price controls, BNetzA calculates the relevant efficient costs of the network based on an assumption that the incumbent's SDH network is an efficient network for the provision of Ethernet services. Furthermore, BNetzA does not regulate the same range of high-capacity Ethernet bandwidths that the regulators in the U.K., France, and the Netherlands regulate. *See id.* at 66-71.

[17] *Id.* at 3.

It is also the case in the U.K. that the majority of business customers are purchasing more circuits at higher bandwidth speeds than in the other countries studied. According to Ofcom, the majority of new circuits installed in the U.K. had shifted from TDM to Ethernet technologies by 2013.[18] Moreover, the U.K. has the highest proportion of 1 Gbps services as a percentage of all Ethernet services sold among the four EU countries covered in the WIK Study and the U.S.[19] In other words, by 2013 the U.K. business access services market had already experienced significant migration to Ethernet technology, whereas in the U.S. the majority of circuits *still* rely on legacy TDM-based technology.

Ofcom indicates that entry level speeds for Ethernet services in the U.K. have shifted to 100 Mbps and 1 Gbps services.[20] This is corroborated by the WIK Study's discussion of BT's regulatory financial statements, which shows that BT sold three times more of its 100 Mbps Ethernet Access Direct Local Access ("EAD LA") service than its 10 Mbps EAD LA service.[21] This likely is due to the fact that BT decreased the price of its 100 Mbps service so that it is nearly identical to the price of its 10 Mbps service. As a result of these prices, businesses in the U.K. are able to purchase higher-bandwidth advanced services, and to experience a faster, smoother migration from legacy to advanced services than would be the case if BT were able to charge arbitrarily higher prices for higher bandwidth services.

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[18] *See id.* at 80.

[19] *See id.* at 42 & fig.16.

[20] *See id.* at 32.

[21] *See id.* at 36.

III. DUCT, FIBER, AND ELECTRONICS DRIVE ETHERNET COSTS, AND THESE COSTS DO NOT VARY SIGNIFICANTLY ACROSS BANDWIDTHS UP TO 1 GBPS

As the WIK Study explains, the costs of providing Ethernet business access services do not increase significantly as bandwidths increase. Therefore, those costs do not justify the U.S. incumbent LECs' exorbitant rates for higher-speed Ethernet services. An examination of BT's publicly available regulatory financial statements shows that the main drivers of costs for Ethernet access services up to 1 Gbps are the depreciation and overhead costs associated with duct, fiber, and Ethernet electronics providing access from the BT exchange to the business customer's premises.[22] The other cost elements – product management, service center assurance, and systems and development – represent a proportion of costs so small as to be immaterial.[23] The WIK Study's analysis of the costs associated with EAD LA, the most popular BT Ethernet access product in the U.K., shows this cost profile quite clearly.[24] The WIK Study also shows that costs do not vary much across the different bandwidths of the EAD LA product up to speeds of 1 Gbps.[25] BT's other main Ethernet services product, Wholesale Extension Service ("WES"),[26] has a similar cost profile, with the fiber element representing slightly over 50 percent

[22] *Id.* at 35.

[23] *Id.*

[24] *See id.* at 35-36.

[25] *See id.* at 35 & fig. 13.

[26] WES is a "high speed, point-to-point data circuit . . . which provides a secure link between the point of presence of a [Communications Provider] and a third party customer site." Ofcom, BT Undertakings Glossary, http://stakeholders.ofcom.org.uk/telecoms/policy/bt-undertakings/glossary.

of the total cost. Thus, it is reasonable to conclude that that the main Ethernet access cost elements – duct, fiber, and electronics – do not vary much across service speeds up to 1 Gbps.[27]

Prices, however, do not and need not precisely reflect actual costs. Accordingly, the tariff structure in the U.K., and indeed in France, Germany, and the Netherlands, is not flat, and regulators permit incumbents to adjust tariffed rates within the boundaries of the price controls that are set to account for certain benefits received by users, such as capacity, service level agreements, and guarantees. But, as BT's regulatory financial statements make clear, regulators in these countries are provided a great deal of transparency with respect to incumbents' costs. Thus, rates in these countries are cost-oriented, not plucked from thin air like the excessive rates charged by dominant U.S. incumbent LECs.

In addition, the increases in rates from one bandwidth to another in these European countries are not as steep as in the U.S., as is evident in the WIK Study's comparison of incumbents' metro Ethernet rack rates. Figure 17 shows that the differences among BT's and KPN's metro Ethernet prices for 10 Mbps, 100 Mbps, and 1 Gbps are relatively small, while the differences among the U.S. incumbents' rack rates for those same bandwidths are enormous.[28] Moreover, Figure 15, which depicts Ovum data for average 2013 revenues earned from U.S. consumers per metro Ethernet end point versus the average of 2013 revenues per end point for metro Ethernet services in France, Germany, the Netherlands, and the U.K., also shows that the increase in revenues earned per end point as bandwidths increase is much greater in the U.S.[29]

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[27] In the U.K., BT allocates costs for duct equally among the various products depending on the space occupied in the duct. Another regulator may decide to allocate costs for duct depending on the benefit received by users from the product, *i.e.*, a 1 Gbps Ethernet service would carry more duct costs than a 10 Mbps Ethernet service.

[28] *See* WIK Study at 44 fig.17.

[29] *See id.* at 41 & fig.15.

These data indicate that U.S. incumbents' pricing of Ethernet services is utterly arbitrary. The U.S. incumbents' Ethernet pricing bears no relationship to an appropriate measure of costs, or to competitive rates, and becomes increasingly untethered from reality as bandwidths increase. This indicates that the incumbent LECs are abusing their market power over the only connections into most U.S. business locations. Furthermore, the high prices and other harmful effects that result from the incumbent LECs' abuse of their market power are compounded by the lack of transparency and regulatory controls over their activities.

IV. THE COMMISSION SHOULD TAKE ACTION TO CURB THE INCUMBENT LECS' ABUSE OF THEIR MARKET POWER

The Commission should take action to curb the U.S. incumbent LECs' abuse of their market power by regulating Ethernet and TDM-based business access service prices. In so doing, the Commission can prevent further harm to the U.S. business access services marketplace, to consumers, and to the broader U.S. economy, as the WIK Study demonstrates. The WIK Study also explains that, in implementing price regulations for business access services, the Commission can find guidance in the experiences of EU regulators.

A. The Commission Should Adopt Price Caps that Curtail the Incumbent LECs' Ability to Arbitrarily Set Prices

The Commission's price caps for TDM-based business access services have either been fixed at the same level for over a decade (except for adjustments to account for inflation and exogenous costs), or have been eliminated altogether, allowing incumbents to earn ever-increasing margins on TDM-based access services, even as their costs have decreased. At the same time, the Commission has eliminated *ex ante* rate regulation for most Ethernet services. As Ovum data shows, incumbent LECs' rack rates for Ethernet in the U.S. are orders of magnitude higher than Ethernet rates in the U.K., where the incumbent BT is subject to tight price

controls.[30] Therefore, before the Commission updates price caps for business access services, it must attribute prices to incumbent LECs' TDM-based and Ethernet services that reflect rates that could be charged in a competitive market. The Commission could do so by evaluating either the incumbent LECs' actual costs to provide the services, as EU regulators have done. But there are other permissible ways in which the Commission could attribute prices to business access services for the purpose of setting price caps. For example, the Commission could base those prices on incumbent LECs' forward-looking costs, or it could use benchmarks, such as competitive prices.

Appropriate rate regulation will not prevent incumbent LECs from earning a reasonable profit. Despite stringent price controls requiring BT to cut its Ethernet services prices by the Retail Price Index-11 percent every year, BT is making reasonable returns on its Ethernet services. BT's Ethernet services rates were cut significantly for each year between 2012 and 2015, but BT's revenues and margins increased during each of those years.[31] Indeed, BT's regulatory financial statements show that BT earned a return on mean capital employed for its Ethernet services of 25.7 percent in 2014 and 23 percent in 2015.[32] By comparison, incumbent LECs in the U.S., which, like BT in the U.K., are dominant in the provision of business access services, offer Ethernet services at rates that are not constrained by regulation or competition. As a result, the incumbent LECs have been able to arbitrarily set Ethernet prices at exorbitant starting prices of their choosing, and to adopt onerous terms and conditions that lock customers

[30] *See id.* at 44 fig.17.

[31] *See id.* at 38-39 & tbl.7.

[32] *Id.* at 38 & tbl.6.

in to purchasing increasing amounts of Ethernet. They likely have earned unimaginable excess profits from U.S. consumers in the process.

B. Regulations that Significantly Reduce Incumbent LECs' Ethernet and TDM Access Rates Will Benefit the U.S. Economy and Consumer Welfare

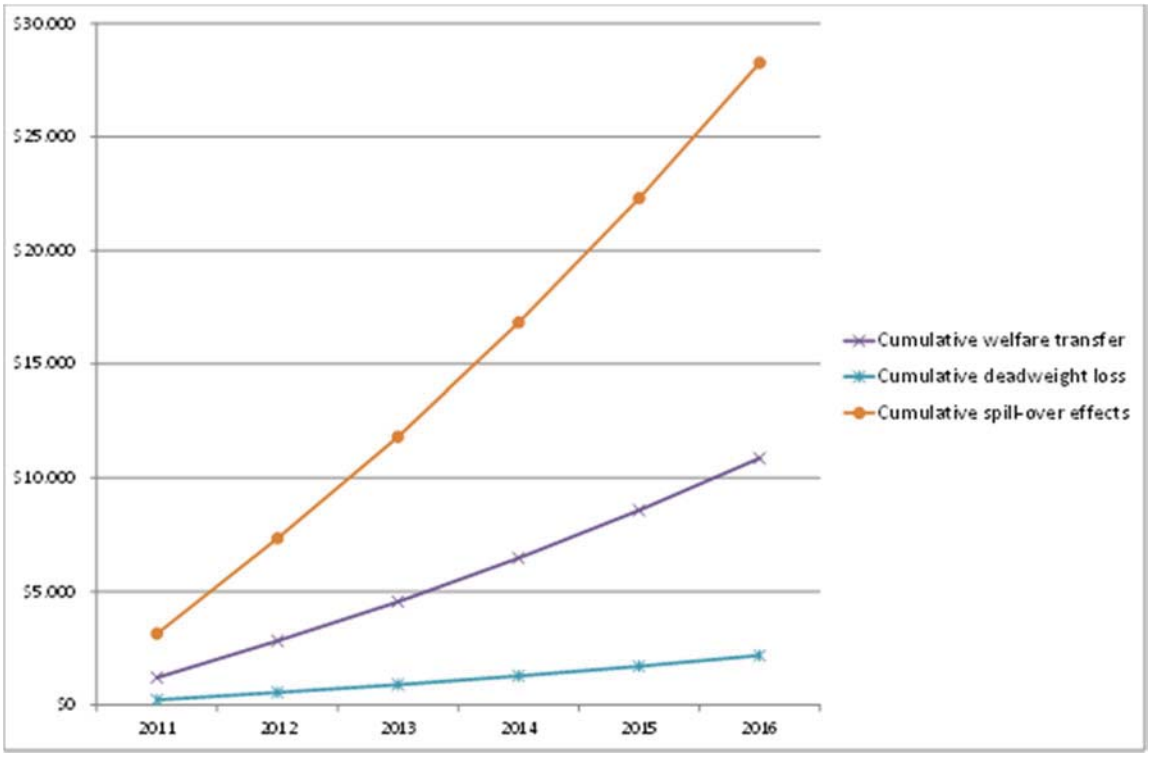
The WIK Study indicates that the U.S. is likely to experience substantial increases in consumer welfare if the Commission adopts appropriate regulations governing incumbent LEC business access service prices. In estimating the benefits that the U.S. economy and consumer welfare would have experienced had the Commission adopted cost-based pricing for metro Ethernet leased lines equivalents in 2011, WIK first derived a hypothetical cost-based price for each of the following bandwidths of metro Ethernet services: 10 Mbps, 100 Mbps, 1 Gbps, and 10 Gbps. It did so by using Ovum Ethernet revenues per end point generated from consumers in the Netherlands, U.K., France, and Germany at these speeds. WIK then derived an average of these cost-based prices from these four countries at each bandwidth and arrived at a hypothetical cost-based price for each speed of service.

Next, WIK calculated the amount of additional consumption that would have resulted in the U.S. if prices for metro Ethernet services had shifted to these hypothetical cost-based prices. WIK then calculated the deadweight loss (the consumption that should have taken place but did not), the welfare transfer (the involuntary transfer of surplus from business consumers to U.S. service providers), and the spill-over effects that the broader economy would have experienced if U.S. businesses could have reinvested the money that was involuntarily transferred to service providers. Relying on a macroeconomic model, WIK estimated that the spill-over effects into the broader economy would have been 2.6 times as great as the welfare transfer.

Based on this methodology, the WIK Study estimates the cumulative effects through 2016 of welfare transfers, reduction in deadweight loss, and spill-over effects into the broader

economy had the U.S. implemented cost-based pricing for metro Ethernet leased line equivalents in 2011.[33] As depicted in the graph below, the aggregate cumulative effects from 2011 through 2016 would have been $10.9 billion in welfare transfers from U.S. business customers to incumbent LECs, $2.2 billion in reduction in deadweight loss (*i.e.*, direct gain in societal welfare), and $28.3 billion in spill-over effects.[34] As WIK observes, "[b]y any measure, this is significant."[35]

Cumulative welfare transfers, reduction in deadweight loss, and spill-over effects had the U.S. implemented cost-based pricing for metro Ethernet in 2011 (unadjusted 2013 in million USD) (2011-2016):



Source: Ovum data (2013), WIK/Marcus calculations

[33] This assumes that any change initiated by the Commission in the very near future would be unlikely to take full effect before the end of 2016.

[34] *Id.* at 57.

[35] *Id.*

The WIK Study concludes that "[u]nder a well-designed, cost-oriented regulatory arrangement, these losses could be avoided in future years."[36] WIK estimates avoidable welfare transfer from U.S. firms to incumbent network operators in 2016 to be approximately $2.3 billion, avoidable deadweight loss in 2016 to be some $480 million, and avoidable loss of positive spill-over effects in 2016 to be approximately $5.9 billion. These estimates rely on the conservative assumption of a price elasticity of demand of -1.0.[37] WIK also concludes that "[e]ffects would be even greater with a higher (and thus more realistic) price elasticity of demand, and can also be expected to be significantly higher in years after 2016."[38]

C. The Commission Should Determine Effective Competition in the Business Access Services Market Based on the Level of Facilities-Based Competition that Results in Discipline of Incumbent LEC Prices Today

The Commission should adopt a test for determining which geographic markets are effectively competitive that is based on the level of facilities-based competition that results in discipline of incumbent LEC prices *now*, not one that is based on predictions of future competition. Developing such a test is of critical importance because business access services are enduring bottlenecks, and competing last mile connections to businesses have been slow to materialize. The incumbent LECs argue that the U.S. business access services market is competitive because, they claim, nearly all of the census blocks that contain most of the business access services demand have one competitor with fiber somewhere in the census block. This is inaccurate because the presence of one nearby competitor is not indicative of effective

[36] *Id.*

[37] *See id.*

[38] *Id.*

competition, and the incumbent LECs have incorrectly defined the relevant market in any event.[39]

In crafting such a test, the U.S. may consider best practices in major EU member states where regulators have amassed years-worth of data regarding the emergence of competition in leased line access services. Those regulators have concluded that deregulation should occur only in locations where competition in the provision of business access services is sufficient to discipline dominant incumbents' prices *today*. While assessments of effective competition undoubtedly must take into account the specific characteristics of and market conditions in the countries in which they are conducted, the Commission should adopt an approach to assessing effective competition that is informed by best practices in the EU.

In the U.K., for example, Ofcom's effective competition test focuses first and foremost on network reach and the intensity of rival infrastructure. Ofcom then examines service shares, pricing, profitability, and other structural indicators to determine whether effective competition is likely to emerge. To determine the network reach and intensity of rival infrastructure, Ofcom mapped the number of competitors with splice points in their fiber facilities within 100 meters of large businesses in postcodes (which contain about 15 addresses). In determining whether competition is effective, Ofcom looks for postcode sectors (which contain about 3,000 addresses) that meet one of two criteria: (1) large businesses have on average five or more alternative business fiber providers within a buffer distance of 100 meters;[40] or (2) large businesses have on

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[39] *See* Joint CLEC Comments at 13-19 (describing the relevant product and geographic market definitions).

[40] WIK Study at 23; *see also id*. at n.24 (explaining that the "buffer distance" is the distance between a business site and a "flexibility point" on a competing provider's network, and that a flexibility point is a point on the competing provider's network where it can add new fiber in order to connect to end-users).

average four or more providers within 100 meters, and 90 percent of the businesses are within 100 meters of at least two alternative business access providers.[41] In addition, Ofcom discards postcode sectors that are "islands" and will only make effective competition determinations in postcode sectors that are "contiguous geographic areas of material scale."[42]

Ofcom then examines the market shares of the incumbent and its competitors to determine if its findings regarding the distribution of market shares corroborates its findings on the reach and intensity of rival infrastructure in competitive versus non-competitive geographies. Ofcom also examines the pricing and profitability of the incumbent's services to determine if there are variations in pricing and profitability based on competitive intensity. Finally, Ofcom will consider structural indicators such as the density of businesses in a geographic market.

As a result of all these considerations, Ofcom has refused to price deregulate BT's Ethernet services in the central business districts of major cities like Leeds and Manchester and proposes to reverse Ethernet services price deregulation in an area it calls the London Periphery.[43] While BT does not agree with all the criteria of Ofcom's test for determining the U.K. geographies where competition is effective, Ofcom has set a high threshold for price deregulating a geographic market.

In France ARCEP is deregulating the provision of business Ethernet services in certain "communes" where it found that competition is effective.[44] Like Ofcom, ARCEP sets a high

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[41] *Id.* at 23.

[42] *Id.* at 24 (quoting Ofcom, Business Connectivity Market Review at n.100 (May 15, 2015), http://stakeholders.ofcom.org.uk/binaries/consultations/bcmr-2015/summary/BCMR_Sections.pdf).

[43] *Id.*

[44] *See id.* at 26-27. A commune is loosely equivalent to a U.S. municipality. Communes in France can be of varying sizes.

threshold for the determination that competition is effective and, correspondingly, that price deregulation is appropriate. ARCEP originally determined that those communes with five alternative operators present should be considered effectively competitive, but, on further analysis, it determined that this criterion did not guarantee sufficient network coverage by alternative operators to ensure that competition would in fact be effective. Therefore, ARCEP devised a three-part test that must be satisfied before a commune can be price deregulated. The test requires that (1) there are more than 50 businesses (employing more than 10 employees) per square kilometer; (2) there have been significant rollouts, with at least 50 fiber-based high-quality access lines sold in the commune's retail market; and (3) alternative operators' fiber networks with a network reach at least comparable to that of the incumbent telecommunications provider's network are present in the commune – that is, at least 50 percent of the fiber access lines built to business locations in the commune must have been constructed by alternative operators.[45] Through the first and second parts of its effective competition test, ARCEP seeks to establish deregulation in homogeneous markets that are of minimum scale and importance. Through the third part of the test, ARCEP seeks to ensure that alternative operators of a certain scale are considered.

The Commission likewise must set meaningful and responsible criteria for determining whether effective competition is likely in a geographic market, while keeping any tests sufficiently simple and administrable.

D. Contrary to the Incumbent LECs' Claims, Best-Efforts Broadband Is Not a Substitute for Business Access Services

The incumbent LECs argue that best-efforts broadband service should be included in the same market as business access services, presumably because they believe these services are

[45] *Id.* at 27.

substitutes for symmetric, high-quality business access services.[46] But the incumbent LECs adduce no evidence – consumer surveys, for instance – showing that users believe such services are indeed substitutable for business access services. Regulators in the countries considered in the WIK Study analyzed this very question with respect to best-efforts broadband. All of the countries examined in the study determined that they would not include cable-based best-efforts broadband access services in the same market as TDM-based and Ethernet access services. Moreover, only France and the Netherlands favored limited inclusion of the incumbent telecommunications provider's asymmetric business-grade broadband service in the same product market as TDM-based and Ethernet business access services.

In the U.K., Ofcom conducted consumer surveys and concluded that neither cable-based nor telecommunications provider-based asymmetric broadband services could be considered substitutes for leased line access services.[47] Furthermore, the surveys revealed no evidence that customers were disconnecting leased line business access services in favor of asymmetric broadband services. In Germany, BNetzA also excluded all best-efforts broadband services from the market for leased line business access services.[48] In France and the Netherlands, ARCEP and ACM, respectively, determined that certain high-end, business-grade contended broadband services should be included in the same market as leased line access services, but only provided that those business-grade broadband services met the specific ordering, provisioning, service availability, and repair service level agreements and guarantees ("SLAs and SLGs") met by

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[46] *See, e.g.*, AT&T Comments at 11-15; Verizon Comments at 28-40; CenturyLink Comments at 17-24.

[47] *See* WIK Study at 20 tbl.1; *see also id.* at 22.

[48] *See id.* at 20 tbl.1; *see also id.* at 22, 66-67.

leased line access services.[49] Both the French and Dutch regulators specifically considered best-efforts cable broadband services offers in their countries and concluded that there were no business grade broadband services offered by cable companies that met the SLAs and SLGs offered by leased line access service providers.[50]

The Commission should similarly determine that best-efforts broadband services are not substitutes for business access services. Accordingly, the Commission should decline to consider best-efforts broadband to be in the same product market as business access services unless and until the incumbent LECs produce evidence of customer migration to high-quality, business-grade best-efforts offerings and away from Ethernet and TDM-based leased line business access services.

V. CONCLUSION

For the foregoing reasons, the Commission should promptly reform the regulatory regime governing incumbent LEC provision of business access services, and, in so doing, should look to the EU for guidance.

[49] *See id.* at 20 tbl.1; *see also id.* at 21-22, 60.

[50] *Id.* at 21-22.

Respectfully submitted,

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APPENDIX

WIK-Consult • Report

Commissioned by BT

Ethernet leased lines:
An international benchmark

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Executive Summary

The FCC is currently in the process of reviewing the market for the supply of leased line access for businesses in the US (also known as the special access market in the US). As part of this review and the transition from legacy leased line access technologies to Ethernet, the FCC is specifically considering whether, and if so how, Ethernet leased lines should be regulated. This is an issue that has received considerable attention already in the EU.

This study seeks to provide insights from EU experience that may be helpful to the FCC's decision-making. Specifically it; (i) describes the EU regime for business access regulation (with a focus on Ethernet) and illustrates it through four case studies; (ii) analyses the cost drivers of Ethernet leased lines as revealed in published regulatory accounts of the UK incumbent BT; (iii) compares charges for similar Ethernet leased lines in the EU with those offered in the US; and (iv) estimates the welfare effects of failing to address excessive charges for Ethernet leased lines in the US.

Key findings from the review of regulatory guidelines and case studies in Europe are described below.

Facilities-based access competition remains limited outside of a few dense business districts, incumbents continue to be dominant in the provision of Ethernet access services and hence Ethernet leased line access services are typically regulated in Europe

Major western European regulatory authorities assess their business access markets at least every three years. They collect a lot of competition and cost data during each market review cycle. As a result of running these market reviews over time, these regulators have a data-driven perspective on how business access markets have been evolving.

Regulators in Europe have generally found that incumbent operators are dominant in the provision of Ethernet access and have regulated access to this product either across the whole of the national territory or in all regions apart from dense business districts. Indeed this is the case in the four countries studied herein – the UK, France, Germany and the Netherlands. Where regional carve-outs have occurred, the scope is based on the degree of competition as evidenced by the network reach and density of infrastructure belonging to competing operators and the intensity of demand for business access services.

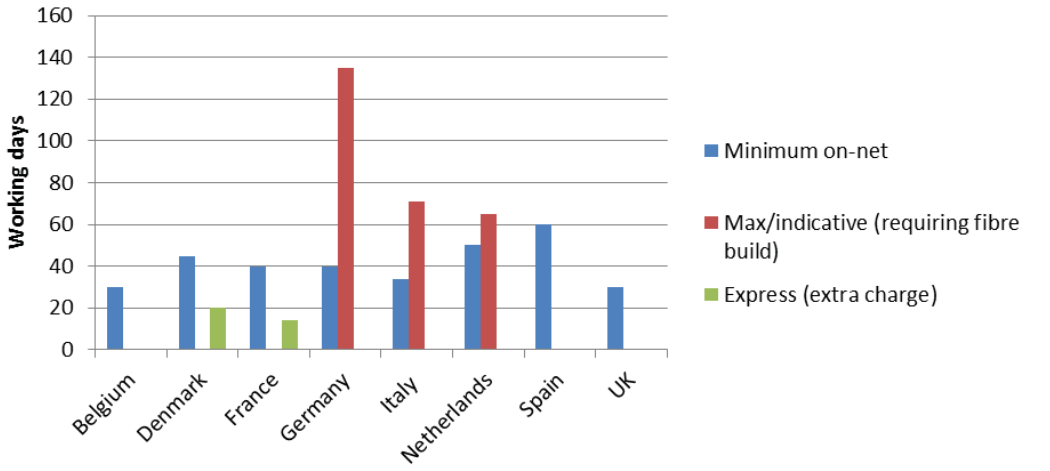
Price controls for Ethernet leased line access are common within Europe and exist in all the countries studied herein. For example, in the UK, the Netherlands and Germany, these circuits are required to be cost-oriented[1] with charges assessed on the basis of top-down accounting models. In France, outside a limited number of communes where

1 In Germany, costs are however calculated on the basis of Ethernet over SDH, therefore not reflecting the efficiencies available from Ethernet technology.

pricing for Ethernet over fiber access has been deregulated, the incumbent may not charge prices for such services that are “excessive.” The French regulator is currently examining cost models for dedicated optical local loops to determine what thresholds would satisfy this excessive pricing principle.

It is common in Europe to apply obligations of non-discrimination to ensure fair terms and conditions and in particular reasonable provisioning and repair times. Regulators typically enforce these conditions by ensuring the inclusion of Service Level Agreements (“SLAs”) and Guarantees (“SLGs”) within the incumbent’s Reference Offer. Provisioning times for on-net Ethernet leased lines in Europe fall between 30-45 working days (see Figure 1) while 5 hour repair is offered in many countries.

