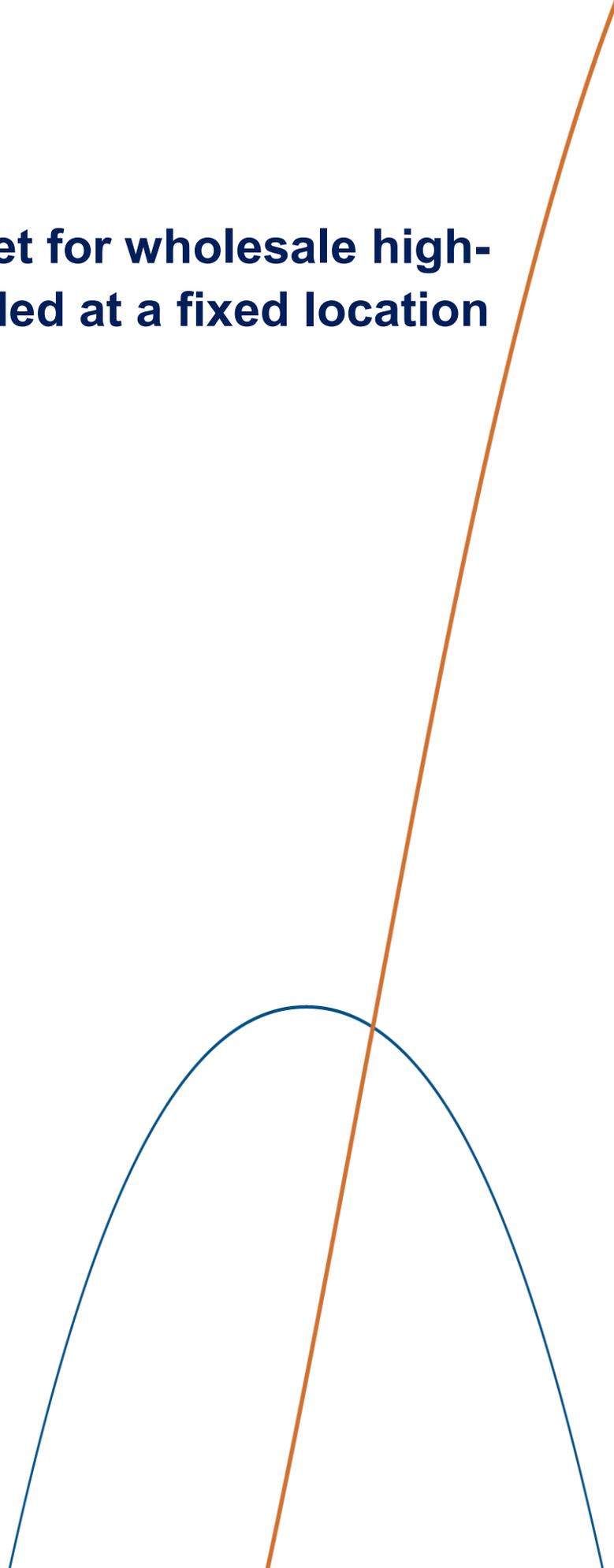


Annex 1

Analysis of the market for wholesale high-quality access provided at a fixed location (Market 4)

Case 1505331

20 December 2018



Summary

This document contains a market analysis that the Norwegian Communications Authority (Nkom) has carried out on the market for wholesale high-quality access provided at a fixed location (Market 4 in the EFTA Surveillance Authority's (ESA) recommendation on relevant markets). The market is based on Market 6 in ESA's previous recommendation on relevant markets, but is now focused on wholesale products which are used as a basis for offering services to companies that require greater functionality and/or quality than is provided by the standard access products in the mass market.

Chapter 1 contains a description of the background and framework for the market analysis.

Chapter 2 contains Nkom's definition of the relevant market. First, there is a comprehensive description of the market and competition situation in the overall retail market for fixed access in Norway. The description includes fixed access to both households and businesses, and it contains information on broadband coverage and the number of broadband customers, customer developments broken down according to different technologies, developments in broadband customers' choice of products and capacities, the different customer segments in this retail market, and the providers' market shares.

Furthermore, Nkom defines the retail market for high-quality access products. Nkom has concluded that all types of capacity and data communication products that are offered to companies that require access products with greater functionality/quality than standard broadband subscriptions are included in this market. This applies to both IP-VPN products, Ethernet-VPN products and capacity products such as leased lines and optical channel (wave lengths). The market also includes products that provide high-quality, dedicated access to the internet. Dark fibre is not included in the retail market for high-quality access products.