Figure 1: Provisioning timescales for Ethernet leased lines in Europe March 2015



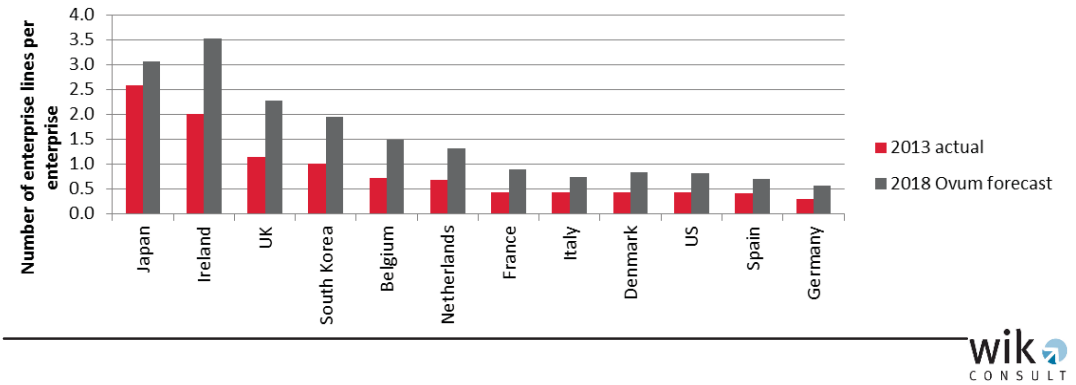
Source: WIK-Consult (2015), Access and interoperability standards for the promotion of the internal market for Electronic Communications

Ethernet take-up in several EU countries is accelerating and is ahead of the US

Notwithstanding price and other economic regulation of Ethernet leased line access in Europe, take-up of Ethernet is proceeding rapidly in Europe. Several EU countries have higher Ethernet penetration than the US as a proportion of businesses.[2]

2 Considering businesses with more than 10 employees.

Figure 2: Ethernet leased lines per enterprise (>10 employees)



Source: WIK based on Ovum (2013), Ethernet Service Forecast spreadsheet to 2018

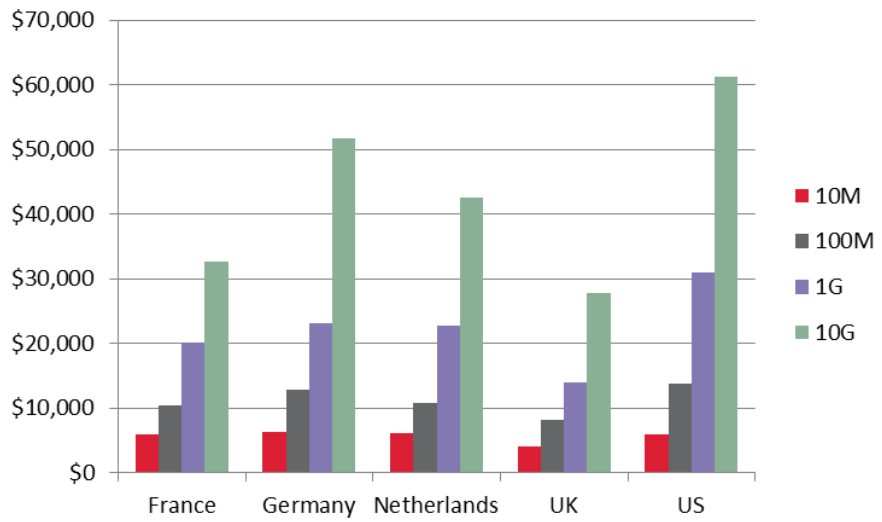
One possible reason for this high uptake could be the positive effect of regulation on wholesale prices and service levels for Ethernet leased lines, which feed through to more competitive retail markets.

US Ethernet prices remain above European benchmarks

Benchmarks of charges highlight the degree to which access-seekers as well as corporate customers may be over-paying for Ethernet circuits in the US. Data on average revenues for Ethernet leased lines by speed from Ovum suggest that US customers are paying significantly more than most customers in the benchmarked European countries.[3] This overpayment is especially marked at speeds of 100Mbit/s and above. Unsurprisingly given the high charges levied for very high bandwidths in the US, there is also a lower proportion of Ethernet connections at speeds of 1Gbit/s+ in the US than in any other country studied apart from Germany, while the UK, which offers the lowest prices for very high bandwidth connections also enjoys the highest take-up of 1Gbit/s+ services of the countries considered.

3 An exception is Germany at 100Mbit/s. It should be noted in this context that, unlike the UK and Netherlands, the German regulator calculates cost-based charges for Ethernet on the basis of the cost of Ethernet over SDH, and therefore does not reflect the savings inherent in Ethernet technology.

Figure 3: Average annual revenues for metro Ethernet leased lines by speed (2013)



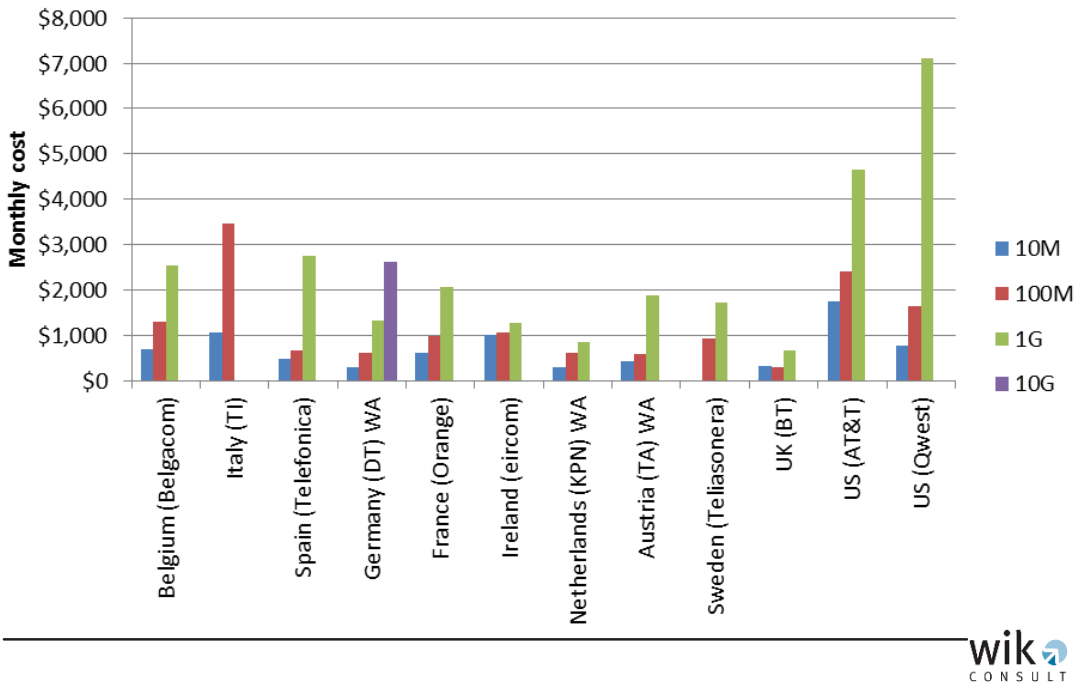
Source: WIK based on Ovum (2013), Ethernet Service Forecast spreadsheet to 2018

Another source of pricing comparisons are the published offers of incumbents in the US (termed 'rack rates') and in Europe (referred to as 'Reference Offers'). Using this method of comparison to benchmark metro Ethernet circuit tails (with handover at the serving exchange) suggests even wider variations between charges of the US incumbents and European equivalents (see Figure 4).[4] While this method does not take account of discounts which may be offered by incumbents in the US and in some European countries, discounts by US incumbents of even fifty percent would still result in US rates being significantly higher than equivalent UK rates.[5]

4 Verzion's Ethernet access rates are not published and therefore are not included in the comparison of incumbents' rack rates.

5 Many EU incumbents are prohibited from deviating from Reference Offers as this could be considered a form of discrimination.

Figure 4: Incumbent rack rate metro Ethernet leased line charges 2014/15



Source: WIK (2014), Ethernet Leased Lines: a European benchmark for EU rates - European charges as of October 2014. Published rack rates for AT&T, Qwest downloaded November 2015. $1=€0.9. WA = 'Weighted Average.' Pricing is based on a term of 24 months.

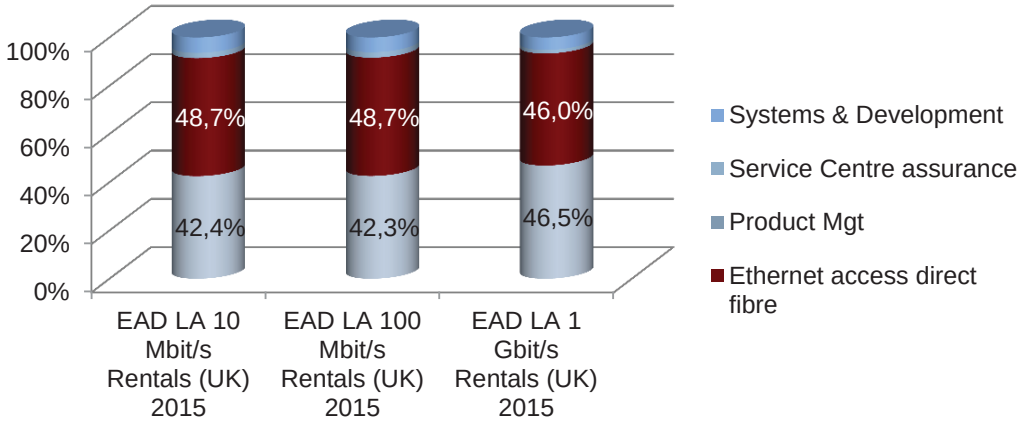
Despite sharp mandated year-on-year decreases in the prices of BT's Ethernet access services these services remain profitable

In the UK, the incumbent BT is required to publish detailed regulatory accounts.[6] From an analysis of the published figures, it is clear that BT's Ethernet services overall remain profitable despite the application of price controls requiring year-on-year decreases in Ethernet access prices of the Retail Price Index-11%. Indeed, overall volumes of Ethernet access services sold by BT are increasing perhaps spurred, amongst other things, by these price decreases and demand for Ethernet access services.[7] Another interesting feature that can be seen from analysis of BT's regulatory accounts is that speed is not a significant driver of costs for the Ethernet access for bandwidths of up to 1Gbit/s. BT estimates that the relative price for electronics used to provide a 1Gbit/s Ethernet access service is approximately 12% more expensive than the electronics for a 100Mbit/s circuit while the cost of access fiber remains relatively steady across the 10Mbit/s, 100Mbit/s and 1Gbit/s Ethernet access speeds.

6 Regulatory authorities base charges on regulatory accounts in several other countries including Germany and the Netherlands. However, detailed accounts are not publicly available for these countries.

7 Ofcom is currently consulting about tightening the price control by increasing the X factor in the RPI-X% price control formula.

Figure 5: BT UK Ethernet cost-drivers YE 2015 based on BT's Ethernet Access Direct Local Access Product (EAD LA) (up to 1Gbit/s)



Source: BT Regulatory accounts

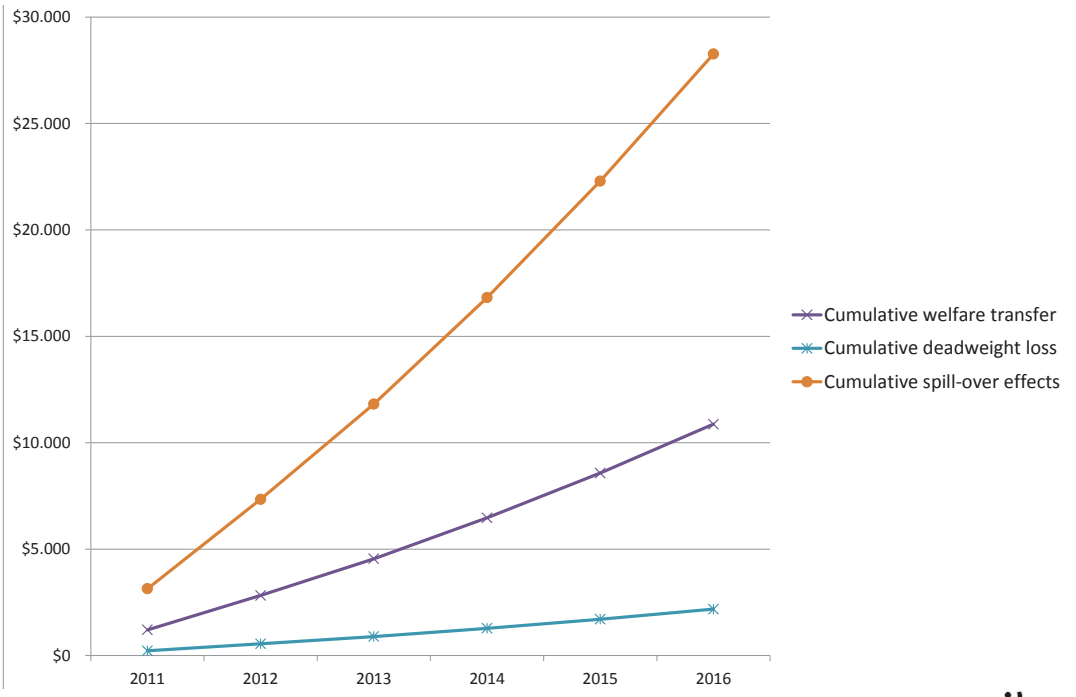
Furthermore, despite the steep annual price cuts associated with BT's Ethernet services, its overall revenues for these services have increased over time because the resulting reductions in prices BT could charge have been offset by overall increased volumes of Ethernet services sold by BT. Even more interestingly, BT's margins for Ethernet services have increased indicating that costs declined as volumes increased and that BT was incentivized to become more efficient in providing service.

Significant benefits could be gained for US corporate customers if Ethernet circuits were price regulated

We have estimated the cumulative effects through 2016[8] of welfare transfers, reduction in deadweight loss, and spill-over effects into the broader economy had the US implemented cost-based pricing for metro Ethernet leased line equivalents in 2011. The aggregate cumulative effects from 2011 through 2016 would have been $10.9 billion in welfare transfers, $2.2 billion in reduction in deadweight loss (i.e. direct gain in societal welfare), and $28.3 billion in spill-over effects. By any measure, this is significant.

8 We assume that any change initiated by the FCC today would be unlikely to take full effect before the end of 2016.

Figure 6: Cumulative welfare transfers, reduction in deadweight loss, and spill-over effects had the US implemented cost-based pricing for metro Ethernet in 2011 (unadjusted 2013 million USD) (2011-2016).



Source: Ovum data (2013), WIK/Marcus calculations

Under a well-designed cost-oriented regulatory arrangement, these losses could be avoided in future years. We estimate avoidable welfare transfer from US firms to incumbent network operators in 2016 to be some $2.3 billion; avoidable deadweight loss in 2016 to be some $480 million; and avoidable loss of positive spill-over effects in 2016 to be some $5.9 billion (due for instance to over-pricing detracting from the ability of businesses to increase productivity and to benefit from the digitalised economy), under the conservative assumption of a price elasticity of demand of -1.0. Effects would be even greater with a higher (and thus more realistic) price elasticity of demand, and can also be expected to be significantly higher in years after 2016.

The European experience suggests that there are more risks and costs associated with maintaining monopolistic market conditions than in addressing competitive bottlenecks (in areas where these exist) through wholesale access regulation and appropriate price control mechanisms.

Contents

List of figures **11**

List of tables **13**

1 Introduction **15**

2 Regulatory context for leased lines in Europe **16**

2.1 Legislative framework – the market analysis process 16

2.2 Regulatory recommendations concerning leased lines 17

2.3 Country case studies 18

2.3.1 A summary of regulatory approaches to Ethernet in case study countries 19

2.3.2 Approaches to defining relevant markets 21

2.3.3 Market power in wholesale leased lines is prevalent 28

2.3.4 Price controls on Ethernet are typical in Europe 28

2.3.5 Regimes to ensure timely and non-discriminatory provision 29

2.3.6 Several EU countries are making provision for migration to Ethernet 31

3 Ethernet leased line access cost drivers – an analysis of BT's regulatory financial statements **34**

3.1 The Main Cost Drivers of Ethernet Access Services are Electronics, Fiber and Duct which do not Vary Much over the Different Bandwidths up to 1Gbit/s 35

3.2 BT's Margins on Ethernet Access are Reasonable Despite Year on Year Price Reductions of RPI-11% 37

3.3 Ethernet Access Costs Trend Downward over Time 38

4 Price comparisons for Ethernet leased lines **40**

4.1 Cross country comparisons EU vs US 40

4.1.1 Ovum data signals higher average prices for Ethernet circuits 40

4.1.2 US rack rates significantly exceed EU equivalents 42

5 The impact on societal welfare of the lack of effective regulation in the United States **45**

5.1 Estimating the impact on societal welfare: key literature 45

5.2 Methodology for the analysis 46

5.3 How do effective unit prices for Ethernet-based leased line equivalents in the US compare to cost-based prices? 47

5.3.1 Results for traditional leased lines in the literature 47

5.3.2 An estimate of over-pricing for Ethernet-based leased line equivalents 48

5.4 How would lower prices have interacted with demand by businesses? 52

5.5 Estimates of the impact 55

6 Conclusions **58**

7 Annex: country case studies 60

7.1 Netherlands 60

7.1.1 Market definition and Assessment of Dominance 60

7.1.2 Remedies 61

7.2 Germany 66

7.2.1 Market definition and Assessment of Dominance 66

7.2.2 Remedies 67

7.2.3 Service level agreements and guarantees (SLA/SLG) 70

7.3 France 72

7.3.1 Market definition and Assessment of Dominance 72

7.3.2 Remedies 75

7.3.3 Price control 76

7.3.4 Service level agreements and guarantees (SLA/SLG) 78

7.4 UK 80

7.4.1 Market definition and Assessment of Dominance 80

7.4.2 Remedies 81

7.4.3 Price control 82

7.4.4 Service levels 85

List of figures

Figure 1: Provisioning timescales for Ethernet leased lines in Europe March 2015 2
Figure 2: Ethernet leased lines per enterprise (>10 employees) 3
Figure 3: Average annual revenues for metro Ethernet leased lines by speed (2013) 4
Figure 4: Incumbent rack rate metro Ethernet leased line charges 2014/15 5
Figure 5: BT UK Ethernet cost-drivers YE 2015 based on BT's Ethernet Access Direct Local Access Product (EAD LA) (up to 1Gbit/s) 6
Figure 6: Cumulative welfare transfers, reduction in deadweight loss, and spill-over effects had the US implemented cost-based pricing for metro Ethernet in 2011 (unadjusted 2013 million USD) (2011-2016). 7
Figure 7: Distribution of network reach (i.e. of rival infrastructure) across postcode sectors in the UK 26
Figure 8: France: Infrastructure competition in fibre leased lines by region 27
Figure 9: Provisioning timescales for Ethernet leased lines in Europe March 2015 29
Figure 10: Fault repair times for Ethernet leased lines in Europe (March 2015) 30
Figure 11: Ethernet leased lines per enterprise (>10 employees) 31
Figure 12: Number of TDM leased lines supplied by BT in 2014 (split between internal self-supply and external) 32
Figure 13: 2015 EAD LA Cost Stack by Activity and Bandwidth (per circuit per annum) 35
Figure 14: 2015 EAD LA Percentage by Activity Cost Stack by Bandwidth (per circuit) 36
Figure 15: Average revenues for Ethernet leased lines by speed (2013) 41
Figure 16: Proportion of Ethernet lines at 1G and above 42
Figure 17: Incumbent rack rate metro Ethernet leased line charges 2014/15 44
Figure 18: The Harberger triangle 46
Figure 19: Effective unit price per 10Gbit/s metro Ethernet end points in France, Germany, the Netherlands, the UK, and the United States (unadjusted 2013 USD). 49
Figure 20: Degree to which cost-based prices for metro Ethernet services would be lower than actual US prices (2011-2018). 50
Figure 21: Actual prices per end point versus hypothetical cost-based prices for metro Ethernet services in the United States (unadjusted 2013 USD). 51
Figure 22: Actual consumption of metro Ethernet end points versus that would be expected with hypothetical cost-based prices in the United States (2011-2018) assuming a price elasticity of demand of -1.0. 53

Figure 23: Actual consumption of metro Ethernet end points versus that would be expected with hypothetical cost-based prices in the United States (2011-2018) assuming a price elasticity of demand of -1.5. 54

Figure 24: Welfare transfer from firms that use metro Ethernet to those that provide it in comparison with that expected had the US implemented cost-based pricing for metro Ethernet in 2011 (unadjusted 2013 million USD) (2011-2018) assuming a price elasticity of demand of -1.0. 55

Figure 25: Reduction in deadweight loss (i.e. net gain in societal welfare) had the US implemented cost-based pricing for metro Ethernet in 2011 (unadjusted 2013 million USD) (2011-2018) assuming a price elasticity of demand of -1.0. 56

Figure 26: Cumulative welfare transfers, reduction in deadweight loss, and spill-over effects had the US implemented cost-based pricing for metro Ethernet in 2011 (unadjusted 2013 million USD) (2011-2016). 57

Figure 27: Wholesale market shares for copper-based bitstream products with a 4h repair time (DSL access) or 10h repair time (leased lines) (estimate as of end 2013) 72

Figure 28: Evolution in market shares (retail and wholesale) by volume for provision of dedicated fibre access connections to business customers 73

Figure 29: Number of Ethernet access lines on fiber optic local loops (wholesale market and self-supply on retail market), and provision of these access lines on Orange versus alternative operators' infrastructures end 2013 74

Figure 30: Infrastructure competition in fibre leased lines by region 78

Figure 31: BT Ethernet Access Direct – impact of long term discounts 84

Figure 32: Volumes of Leased Lines By Different Interfaces and Bandwidths 2013 85

Figure 33: BT Openreach Ethernet provision metrics (key performance indicators) to 2015 86

List of tables

Table 1:	Summary of regulatory approaches to Ethernet leased lines – 4 European markets September 2015	20
Table 2:	Proportion of businesses within 100m of BT's competitors' networks	24
Table 3:	Rival infrastructure and market shares UK leased lines	25
Table 4:	Margins for BT Ethernet Access Direct Local Access	37
Table 5:	Margins for BT Ethernet Access Direct Local Access split by bandwidth	37
Table 6:	BT Ethernet return on capital employed	38
Table 7:	Costs Trends for BT's Ethernet (AISBO) Services 2012-2015	39
Table 8:	Ordering / Provisioning	64
Table 9:	Service availability / fault repair	65
Table 10:	Ordering / Provisioning	70
Table 11:	Service availability / fault repair	71
Table 12:	Ordering / Provisioning	79
Table 13:	Service Availability / Fault Repair	79
Table 14:	Proportion of businesses within 100m of BT's competitors' networks	80
Table 15:	Proposed market definitions and dominance (SMP) findings	81
Table 16:	Overview of remedies proposed in wholesale contemporary interface markets in which BT would be considered dominant	82
Table 17:	Price controls on BT traditional interface and Ethernet leased lines	83
Table 18:	Ordering / Provisioning	85
Table 19:	Service availability / fault repair	86
Table 20:	Proposed minimum standards for provisioning times and repair	87

1 Introduction

The FCC is currently in the process of reviewing the market for the supply of leased lines access services in the US (also known as “special access” services). Leased line or special access services are fixed line connections used to connect the premises of customers (business or government) to the telecommunications network POPs of interexchange and global providers of telecommunications services. These services are also used to provide connectivity between cell towers and the core networks of wireless telecommunications providers, backhaul traffic to Internet backbones, connect data centres and ATMs, and enable cloud-based offerings. At present the majority of these connections in the US are provisioned using TDM technology though incumbent operators are seeking to migrate customers off legacy TDM access services and on to Ethernet-based services. In light of the transition, the FCC is specifically considering whether, and if so how, Ethernet leased line access services should be regulated.

This is an issue that has already received considerable attention in the European Union. This study seeks to provide insights from EU experience that may be helpful to the FCC’s decision-making.

Chapter 2 describes the EU regime for the regulation of leased line access services (with a focus on Ethernet) and illustrates it through four case studies.

Chapter 3 analyses the cost drivers of Ethernet leased line access services as revealed in published regulatory accounts of the main UK incumbent, BT.

Chapter 4 compares charges for similar Ethernet leased line access services in the EU with those offered in the US; and

Chapter 5 estimates the welfare effects of failing to address excessive charges for Ethernet leased lines in the US.

Chapter 6 provides our conclusions.

Finally, Chapter 7 is an Annex that provides detailed case studies for the UK, France, Netherlands and Germany.

2 Regulatory context for leased lines in Europe

In this section, we describe the legislative framework for leased line access regulation in Europe as well as relevant guidelines. We then summarise by means of tables and charts how the rules are applied in four case study countries – the UK, France, Germany and the Netherlands. Further detail is provided in the Annex.

2.1 Legislative framework – the market analysis process

Regulation of leased line access services in Europe is applied on the basis of an analysis of the relevant product and geographic markets. Under the EU Framework for electronic communications,[9] national regulators are required to complete regular (i.e., at least three yearly)[10] reviews of relevant markets including the market for leased line access services.[11] Markets are considered from a demand and supply-side perspective and are treated in a technologically neutral manner. Products which substitute for each other are considered to be in the same market.[12] National regulators conduct periodic data gathering processes as input into market reviews, and certain market data including on wholesale markets is also gathered annually by the European Commission.[13]

If regulatory authorities find that one or more operators within the market have 'significant market power' – a concept equivalent to *dominance* under competition law[14] -- they *must* apply one or more appropriate remedies[15] such as the requirement to provide specific types of wholesale access, non-discrimination, price controls, accounting separation between retail and wholesale activities and transparency obligations including the requirement to publish a Reference Offer (equivalent to a tariff in that a Reference Offer contains the detailed terms, conditions and prices relating to a service offering).

9 EU Regulatory Framework for electronic communications http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=URISERV:l24216a&from=EN

10 Article 16(6)a of Directive 2002/21/EC – delays are permitted of up to a further 3 years only if the national regulatory authority notifies a reasoned proposed extension and the Commission does not object.

11 European Commission Recommendation on relevant markets within the electronic communications sector susceptible to ex ante regulation https://ec.europa.eu/digital-agenda/en/news/commission-recommendation-relevant-product-and-service-markets-within-electronic-communications

12 Demand-side substitution is evaluated by applying the SSNIP test which is a determination of whether customers would switch from one product to another in response to a small but significant non-transitory increase in price.

13 The data is published within the 'Digital Agenda Scoreboard' – see http://ec.europa.eu/digital-agenda/en/create-graphs

14 Under EU law, a dominant position is understood to mean that an undertaking can behave to an appreciable extent independently of its competitors, customers and ultimately of its consumer.

15 Article 8(2) Directive 2002/19/EC.

The concept of non-discrimination is generally enforced in one of two ways across Europe:

1. Equivalence of Output (EoO): Under this interpretation, provision by the dominant operator must lead to the same outcomes for example in terms of provisioning and repair times, and overall quality. Compliance is measured by means of metrics or Key Performance Indicators (KPIs), which are in several cases such as the UK, France and Netherlands, made publicly available.

2. Equivalence of Input (EoI): Under this interpretation, the dominant operator must use the same systems, interfaces and processes for its downstream retail operations as it uses for third parties. EoI was first implemented for key wholesale services in the UK and has been introduced for key products in certain other EU countries.

2.2 Regulatory recommendations concerning leased lines

In Europe today, wholesale leased lines are considered to fall within a wider market for "wholesale high-quality access provided at a fixed location." The European Commission recommended that not only leased lines be considered within this market but also certain types of high quality broadband access services that demonstrate characteristics such as:

(i) guaranteed availability and high quality of service in all circumstances including SLAs, 24/7 customer support, short repair times and redundancy, typically found in a services environment geared to the needs of business customers;

(ii) high-quality network management, including of backhaul, resulting in upload speeds appropriate for business use and very low contention;

(iii) the possibility to access the network at points which have been defined according to the geographic density and distribution of business rather than mass-market users; and

(iv) the possibility to offer separate Ethernet continuity (e.g. through an additional header allowing for several layers of virtual LANs).[16]

The Dutch and French regulators have included in the market for leased line services business-grade broadband services offered by the telecommunications incumbents in these countries because these incumbents' services have, amongst other things, low contention ratios, short repair times, and more stringent SLAs. These services have to meet the SLAs and SLGs met by leased line services and which are discussed in the country case studies in the Annex. Contended broadband services offered by cable

16 Commission Recommendation on relevant product and service markets within the electronic communications sector http://ec.europa.eu/digital-agenda/en/news/explanatory-note-accompanying-commission-recommendation-relevant-product-and-service-markets

companies were considered by these regulators, but not included in the same market as leased line services because these cable broadband offers lacked the necessary technical characteristics to be considered substitutable for leased line services.

The competitive conditions in the high-bandwidth segment may vary depending on the geographical area – and specifically the density of business and other large customers. When assessing competitive conditions on a nationwide basis, the European Commission notes that *a larger presence of alternative operators in a limited number of dense business areas may have a significant effect on the national market shares without necessarily allowing competing operators to provide competitive offers nationwide for multiple site contracts, which include connectivity for more remote sites*. If this phenomenon is observed, the European Commission recommends geographic segmentation of the market.

In two 2005 Recommendations, the Commission also issued specific guidelines concerning remedies for wholesale leased lines in the EU.[17] These Recommendations set out best practices for 'major supply conditions' and pricing for wholesale leased lines based on benchmarks for wholesale tariffs and provisioning timeframes including that:

(i) prices associated with the provision of a leased line part circuit reflect only the costs of the underlying network elements and the services being requested including a reasonable rate of return (including one-off connection prices covering the justified initial implementation costs of the service being requested and monthly prices covering the on-going cost for maintenance and use of equipment and resources provided); and

(ii) the price ceilings be respected unless there is reliable evidence from cost accounting analysis that the recommended ceiling would result in a price level below the efficient costs of the underlying network elements and the services being requested including a reasonable rate of return.

2.3 Country case studies

For this study, we examined approaches to Ethernet leased line access regulation in detail for four European countries.[18] These include the three largest European economies, Germany, the UK and France with the addition of the Netherlands, a smaller country which offers some features similar to the US market including widespread cable and, in some areas, FTTH deployment.[19] The information in the case studies is drawn from analysing the market decisions made by national regulators as well as the Reference Offer published by the dominant operator (typically the incumbent).

17 http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32005H0268 and http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32005H0057
18 As of September 2015.
19 Reaching 28% coverage as of end 2014 – according to IHS for the EC.

In general, the case studies illustrate an approach which involves more significant regulatory intervention to support competition in business access markets than is currently applied in the US. Our in-depth discussion of these countries is complemented with summary data on pricing, service levels and Ethernet take-up spanning a wider range of EU countries.

2.3.1 A summary of regulatory approaches to Ethernet in case study countries

Table 1 provides a summary of the regulatory approach to Ethernet leased lines in the four countries assessed, while key themes from the analysis are discussed below.

Table 1: Summary of regulatory approaches to Ethernet leased lines – 4 European markets September 2015

Country/Regulator	Product Market	Dominance	Main Remedies	Price Regulation Mechanism
UK/Ofcom	Business Connectivity Market includes terminating segments of leased lines (i.e. leased line access) of all technologies. In 2015 Ofcom proposed to regulate TDM access ≥2 Mbit/s but less than 8 Mbit/s and Ethernet access ≤ 1Gbit/s. Asymmetric broadband is expressly excluded because evidence indicates that substitutability is insufficiently strong.	Incumbent has dominance in all areas outside West, East and Central London ("WECLA"). In the 2015 market review, Ofcom proposes to reverse deregulation of Ethernet services granted in the periphery of this WECLA area and to narrow the deregulation to a smaller Central London Area.	Access obligation, price control, non-discrimination enforced via functionally separate unit openreach delivering Equivalence of Inputs, Reference Offer, accounting separation between retail and wholesale units. In 2015, Ofcom also proposed quality of service parameters for BT's Ethernet access service.	Cost-orientation implemented through multi-year RPI-11% price control for Ethernet services based on top-down costing model. In 2015 Ofcom proposed a steeper price control for Ethernet services.
France/ARCEP	High quality data connectivity services market including leased line access and business-grade broadband of all technologies. Best efforts cable broadband not included in this market.	Nationwide geographic market, but no price regulation within designated competitive areas.	Access obligations including near-net provisioning, non-discrimination (Equivalence of Output version), transparency including the publication of a Reference Offer and KPIs or metrics, quality of service obligations, price controls and accounting separation between wholesale and retail activities	No price control in zones designated as effectively competitive. In other areas, the price control is based on a prohibition of excessive pricing for Ethernet over fiber services. For Ethernet over copper services, in Zone 1 designated competitive there is no price control, in Zone 2 Orange is prohibited from price squeeze (non-eviction tariff) and in Zone 3 (rural zones) Orange's prices must be cost orientated
Germany/BNETZA	Leased line access services of all technologies up to speeds of 155 Mbit/s included in the market (excluding native Ethernet services).	Nationwide	Access obligations including near-net/new line provisioning, Reference Offer, non-discrimination and ex ante price control (prior approval of NRA)	Cost-orientation – implemented through top-down model adjusted for efficiency. Costs including for Ethernet are calculated on the basis of the underlying SDH network, rather than native Ethernet
Netherlands/ACM	'High quality' broadband access services market encompassing leased lines (all technologies) and business-grade broadband. Best efforts cable broadband not included in this market.	Nationwide	Access obligation at metro level, included obligation to supply 'near-net' fibre, Reference Offer, non-discrimination (EoO), prohibition on margin squeeze, charge control. Access to fiber and near-net obligation annulled by Dutch court in September 2015, but issue is likely to be re-visited in next round of market analysis.	Cost-orientation – implemented through multi-annual charge control based on KPN 'Embedded Direct Costs' (top-down CCA FAC)

The approaches to Ethernet leased lines in the four researched countries vary in several respects, but there are a number of important aspects which may be relevant to the ongoing consideration of Ethernet leased line regulation in the US. These include (i) the approaches taken to defining the relevant markets including approaches to geographically segmenting the market definitions or associated remedies; (ii) the conclusions regarding market power; (iii) the application of price controls on Ethernet leased line access services; (iii) regimes to ensure timely and non-discriminatory provision and repair of Ethernet circuits; and (iv) provisions made to foster migration from wholesale traditional leased lines towards modern Ethernet equivalents. We address each of these points in turn.

2.3.2 Approaches to defining relevant markets

2.3.2.1 All countries included Ethernet within the business access market

All of the regulatory authorities considered that leased line access services were a core service required in the provision of access to businesses. Leased lines are generally defined in a technologically neutral manner as 'high-grade' circuits offering symmetric capacity, business-grade service level conditions (such as high service availability guarantees, shorter repair times and advanced quality of service characteristics), which can be configured so as to be uncontended. Ethernet leased line access services have been included within the market definition in all the cases studied, as well as the vast majority of other countries within Europe.

2.3.2.2 Some countries also included business-grade broadband in the business access market, but declined to include cable–based broadband because cable could not deliver the required quality of service

Although leased lines are a core wholesale product for large business sites and backhaul, smaller businesses and small sites of multi-site corporations often have less intensive bandwidth and quality requirements. To reflect these requirements, wholesale broadband access supplied with business-grade specifications were included in the market definition for high quality access services alongside leased line access in two of the four countries considered.

In France, the regulator included business broadband services in the wider market for high quality business access services because of high service level agreements (e.g. outages not to exceed 9-13 hours per annum and penalties of 25% or more of monthly rental charges paid for outages exceeding these time limits) and guaranteed repair times of less than 4 hours.

In the Netherlands, the regulator found that business-grade broadband services should be considered part of a 'high-quality' wholesale market alongside leased line access because there is evidence of greater substitutability resulting from both services having

similar upload capacities (up to 100Mbit/s for ninety-five percent of services) and service level agreements. The regulator noted decreases in the price of leased line access services as a result of increases in the capacity of business-grade broadband services. Furthermore, both services are sold in the Netherlands to the same types of business customers by the same commercial sales force. The regulator also found that both services are delivered via the same networks.[20] The Dutch regulator did not include cable networks in the market for high quality access services because cable networks could not guarantee a certain contention ratio and did not offer the required service level agreements.

A more detailed outline of the SLAs and SLGs relating to ordering, provisioning, service availability and repair time that must be met by business-grade broadband services and other wholesale high quality access services are set forth in the case-studies discussing France and the Netherlands in the Annex.

2.3.2.3 Most countries include leased line speeds of at least up to 1Gbit/s

In all cases reviewed, with the exception of Germany, regulators have defined markets susceptible to ex ante regulation at all relevant service speeds up to 1Gbit/s. Germany on the other hand has excluded leased lines with speeds above 155Mbit/s. On the basis of nationwide market share data, the German regulator, BNetzA, suggested that lines above this speed were supplied in a competitive market. However, BNetzA did not analyse whether the availability and market shares associated with high speed leased lines differed in central business districts compared with other areas. Evidence from countries such as the UK and France (see section 2.3.2.5), suggests that had they done so, BnetzA may also have found that competition in very high speed circuits was limited to central business districts where alternative fibre operators have installed networks.

2.3.2.4 Cable access is generally excluded from the scope of the market

Cable access has not been considered as providing an economic substitute for specialised business access in any of the cases considered. In the Netherlands cable has been explicitly excluded from the scope of the relevant market, due to technical network characteristics, which in the regulator's view, would make it impossible to guarantee bandwidth. In France the regulator includes business access services covering copper and fibre technologies, but not coaxial cable.[21] Meanwhile, in the UK and Germany, the scope of the relevant market is restricted to leased line services, thereby excluding all asymmetric broadband services including cable broadband because they do not meet the required technical characteristics.

20 NL/2012/1408.
21 There is no extensive discussion of cable within ARCEP's determination.

2.3.2.5 There is a trend towards geographic segmentation of business markets

There is an increasing trend amongst European regulators to geographically segment markets to reflect differing competitive intensities. In cases where the geographic boundary is considered to be relatively stable, regulators have defined specific geographic submarkets, which are deemed to be competitive, while in cases where the boundary is less well-defined or less stable, regulators have differentiated remedies by geography, applying lighter touch regulation in areas exhibiting a higher degree of competitive intensity.

Amongst the countries considered, the UK regulator Ofcom has conducted the most detailed regional evaluation of the scope of infrastructure-based competition. In the context of its ongoing Business Connectivity Market Review Ofcom focused on identifying the area in which competition was likely to be fully effective across a range of business products. To identify the boundary of this market, Ofcom created a "boundary test"[22] whereby the boundary is formed by postcode sectors[23] which fulfil at least one of the following conditions:

1. Large businesses have on average five or more alternative business fibre providers within a buffer distance of 100m;[24] or

2. Large businesses have on average four or more providers within a 100m and in addition, 90% of the businesses are within 100m of at least two alternative business access providers

This boundary test is better explained using the following example:

> A postcode sector with one thousand large business locations, five hundred of which have five or more alternative providers within a buffer distance of 100m and five hundred of which have three alternative providers within a buffer distance of 100m would have an average of four providers within the required buffer distance of 100m and therefore would not qualify under the first part of the boundary test. However this postcode sector would qualify under the second part of the test if nine hundred of the businesses in the postcode sector are within 100m of the infrastructure of at least two alternative access providers.

Ofcom explained that the requirement for businesses to be served by several alternative providers allowed for at least two competing offers on average in addition to offers available from BT, even if the customer needed to contract with two providers for resilience purposes (to be connected by two independent infrastructures). This increased the likelihood that BT would be constrained by competition and minimised any tacit collu-

22 Para 4.3.3.1, BCMR consultation May 2015.
23 Postcodes in the UK fulfill a similar function as zipcodes in the US, but typically cover smaller geographies. There are approximately 1.8 million postcodes in use in the UK and on average a postcode covers 15 addresses. A postcode sector typically covers 3000 addresses.
24 The "buffer distance" is the distance between a business site and a "flexibility point" on a competing provider's network. A flexibility point is a point on the competing provider's network where it can add new fibre in order to connect it to end-users.

sion. In addition to its boundary test, Ofcom will discard postcode sectors that are "islands" and will price deregulate only those postcode sectors that are "contiguous geographic areas of material scale."[25]

On this basis in a May 2015 consultation document,[26] Ofcom reported that it had found that for the Central London Area, more than 90% of businesses were within 100m of at least four alternative networks. There was some competition also in the London Periphery, but more limited. However, in the rest of the UK, the picture was very different, with only 15% of businesses being within reach of three or more business access providers. Ofcom consequently proposed to segment the market between the Central London Area and the remainder of the country. If implemented, this would be a reversal of forbearance from Ethernet regulation Ofcom previously granted for certain areas of London that Ofcom has now renamed the London Periphery and which Ofcom proposes to re-regulate with respect to Ethernet services.[27]

Table 2: Proportion of businesses within 100m of BT's competitors' networks

Number of competitors' networks	Central London Area	London Periphery	Rest of UK (exc. Hull)
At least 1	100%	96%	61%
At least 2	99%	68%	15%
At least 3	98%	40%	5%
At least 4	93%	22%	2%
At least 5	83%	11%	0%

Source: Ofcom BCMR consultation May 2015[28]

In addition to rival infrastructure, Ofcom also considered other factors in determining which areas to deregulate such as the distribution of service shares, pricing and profits and other structural indicators of competition. While BT's service shares and pricing and profitability in the Central London Area (CLA) were at levels consistent with a finding of dominance, Ofcom felt it was appropriate to give more weight to the presence of rival infrastructure in the CLA. Ofcom found that the presence of multiple operators' rival infrastructure and the density of business demand in the CLA being seven times greater than in the London Periphery made it likely that BT faced effective competition in the CLA. However, Ofcom did not believe competitive constraints existed to the same extent outside the CLA and therefore proposes to regulate Ethernet access services outside the CLA. Table 3 below shows Ofcom's detailed analysis of rival infrastructure and service shares in the CLA, the London Periphery, in Central Business Districts of other major cities like Leeds and Manchester and the rest of the UK.

25 BCMR May 2015 consultation at footnote 100.
26 BCMR May 2015 consultation http://stakeholders.ofcom.org.uk/binaries/consultations/bcmr-2015/summary/BCMR_Sections.pdf
27 West, East and Central London area (WECLA) that Ofcom had previously designated as a competitive area and free from Ethernet price regulation has been re-apportioned as two areas - (i) Central London Area and (ii) London Periphery – the latter of which Ofcom proposes to subject to Ethernet price regulation. See Ofcom BMCR consultation May 2015, Sec 4.154.
28 Ofcom BCMR consultation May 2015 http://stakeholders.ofcom.org.uk/consultations/bcmr-2015/

Table 3: Rival infrastructure and market shares UK leased lines

Competitive indicators	Metrics		CLA	LP	CBDs in other cities	Rest of UK (exc. Hull)
Rival infraetructure	Average network reach* (100 metres)		6.2	2.4	2.8	0.8
	Average network reach (200 metres)		8.0	4.1	4.4	1.2
	Average network reach (500 metres)		9.5	6.6	7.2	2.0
	Depth of network reach – 100 metres (200 metres)**	1+	100% (100%)	96% (99%)	97% (99%)	61% (71%)
		2+	99% (100%)	68% (91%)	79% (95%)	15% (30%)
		3+	98%(100%)	40% (78%)	55% (84%)	5% (12%)
		4+	93%(100%)	22% (59%)	30% (65%)	2% (5%)
		5+	83% (98%)	11% (37%)	15% (46%)	0% (2%)
Distribution of service shares	BT share	Low bandwidth TISBO	63%	70%	88%	94%
		CISBO up to and including 1Gbit/s***	46%	50%	47%	57%
		- Low CISBO	41%	44%	40%	46%
		- Medium CISBO	55%	57%	54%	69%
		- High CISBO	34%	44%	47%	64%
		Very high CISBO****	8-11%	14-15%	21%	30-32%
		CISBO Total*** (by revenue)	37%	41%	44%	53%
		CISBO Total*** (by volumes)	44%	48%	47%	56%
	Virgin Media share	CISBO up to and including 1Gbit/s	9%	25%	33%	30%
		Very high CISBO	16-17%	39-42%	57-58%	48-53%
		CISBO Total	10%	26%	33%	31%
	Combined BT and Virgin Media share	CISBO up to and including 1Gbit/s	55%	75%	80%	87%
		Very high CISBO	28%	53%	80-81%	84-85%
		CISBO Total	54%	73%	80%	87%
	Concentration (HHI)	CISBO Total	2,773	3,100	3,395	4,154

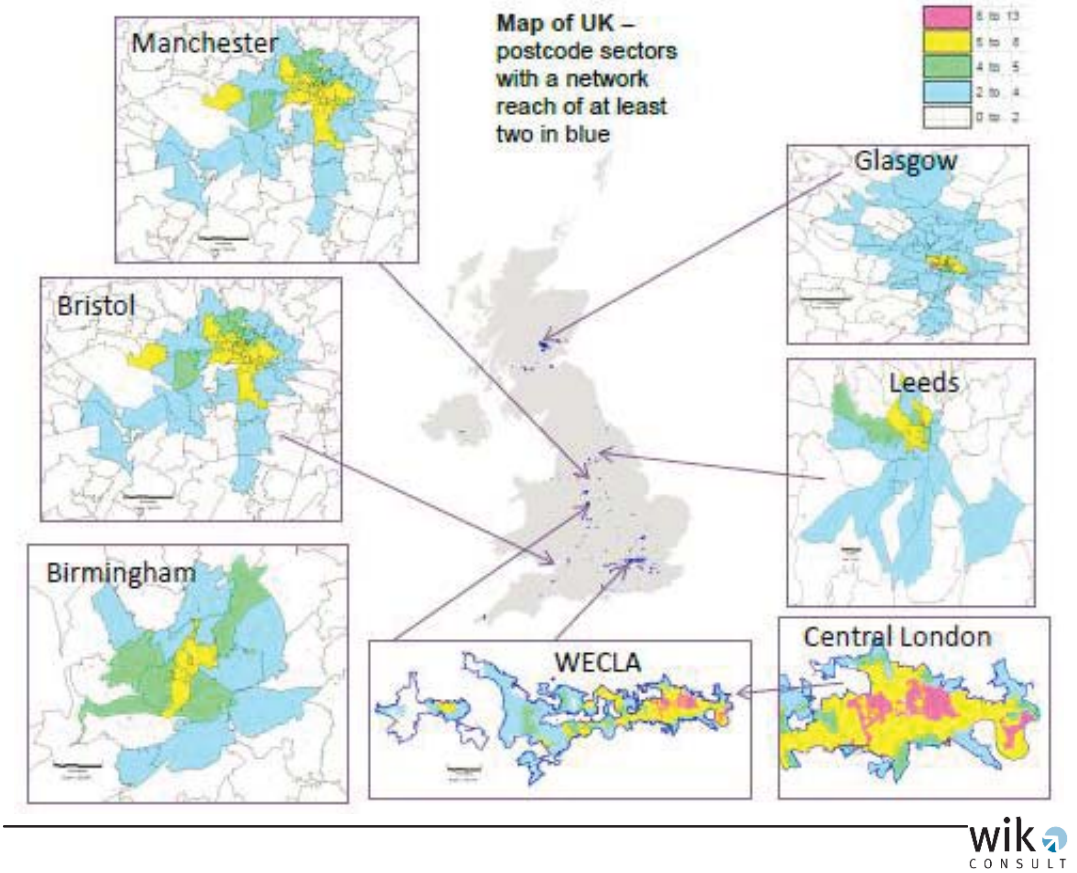
Source: Ofcom 2015 BCMR consultation. Market share and infrastructure availability distinguished by region. CLA "Central London Area", LP "London Periphery", Central Business Districts (CBDs) other cities and rest of UK. TISBO stands for TDM Symmetric Broadband Origination services which in US parlance are TDM services. CISBO are Contemporary Interface Symmetric Broadband Origination services which are mainly Ethernet services.

Figure 7 is a heat map of this information. It shows the network reach[29] of competitive infrastructure across the UK in 2015. There are areas in other major UK cities where upwards of four competitors have rival infrastructure within 100m of business locations, but these areas fail Ofcom's proposed boundary test because at least two rivals do not have infrastructure within 100m of ninety percent of the business locations.[30] Furthermore the number of businesses per square kilometre is low at 62/km2.

29 Ofcom defines network reach as follows: "When we refer to the "network reach" of an area, usually a postcode sector or group of postcode sectors, we mean the average number of OCPs [Other Communications Providers] with network within a given "buffer distance" of the large businesses in that area. Network reach analysis determines on a postcode sector basis the number of OCPs with infrastructure sufficiently close to businesses to be (potentially) able to compete to supply services to those businesses. We measure the buffer distance between a business site and a "flexibility point" on a CP's network. A flexibility point is a point on an existing network where a CP can add new fibre in order to connect it to end-users." May 2015 BCMR Consultation at p 65.

30 See Ofcom BMCR consultation May 2015, Table 4.4.

Figure 7: Distribution of network reach (i.e. of rival infrastructure) across postcode sectors in the UK



Source: Ofcom 2015.

Although the French regulator, ARCEP, considered that the market was national in scope, like Ofcom, it also noted significant differences in the strength of competition in different geographic areas. While ARCEP found that in 159 communes, at least three alternative operators had built out fibre networks to serve business customers (mainly in the Paris area), and in these communes the incumbent Orange maintained a market share of 45%, this did not suffice for ARCEP to deregulate services in these communes. ARCEP initially proposed to delineate as 'effectively competitive' communes in which there were at least five alternative operators present providing business fibre connections. However, a more detailed analysis by commune revealed that this criterion did not guarantee sufficient network coverage by alternative operators to ensure effective competition. ARCEP therefore decided to base its assessment of effective competition in fibre-based Ethernet leased lines[31] on the following criteria:

31 Concerning copper-based leased line access, ARCEP proposed to delineate areas as 'effectively competitive' if there was (i) at least one alternative operator in addition to the incumbent telecommunications provider, Orange, offering copper-based business-grade broadband with repair times of less than 4 hours; and (ii) a history of unbundling in that area for more than seven years.

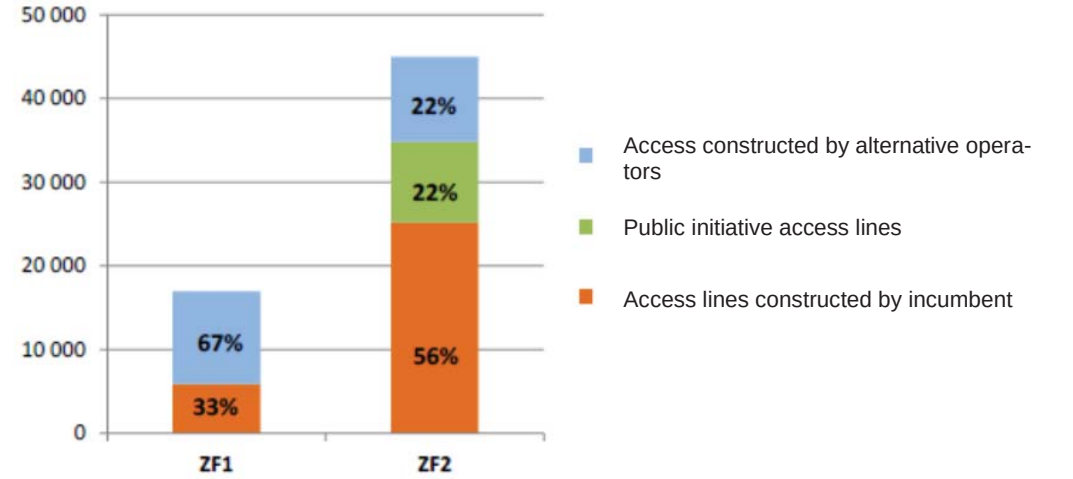
(i) the theoretical economic potential of a given territory – measured by the density of more than 50 businesses (employing more than 10 employees) per km2;

(ii) significant rollouts, with at least 50 “high quality” access lines sold in the commune’s retail market; and

(iii) presence in the commune of alternative operators’ fibre networks with a network reach at least comparable to that of the incumbent telecommunications provider’s network. Specifically, **at least fifty percent of the fibre access lines built to business locations in the commune had to have been constructed by alternative operators**.

ARCEP is in the process of a detailed infrastructure mapping exercise to help determine where these criteria are met, but noted that as of June 2014, it had identified only 10 communes which met these criteria out of a total of approximately 37,000 communes.[32] The market share of the incumbent in these communes was 33% on average (as shown in Figure 8).

Figure 8: France: Infrastructure competition in fibre leased lines by region



Source: ARCEP – data September 2013

32 As of January 2016, ARCEP has identified 20 communes that meet these criteria.

2.3.3 Market power in wholesale leased lines is prevalent

It is notable that in all countries considered, national regulators have found that the incumbent remains dominant in the provision of leased line access including Ethernet leased line access either across the whole territory or the majority of the territory with the exclusion only of some major business districts. The main factors supporting these conclusions have been findings of depth and density of rival infrastructure, high market shares, which would further increase in the absence of regulatory intervention, widespread territorial coverage which would advantage the incumbent compared with alternative network operators in the supply of services to multi-site businesses and the challenges to replicate copper and fibre infrastructures especially outside central business districts. Very high incumbent market shares are common in the supply of copper-based TDM leased lines at lower speeds (e.g. ≤ 8Mbit/s), which are generally not offered by alternative providers. Furthermore, high incumbent market shares outside central business districts are also apparent in the supply of (typically fibre-based) Ethernet leased lines, in cases where these distinctions have been revealed by national regulators. See, for example, Ofcom's analysis discussed in the preceding section.