Based on the retail market for high-quality access products, Nkom then determines the relevant product market at wholesale level. All wholesale products that form the basis for high-quality access products in the retail market and which also satisfy specific requirements for product characteristics associated with quality, availability and service level, are part of the market for wholesale high-quality access provided at a fixed location, regardless of the capacity and technical interface of the dedicated connections. Wholesale sales of leased lines, optical channels and data communication services (including IP-VPN and Ethernet-VPN) are examples of products included in this market. Dark fibre does not satisfy the specified requirements for product characteristics and is therefore not included in this market.

To conclude, Chapter 2 contains an assessment of the geographic market. Nkom is of the view that the Norwegian market for high-quality access products is not characterised by significant and different geographical competitive terms at retail level. Furthermore, the product and price structures of the nationwide providers for leased lines in the wholesale market apply to the entire country. In addition, local and regional operators have in recent years constructed

fibre networks at multiple locations in the country. This applies to both central areas and in areas where settlements are more spread out. Despite the fact that, until now, most of these local and regional fibre operators have focussed on offering fibre access to the residential market, the fibre infrastructure that these operators have developed also enables leased lines to be offered at both retail and wholesale level. Many of them have already commercialised an offer of leased lines and other high-quality access services. Based on this, Nkom has concluded that the market for wholesale high-quality access provided at a fixed location is national.

Since Market 4 is a new market in the Recommendation and it is only leased lines with capacities up to and including 8 Mbit/s that have been subject to sector-specific regulation in Norway since 2012, Nkom has found it appropriate to conduct a three-criteria test to determine whether Market 4 qualifies for sector-specific ex ante regulation in Norway. For a market to qualify for sector-specific ex ante regulation, three cumulative criteria must be satisfied:

1. The presence of high and non-transitory structural or regulatory barriers to entry.
2. The market structure does not tend towards effective competition within the relevant time horizon.
3. General competition law is insufficient to adequately safeguard the considerations behind the sector-specific regulation.

Under the first criterion, Nkom has assessed different structural and regulatory barriers to entry. Telenor's control over a nationwide access network is considered a barrier to entry in the market for high-quality access products. The development of alternative access infrastructure has contributed to the barriers to entry having been reduced somewhat in recent years, but the alternative access infrastructure is still very fragmented and is primarily oriented towards offering standardised access products to the mass market. Telenor is therefore still the only provider in the Norwegian market with continuous, nationwide trunk and access infrastructure that enables services to be offered in the entire country to companies that demand high-quality access solutions with geographically spread locations. This is still considered to represent a not insignificant barrier to entry in this market.

Even though some of the factors Nkom has assessed may indicate that the barriers to entry in the market for high-quality access products have been somewhat reduced in recent years, an overall assessment indicates that the barriers to entry are still significant. This particularly applies to operators who will compete with Telenor on nationwide services. Nkom has therefore concluded that the first criterion in the three-criteria test has been satisfied.

Under the second criterion, Nkom has assessed the development in market shares at retail and wholesale level, price development, price differentiation, switching costs, lock-in mechanisms, barriers to growth and potential competition.

When measured in terms of sales, Telenor has an overall market share at wholesale level of 47 % for capacity products and data communication services. Broadnet is the second largest provider with a market share of 32 %. Despite the fact that Telenor's market share at wholesale level generally indicates significant market power, the breakdown of market share at retail level does not provide a basis on which to conclude that it is necessary to have new regulation at wholesale level in this market to enable efficient competition in the retail market for high-quality access products in Norway. Telenor is the largest provider in the retail market with a market share of 24 % and five other providers have market shares of between 20 % and 9 % each.

The development in market share therefore indicates that the Norwegian retail market for high-quality access products is characterised by effective competition, despite the absence of wholesale regulation beyond current regulation of leased lines with capacities up to and including 8 Mbit/s. In addition, the infrastructure competition in the Norwegian market is significantly stronger than what is described in the Commission's Explanatory Note under the grounds for including Market 4 in the Recommendation. There is significant potential competition in both the retail and wholesale market from the many local/regional fibre operators. An assessment of product differentiation, switching costs, lock-in mechanisms and barriers to growth does not indicate that these are elements that would suggest that the market does not tend towards effective competition. Based on this, Nkom has concluded that the second criterion in the three-criteria test is not satisfied.