2.3.4 Price controls on Ethernet are typical in Europe

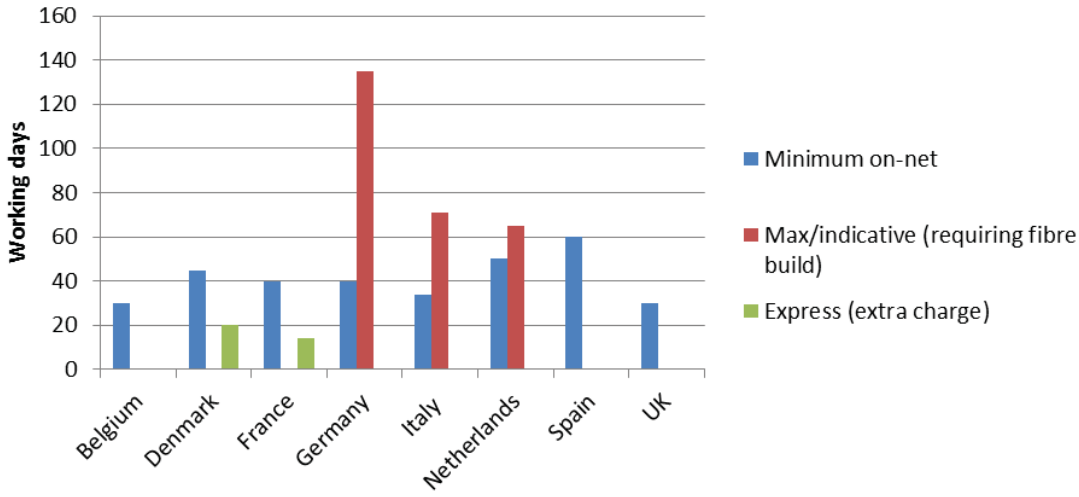
Price controls have been applied for Ethernet leased line access services in all the countries considered, for all areas or speeds where competition has not been found to be effective. In three cases price controls have been based on cost-orientation. In all these cases – Germany, the Netherlands and the UK, cost-oriented charges have been calculated on the basis of top-down models based on the regulated accounts of the incumbent. In the UK and the Netherlands multi-annual charge controls are used following the format RPI (Retail Price Index)-x. These controls aim to achieve cost-oriented charges adjusted for efficiency at the end of the charge control period, and incentivise further efficiency gains by the incumbent by permitting them to retain any further cost savings during each charge control period.

As can be seen in section 4.1, the UK and the Netherlands have amongst the lowest Ethernet leased line charges in Western Europe. The reason for the competitive charges in the UK and the Netherlands (as seen in Figure 17) is the use of charge controls reflecting the cost of native Ethernet provision. In contrast, in Germany, costs are assessed on the basis of Ethernet over SDH rather than native Ethernet, which results in higher costs for equivalent speeds, while in France charges in non-competitive areas are only required 'not to be excessive', which may also result in charges above cost-based levels.

2.3.5 Regimes to ensure timely and non-discriminatory provision

Alongside price, non-price conditions such as provisioning and repair times are elements considered of particular importance to business customers. In the case studies examined (as well as in many other countries within Europe), leased line access and business-grade broadband have been required to be made available on 'non-discriminatory' terms and conditions, including service levels. Following interventions by regulators, Reference Offers within the EU for Ethernet leased line access typically contain service level agreements for provisioning and repair, with associated compensation if these commitments are not met. A detailed description of the service levels and guarantees for the reviewed countries is shown in the country case studies. A wider benchmark within the EU (see Figure 9) shows that on-net provisioning times for Ethernet leased lines were between 30 and 45 working days in the majority of countries.

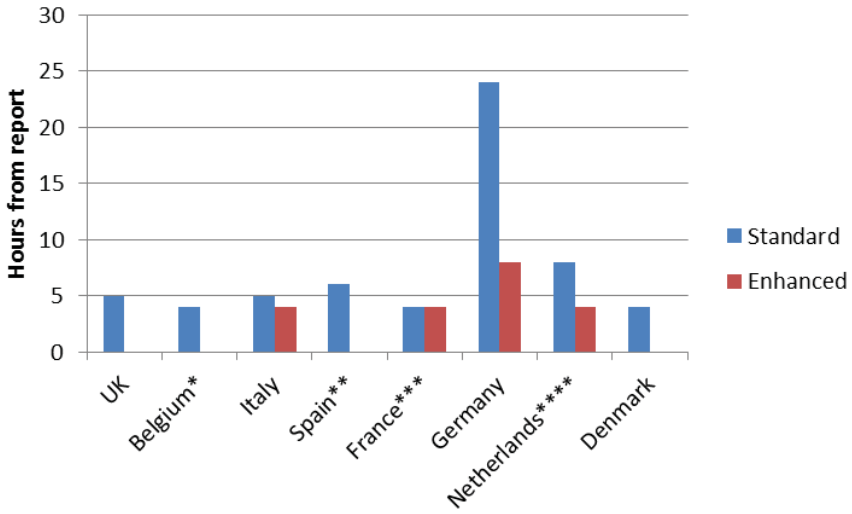
Figure 9: Provisioning timescales for Ethernet leased lines in Europe March 2015



Source: Data from WIK-Consult (2015) Access and interoperability standards for the promotion of the internal market for Electronic Communications

Benchmarks also show that the majority of countries in Western Europe either offered a standard fault repair time of 4-5 hours or offered this option as a premium service.

Figure 10: Fault repair times for Ethernet leased lines in Europe (March 2015)[33]



Source: WIK-Consult (2015) based on data from Access and interoperability standards for the promotion of the internal market for Electronic Communications

Service level guarantees are routinely offered in EU Reference Offers for Ethernet leased line services, and in some countries such as the UK and France are paid automatically. However, the amounts vary. To address concerns over perceived shortcomings in provisioning of Ethernet leased lines in the UK, the UK regulator Ofcom has proposed to introduce a general obligation on BT to abide by given quality of service targets. This would require BT to deliver Ethernet leased lines (including near-net lines)[34] within an average of 40 working days by 2017/18 and to fix at least 94% of faults within 5 hours.[35] If BT fails to comply with these targets, it could be subject to a significant fine based on the company's turnover.

33 * In Belgium these repair times apply to disruptions impact traffic – repair time of 3 working days apply for other disruptions. In Spain, repair times are 6 hours in the capital of the province and 8 hours in other cities. In France the standard SLA applies only in working hours while the enhanced SLA applies 24/7. In the Netherlands, 90% of repairs must meet this target

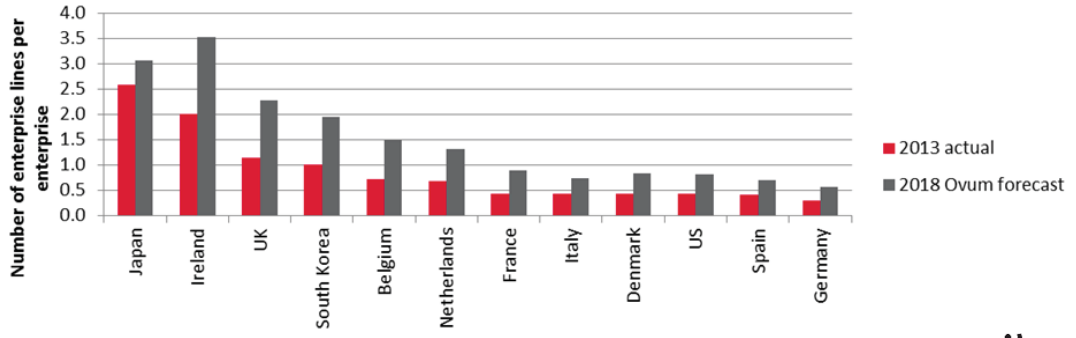
34 Near-net lines are lines that require some installation work because they are within a certain dig-distance from a network connection point or fall within a allowed additional construction cost eg standard connection charges for Ethernet leased lines in the UK include an allowance to fund the completion of 'near-net' circuits falling within a certain cost.

35 See Table 1.4, BCMR consultation 2015 – proposed minimum standards of provision lead times and repair available at http://stakeholders.ofcom.org.uk/binaries/consultations/bcmr-2015/summary/BCMR_Sections.pdf

2.3.6 Several EU countries are making provision for migration to Ethernet

Available data (see for example Figure 11) suggests that migration from legacy technologies to Ethernet is well-advanced in several European countries, bringing associated benefits in terms of higher speeds to business customers at lower cost. The pace of migration in particular in countries such as the UK which have tight regulatory regimes in place for Ethernet also suggests that the regulatory regimes have not proved to be a barrier for this migration, and indeed may have supported the upgrade by enabling competitors to effectively market Ethernet-based services on a nationwide basis alongside the regulated incumbent.

Figure 11: Ethernet leased lines per enterprise (>10 employees)



Source: WIK based on Ovum (2013), Ethernet Service Forecast spreadsheet to 2018

In view of this progression, several EU countries and regulators are starting to take steps to further foster migration from TDM and other legacy technology-based circuits[36] to Ethernet and to plan for the ultimate switch-off of legacy circuits. The main strategies are to set out the conditions under which legacy circuits may be discontinued and to incentivise switching through the relative pricing regimes for legacy and Ethernet circuits.

In the UK, in recognition that the volumes of TDM services are declining rapidly, Ofcom has proposed to deregulate traditional leased lines offering bandwidths of less than 2 Mbit/s[37] or above 8Mbit/s – as it notes that "higher speeds are today served predominantly with Ethernet technology",[38] which is subject to cost-based regulation. Indeed

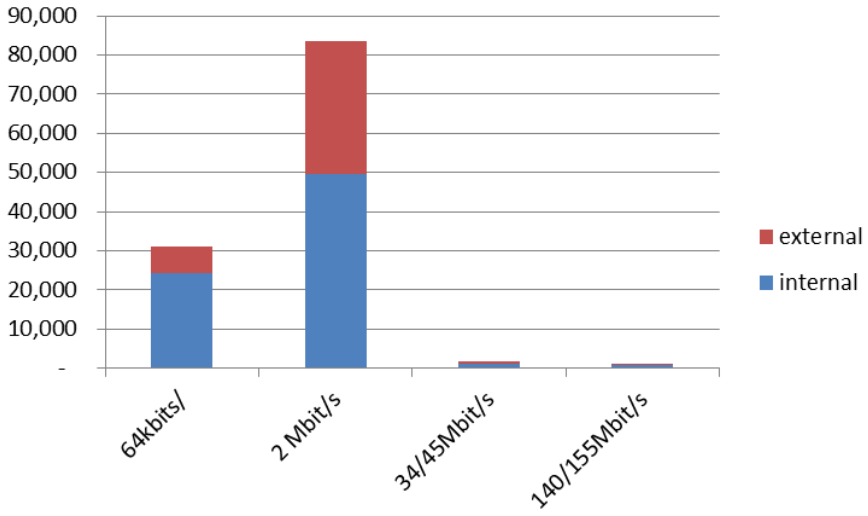
36 In addition to the regulatory regime for Ethernet, the countries included in our case study also regulate access to legacy TDM connections, typically on the basis of non-discrimination and with cost-oriented rates. National regulators note that there is very little competition in TDM-based services, especially for low bandwidth circuits of 2 Mbit/s and below, and yet there is continued reliance on these circuits for certain customers and sites.

37 Note that in Europe, the equivalent of a T1 or 1.5 Mbps TDM circuit is an E1 or 2 Mbit/s TDM circuit. There is no commonly available 1.5 Mbps TDM service available in Europe. So when Ofcom discusses deregulating TDM services of less than 2 Mbit/s (which is because of a platform closure), this would be the equivalent of the FCC discussing deregulation of sub-T1 speeds in the US because of a withdrawal of these services from the market.

38 Ofcom Business Connectivity Market Review consultation May 2015 http://stakeholders.ofcom.org.uk/binaries/consultations/bcmr-2015/summary/BCMR_Sections.pdf

data from BT's published regulatory accounts[39] (see Figure 12) shows the very low (and declining) numbers of legacy connections especially at speeds above 2 Mbit/s. Ofcom has also set price caps for TDM-based services that have allowed the charges for these services to increase, while charges for Ethernet connections are subject to significant RPI-11% year on year price reductions. The combination of these measures serves to foster further migration to Ethernet.

Figure 12: Number of TDM leased lines supplied by BT in 2014 (split between internal self-supply and external)[40]



Source: WIK based on BT Regulatory accounts 2014

As regards Ethernet, there is some indication that 100Mbit/s and to some extent 1Gbit/s Ethernet leased line services are increasingly viewed in the UK as entry level speeds for leased lines users.[41] It is notable that in the UK BT has dropped its pricing of its 100Mbit/s Ethernet access services such that prices for its 100Mbit/s Ethernet services are nearly identically to its 10Mbit/s. Attractively-priced Ethernet services could hasten the migration from legacy to Ethernet and other advanced services.

Meanwhile in France, ARCEP noted in its 2014 market decision that Ethernet services are considered substitutes for services provided via PDH/SDH or ATM technologies, and are expected to progressively replace traditional services in the horizon of the next market analysis cycle. In this context, ARCEP has set general guidelines for the withdrawal of TDM services and migration to Ethernet. It has stated that the incumbent Orange may not withdraw PDH/SDH or ATM without giving reasonable notice to alterna-

39 BT regulatory accounts 2014 http://www.btplc.com/thegroup/RegulatoryandPublicaffairs/Financialstatements/index.htm

40 Internal self-supply refers to sales by the upstream, highly-regulated BT Openreach or less regulated BT Wholesale business units to downstream BT business units like BT Global Services. External supply refers to sales by BT Openreach and BT Wholesale to unaffiliated, independent purchasers.

41 May 2015 BCMR Consultation at para 3.48.

tive operators (12 months for a regional withdrawal and 3 years for nationwide) and ensuring the availability of an equivalent Ethernet offer and appropriate migration processes. In addition, with respect to TDM leased line services of < 2 Mbit/s leased lines whose technical closure is planned on 31st Dec. 2016, ARCEP has also stated that it would not be reasonable for the incumbent Orange to charge migration fees to migrate these leased line services to 2 Mbit/s leased lines or to other copper-based access services because this migration was decided unilaterally by Orange and without change in the physical support (i.e. access remains over copper). (Note that the equivalent to 2Mbit/s leased lines or “E1s” in Europe are 1.5 Mbps TDM or T1 lines in the US, and that what ARCEP is permitting would be the equivalent of a shutdown of sub-T1 leased line services in the US).

3 Ethernet leased line access cost drivers – an analysis of BT's regulatory financial statements

As noted in the previous section, several countries have used a top-down analysis of incumbent accounts to calculate cost-oriented charges for Ethernet leased lines in Europe. In this section we review available published regulatory accounts in the UK to identify the main cost drivers for Ethernet services.[42]

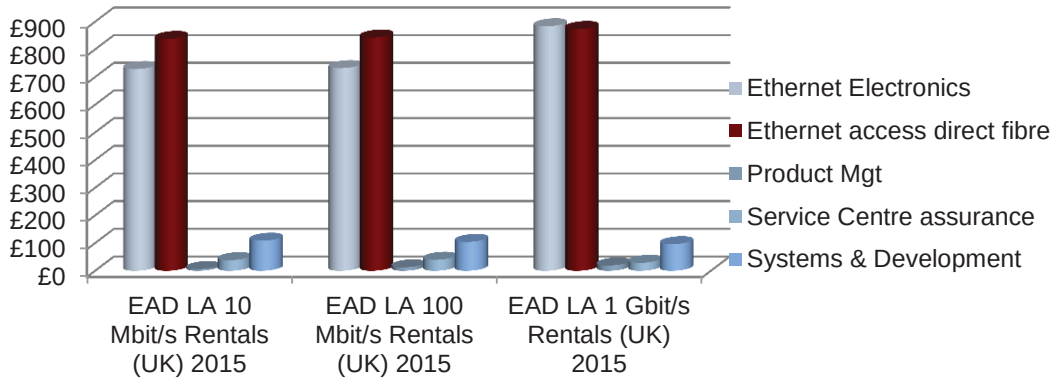
BT's published regulatory financial statements provide the most transparent, robust, granular and informative 'top-down' or accounting based information source published by a telecommunications operator which, for parts of its business, is subject to economic regulation. They show the financial performance of a range of services BT provides in the UK. This analysis focusses on the most widespread Ethernet access service sold by BT called "Ethernet Access Direct – Local Access" (EAD LA). EAD LA offers uncontended point-to-point connectivity between sites within the same fiber serving exchange (e.g. a customer site and connection point to a competitive provider's network within the same fiber serving exchange). The maximum radial distance for the service is 25 km.

42 Although as previously noted, top-down methods were also used to calculate charges in the Netherlands and Germany, these accounts have not been made publicly available in sufficient granularity for us to be able to analyse them. In addition, charges for Ethernet leased lines in Germany are not based on native Ethernet, but rather the costs of Ethernet over SDH, and therefore reflects the higher costs of legacy technologies.

3.1 The Main Cost Drivers of Ethernet Access Services are Electronics, Fiber and Duct which do not Vary Much over the Different Bandwidths up to 1Gbit/s

From the activity analysis in BT's regulatory financial statements, we can illustrate which elements are the main cost-drivers for this product. These are shown in the figure below.

Figure 13: 2015 EAD LA Cost Stack by Activity and Bandwidth (per circuit per annum)



Source: BT published regulatory accounts

As expected, two cost elements dominate the cost stack. These are the depreciation and overheads associated with (i) the rental costs of Ethernet electronics and (ii) for fiber and duct providing access from the BT exchange to the customer's premises.

The other three cost elements -- product management, service centre assurance and systems & development -- represent a small proportion of costs and are largely immaterial to understanding how the costs of this service are incurred and driven. BT's other main Ethernet product known as Wholesale Extension Services also shows a very similar cost profile with the fiber element representing slightly over fifty percent of the total cost.

The key observation from this chart is that the overall cost of this product increases marginally over the three bandwidths and is unrelated to the data transfer rate.[43] Further evidence to support the observation that Ethernet electronics is not a key driver can be found in BT's supporting documentation where BT states that, "the usage factor for this component is based on the relative price of the electronics used to provide the service and that "the electronics used for a EAD 1000Mbit/s circuit (usage factor 1.70) is

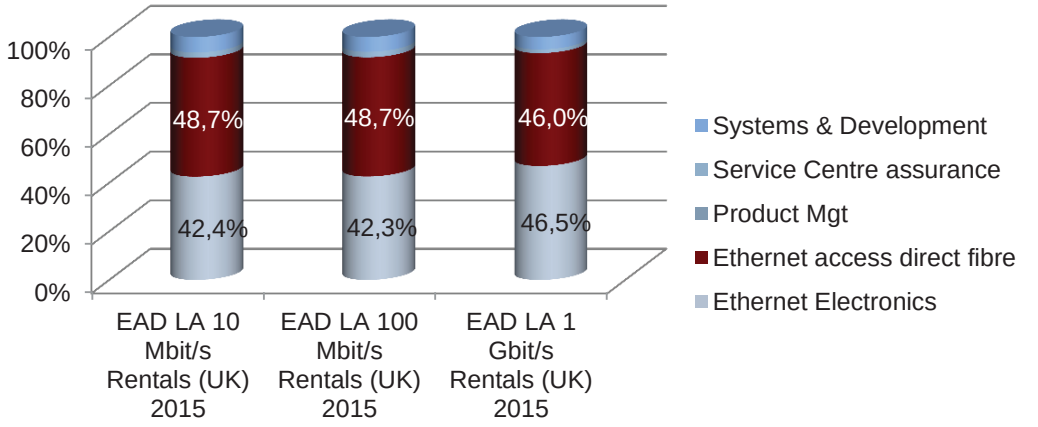
43 Note however that BT's price increases for increases in bandwidths of its Ethernet access services do not track the increases of cost by bandwidth as derived from BT's regulatory financial statements. BT's pricing decisions are a matter of commercial decision-making and regulation by Ofcom.

approximately 12% more expensive than the electronics for a EAD 100Mbit/s circuit (usage factor 1.52).” In other words, by examining its procurement costs, BT found that a ten times increase in bandwidth required electronics that were only twelve percent more expensive. As electronics is only part of the overall product cost, the impact of this increase as a percentage is further diluted to relatively small amounts.

Another factor at play would be the economies of scale and scope at particular bandwidths. For example BT sold 47,900 circuits of the 100Mbit/s EAD LA product in 2014/15 compared with 15,600 circuits for the 10M/bits EAD LA product. Procuring greater quantities of electronics for 100M/bits circuits should enable BT to achieve further procurement savings.

Representing this data as a proportion of total costs shows the following:

Figure 14: 2015 EAD LA Percentage by Activity Cost Stack by Bandwidth (per circuit)



Source: BT published regulatory accounts

The cost stacks are broadly similar across all bandwidths although, as expected, the proportion represented by Ethernet electronics increases slightly at the high bandwidth 1Gbit/s level but not significantly.

3.2 BT's Margins on Ethernet Access are Reasonable Despite Year on Year Price Reductions of RPI-11%

Within the constraints of a basket price control requiring year on year reductions in prices in real terms, the margins and profitability of BT's EAD LA product (rentals and connections) as reported show reasonable margins. The following table shows these margins.

Table 4: Margins for BT Ethernet Access Direct Local Access

EAD LA (Rentals & Connections)						
	2014			2015		
	Revenues £m	Op Costs £m	Margin £m	Revenues £m	Op Costs £m	Margin £m
Total BT coverage	154.4	113.6	40.8	191.3	145.5	45.8

Source: Analysis based on BT published regulatory accounts

The margins are healthy although these margins would be reduced as the glidepath effect of the price control causes further cuts in BT's Ethernet access prices.

The next table analyses the margins by bandwidth.

Table 5: Margins for BT Ethernet Access Direct Local Access split by bandwidth

EAD LA (Rentals & Connections)				
	Revenues £m	Op Costs £m	Margin £m	Margin %
2015				
10M/bits	29.7	27.6	2.1	7.0%
100M/bits	110.3	93.0	17.3	15.7%
1 G/bits	51.3	24.9	26.4	51.5%
Total	191.3	145.5	45.8	23.9%
2014				
10M/bits	37.7	28.4	9.3	24.7%
100M/bits	76.1	66.0	10.1	13.2%
1 G/bits	40.6	19.2	21.4	52.7%
Total	154.4	113.6	40.8	26.4%

Source: Analysis based on BT published regulatory accounts

Although the above analysis showing positive margins is useful, the return on capital employed is a more important measure of profitability. While BT's regulatory financial statements do not show the capital employed at the product level, they do provide sufficient data to evaluate BT's return on capital employed across all its Ethernet products. The following table shows the most detailed level of return for BT's Ethernet services (also known as "Alternate Interface Symmetric Broadband Origination" or "AISBO" services in the UK).

Table 6: BT Ethernet return on capital employed

Ethernet (AISBO)					
	Revenues £m	**Op Costs £m**	**Margin £m**	**Mean Capital Employed £m**	**Return on MCE**
2015	808	422	386	1676	23.0%
2014	827	382	445	1729	25.7%

Source: Analysis based on BT published regulatory accounts

As can be seen above the reported return has reduced from 25.7% to 23% between 2014 and 2015.

3.3 Ethernet Access Costs Trend Downward over Time

An analysis of BT's costs associated with its provision of Ethernet/AISBO services derived from BT's regulatory financial statements between 2012-2015 shows that costs have trended downward over time. BT's activity breakdown of the cost stack attributed to the EAD LA product is shown in the table below. Revenues have increased over time even though Ofcom has required stringent year-on-year reductions in Ethernet prices of RPI-11% (and is proposing more stringent reductions in the current market review). Furthermore BT's margins have increased over time as well. The takeaway is that whilst consumers have benefited from the tight price controls and other remedies imposed by Ofcom, BT has also made reasonable margins in the process. It is likely, however, that these revenue and margin increases will level off as the Ethernet product market matures in the UK and becomes saturated.

Table 7: Costs Trends for BT's Ethernet (AISBO) Services 2012-2015

Wholesale Costs		***2012*** **£m**	***2013*** **£m**	***2014*** **£m**	***2015*** **£m**
Prov/Mtce		12	11	11	12
Accommodation		21	16	20	24
Other		6	8	9	9
Total Opex		**246**	**226**	**214**	**214**
Depreciation		**215**	**191**	**217**	**206**
Total HCA Opex		**461**	**417**	**431**	**420**
CCA Adjustments		49	(17)	(49)	2
Total CCA Opex		**510**	**400**	**382**	**422**
AISBO REVENUES		**725**	**803**	**827**	**808**
MARGIN (HCA)		**264**	**386**	**396**	**388**
Network Support		32	28	20	24
General Support		57	67	46	44
General Management		114	93	104	97
Finance		4	3	4	4

Source: Analysis based on BT published regulatory accounts

4 Price comparisons for Ethernet leased lines

In this section we consider how retail and wholesale charges for Ethernet leased line access services in the US compare with those in more tightly regulated European markets.

4.1 Cross country comparisons EU vs US

We use average revenue data from Ovum and benchmark pricing data from Reference Offers – termed 'rack rates' in the US – to compare the level of charges in the US with those in the reviewed European benchmark countries.