The three-criteria test is therefore not satisfied for the market for wholesale high-quality access provided at a fixed location in Norway. Thus, this market does not qualify for sector-specific ex ante regulation.

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1 Introduction

1.1 Background and framework for the analysis

1. The regulatory framework for electronic communications is based on five directives adopted by the European Union (EU)¹. These directives have been implemented in Norwegian law by Act no. 83 of 4 July 2003 concerning electronic communications (Electronic Communications Act) and the appurtenant regulations, including Regulation no. 401 of 16 February 2004 on electronic communications networks and services (Electronic Communications Regulation)

2. The framework shall lay the foundation for the harmonisation of regulation in the European Economic Area (EEA), limit entry barriers, and facilitate sustainable competition to the benefit of the users.

3. It follows from Sections 3-2 and 3-3 of the Electronic Communications Act, and Norway's obligations under the EEA Agreement, that identification of providers with significant market power must take place in accordance with the guidelines and recommendations prepared by the EFTA Surveillance Authority (ESA) under the new framework directive for electronic communications services:

- Guidelines on market analysis and the assessment of significant market power (hereinafter referred to as the Guidelines)²
- Recommendation on relevant markets (hereinafter referred to as the Recommendation³)

4. According to the Guidelines, an assessment of relevant markets and significant market power must be based on a market analysis. The assessment must be in accordance with competition law methodology. The Guidelines and the Recommendation, together with relevant provisions in the Electronic Communications Act, particularly Sections 3-1 to 3-3, will therefore form the legal framework for the market analysis.

5. ESA revised the original Recommendation⁴ concerning relevant markets for the first time in 2008. The number of pre-defined markets for ex-ante regulation was then reduced from

¹ Directive 2002/21/EC on a common regulatory framework for electronic communications networks and services (Framework Directive); Directive 2002/20/EC on the authorisation of electronic communications networks and services (Authorisation Directive); Directive 2002/19/EC on access to, and interconnection of, electronic communications networks and associated facilities (Access Directive); Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive); Directive 2002/58/EC concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications).

² EFTA Surveillance Authority Guidelines of 14 July 2004.

³ EFTA Surveillance Authority Recommendation of 11 May 2016 with the Commission's Explanatory Note.

⁴ The EFTA Surveillance Authority Recommendation of 14 July 2004 was identical to the Commission's Recommendation of 11 February 2003.

18 to 7. The European Commission (hereinafter referred to as “the Commission”) revised the list of relevant markets again and adopted a new recommendation on 9 October 2014⁵. The number of pre-defined markets for ex-ante regulation was then reduced to 5. The new recommendation was published with an Explanatory Note⁶, explaining in more detail the background of the revised list of relevant markets. ESA published an identical recommendation for the EEA/EFTA states on 11 May 2016⁷.

6. The 2016 Recommendation includes changes in the market definition for the wholesale markets for fixed access compared with the 2008 Recommendation, which was used as the basis for Nkom’s current decision in the wholesale markets for broadband access based on fixed networks and leased lines. In the Recommendation from 2016, the former Markets 4, 5 and 6 are replaced with the following relevant markets:

- Market 3a: *Wholesale Local Access at a fixed location*
- Market 3b: *Wholesale Central Access at a fixed location (to provide mass-market services)*
- Market 4: *Wholesale high-quality access*

7. The wholesale market for local access provided at a fixed location (hereinafter “Market 3a”) is based on former Market 4, but is now being expanded to also include non-physical, virtual wholesale products whose functionality, from the wholesale customer’s standpoint, is equivalent to today’s LLU products.

8. The market for wholesale central access provided at a fixed location (hereinafter “Market 3b”) is based on former Market 5 and includes access products with regional or national connection points that are used to provide broadband services in the mass market.

9. The wholesale market for high-quality access to fixed access networks (hereinafter “Market 4”) is based on former Market 6, but is now focused on wholesale products that allow buyers of access to offer services to businesses that need greater functionality and/or quality than is provided by the standard access products in the mass market.

10. With regard to former Market 6, Nkom used a slightly different delimitation of the relevant market than the market definition in the ESA Recommendation. The former wholesale markets for leased lines (former Markets 13 and 14) were defined as leased lines with capacities up to and including 8 Mbit/s and over 8 Mbit/s, respectively. In other words, Nkom did not distinguish explicitly between terminating and trunk segments of leased lines in the same way as the Recommendation. Nkom held that speed was the criterion that best reflected

⁵ Commission Recommendation of 9 October 2014.