4.1.1 Ovum data signals higher average prices for Ethernet circuits

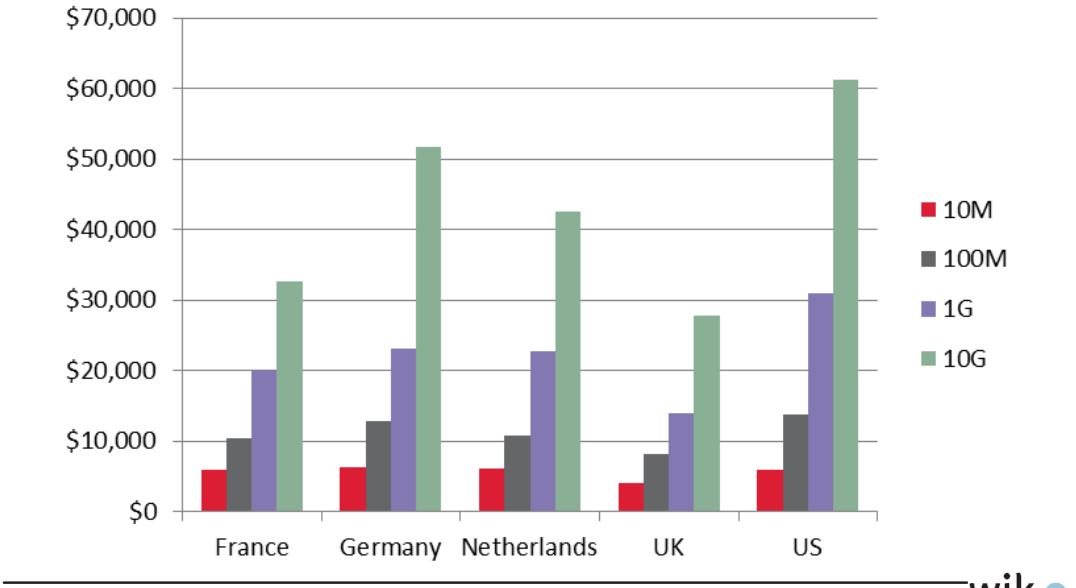
Ovum has prepared regular reviews and forecasts over a number of years for Ethernet services on a global basis, which provide information concerning the volumes and retail revenues associated with metro and national Ethernet leased lines at different speeds. Current data is gathered in key countries through interviews with incumbent and competitive communications service providers and corroborated through interviews with other stakeholders such as system and component vendors and industry organisations such as the MEF (a standards organization for carrier class Ethernet). Ovum then estimates future market developments based on feedback from communications service providers and macroeconomic trends.[44]

Data from the 2013 Ovum Enterprise Ethernet Service Forecast Spreadsheet, suggests that in 2013, average revenues per line for metro Ethernet leased lines in the US (a proxy for metro access and transport prices) were high in comparison with the benchmarked countries especially for speeds at 100Mbit/s and above (see Figure 15). At these speeds, unlike for 20 Mbit/s and below, there would not be competition from Ethernet over copper services based on the availability of unbundled local loops.

Although there were distinctions in all countries in charges for different speeds, the high starting values for US charges at speeds of 100Mbit/s, further accentuate the costs at higher bandwidths.

44 Ovum has gathered information regarding revenues for various bandwidths of metro and national Ethernet leased lines (consisting of two access endpoints and transport) across many countries for a number of years. The parameters for Ovum's data collection, while consistent across the countries for which it has collected Ethernet data and for the years it has done so, are not the same parameters that the FCC used in its mandatory data collection in the US. Hence it was impossible to achieve an apples-to-apples cross country comparison using US Ethernet data from the FCC's mandatory data collection and comparing it to Ovum's data for other countries.

Figure 15: Average revenues for Ethernet leased lines by speed (2013)

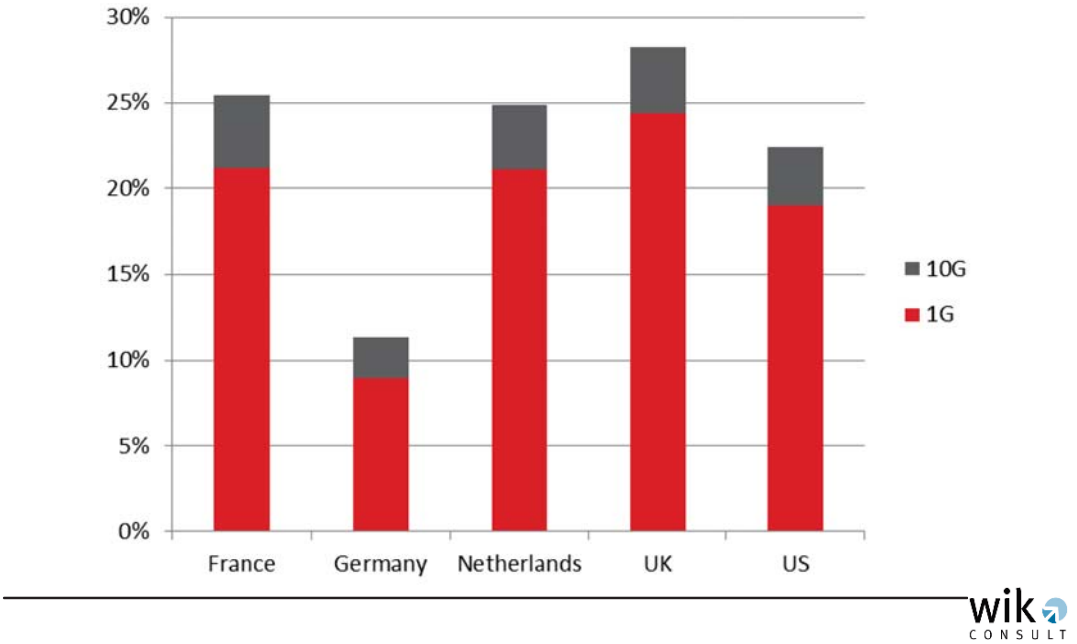


Source: WIK based on Ovum (2013), Ethernet Service Forecast spreadsheet to 2018

At the same time, volumes of Ethernet leased line access, taken in proportion to the number of businesses with more than 10 employees are lower in the US than in all benchmarked countries with the exception of Germany, and are considerably lower than in the UK and Netherlands as can be seen in Figure 11.

Another way of considering the impact of Ethernet leased line migration is to consider the effect this has on increasing bandwidth for business and backhaul connectivity, since Ethernet technology enables speeds of 100Mbit/s, 1Gbit/s and above to be made available in a cost-effective way. In this context, it is notable that not only does the US trail the benchmarked countries on take-up (with the exception of Germany), but also trails the UK, France and Netherlands as regards the proportion of Ethernet connections at 1Gbit/s or more. According to Ovum, these accounted for 22% of Ethernet leased lines in 2013 in the US, compared with 28% in the UK.

Figure 16: Proportion of Ethernet lines at 1G and above



Source: WIK based on Ovum (2013), Ethernet Service Forecast spreadsheet to 2018

Although it is not possible to prove that regulation of prices and conditions has supported Ethernet leased line take-up, including take-up at higher speeds, it is striking that the majority of countries reported as having high take-up are either subject to stricter regulatory obligations on Ethernet leased lines (often although not always involving cost-orientation) or have other features which contribute to competitive provision – such as the high building densities in Japan and South Korea. It could be hypothesised that competitive leased line markets supported by regulation or other factors, may have helped to drive down prices and facilitate more aggressive retail marketing at the retail level thereby bringing more widespread deployment and innovation to customers faster and more cheaply.

4.1.2 US rack rates significantly exceed EU equivalents

In the context of a previous study "Ethernet Leased Lines: a European benchmark",[45] WIK calculated benchmark charges for wholesale Ethernet leased line access in Europe. The main product for which comparable prices could be collected was a short metro[46] uncontended[47] tail circuit connecting the serving exchange to the end customer. Benchmark charges were calculated for incumbent 'Reference Offer' charges at speeds of 10Mbit/s, 100Mbit/s and 1GBit/s. Connection charges (if any) were amortised

45 WIK (2014), Ethernet Leased lines: a European benchmark http://www.wik.org/fileadmin/Studien/2015/BT_EthernetLL_Benchmark_final.pdf
46 In countries using distance as a core parameter 5km was used
47 In many EU countries, the standard Ethernet circuit is point to point uncontended service

over 24 months. Reference Offers are standard published (normally regulated) offers available to all licensed operators. The nature of the Ethernet products compared and methodology for the European charge calculations are described in Annex III of the study.[48] Numerous sensitivities are also described in the study. For the UK, France, Germany and the Netherlands, the price benchmark the same Ethernet product subject to charge regulation as described in the countries case studies in this report.

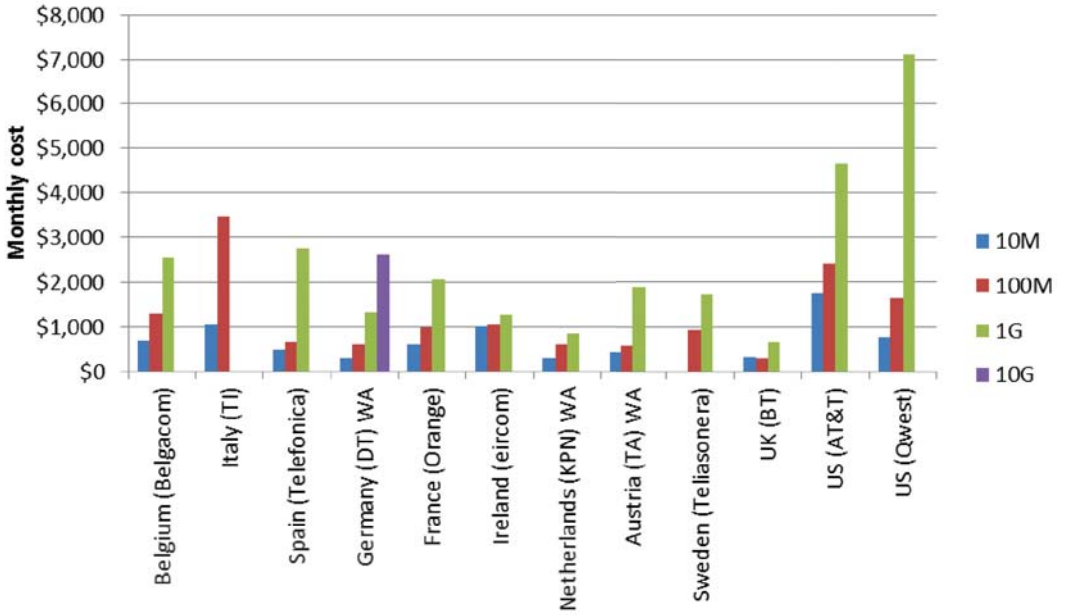
In order to calculate charges for similar circuits offered by US-based incumbents, we consulted rack rates published by AT&T and Centurylink. For AT&T charges are as listed in the Switched Ethernet Service Guidebook,[49] for speeds of 10Mbit/s, 100Mbit/s and 1Gbit/s with a 24 month contract. The port charge[50] is added to the 'information rate.'[51] Real time Class of Service (COS) is used to approximate the high quality of service available via a point-to-point connection. The non-recurring charge is assumed to be waived for the long-term commitment. Charges for Centurylink are likewise taken from the Service Guide online.[52] For each of the speeds calculated, the Customer Premise Metro Optical Ethernet ("MOE') bandwidth is added to the charge for COS Real Time, for a 24 month contract.[53] The non-recurring charge for the MOE Port is distributed across the 24 months.

The resulting comparisons clearly show that US Ethernet rack rate charges are substantially higher than equivalent European charges, with price gaps increasing with higher speeds of 100Mbit/s and above. Even if 50% discounts were offered on the US rates (most European rates are not subject to discounts as rates are required to be transparent and non-discriminatory), they would still be higher by some margin than rates in countries such as the UK, Netherlands and Germany, which are required to be cost-oriented.

Moreover, the price gaps between bandwidths in the case of Centurylink's pricing of 100M and 1G Ethernet clearly exceed our top-down estimates of the influence of bandwidth on cost (see section 3).

48 Annex III, page 33 http://www.wik.org/fileadmin/Studien/2015/BT_EthernetLL_Benchmark_final.pdf
49 Service Guide online http://cpr.att.com/pdf/se/0001-0004.pdf consulted in November 2015.
50 Section 4.4.6(1)(A) for 10M, 4.1.1 and 4.1.2 for 100M and 1G.
51 Section 4.4.6(1)(B) for 10M and 1G, 4.2.2-4.2.5 for 100M.
52 Qwest Service Guide Online downloaded Nov 2015 http://www.centurylink.com/tariffs/fcc_cloc_acc_isg_no_11_part2.pdf
53 Section 8.8.4.

Figure 17: Incumbent rack rate metro Ethernet leased line charges 2014/15



Source: WIK (2014), Ethernet Leased Lines: a European benchmark for EU rates - European charges as of October 2014. Published rack rates for AT&T, Qwest downloaded November 2015. $1=€0.9. WA = 'Weighted Average.' Pricing based on a term of 24 months.

5 The impact on societal welfare of the lack of effective regulation in the United States

Crucial for authorities and policymakers is an understanding of how these inflated wholesale prices impact businesses and consumers. In this chapter, we provide a quantitative estimate of the harm.

5.1 Estimating the impact on societal welfare: key literature

A number of attempts have been made to estimate the impact on social welfare that results from excessive pricing of special access services by US incumbents (both leased lines and Ethernet-based equivalents) on businesses in the US. Noteworthy is Rappoport, Taylor et al. (2003),[54] which provides an assessment of the overall impact of over-pricing using macroeconomic analysis. It includes an assessment of the demand elasticity for special access on the part of US businesses (see Section 5.4).

Rappoport, Taylor et al. (2003) simulated the impact of reducing the incumbents' special access prices by 42% (which amounted to $5.6 billion on 2002 revenues) in order to produce an 11.25% rate of return (an FCC estimate of the WACC, the permitted return). The downstream effect of this price reduction on all industry sectors was quantified by means of a macroeconomic model. If this price reduction had gone into effect at the start of 2003, they estimate that it would have had the effect of adding 132,000 jobs and $14.5 billion in real Gross Domestic Product (GDP) to the U.S. economy.

This is an important and perhaps surprising finding. The annual increase in real GDP of $14.5 billion is *2.6 times as great* as the direct reduction in prices of $5.6 billion, which is to say that there are substantial spill-over effects into the broader economy. In other words, the importance of these services extends beyond the telecommunications industry proper, and is moreover subject to significant *multiplier effects*.

At the same time, the change *would not have impacted the revenues of U.S. network operators*.[55] The demand of businesses for special access is highly responsive to price, which is to say that it is highly elastic (see Section 5.4). As they put it, "price reductions are offset by the increase in demand stimulated by the reduced prices, such that the [incumbents'] total revenues remain about the same."

A number of subsequent studies have built on and updated Rappoport and Taylor (2003), including Ford and Spiwak (2003)[56] and Selwyn et al. (2007).[57]These results are important and illustrative, but they relate to traditional leased lines (whether copper-

54 Paul N. Rappoport, Lester D. Taylor, Arthur S. Menko, Thomas L. Brand (2003), Macroeconomic Benefits from a Reduction in Special Access Prices.
55 There would, however, likely have been negative impact of *profits*.
56 George S. Ford and Lawrence J. Spiwak (2003), Set It and Forget It? Market Power and the Consequences of Premature Deregulation in Telecommunications Markets.
57 Lee L Selwyn et al. (2007), Special Access Overpricing and the US Economy: How Unchecked RBOC Market Power is Costing US jobs and Impairing US Competiveness.

based or fibre-based), not to modern Ethernet equivalents. The relevant analysis today must concern itself with Ethernet-based leased line equivalents.

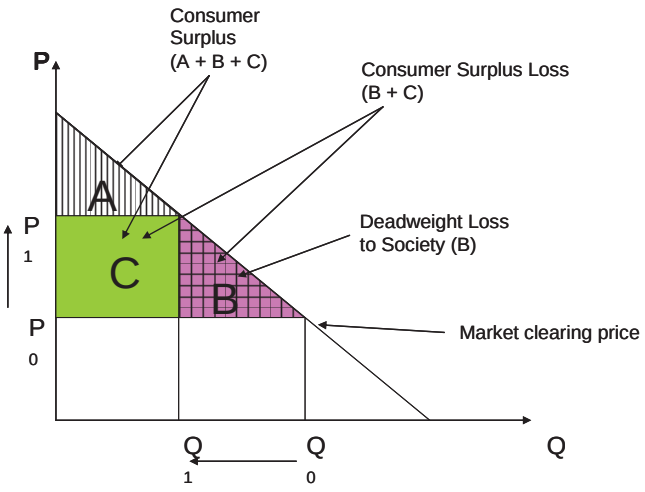
5.2 Methodology for the analysis

In understanding societal benefits, it is helpful to review the basic economics, beginning with the Harberger Triangle (see Figure 18). In an ideal competitive market, prices would be set at the exact level where the supply and demand curves cross. In Figure 18, the line that slopes downward to the right is the consumer demand curve, while the supply curve (the horizontal line at P_0) is usually not critical to the discussion. The point identified as the 'market clearing price' is the expected and optimal pricing point in an ideal competitive market.

If prices are distorted, social welfare is reduced. Market power is such a distortion, which leads not only to higher prices, but also to lower consumption as a result. This is due to the price elasticity of demand, the tendency of buyers to increase demand in response to a reduction in price and vice versa.

If prices are set at the market-clearing point (P_0), the surplus for purchasers (who in this case are businesses rather than consumers) corresponds to the areas labelled A, B, and C in Figure 18. It is the entire area above the price charged, but below the demand curve. It can be thought of as the degree to which buyers would have been willing to pay more than they were required to pay (i.e. the surplus accruing to purchasers at the market-clearing price).

Figure 18: The Harberger triangle



Source: WIK

If a market distortion (for instance, last mile market power) artificially inflates the price charged, the price moves up from P_0 to P_1, while the quantity correspondingly contracts from Q_0 to Q_1. This reduces the consumer surplus (previously A+B+C) by the sum of the areas B+C. All that remains as consumer surplus is A.

This change entails two distinct effects. Area C represents a transfer of surplus (or welfare) from buyers (often consumers, but in this case businesses) to producers. To an economist, who tends to look at societal welfare in terms of the sum of consumer surplus and producer surplus, there is a tendency to think of this transfer as an allocative effect that neither adds to nor detracts from the overall welfare of society. In this case, however, it is highly relevant, because it represents an involuntary transfer from enterprises to U.S.-based (mostly incumbent) network operators.

The area in triangle B is clearly problematic. It represents consumption that should have taken place, but did not. It is referred to as a *deadweight loss*.

5.3 How do effective unit prices for Ethernet-based leased line equivalents in the US compare to cost-based prices?

A central question is: "What would prices have been had they been properly regulated?" In other words, to what degree does the actual level of prices for special access differ from the "but for" level of prices?

5.3.1 Results for traditional leased lines in the literature

The FCC has sometimes used 11.25% as a permissible level of profit (or an estimate of the *Weighted Average Cost of Capital (WACC))*. We follow the previous literature in taking this as the benchmark for comparison. A more complex question is, to what extent are current prices inflated? The FCC stopped collecting data in 2007, so there is no solid, undisputed source today; however, several estimates were made in previous years. Among these are:

- Rappoport, Taylor et al. (2003),[58] which estimated incumbent special access rate of return in 2000, 2001, and 2002 to have been 29.3%, 38.9%, and 39.7%, respectively;

- Friedlander and Willig (2002),[59] which estimated the special access rate of return in 2001 to have been 49.3% for Bellsouth (now part of AT&T), 46.6% for Qwest (now Centurylink), 54.6% for SBC (now part of AT&T), 21.7% for Verizon (including New York State), and 37.1% for Verizon (excluding New York State). Rates of return rose dramatically after deregulation.

58 Paul N. Rappoport, Lester D. Taylor, Arthur S. Menko, Thomas L. Brand (2003), Macroeconomic Benefits from a Reduction in Special Access Prices.

59 Declarations on behalf of AT&T in the matter of AT&T's petition for rulemaking to reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services.

- Selwyn (2009)[60] estimates the overall special access rate of return for former Bell systems incumbents (RBOCs) to have been 101% in 2007: 138% for (post-merger) AT&T, 175% for Qwest (now CenturyLink), and 62% for Verizon.

- Bluhm and Loube (2009)[61] found that AT&T, Qwest, and Verizon had achieved a Return on Investment (ROI) for special access in 2007 of 35%, 38%, and 15%, respectively.

These results collectively and individually demonstrate that over-pricing of special access can be quite substantial; however, estimates can vary widely.

5.3.2 An estimate of over-pricing for Ethernet-based leased line equivalents

Newer data sources can be employed today. There has been considerable commercial interest in recent years in the market potential of Ethernet-based leased line equivalent services; consequently, market research firms have attempted to estimate the volume of shipments that were likely in each developed economy, and the total revenues associated with those shipments. One such source is a dataset developed by Ovum for this purpose.[62] The use of such a data source offers numerous advantages:

- It was created professionally by an independent third party for use for multiple purposes by multiple market players;

- Its value to prospective users is greatest if it is objective and unbiased;

- It is specific to Ethernet leased line equivalents;

- Since it estimates *revenues*, we do not need to speculate on the level of discounting – they are already fully reflected in the estimates; and

- It was not created to make or refute any particular public policy point.

The Ovum data source was released in August 2013. It contains estimated actual data for 2011, 2012, and part of 2013, together with forecast data for subsequent years through 2018. It thus provides a full time series for analysis. Revenues are estimated in constant 2013 US dollars, with no adjustment for inflation or for shifts in exchange rates.[63]

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60 Lee L. Selwyn (2009), "How the Deregulatory Meltdown affected telecom, and what can we do now to fix it?" presentation at the NASUCA Mid-Year Meeting, Boston.

61 Op. cit.

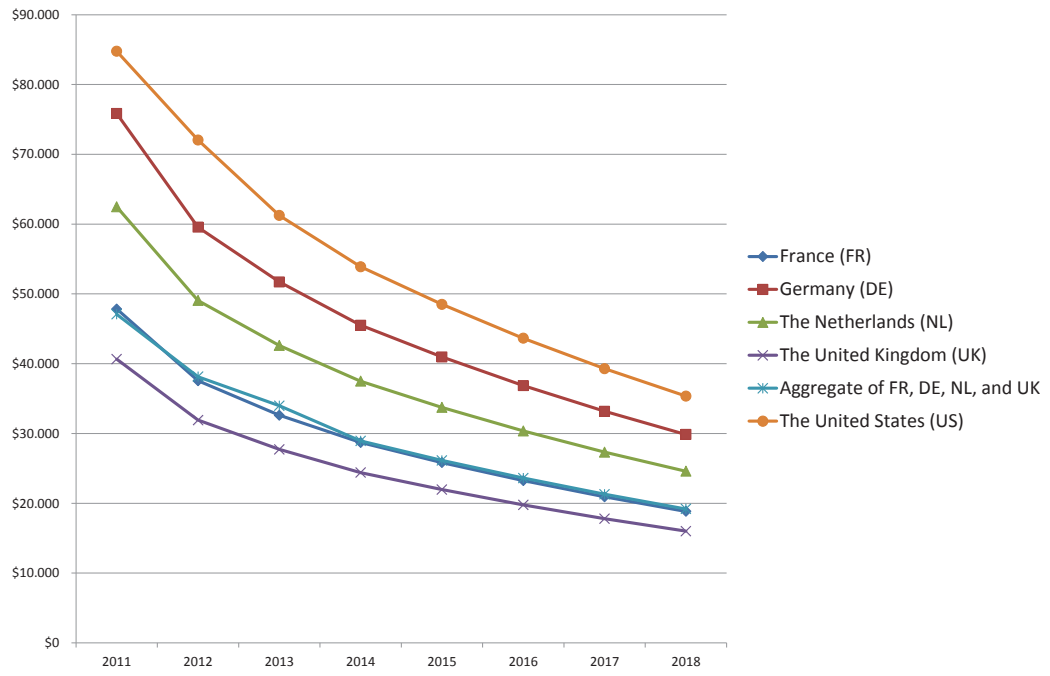
62 The Ovum data is produced (per the documentation embedded in the dataset) using a sensible process beginning with collecting information about "service endpoints, revenues, ASPs, and key segmentation breakdowns from the incumbent and competitive [network operators]." They also "probe the [network operators] for key trends that will steer future directions in overall growth and shifts in segmentation." They incorporate data about the size of enterprises in the countries under study, and factor in a number of other possible drivers including macroeconomic considerations.

63 Given that the value of the US dollar has risen substantially against the euro since 2013, the figures understate over-pricing in the US by some 20% in comparison with France, Germany and the Nether-

Throughout, we have taken leading European Member States including France, Germany, the Netherlands and the United Kingdom (UK) as examples of regulatory practice in regard to leased lines and equivalents. This is not to say that their regulatory practice is identical – the UK imposes significantly tighter caps on the prices of leased lines and equivalents than does, for instance, Germany (see the Annex (Chapter 7) to this report).

Dividing the Ovum estimates of total revenues for metro Ethernet by their corresponding estimate of total shipments (end points) provides a good, unbiased estimate of the discounted effective unit price. For each of the relevant services (10Mbit/s, 100 Mbit/s, 1Gbit/s and 10Gbit/s), it is clear that unit prices are lowest in the UK, higher in France and in the Netherlands, still higher in Germany, and higher still in the United States. Figure 19 shows this comparison for 10Gbit/s metro Ethernet service (results for the other services are similar.) The aggregate unit price across the four countries (total revenues divided by total shipments, which is equivalent to the weighted average) provides an overall measure which we have used here as *the most appropriate measure of what unit prices ought to have been in the US had they been subject to proper regulation*.

Figure 19: Effective unit price per 10Gbit/s metro Ethernet end points in France, Germany, the Netherlands, the UK, and the United States (unadjusted 2013 USD).

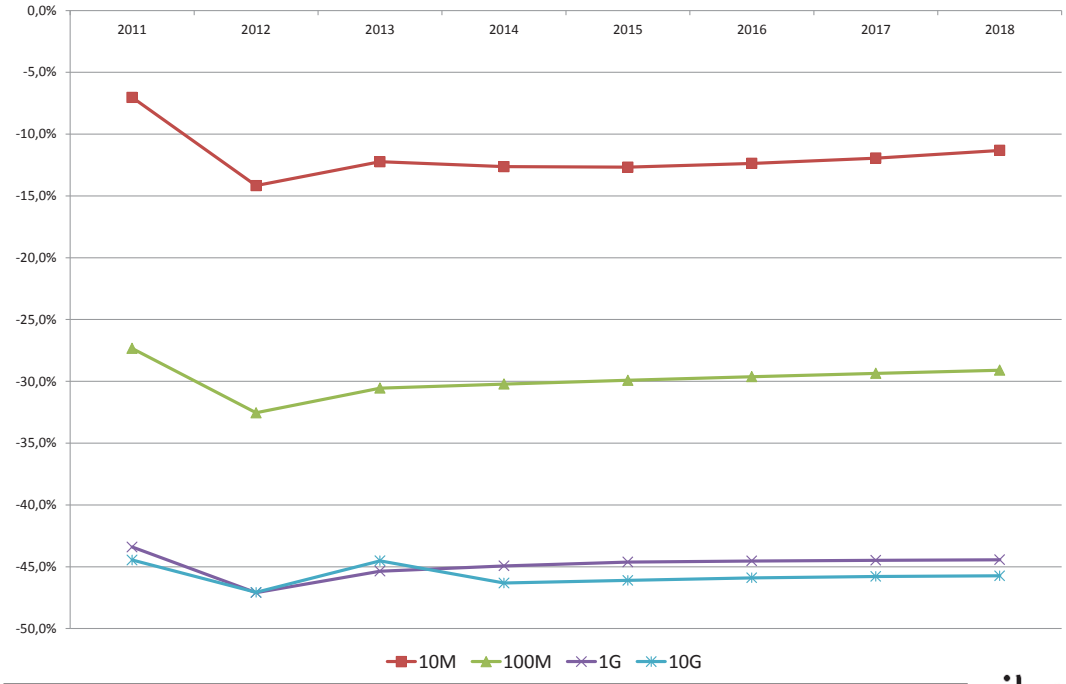


Source: Ovum data (2013), WIK/Marcus calculations

lands, based on US Internal Revenue Service (IRS) estimates of average exchange rates. See https://www.irs.gov/Individuals/International-Taxpayers/Yearly-Average-Currency-Exchange-Rates.