⁶ <https://ec.europa.eu/digital-single-market/en/news/explanatory-note-accompanying-commission-recommendation-relevant-product-and-service-markets>

⁷ The ESA Recommendation does not have a separate Explanatory Note, but refers to the Commission’s Explanatory note.

the distinction between terminating and trunk segments in the Norwegian market, and that this delimitation was not contrary to the delimitation in the Recommendation.

11. Former Market 13 was continued as Market 6, while former Market 14 was removed from ESA's recommended relevant markets in 2008. In 2012, Nkom conducted a new analysis of Market 6 and concluded that speed was still the criterion that best reflected the distinction between terminating and trunk segments in the Norwegian market. Nkom thus continued to use the delimitation of the access market to apply to leased lines with capacities up to and including 8 Mbit/s. At the same time, Nkom removed its regulation of former Market 14. The market for wholesale high-quality access provided at a fixed location (Market 4) will therefore be able to include all the products in former Market 6, plus high-quality access products over 8 Mbit/s that were not included in former Market 6.

12. In the document "Methodology for market analysis" (the Methodology Document) Nkom has elaborated on the criteria for the market analysis in certain respects. The Methodology Document is not legally binding, but expresses Nkom's understanding of the guidelines that Nkom is obliged to follow. The market analyses will therefore be undertaken in accordance with the views and assessments expressed in the Methodology Document. In the event of any inconsistencies between the Methodology Document and the Guidelines or the Recommendation, the Guidelines or the Recommendation will take precedence. The document in no sense regulates the Norwegian Competition Authority's assessments in accordance with the Norwegian Competition Act. This analysis is based on the Methodology Document dated 11 June 2009.

13. The work on the market analysis can be naturally divided into three stages:

- 1) Define relevant markets by defining relevant product markets and geographical markets.
- 2) Carry out market analyses of each of the relevant markets with a view to uncovering whether any providers have significant market power.
- 3) Impose obligations on providers designated as having significant market power.

14. This analysis includes Nkom's assessments in phases 1) and 2) for the market for wholesale high-quality access provided at a fixed location (Market 4). The markets for wholesale local and central access provided at a fixed location (Market 3a and Market 3b, respectively) will be analysed separately. The description of the market and competition situation in the retail market for fixed access (Section 2.2 below) is identical in the analyses of Markets 3a & 3b and Market 4.

15. Market shares and other statistics in the analysis are based on Nkom's electronic communications statistics for 2017, unless otherwise specified.

1.2 Previous analysis of the wholesale markets for LLU and Broadband Access, plus the market for wholesale terminating segments of leased lines

16. Nkom's previous analysis of the broadband markets is dated 20 January 2014 and was based on the Recommendation from 2008. Nkom arrived at the following market definition for the wholesale markets for LLU (former Market 4) and Broadband Access (former Market 5):

- The LLU and Broadband Access markets constitute separate wholesale markets. Both markets are technologically neutral.
- Both the wholesale markets include all external and internal sales, or use, of broadband access products via all fixed access technologies that are used to offer broadband access in the retail market.
- The Broadband Access market covers all speeds offered by the wholesale provider's retail operations.
- Leased lines are not a substitute for LLU or Broadband Access, and are therefore not part of these relevant markets.
- The retail market for mobile network-based broadband access is not included in the same relevant market as fixed network-based broadband access. Wholesale provision of mobile network-based broadband access is thus not included in the LLU or Broadband Access market. However, fixed radio access (point-to-point and point-to-multipoint connections) are part of these relevant markets.
- Both the LLU market and the Broadband Access market are geographically limited to Norway.

17. Nkom's previous analysis of the market for terminating segments of leased lines (former Market 6) is dated 20 April 2012 and was based on the Recommendation from 2008. On the basis of assessments of the competitive situation and other specific national circumstances related to the Norwegian market for leased lines, Nkom has concluded that the relevant wholesale market for leased lines in Norway shall continue to be defined as leased lines with capacities up to and including 8 Mbit/s. The wholesale market for leased lines with capacities up to and including 8 Mbit/s was found to be national.

2 Definition of the relevant market

2.1 Market definition in general

18. Market analyses are based on the pre-defined markets in the ESA Recommendation on relevant markets. However, Nkom must assess whether ESA's pre-defined markets fit the circumstances in the Norwegian market.

19. The market definition should take into account the products included in the relevant markets as well as the geographical scope of the market. The definition of relevant markets must use the same procedure as the market definition within competition law. However, in some cases, markets defined by competition authorities may deviate from markets defined in the Recommendation or by national supervisory authorities in accordance with Article 15, no. 3 of the Framework Directive.