This analysis (under conservative assumptions) leads us to conclude that Ethernet leased line equivalent services are substantially overpriced. Reducing prices to cost-based levels would result in a decrease of at least 10-15% for 10Mbit/s metro Ethernet services, of at least 30% for 100 Mbit/s metro Ethernet services, and of a whopping 45% or more for 1Gbit/s and 10Gbit/s metro Ethernet services.

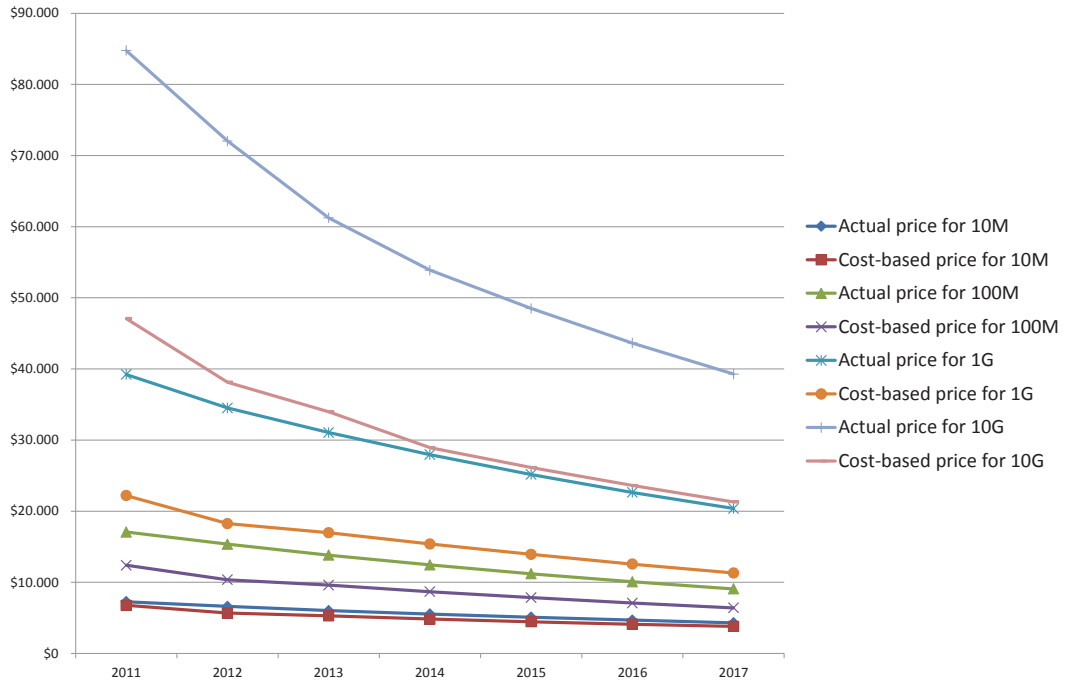
Figure 20: Degree to which cost-based prices for metro Ethernet services would be lower than actual US prices (2011-2018).



Source: Ovum data (2013), WIK/Marcus calculations

If prices for each of the four metro Ethernet services were brought to cost-based levels, using European prices in the four countries as an estimate of what those prices should be, effective unit prices would shift downward to the figures shown in Figure 21.

Figure 21: Actual prices per end point versus hypothetical cost-based prices for metro Ethernet services in the United States (unadjusted 2013 USD).



Source: Ovum data (2013), WIK/Marcus calculations

5.4 How would lower prices have interacted with demand by businesses?

A key question for the welfare analysis addresses the relationship between the price of these services and the demand (i.e., the level that would tend to be consumed). This is generally expressed by means of the *price elasticity of demand* – a number that represents the ratio between a change in *price* and the corresponding change in consumption (*demand*). The price elasticity of demand is generally negative, because lower price implies higher consumption. Where the price elasticity is greater (i.e. more negative) than -1.0, demand is said to be *highly elastic*.

In recent years, many studies have assessed the price elasticity of demand of consumer broadband services. These studies generally find the so-called own-price subscription elasticity to be greater in magnitude than -1.0, which is to say that demand for the service is highly elastic;[64] however, it cannot be guaranteed that leased line equivalents are subject to the same elasticity as residential broadband.

The previously referenced Rappoport, Taylor et al. (2003)[65] includes an assessment of the demand elasticity for special access on the part of US businesses. Lester Taylor, who is a first tier expert on the subject of estimating demand elasticity, led the work.

Rappoport, Taylor et al. (2003)[66] derived an own-price demand elasticity of -1.31 for DS-1 circuits (1.5 Mbit/s), and an own-price demand elasticity of -1.91 for DS-3 and faster circuits (45 Mbit/s and above). This is larger than demand elasticities that have typically been found for voice calls, for instance, but it is consistent with the subsequent findings of Ford and Spiwak (2003).[67]

Rappoport, Taylor et al. (2003) used a demand elasticity of -1.0 for their subsequent macroeconomic modelling, considering it to be a conservative estimate. This can indeed be viewed as being a conservative estimate today. We follow their practice here; however, we also conduct sensitivity analysis to see how societal welfare would respond to a higher price elasticity of demand.

Under an assumed price elasticity of demand of -1.0 for all metro Ethernet services in all years 2011-2018, a shift to cost-based prices in 2011 would have resulted in the consumption shown in Figure 22. The equivalent analysis under an assumed price elasticity of demand of -1.5 for all metro Ethernet services in all years 2011-2018 appears in Figure 23. With a higher price elasticity of demand, the response to lower prices in terms of end-user demand is even greater.

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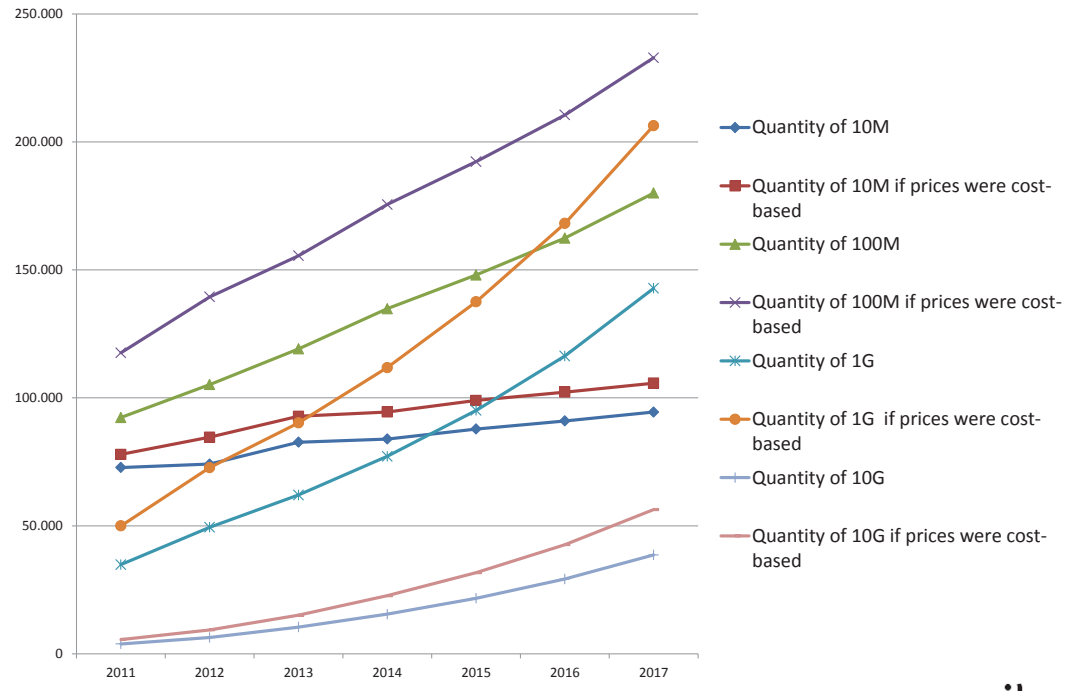
64 See, for instance, Cardona et al. (2009), "Demand estimation and market definition for broadband Internet services", *Journal of Regulatory Economics* 35:70–95, 2009; Ida and Kuroda (2006), "Discrete Choice Analysis of Demand for Broadband in Japan", *Journal of Regulatory Economics* 29:1 5–22, 2006; and Hauge and Prieger (2010), "Demand-Side Programs to Stimulate Adoption of Broadband: What Works?" *Review of Network Economics*, Issue 3 2010, Article 4.

65 Paul N. Rappoport, Lester D. Taylor, Arthur S. Menko, Thomas L. Brand (2003), Macroeconomic Benefits from a Reduction in Special Access Prices.

66 Ibid.

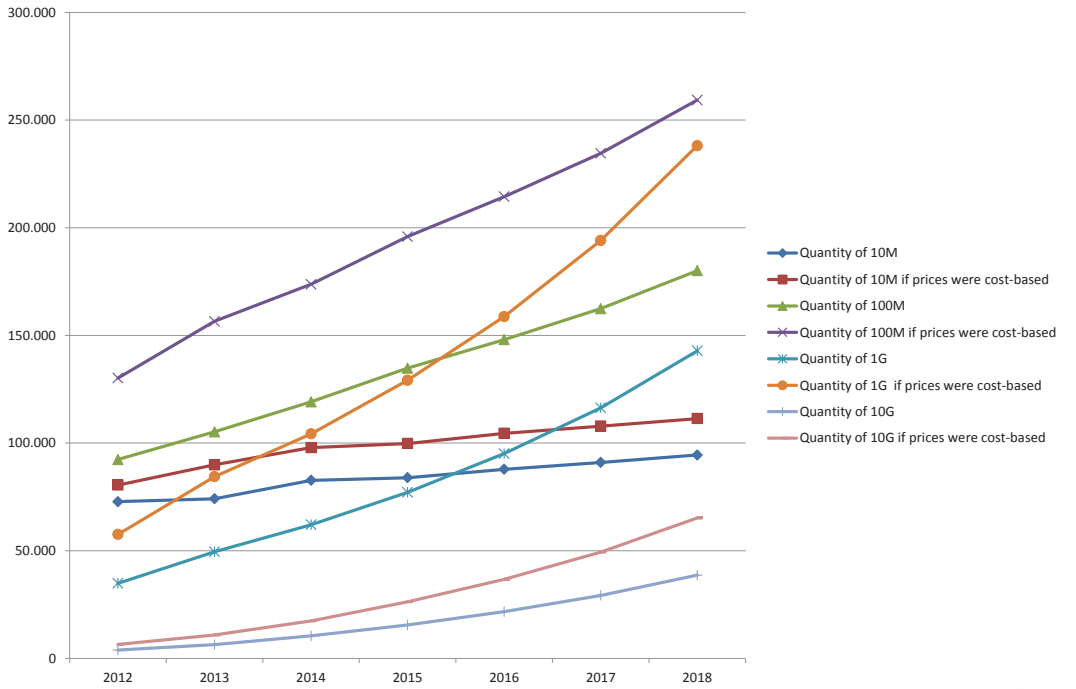
67 George S. Ford and Lawrence J. Spiwak (2003), Set It and Forget It? Market Power and the Consequences of Premature Deregulation in Telecommunications Markets.

Figure 22: Actual consumption of metro Ethernet end points versus that would be expected with hypothetical cost-based prices in the United States (2011-2018) assuming a price elasticity of demand of -1.0.



Source: Ovum data (2013), WIK/Marcus calculations

Figure 23: Actual consumption of metro Ethernet end points versus that would be expected with hypothetical cost-based prices in the United States (2011-2018) assuming a price elasticity of demand of -1.5.



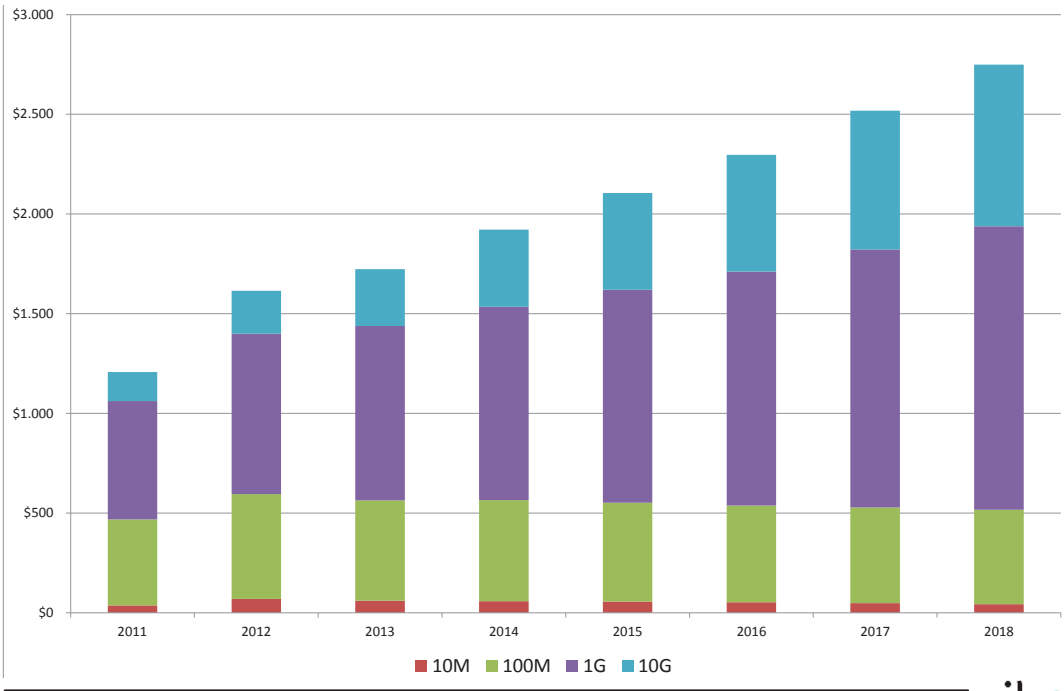
Source: Ovum data (2013), WIK/Marcus calculations

5.5 Estimates of the impact

With the foregoing estimates in hand, it is straightforward to estimate welfare transfer and deadweight loss due to over-pricing of Ethernet-based special access in the US.

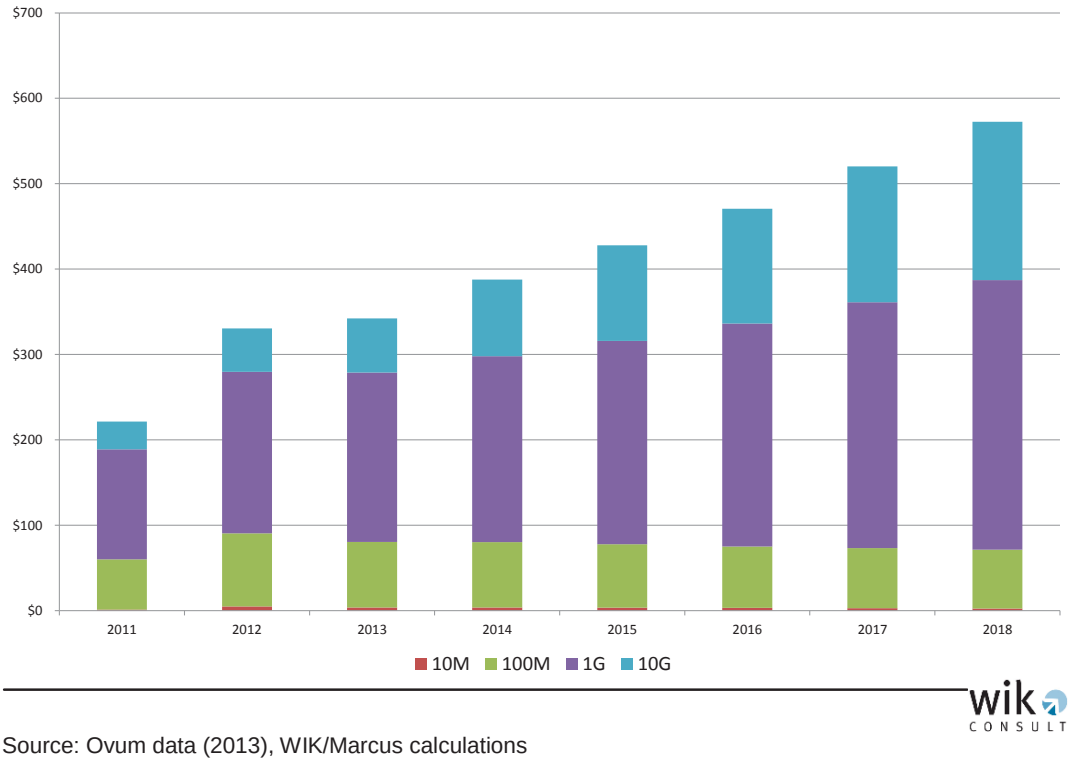
For each of the four metro Ethernet services under discussion, Figure 24 depicts the transfer in societal welfare that has taken place in the past (or could be expected to take place in the future) under current circumstances in comparison with a hypothetical scenario (or for the past, a counter-factual scenario) where prices were regulated down to levels reflective of cost. This welfare transfer can be viewed as having harmed enterprises and network operators that use metro Ethernet services, while benefitting those that provide them (generally incumbents). Figure 25 depicts the reduction in deadweight loss that would have resulted from the counter-factual scenario if prices had been properly regulated. This reduction in deadweight loss represents an unambiguous societal gain under the same assumptions.

Figure 24: Welfare transfer from firms that use metro Ethernet to those that provide it in comparison with that expected had the US implemented cost-based pricing for metro Ethernet in 2011 (unadjusted 2013 million USD) (2011-2018) assuming a price elasticity of demand of -1.0.



Source: Ovum data (2013), WIK/Marcus calculations

Figure 25: Reduction in deadweight loss (i.e. net gain in societal welfare) had the US implemented cost-based pricing for metro Ethernet in 2011 (unadjusted 2013 million USD) (2011-2018) assuming a price elasticity of demand of -1.0.



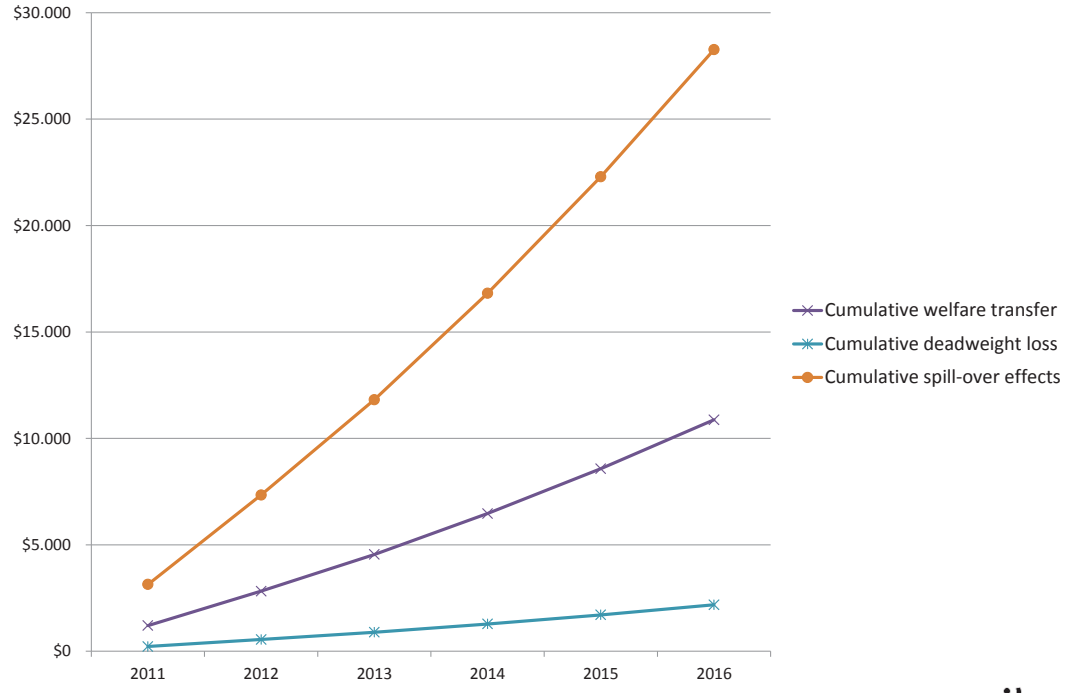
Source: Ovum data (2013), WIK/Marcus calculations

These lower prices flow into the broader economy in many ways. Businesses that are better able to coordinate their geographically dispersed operations are able to operate more efficiently. Competing fixed and mobile telecommunication services that depend on leased lines but have only limited ability to self-supply (for instance Sprint and T-Mobile) have lower operating costs, and are thus better able to compete on price producing further consumer benefits in a virtuous cycle.

The previously cited Rappoport et al. (2003) study invoked a sophisticated macroeconomic model to estimate the spill-over effects into the broader economy. Assuming that companies would re-invest 27% of the money saved, Rappoport et al. estimated that spill-over effects into the broader economy for 2003 would have been 2.6 times as great as the direct reduction in expenditures (i.e. the welfare transfer). This represents an important *multiplier effect* – again, the over-pricing of these services not only impacts competitive network operators, but also flows into the broader economy. We follow the example of Rappoport et al. in taking 2.6 as an estimate of spill-overs for purposes of this exercise.

In general, these benefits can be viewed as being cumulative over time. Figure 26 depicts the cumulative effects through 2016[68] of welfare transfers, reduction in deadweight loss, and spill-over effects had the US implemented cost-based pricing for metro Ethernet leased line equivalents in 2011. The aggregate cumulative effects from 2011 through 2016 would have been $10.9 billion in welfare transfers, $2.2 billion in reduction in deadweight loss (i.e. direct gain in societal welfare), and $28.3 billion in spill-over effects. By any measure, this is significant.

Figure 26: Cumulative welfare transfers, reduction in deadweight loss, and spill-over effects had the US implemented cost-based pricing for metro Ethernet in 2011 (unadjusted 2013 million USD) (2011-2016).



Source: Ovum data (2013), WIK/Marcus calculations

Under a well-designed cost-oriented regulatory arrangement, these losses could be avoided in future years. We estimate avoidable welfare transfer from US firms to incumbent network operators in 2016 to be some $2.3 billion; avoidable deadweight loss in 2016 to be some $480 million; and avoidable loss of positive spill-over effects in 2016 to be some $5.9 billion (due for instance to over-pricing detracting from the ability of businesses to increase productivity and to benefit from the digitalised economy), under the conservative assumption of a price elasticity of demand of -1.0. Effects would be even greater with a higher (and thus more realistic) price elasticity of demand, and can also be expected to be significantly higher in years after 2016.

68 We assume that any change initiated by the FCC today would be unlikely to take full effect before the end of 2016.

6 Conclusions

An analysis of regulatory approaches and outcomes in European business access markets reveals that:

- Business access is considered to be a market which is susceptible to ex ante regulation. Most incumbent operators have been found to be dominant in this market or a major part thereof.

- Regulation of Ethernet leased lines is standard practice. Typical obligations include the obligation to provide wholesale access, price controls and obligations to supply on non-discriminatory terms. The provisioning and repair conditions in European standard 'Reference Offers' are also typically subject to regulatory oversight.

- There is evidence that competitive conditions for the supply of fibre Ethernet leased lines may vary between regions. Regulators have taken various factors into account in 'segmenting' the market. A key factor is the presence of sufficient competing alternative network infrastructures. Those regulators that have segmented the market have found that only limited areas (typically dense business districts) were competitively supplied. Data from European regulators such as those in the UK and France, suggest that in many areas of the country, the incumbent is the only supplier of business access circuits.

- Despite wholesale access and price regulation, the deployment and take-up of fibre Ethernet connections appears more advanced in several EU countries including the UK and the Netherlands, than in the US. Take-up of high bandwidth Ethernet circuits of 1Gbit/s and above is also higher in these countries than in the US. Furthermore, data suggests that entry level speeds for leased line users are higher in countries like the UK which have stricter Ethernet regulation.

- In comparison with businesses in countries in tightly regulated countries such as the UK and Netherlands, US businesses appear to be over-paying for Ethernet circuits – especially at speeds above 100Mbit/s, which cannot be readily provided over copper infrastructure.

- Higher prices and lower take-up of high bandwidth Ethernet result in a welfare loss for US businesses (and not just for telecommunications firms). We estimate avoidable welfare transfer from US firms to incumbent network operators in 2016 alone to be some $2.3 billion; avoidable deadweight loss in 2016 to be some $480 million; and avoidable loss of positive spill-over effects in 2016 to be some $5.9 billion (due for instance to over-pricing detracting from the ability of businesses to increase productivity and to benefit from the digitalised economy), under the conservative assumption of a price elasticity of demand of -1.0. Effects would be even greater with a higher (and thus more realistic) price elasticity of demand, and can also be expected to be significantly higher in future years.

- The European experience suggests that there are more risks and costs associated with maintaining monopolistic market conditions than in addressing competitive bottlenecks (in areas where these exist) through wholesale access regulation and appropriate price control mechanisms.

7 Annex: country case studies

7.1 Netherlands

7.1.1 Market definition and Assessment of Dominance

7.1.1.1 The scope of the market

The Dutch Regulator ACM (previously known as OPTA) includes both high quality broadband and leased lines in the same relevant market irrespective of whether the wholesale products are delivered over copper or fibre and irrespective of the capacity (i.e., all bandwidths are included). High quality broadband (as opposed to low quality broadband) is included because the service has a maximum contention ratio of 1:20 and higher service level agreements are available (e.g. eighty percent of faults will be resolved within eight hours).[69] Furthermore, ACM finds that leased line access and high quality wholesale broadband are substitutable because both are used to satisfy the same demand for business network services. From a demand side perspective, increased capacity in high quality wholesale broadband has resulted in greater substitutability, and the price of leased line access in the Netherlands has been decreasing pointing towards competitive pressure from this high quality broadband product on leased lines. In addition, both segments share similar upload capacity (up to 100Mbit/s for more than 95% of all services), they have similar SLAs, accessibility, are sold by the same commercial sales force and provided via the same networks.[70] Coaxial cable is not included in the relevant market due to technical network characteristics that entail, at least currently, an impossibility to guarantee bandwidth. High quality broadband also must meet the ordering, provisioning, service availability and repair criteria set forth in Table 8 and Table 9.

While ACM finds that there are different prices and market shares in areas where providers offer unbundled local loops compared with areas where providers do not offer unbundled local loops, ACM concludes that these differences are not sufficient to geographically segment the market. Therefore the relevant geographic market is considered to be national.[71]

7.1.1.2 Dominance

ACM finds that KPN, the incumbent telecommunications provider, is dominant in the combined market for high quality wholesale broadband and leased line access on the basis of its market shares. At the time of the market review (2012) KPN had a market

69 OPTA (2012), p. 68.
70 NL/2012/1408.
71 OPTA (2012), p. 94 ff.

share of 55-60%.[72] KPN is the only nationwide provider of these services while Tele2 as second largest external provider is partly dependent on KPN for supply for this product. According to ACM, KPN's competitors would, in the absence of regulation of this market, find it difficult to compete on the multi-site market for business services which would lead to an increase in KPN's market shares by 2015 (to between 60 and 75%). In particular, the forecast of the market share development was taken into account with respect to the dominant analysis.

In addition to the high market share, KPN also benefits from other aspects which were considered in the dominance analysis:

- difficulty for non-incumbents to replicate copper and fibre infrastructures;
- advantages for the incumbent from vertical integration enhanced by its network coverage which facilitates in particular the provision of competitive multi-site offers;
- economies of scale and scope; and
- insufficient countervailing buyer power.

7.1.2 Remedies

ACM imposed the following remedies on KPN:[73]

Access obligation

KPN was required to provide wholesale access both over its copper and fibre networks, including access to associated facilities at the highest network level at which competitors can reasonably roll out their infrastructure. In addition to access over fibre, ACM also imposed a near-net service obligation on KPN. This meant that, at the request of a wholesale customer, KPN had to connect business locations that were within 250 meters of KPN's Fiber to the Office network.[74] Without such near-net services alternative providers could only compete with already connected clients, which reflects only a small part of the potential market. The access and near-net obligations with respect to fibre-based services recently have been annulled by a Dutch court, but the issue likely will come up again in the next round of market analysis due to commence in the second quarter of 2016.[75]

72 OPTA (2012), p. 102 ff.
73 OPTA (2012), p. 145 ff.
74 OPTA (2012), p. 13.
75 College van Berope voor het bedrijfsleven (CBb) [Dutch Court of Appeals], uitspraak [decision] of Sept. 3, 2015, case numbers 13/84, 13/85, 13/86 and 13/90.

Non-discrimination obligation

ACM imposes a non-discrimination obligation on the basis of Equivalence of Output (EoO).[76] All customers, including KPN, must receive the same services on the same conditions. To further ensure that wholesale customers can compete in the retail markets and are not squeezed out of the market, KPN must ensure that its retail price covers its own costs including the imputed wholesale costs.

Reference Offer

To ensure that the access obligation and the non-discrimination obligation are sufficiently effective to actually promote competition on the underlying retail markets KPN must publish a reference offer, including service levels (SLAs) for provisioning and repair times (summarized in Table 8 and Table 9).[77]

Tariff regulation and Price Controls

KPN must provide services at cost-oriented rates for both leased line access and high quality broadband access services via copper and fibre. Tariff regulation is based on an embedded direct costs methodology and wholesale price cap system. The methodology for embedded direct costs allows only those costs directly attributable to the services to be included in the cost of these services. Once all relevant costs, including indirect, joint and common costs to the services have been allocated, adjustments are made to provide appropriate investment incentives to potential entrants which include the use of current cost accounting (CCA) and financial capital maintenance (FCM).[78]

Price caps for the term that the price control remains in effect are determined by drawing a straight line between the actual cost price for the last available year (2011) and the forecast cost of the final year (2015) of the tariff period.[79] In exceptional cases where the regulated price caps lie below the non-discrimination margin squeeze price floor, the price cap will be set at the level of the margin squeeze price floor so as to protect market entrants.[80]

Cost allocation is performed according to the value of the service in the market, which is set as the price KPN charged on a commercial basis before the current market analysis decision came into force. Where KPN did not offer the currently regulated services on a commercial basis (e.g. at the metro core level), the values on the closest level are used (e.g. at the national network interconnection level).[81] In addition to applying an embedded costing methodology, the regulator

76 OPTA (2012), p. 155.
77 OPTA (2012), p. 156.
78 OPTA (2012), p. 533.
79 OPTA (2012), p. 540.
80 NL/2013/1513.
81 NL/2013/1513.

also sets price caps based on a "benefits received" principle[82] which avoids setting a flat tariff structure that would not differentiate prices according to the capacity need of users, service level agreements and guarantees.

The following tables show the contractual obligations concerning provisioning, repair times and penalties.

82 OPTA (2012), p. 184.

Table 8: Ordering / Provisioning

Order confirmation	• Wholesale customers receive a quotation within 5 working days, which must be confirmed within 3 months.
	• The final orders relate to three separate elements:
	  ○ Wholesale access points (WAP)
	  ○ End user access service (EUP)
	  ○ Ethernet virtual circuits (EVC)
	• After the final order (separate for WAP, EUP, EVC) incumbent KPN sends order confirmation within 1 working day. The planned Ready For Service (RFS) date within 15 working days and for EVC within 1 working day.
	• Thereafter site survey follows to inventory fibre/copper lines/WAP ports. Customer is informed about additional costs, if significant customer can cancel order within 5 working days without fee.

Standard Provisioning	• For fibre EUP services between 50 and 65 working days. • For copper EUP between 30-60 working days. • For EVC 5 working days delivery. • No standard for provisioning WAP, to be discussed with wholesale customer after site survey. Ready for service date is set between KPN and customer.
Scheduled Provisioning	• Yes, possible. If scheduled provisioning is later than planned Ready for Service date, then Ready for Service date is postponed. If requested date lies before Ready for Service date then incumbent makes best effort to meet this date.

Excess construction	• Differentiated pricing based on infrastructure availability (combination of area and location type):
	• Areas
	  ○ Metropolitan areas (category A)
	  ○ Urban areas (category B)
	  ○ Rural areas (category C)
	  ○ Certain business areas (category O)
	• Location type (On net, Near net , Off net)
	• On-net is further differentiated in :
	  ○ NLS1: a free fiber pair is available between the EAN and EAP; only patching activities necessary and no additional construction work is required.
	  ○ NLS2: a free fiber pair is available between the EAN and EAP and maximum three splices are required to connect the EAN to the EAP.
	  ○ NLS3: no free fiber pairs available. More than three splices or extra fiber with digging activities with a maximum of 250 meter is necessary to connect the EAN with the EAP.

Penalties	• Compensation for not achieving service delivery:
	  ○ delay between 1-6 working days of scheduled ready for service date. 20% discount on monthly recurring charge for standard and 50% for advanced service level
	  ○ 7-14 days delay, 35% discount (standard) and 75% (advanced)
	  ○ ≥ 15 days delay, 60% (standard) and 100% (advanced)

Source: https://www.kpn-wholesale.com/en/our-products/data-networks/collocation/c/collocatie-(1).aspx

Table 9: Service availability / fault repair

Service availability	• Average yearly availability:
	  ○ 99,9 % over Fibre access standard (single fibre)
	  ○ 99,98% Fibre access protected (redundant)
	  ○ 99,9% Copper access

Fault repair time	• Restoration time:
	  ○ standard: 90% within 8 hours of trouble ticket. 100% within 12 hours (except for fibre/copper disruption at end user side)
	  ○ advanced: 90% within 4 hours, 100% within 8 hours

Penalties	• Compensation for not achieving fault restoration times for standard fibre & copper:
	  ○ for standard SLA , restoration time longer than 8 hours: 60% discount on recurring charge of end user access + virtual circuit. But 20% only on access port POI
	  ○ for advanced SLA: between 2 and 4 hours: 40% discount, longer than 4 hours: 60% and maximum 50% discount on access port POI.
	• Compensation for not achieving fault restoration time for protected (redundant) fibre:
	  ○ for standard SLA; longer than 8 hours, 60% discount on end user access + virtual circuit, but max 20% on access port POI.
	  ○ for advanced SLA: between 2-5 minutes, 10%, between 5 minutes and 1 hour, 20%, between 2-4 hours, 50% and above 4 hours 60% and max 50% on access port POI

Source: https://www.kpn-wholesale.com/en/our-products/data-networks/collocation/c/collocatie-(1).aspx

7.2 Germany

7.2.1 Market definition and Assessment of Dominance

7.2.1.1 Market definition

The German regulator BNetzA finds the relevant product market for leased line access services to comprise all leased line connections with TDM and Ethernet-based interfaces.[83] BNetzA finds that the market consists of four separate submarkets distinguishable by bandwidth:[84]

i. analogue access lines with a bandwidth of less than 2 Mbit/s;[85]

ii. access lines with a bandwidth of 2 Mbit/s up to and including10 Mbit/s;

iii. access lines with a bandwidth of more than 10Mbit/s up to and including 155 Mbit/s; and

iv. access lines with a bandwidth of more than 155 Mbit/s.

The main reasons cited by BNetzA for this subdivision of the market into four different bandwidth classes are a different structure of supply and demand, different conditions of competition as well as the results of a supply-side substitutability examination.

The BNetzA considers each of the four submarkets to be national in scope.[86]

Based on the analysis of the "three criteria test"[87] BNetzA considers only two submarkets to be susceptible to ex ante regulation which are submarkets (ii) and (iii) -- access lines with a bandwidth of 2 Mbit/s up to and including10 Mbit/s; and access lines with a bandwidth of more than 10Mbit/s up to and including 155 Mbit/s.

According to BNetzA, in the case of submarket (i) there is a widespread migration towards higher bandwidths and therefore the second and third criteria under the "three criteria test" are not fulfilled. In case of submarket (iv) there are no significant or persistent entry barriers (first criterion of the "three criteria test") as demand for very high

83 The backbone is not part of the regulated market.
84 BNetzA (2012), Festlegung Markt 6, p.108.
85 See earlier discussion about the European equivalent of T1 service in the US being an E1 or 2 Mbit/s TDM leased line service.
86 BNetzA (2012), Festlegung Markt 6, p.113.
87 The European Commission articulated three criteria which should be satisfied before a market is deemed susceptible to ex ante regulation – see recital 11 of the 2014 EC Relevant Market Recommendation https://ec.europa.eu/digital-agenda/en/news/commission-recommendation-relevant-product-and-service-markets-within-electronic-communications. The 3 criteria are:
(i) the presence of high and non-transitory barriers to entry (which may be of a structural, legal or regulatory nature);
(ii) a market structure which does not tend towards effective competition within the relevant time horizon;
(iii) the insufficiency of competition law alone to adequately address the market failure(s) concerned.

bandwidths is predominantly in and between urban areas where many alternative providers are present and have their own infrastructure.[88]

7.2.1.2 Dominance

Deutsche Telekom (DT) is considered to be dominant in the above defined submarkets susceptible to ex ante regulation. BNetzA bases its assessment on the following facts:[89]

- high market shares;
- infrastructure advantage;
- market entry barriers (high sunk costs in building competing infrastructure);
- vertical integration;
- less dependence in procurement compared to competitors;
- lack of countervailing power on the demand side; and
- low actual and potential competition.

7.2.2 Remedies

BNetzA imposes a full set of remedies for the two wholesale access submarkets in which BNetzA identified DT as having dominance. All of the remedies also apply to TDM and Ethernet-based circuits. Based on the German Telecommunications Act, these obligations were tested with regards to suitability, necessity and proportionality of the obligations. The remedies imposed are:[90]

Obligation to grant access, including an obligation to provide collocation

DT is obliged to provide access to all leased lines except for connections between backbone locations of DT. The access obligations focus on TDM and Ethernet products (i.e. SDH leased lines and Ethernet-over-SDH leased lines as opposed to native Ethernet solutions). In addition, DT is required to provide access to all additional services to enable the use of these access services in practice. DT is also obliged to provide collocation to enable alternative providers to install their own transmission technology equipment at the network locations of DT where these access lines end.[91]

Obligation to publish a Reference Offer

DT is required to publish a reference offer (RO) regarding these access services three months following the decision of the BNetzA to mandate access to such

88 DE/2011/1277.
89 BNetzA (2012), Festlegung Markt 6, p.140-148.
90 BNetzA (2012), Beschluss, BK2a-12/001 R.
91 BNetzA (2012), Beschluss, BK2a-12/001 R, p. 24.

lines.[92] With regards to the tariffs included in the RO, a final approval by the BNetzA is necessary.[93]

Non-discrimination obligation

In accordance with § 19 TKG, a dominant operator of a public telecommunications network is obliged to provide access agreements based on objective criteria, which are comprehensible, offer equivalent access and comply with the principles of equality and fairness. DT is obliged to provide its wholesale services to both alternative providers and its own retail arm on the same conditions and with the same quality.[94]

Ex-ante price controls

BNetzA must approve the rates of DT for these regulated TDM and Ethernet access services before they can become effective.[95] BNetzA will approve rates that do not exceed the costs of efficient service provision.[96] These are derived from the long run incremental costs of providing the service and an appropriate mark-up for volume-neutral common costs, inclusive of a reasonable return on capital employed, in as far as these costs are required to provide the service.[97] Expenditure exceeding the costs of efficient service provision is taken into account only insofar as and for as long as such expenditure derives from a legal obligation or in case the undertaking demonstrates other proper justification for it. Where BNetzA, in examining the cost statements, deems essential components of the stated costs inefficient, it shall request the operator, without undue delay, to explain whether and to what extent these cost components constitute expenditure.[98]

In determining a reasonable return on capital employed the BNetzA takes into account, in particular, the following factors:[99]

1. the capital structure of the regulated undertaking;
2. the situation in the national and international capital markets and the rating of the regulated undertaking in these markets;
3. the requirements concerning the return on equity capital employed, whereby the service-specific risks of equity capital employed may also be acknowledged. This may also include specific risks in relation to the rollout of next generation networks; and

92 BNetzA (2012), Beschluss, BK2a-12/001 R, p. 34. See also § 23 TKG.
93 See chapter price control measures.
94 BNetzA (2012), Beschluss, BK2a-12/001 R, p. 27.
95 BNetzA (2012), Beschluss, BK2a-12/001 R.
96 § 31 (1) TKG.
97 § 32 (1) TKG.
98 § 32 (2) TKG.
99 § 32 (3) TKG.

4. the long term stability of the economic environment, also with a view to the situation as regards competition in the telecommunications markets.

BNetzA must perform two steps for the approval of the rates. First, DT must submit all relevant documents required to allow for the evaluation of its submission.[100] These include in particular:

i. current cost statements, to be made available on data carrier also;

ii. detailed service specifications, including details of quality of service and the draft general terms and conditions; and

iii. details of sales, sales volumes, the level of the different costs (direct costs, common costs), the contribution margins, and the development of user structures for the service concerned for the two years prior to submission, for the year of submission and for the following two years.

If cost information submitted is not considered to be sufficient to approve the rates, BNetzA may, in addition,[101]

1. refer, for the purpose of comparison, to the prices of undertakings that offer similar services in comparable competitive markets; provided that any special features of the reference markets are taken into account; and

2. apply, for the purpose of determining the costs of efficient service provision, cost accounting methods independent of those used by the undertaking, and refer to cost models in doing so.

In order to calculate the relevant efficient costs BNetzA uses a methodology based on current costs (*Bruttowiederbeschaffungskosten*). As the basis for its calculations BNetzA assumes an SDH network (Synchronous Digital Hierarchy) as the efficient network, even when considering the costs for the provision of Ethernet services.[102] BNetzA argues that DT as the dominant operator, is under an obligation to provide access to its leased line access services on a nationwide basis. According to BNetzA, as soon as one part of the line provided runs over the legacy SDH network, a provision of native Ethernet becomes impossible given the characteristics of the provision of leased lines (in principle as point-to-point connections). As a result, it is appropriate in BNetzA's view to base its cost calculations at this stage of Ethernet roll-out on the SDH network alone.[103] The current rates approved by BNetzA apply retroactively from the 1 July 2015 until 31 December 2016.

100 § 34 (1) TKG.
101 § 35 (1) TKG.
102 This means that for Ethernet services BNetzA assumes in its cost calculations that the most efficient provision of Ethernet is one via SDH and not as native Ethernet.
103 DE/2014/1620.

7.2.3 Service level agreements and guarantees (SLA/SLG)

The following tables show the individual contractual aspects regarding provisioning, repair times and penalties. **104**

Table 10: Ordering / Provisioning

Order confirmation	• Maximum 2 working days (order acknowledged), • Inspection of the location 8 days after Order (in case of no agreement DT determines a date maximum 10 days after order)
Standard Provisioning	• Max 20 working days after order DT tells the date of delivery of the CFV (which is the incumbent's brand name for the SDH and Ethernet-over-SDH wholesale leased lines it sells). • 8 weeks in case of available resources • 4 months in case of available resources with only a few additional works • 6 months in case of available resources with a lot of additional work
Scheduled Provisioning	• Client has the option to order a later delivery date
Excess construction	• The contract only includes the supply of CFV where appropriate infrastructure is available. Roll out of additional infrastructure is not included in the contract. If the supply is only possible with additional infrastructure DT will refuse the standard order. (see Annex 5 of the RO - additional performance). • In such circumstances roll out is only possible by paying an additional amount (determined by DT) . The client must accept this offer during 30 days otherwise DT has the right to refuse the order. • Additional infrastructure for example is necessary in the following cases: o there is actual no connection between MPoP and APL o on the property, where the CFV should be terminated, exists actual no APL
Penalties	• In case of delayed provisioning of more than 15 working days the customer has the right for compensation o >16-30 days: 20% of the provisioning price o >31-45 days: 40% of the provisioning price o >45 days: 60% of the provisioning price

Source: http://www.wholesale-telekom.de/produkte/carrier-festverbindung/

104 DE/2015/1628; http://www.wholesale-telekom.de/produkte/carrier-festverbindung/

Table 11: Service availability / fault repair

Service availability	• Availability: 99% (based on legal year) • The additional service High performance solution“ is available for the "CFV Premium" (e.g. 10GE) products, which increases the service availability to 99.9%. CFV Premium products are not regulated and not included in the RO.
Fault repair time	• 24 hours (standard) and option for 8 hours express (extra charge). • CFV Premium 8 hours
Penalties	• In case of delay the customer has the right of a standardised compensation Standard repair o >12 h: 10% of the 1/12 annual price o >30 h: 15% of the 1/12 annual price o >48 h: 20% of the 1/12 annual price • Express Repair within 8 hours (relevant for CFV Premium and CFV SDH or CFV Ethernet if the express option is ordered directly at the begin of the order process): o >2h: 10% of the 1/12 annual price o >4h: 20% of the 1/12 annual price o >8h: 40% of the 1/12 annual price

Source: http://www.wholesale-telekom.de/produkte/carrier-festverbindung/

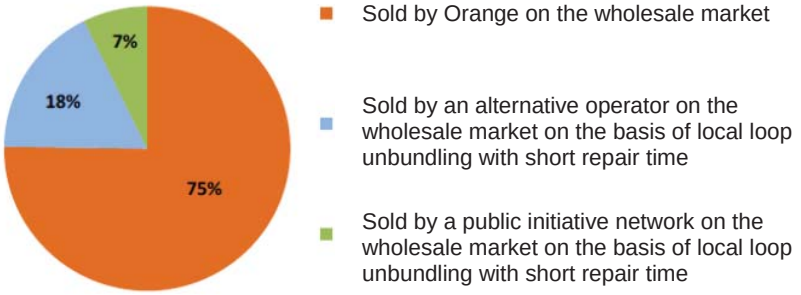
7.3 France

7.3.1 Market definition and Assessment of Dominance

The market analysis for high quality data connectivity including leased line access was last updated by the French regulator ARCEP in June 2014. The scope of the market includes all active products offering high quality data connectivity services (e.g. including guaranteed repair time), irrespective of transmission capacity, interface (traditional PDH/SDH or alternative ATM/Ethernet) or underlying infrastructure (copper or fibre). Alongside leased line access, ARCEP includes within this market DSL-based broadband services tailored for the business market (e.g., including guaranteed repair times of 4 hours or less).

ARCEP notes that the number of wholesale copper-based leased lines with TDM interface (64 kbit/s-2 Mbit/s) represented around 18,000 access lines at the end of 2013 and that the incumbent Orange's market share in this wholesale market (excluding self-supply) approached 100%. When also including offers with Ethernet and other alternative interfaces via xDSL with short repair times, the number of wholesale lines was around 176,000 at the end of 2013 of which Orange supplied 75%. Out of the 25% of lines wholesaled by other operators, 7% were supplied by public initiative networks, often providing a complementary service to Orange in hard-to-reach areas while the remaining wholesale lines sold by alternative operators were based on unbundling of the Orange network.

Figure 27: Wholesale market shares for copper-based bitstream products with a 4h repair time (DSL access) or 10h repair time (leased lines) (estimate as of end 2013)



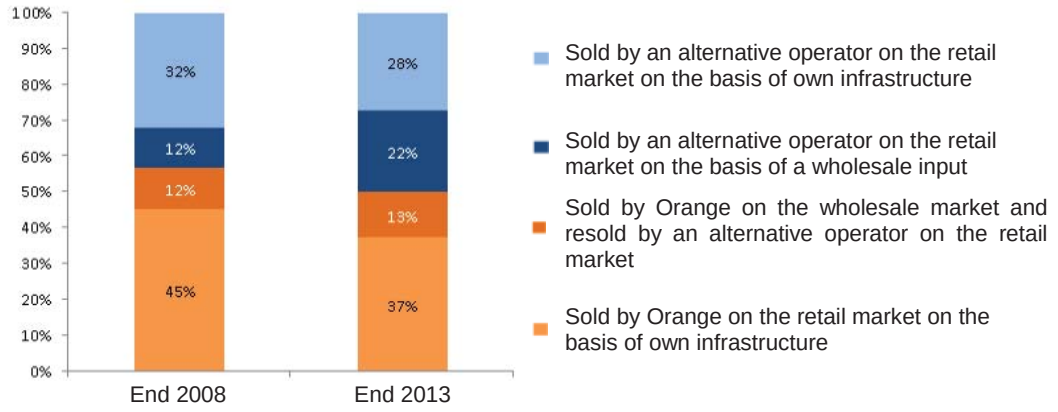
Source: ARCEP

ARCEP notes in this context that business-grade broadband was found to be significantly less competitive than residential broadband. ARCEP notes that, in contrast with residential broadband, the development of a business broadband offer requires the de-

velopment of a number of internal processes, including adaptations of the information and ordering systems.

With respect to the provision of wholesale dedicated fibre for businesses, at the end of 2013 50% of those access lines were provided by Orange –37% were self-supplied (i.e. sold by the wholesale division to downstream retail divisions of Orange) and 13% were sold by Orange to independent, unaffiliated wholesale purchasers – a reduction from 57% in 2008. Alternative operators supplied the remaining 50% of fibre-based leased lines (of which 22% were sold to wholesale purchasers).

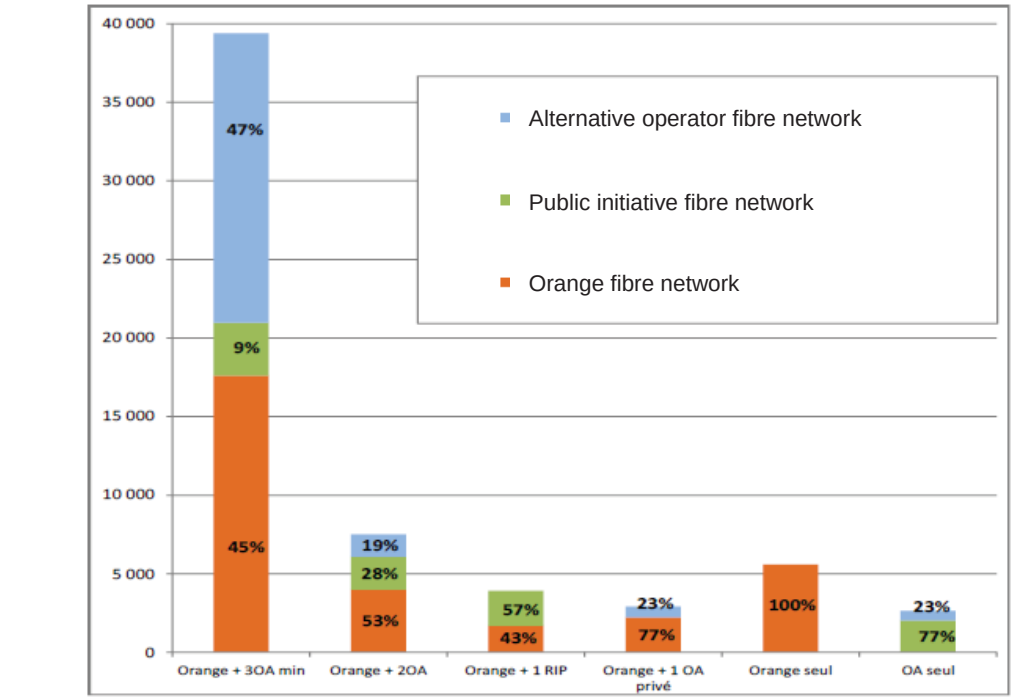
Figure 28: Evolution in market shares (retail and wholesale) by volume for provision of dedicated fibre access connections to business customers



Source: ARCEP

However, ARCEP later notes that there are significant geographic differences in the degree of infrastructure competition for dedicated business fibre lines – see Figure 29 below.

Figure 29: Number of Ethernet access lines on fiber optic local loops (wholesale market and self-supply on retail market), and provision of these access lines on Orange versus alternative operators' infrastructures end 2013



Nb communes	159	229	381	203	1 532	964

Source: ARCEP

On the basis of an assessment of the market for high capacity data connectivity for businesses as a whole, ARCEP concludes that the scope of the relevant market is national and incumbent FT-Orange (formerly known as France Telecom) is dominant on the basis of (i) the size of the company and difficulties associated with duplication of infrastructure; (ii) market shares of in excess of seventy percent; (iii) vertical integration and economies of scale; and (iv) first mover advantages. Although the market is national in scope, remedies are however geographically segmented (see below), reflecting differences in infrastructure-based competition in different areas for copper-based broadband (where competition is based on unbundling), and for fibre (where competition is end-to-end).

7.3.2 Remedies

A set of remedies are imposed including (i) access, (ii) non-discrimination (iii) transparency, including the publication of a reference offer; (iv) quality of service (v) price control and (vi) cost accounting/accounting separation.

Specifically Orange is obliged to negotiate in good faith and meet reasonable demands for access from other operators. It must also maintain existing access offers on traditional (TDM/SDH) and alternative interfaces (including Ethernet and ATM) via copper and fibre, except as permitted in the context of migration procedures.

Migration

ARCEP notes that Ethernet services are considered substitutes for services provided via PDH/SDH and ATM technologies, and are expected to progressively replace traditional services in the horizon of the next market analysis cycle. In this context, Orange may not withdraw PDH/SDH or ATM, without giving reasonable notice to alternative operators (12 months for a regional withdrawal and 3 years for nationwide) and ensuring the availability of an equivalent Ethernet offer and appropriate migration processes. ARCEP cites as an example that it would not consider it reasonable for Orange to charge migration fees to migrate <2Mbit/s leased lines whose technical closure is planned for 31 December 2016, to 2M/bits leased lines or to copper access, given that this is a migration decided unilaterally by Orange and without replacement of the copper with fiber. Note that, at present ARCEP is only allowing shutdown of TDM leased line access services below 2 Mbit/s. ARCEP notes that the requirement to maintain TDM services is justified because, in the absence of that obligation, Orange would have an advantage across the territory as a whole, and notably in that part of the territory where TDM services are the only wholesale offer available for technical reasons (areas which have not been Ethernet enabled). ARCEP presents this as an approach based on 'non-discrimination'.

Concerning the nature of access, Orange must propose in its wholesale offers, sufficient granularity of speeds to permit an alternative operator to replicate technically and economically Orange's retail offers. Any new Orange retail offer must be accompanied by an assessment as to the technical replicability of such offers for wholesale customers. ARCEP notes that Orange offers speeds from 0.5-16Mbit/s via copper, while speeds ranging from 2Mbit/s-200Mbit/s (and 1Gbit/s in certain areas) are available on fibre.

7.3.3 Price control

The objective of price control measures is to foster and safeguard competition and prevent monopolistic pricing to the detriment of end-users. As regards the methodology, ARCEP notes that this should be designed to ensure sustainable competition, protect consumers and at the same time ensure a reasonable return on capital employed, taking account of the risk incurred.

The pricing regime varies for different product types (copper-based business broadband vs dedicated fibre leased lines) and between different geographic areas based on the degree of competition. For copper-based business broadband :

1. Copper-based offers on TDM access services that are <2 Mbit/s are subject to cost-orientation as Orange maintains a quasi-monopoly on these services.

2. For business-grade Ethernet over copper, ARCEP proposes progressive and partial lifting of price controls to start in 2015 in certain geographic areas with:

    a. a cost-oriented tariff for monopolistic zone corresponding to those areas in which the Main Distribution Frames (MDFs) are not unbundled;

    b. a ‘non-eviction’ tariff for zones (i.e. designed to prevent margin squeeze) where infrastructure-based competition has recently developed. These are MDFs where there is at least one alternative operator in addition to Orange proposing copper broadband business offers with repair times of 4 hours or less, and which MDFs have been unbundled for less than 7 years.

    c. No price control/deregulation for zones where infrastructure-based competition has developed. These are areas in which there is at least one alternative operator in addition to Orange proposing copper broadband business offers with repair times of 4 hours or less and which have been unbundled for at least 7 years.

ARCEP justifies the segmentation of the market on the need to support the business case for alternative operators which provide business-grade broadband on the basis of local loop unbundling. Non-eviction pricing implies pricing that does not create a margin squeeze for competing operators which are using unbundling in order to compete with the incumbent Orange in the supply of business-grade broadband services.

In the zone for which cost-orientation is applied, Orange is required to demonstrate that its tariffs reflect long term costs of an efficient operator. In the absence of an appropriate justification, ARCEP has the authority to require the adjustment of the tariffs and modify the reference offer accordingly.

For dedicated business fibre connections ARCEP differentiates price regulation between two zones:

1. Pricing deregulation in zones which are effectively competitive. These are zones which fulfil the following three criteria:

    a. Theoretical economic potential of the area – such that there is a density of 50 businesses with more than 10 employees per km2;

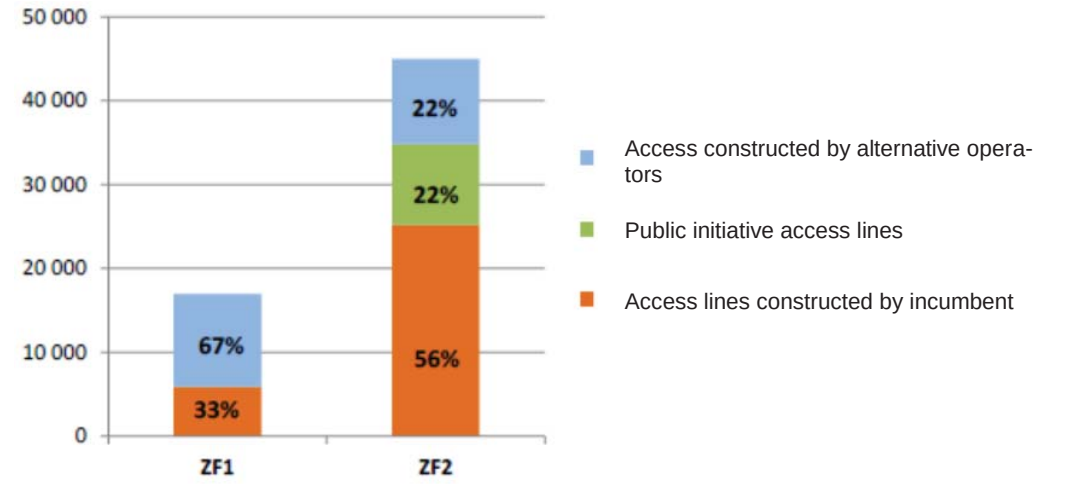
    b. More than 50 active access lines have been sold on the retail market in this area; and

    c. Competitive reach – the presence in the commune of active alternative operators' networks with a network reach at least comparable to that of Orange network which means that at least 50% of dedicated fibre business access lines connecting to business locations in the commune have been constructed by alternative operators

2. Price regulation in zones which do not meet the criteria above and are therefore non-competitive. Here the price control requires prices charged by Orange to meet the principle of 'non-eviction' (i.e. avoid margin squeeze) and be 'non-excessive.'

As of 2014, ARCEP had identified around 10 communes in which the three criteria above for competitive supply were met (as of January 2016 ARCEP has identified 20 such communes). Orange's average market share of fibre infrastructures in those 10 communes was around 33%. The figure below shows the relative size and market structures within these zones where competition is considered effective (ZF1) and where competition is considered insufficient (ZF2). It is notable in this context that the areas of non-competitive supply significantly outnumber those in which competition is considered to be effective.

Figure 30: Infrastructure competition in fibre leased lines by region



Source: ARCEP – data September 2013

7.3.4 Service level agreements and guarantees (SLA/SLG)

ARCEP requires Orange to ensure that provisioning times, repair and the timeframes for the provision of information on wholesale products to third parties must be equivalent to those offered by Orange to its retail business segment. ARCEP ensures such 'equivalence of output' through an obligation to publish Key Performance Indicators (KPIs) (also known as metrics in the US). Monthly publication of KPIs is required covering as a minimum:

- Processing of orders
- Delivery of services
- Quality of service
- Repair time
- Migration between different regulated wholesale inputs

KPIs should be split between copper and fibre-based Ethernet products. QoS must be satisfactory not only on average, but for each subcategory such as fibred vs non-fibred sites.

ARCEP notes that it will pay particular attention to provision time guarantees (penalties associated with failure to provision in due time), because these deadlines tend to be passed on to customers in the retail market. Penalties must therefore provide a sufficient incentive for Orange to respect the deadline. ARCEP notes in this context that since 2013 there has been a deterioration in the QoS indicators for business. It warns that if the situation continues, it will be compelled to further clarify incentive mechanisms

for compliance with SLAs. ARCEP also subjects the provisioning procedure to enhanced surveillance mechanisms. A multi-operator working group on this subject was reconvened in April 2014 to work on this subject. In ensuring effective delivery times, ARCEP also notes the importance of the quality of information provided by alternative providers e.g. in fault diagnostics, and the quality and accuracy of volume forecasts.

The contractual timeframes for delivery and repair and associated penalties for failing to meet targets are shown in the tables below.

Table 12: Ordering / Provisioning

Standard Provisioning	On-net fibre connection • 56 calendar days • Option Fiber To The Office-ready: From 15 October 2015 – fibre access can be ordered from fibred sites where the client site is ready, with delivery within 34 calendar days, but penalties are due only after 56 days Copper connection • 14 calendar days from receipt of the order
Express Provisioning	• Express provisioning for on-net fibre is available for an extra charge to a minimum of 20 calendar days
Excess construction	• For non-fibred sites or where fibre is not available, the delivery date is either 56 calendar days from the order or on another date negotiated between the parties when signing the 'Client operational plan' agreements (POC) • No targets given for sites within the category 'Exceptional construction difficulties'
Penalties	• 10% of monthy rental per day of delay to a ceiling of 6 months rental

Source: http://www.orange.com/fr/innovation/Les-reseaux/documentation

Table 13: Service Availability / Fault Repair

Service availability	• For copper outage should not exceed 13 hours per year • For fibre, outage should not exceed 9 hours per year
Fault repair time	• 4 *working* hours (standard). If notified outside working hours – then must be resolved the following day by 12.00 • 4 hours for additional charge (24h/24 and 7days)
Penalties	• For copper: 25% of monthly rental for annual outage 13-15h, 50% 15-17h, 75% 17-19h and 100% >19h • For fibre, 25% of monthly rental for annual outage 9-15h, 50% 15-17h, 75% 17-19h and 100% >19h • 50% of monthly rental for repair 4-5h, 100% for repair 5-6h, 150% for repair 6-7h, 300% for repair >7h. • 6 month rental ceiling on penalties for failure to meet service conditions

Source: http://www.orange.com/fr/innovation/Les-reseaux/documentation

7.4 UK

7.4.1 Market definition and Assessment of Dominance

The latest effective market decision on business communications in the UK dates from March 2013.[105] At the time, the UK regulator Ofcom noted that the overall value of leased lines (defined as dedicated symmetric transmission capacity between fixed locations) exceeded £2bln per annum in the UK, and that BT remained by far the largest wholesale supplier of leased lines with 82% of the market.

Ofcom's market review of leased line access services covers all technologies. Ofcom noted in 2013 that the number of TDM circuits had been declining, but still accounted for the majority of connections in 2013. However, Ofcom observed that "modern Ethernet transmission equipment is now preferred in most new installations because it costs less and supports higher bandwidths." Ofcom did not find that BT's market power was significantly affected by the type of active equipment (whether the leased line was provided via TDM or Ethernet interfaces). However, it did find differences in the competitive intensity in the London area (termed Western, Eastern, Central London Area or "WECLA") compared with the area outside. Accordingly tighter regulatory rules were applied to leased lines outside the WECLA area.

A further market analysis is underway, and Ofcom published detailed proposals in May 2015. Following a survey of infrastructure deployment, Ofcom concluded that a high proportion of business premises in the Central London Area were within 100m of at least 3 competitors' networks. There was also a degree of infrastructure competition in the London Periphery.[106] However, there was limited infrastructure competition in the rest of the UK.

Table 14: Proportion of businesses within 100m of BT's competitors' networks

Number of competitors' networks	Central London Area	London Periphery	Rest of UK (exc. Hull)
At least 1	100%	96%	61%
At least 2	99%	68%	15%
At least 3	98%	40%	5%
At least 4	93%	22%	2%
At least 5	83%	11%	0%

Source: Ofcom BCMR consultation May 2015

In view of these competitive dynamics Ofcom has proposed not to regulate any Ethernet leased lines in the Central London Area or long-distance leased lines between 60 large data-centres and 181 BT exchanges.

105 Business connectivity market review – final statement.
106 Ofcom has subdivided the area WECLA it previous defined as competitive into a competitive Central London area and less competitive London Periphery area.

In addition, in recognition that the volumes of TDM services are declining rapidly, Ofcom has proposed to deregulate traditional or TDM leased lines offering bandwidths of less than 2 Mbit/s or above 8Mbit/s – as higher speeds are today served predominantly with Ethernet technology. A summary of Ofcom's proposed dominance finding is shown below. The resulting market review decision is likely to apply for the period from 2016-2019.

Table 15: Proposed market definitions and dominance (SMP) findings

		Retail services		Wholesale terminating segments			
Interface technology	Bandwidth (Mbit/s)	Hull	Rest of UK	Central London Area	London Periphery	Rest of UK	Hull
Traditional (TI)	Low: <=8	KCOM	*No SMP*	BT			KCOM
Contemporary (CI)	All bandwidths	KCOM	*No SMP*	*No SMP*	BT	BT	KCOM

Source: Ofcom BCMR consultation May 2015

7.4.2 Remedies

BT is required to supply wholesale TDM as well as Contemporary Interface (primarily Ethernet) leased lines on regulated terms. TDM leased lines between 2-8Mbit/s are subject to regulation (including price control) across the national territory, while remedies on Ethernet leased lines are focused on the areas outside London where BT is found to have dominance.

Remedies for Ethernet leased lines include an obligation of 'Equivalence of Inputs' – which requires that BT must use same systems as well as offering the same prices, terms and conditions to third parties as are available to its retail divisions. This constitutes a strong form of non-discrimination. Terms and conditions must be published in a Reference Offer.

Table 16: Overview of remedies proposed in wholesale contemporary interface markets in which BT would be considered dominant

Remedies	UK, except London and Hull	London Periphery
Network access on reasonable request	Yes	Yes
Specific access remedies		
Dark fibre	Yes	Yes
Ethernet	Yes	Yes
Minimum Quality Standards for Ethernet	Yes	Yes
WDM	Yes	No
Price controls		
Dark fibre	Yes	Yes
Ethernet <1Gbit/s	Yes	Yes
Ethernet >1Gbit/s and WDM	Safeguard cap	No
Equivalence of Inputs		
Dark fibre	Yes	Yes
Ethernet	Yes	Yes
WDM	Yes	n/a
Other general access remedies, including: - No undue discrimination - Publication of reference offers - Notification of changes to charges, terms and conditions - Publication of technical information - Accounting separation	Yes	Yes
Develop new products	Yes	Yes
Ethernet Quality of Service	Yes	Yes

Source: Ofcom BCMR consultation May 2015

Wholesale Ethernet leased lines are also subject to a price control, which seeks to align charges with efficient costs over time. However, Ofcom proposes to distinguish charge controls for Ethernet leased lines >1Gbit/s, setting a lighter safeguard cap on these services outside London, with no price regulation of these services in the London periphery.

7.4.3 Price control

Ofcom favours use of RPI-X type price controls on the basis that these controls, which span multiple years, provide incentives for regulated operators to improve efficiency as well as make efficient investments. RPI-X controls aim to align prices with costs over a period (typically 3 or 4 years), and allow the regulated firm to retain any profits from additional efficiency gains beyond those forecast. Customers also benefit from lower prices due to efficiency gains when the price control is reset at the end of the price control period. Ofcom plans shortly to release its proposals for the charge control for Ethernet leased lines from 2016 onwards.

As regards the current system - Ofcom regulates wholesale charges for Ethernet leased lines in non-competitive areas (outside the WECLA district), through a charge control in the form of RPI-X. Within the WECLA district a safeguard cap (RPI-0%) is used instead on the basis that competition is more likely to constrain prices in this area, and thereby no forecasts are needed for future efficiency gains.

A separate RPI-X charge control is applied for TDM leased lines. The X in the formula is calculated through the following steps:

1. Identify relevant services
2. Determine base year costs for these services
3. Forecast costs of services for the duration of the charge control
4. Consider the case for one-off adjustments to charges at the start of the charge control; and
5. calculate the value of X for the relevant basket of services on this basis

A 3 year period was used for the charge control to strike an appropriate balance between allocative and dynamic efficiency. Ofcom also noted that setting price controls over a longer period would increase the risk and uncertainty associated with forecasting future volumes. The use of baskets which encompass a range of bandwidths enables BT to calibrate relative charges for services in a manner reflecting customer willingness to pay.

The charge controls have been set for this period at RPI+2.25% for TDM lines and RPI-11.5% for Ethernet leased lines – reflecting the migration path from TDM to Ethernet and the degree to which the respective prices of each reflect costs at the start of the charge control period.

Table 17: Price controls on BT traditional interface and Ethernet leased lines

Basket type	non-WECLA	WECLA	Value of X	Sub-caps
TDM basket	Connection and rental charges for wholesale low, medium and high bandwidth PPCs[107]	Wholesale low band-width PPCs	RPI+2.25%	TI (TDM) all services subcap (RPI+10%)
Ethernet basket	Connection and rental charges for Ethernet services (all speeds), ancillary servicves		RPI-11.5%	Sub-basket for EAD 1Gbit/s (RPI-11.5%, subcap on each charge RPI-RPI

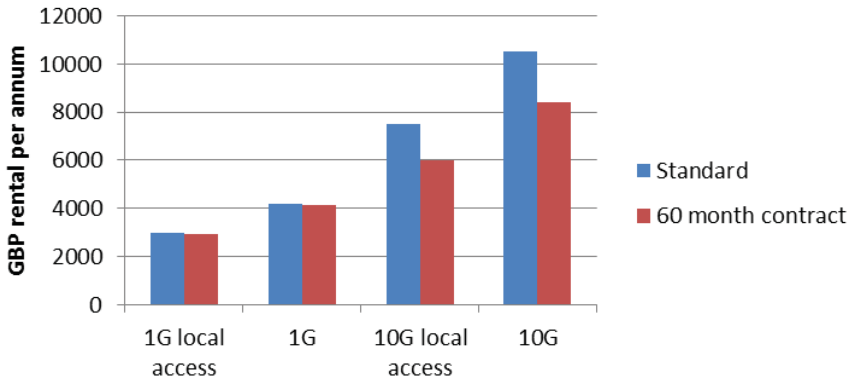
The relatively wide scope of the baskets gives BT flexibility to recover high fixed costs from amongst different service speeds thereby enabling value-based allocation of costs. However, safeguards in the form of ‘subcaps’ exist within the wider baskets in order to prevent excessive pricing of individual services. An example is the subbasket ensuring

107 PPCs are TDM-based leased line access circuits available on a wholesale basis.

reducing prices for BT's Ethernet Access Direct service (EAD) at 1Gbit/s. Other Ethernet speeds are in contrast only subject to subcaps which would maintain stable nominal prices.

Discounted prices are permitted and available for longer contractual periods. However, the degree of discounting is relatively limited. For the EAD 1Gbit/s product a 60 month minimum period reduces the annual rental from £4,200 to £4,152. Greater discounting is however being offered on the newly available EAD 10G product, which is subject to a less restrictive price cap than the 1G services. For this product, a 60 month minimum contract period reduces the annual rental from £10,500 to £8,400.

Figure 31: BT Ethernet Access Direct – impact of long term discounts



Source: BT Openreach EAD price list accessed, September 2015[108]

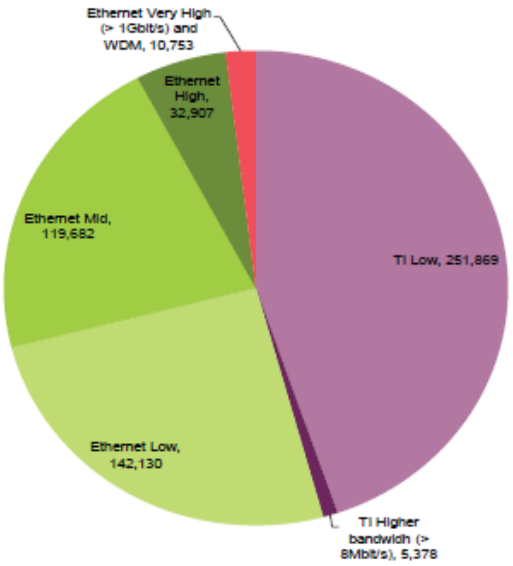
It is also notable that BT's pricing of its Ethernet services does not vary between competitive and non-competitive UK markets (i.e. WECLA versus non-WECLA Ethernet prices do not differ). The only exception to this was that between March 2013 and May 2014 BT waived the connection charges on its EAD 1Gbit/s service. List prices were otherwise the same.[109]

Tight price controls and regulation combined with demand for Ethernet services have result in a rapid migration from legacy TDM to Ethernet services in the UK. The number of TDM circuits at bandwidths higher than 8 Mbit/s has dropped to an insignificant number in the UK - only 5378 in 2013 – whilst the inventory of the remaining TDM services was smaller than that for Ethernet services by 2013.

108 https://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=5uW5cDedIGJkun%2FLo2I67PEgpNm%2BtShF6YESRcCqrDFZ6rNZujnCs99NbIKJZPD9hXYmiijxH6wrCQm97GZMyQ%3D%3D

109 Ofcom May 2015 BCMR Consultation at Table 4.4.

Figure 32: Volumes of Leased Lines By Different Interfaces and Bandwidths 2013



Source: Ofcom based on aggregation of operator data.

7.4.4 Service levels

BT Openreach's contractual service level agreements (SLAs) are subject to the principle of 'Equivalence of Inputs' which means that BT must use the same systems for its downstream retail operations as it offers to third parties. The contractual targets are shown in the following tables.

Table 18: Ordering / Provisioning

Standard Provisioning	• Ethernet leased lines are subject to a provisioning target of 30 working days
Excess construction	• Excess construction requirements allow BT to extend the delivery timeframe to make the necessary repairs. This system is however under review (see below). • All Ethernet Access Direct connection charges include a fixed fee of £548 towards 'excess construction costs'. This means that the first £2,800 of 'excess construction' is exempt from additional charges. Any additional costs above this amount are charged separately
Penalties	• Compensation of 100% of the monthly rental charge is applied for each working day beyond the committed delivery date – to a maximum of 60x monthly rental. However, this system is currently under review (see below)

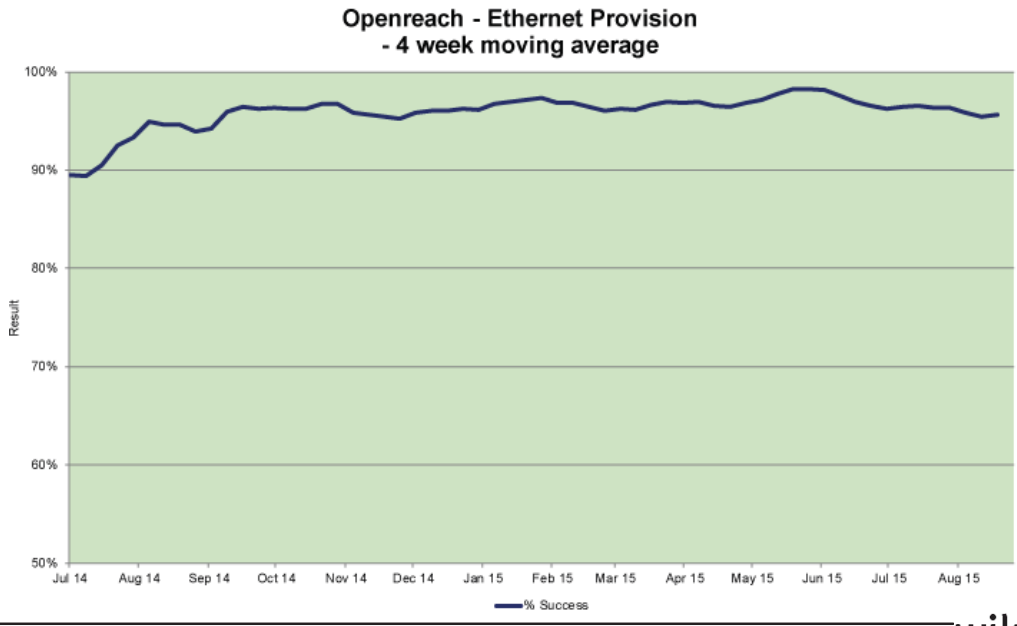
Source: BT Openreach EAD Reference Offer

Table 19: Service availability / fault repair

Service availability	• No general commitment
Fault repair time	• Faults are acknowledged within 1 hour • Faults must be repaired with 5 hours
Penalties	• 15% of monthly charge for each full hour in excess of 5 hours up to a maximum of 200 hours

The service levels including provisioning and repair times are subject to strict non-discrimination obligations and are monitored by means of published internal and external metrics or Key Performance Indicators (KPIs). For example, data available from the Office of the Telecommunications Adjudicator suggests that in the year to August 2015, more than 95% of Ethernet circuits were delivered to the contractual delivery date.

Figure 33: BT Openreach Ethernet provision metrics (key performance indicators) to 2015



Source: http://www.offta.org.uk/charts.htm

Further data provided on the BT Openreach website[110] indicates that in the period April-June 2015 94% of faults were fixed within the agreed time, that it took an average of 27 working days to install on-net services and 65 working days to install circuits where new network build was required. BT reports that around 40% of connections were on-net while 60% required some degree of network build. Following concerns ex-

110 http://www.homeandwork.openreach.co.uk/Our-responsibilities/Default.aspx#fragment-3

pressed by the national regulatory authority Ofcom, BT has progressively reduced the time taken to deliver on-net circuits.[111]

Notwithstanding the improving provisioning performance, in its May 2015 consultation, Ofcom has proposed to introduce a new obligation for BT to meet minimum standards for provisioning lead times and repair. This obligation would be additional to the contractual commitments and compensation included in the Reference Offer. The proposed targets are shown in the following table.

Table 20: Proposed minimum standards for provisioning times and repair

			New minimum standard		
	2011 performance	Current performance (2014)	Performance over Year 1 (2016/17)	Performance over Year 2 (2017/18)	Performance over Year 3 (2018/19)
Mean time to provide across orders	40 working days	46 working days	No more than 46 working days	No more than 40 working days	As Year 2
Lower percentile limit	40% of provisions delivered in 29 working days	40% of provisions delivered in 30 working days	At least 40% of provisions delivered in 30 working days or less	At least 40% of provisions delivered in 29 working days or less	As Year 2
Upper percentile limit	3% of provisions delivered in 118 or more working days	3% of provisions delivered in 159 or more working days	No more than 3% of provisions delivered in 159 or more working days	No more than 3% of provisions delivered in 118 or more working days	As Year 2
% faults fixed within 5 hours	93.1%	94.4% (Jan'14 to Jul'14)	At least 94% of faults fixed within 5 hours	As Year 1	As Year 1

Source: Ofcom BCMR consultation May 2015

On the basis of these new targets, Ofcom has requested that BT reach agreement with its wholesale customers on a revised set of SLAs and SLGs.

111 Average time to install on-net fibre circuits http://www.homeandwork.openreach.co.uk/Our-responsibilities/KPI_overview.aspx?kpi=business-2