20. Nkom conducts market analyses in a forward-looking perspective based on the market and competition situation in Norway, cf. Section 2.2, using the predefined markets in the ESA Recommendation as its starting point.

2.1.1 The product market

21. In accordance with the Guidelines, Nkom has first delimited the relevant product markets at the retail level, in order then to derive the relevant product markets at the wholesale level.

22. A relevant product market is made up of products and services for which adequate substitutes can be found for the end user. The starting point for the definition of a relevant product market is an assessment of demand-side substitutability. However, substitutability may also exist on the supply side and may then be relevant in the delimitation of the relevant market.

23. Substitutability exists on the demand side when in the users' perception two or more products in the market are mutually interchangeable or substitutable on the basis of their characteristics, price and area of use. Supply-side substitutability exists when, in response to a marginal price change, providers of other (non-substitutable) products can change their production or distribution in the short term and offer substitutable products without incurring significant additional costs or risk.

24. An acknowledged method of analysing substitutability is the hypothetical monopolist test (SSNIP). The test seeks to identify the smallest market within which a hypothetical monopolist could exert market power. The starting point for the test is a marginal (in practice 5–10%), non-transitory increase in the price of the relevant product. The assessment is made on the basis of the assumed price level in a market with effective competition and assuming that all other prices are unchanged. The effect of the price increase in the relevant market and

the overall effect on the producer's revenues are then assessed. Determining whether the price increase will be profitable for the producer is key.

25. The Guidelines do not make use of the SSNIP test an absolute requirement in the market definition. Similar methods may therefore also be used. Regardless of method, the hypothetical assessment should be supplemented by factual information about behaviour on the supply and demand sides to the extent that such information is available.

2.1.2 The geographical market

26. Once the relevant product markets have been defined, the geographical scope of the market is defined, cf. the Guidelines. The relevant geographical market may be defined as the area in which the relevant product is offered on approximately sufficiently similar or homogeneous competitive terms. Geographical markets within electronic communications have traditionally been defined based on the extent of the network and the jurisdiction of the legal regulation of the market.

27. The Norwegian Electronic Communications Act applies presumptively to Norwegian land territory. According to Section 1-3, first paragraph, of the Electronic Communications Act, the Act also applies to "Norwegian ships and aircraft and to installations and devices of whatever nature connected to petroleum activity on the continental shelf or for utilisation of renewable energy resources at sea within the scope of the Norwegian Offshore Energy Act". Electronic communications on Norwegian ships and aircraft and installations for utilisation of renewable energy resources at sea are regarded as of very little significance for the market analyses Nkom conducts pursuant to the Electronic Communications Act.

28. However, electronic communications on installations and devices connected to petroleum activity on the continental shelf are assumed to be of some significance to the market analyses Nkom conducts pursuant to the Electronic Communications Act. See the more detailed description in Section 2.2.5 and Section 3.4.1.1.

29. In addition, the Electronic Communications Act also applies to Svalbard, Jan Mayen, the dependencies and Antarctica. This follows from Regulation no. 882 of 4 July 2003 on the geographical scope of the Electronic Communications Act with regard to Svalbard, Jan Mayen, the dependencies and Antarctica, laid down pursuant to Section 1-3 of the Electronic Communications Act. In respect of Svalbard, exemptions have been made for Chapter 3 (significant market power), Chapter 4 (access) and Section 9-3 (consultation procedure) of the Electronic Communications Act. Electronic communications on Jan Mayen, the dependencies and Antarctica are assumed to have very little significance for the market analyses Nkom carries out pursuant to the Electronic Communications Act.

2.2 The market and competitive situation in the retail market for fixed access

30. This section provides a comprehensive description of the market and competition situation in the overall retail market for fixed access in Norway. The description includes fixed access to both households and businesses, and it contains information on broadband coverage and the number of broadband customers, customer developments broken down according to different technologies, developments in broadband customers' choice of products and capacities, the different customer segments in this retail market, and the providers' market shares.

31. The description of the overall retail market for fixed access forms the basis for the delimitation of the relevant product markets at the retail level and forms the basis for further delimitation and analysis of the related wholesale markets.

2.2.1 Coverage and number of customers in the retail market for fixed broadband access

32. According to Nkom's Coverage Report 2018, close to 100% of Norwegian households have broadband coverage with a downstream capacity of 4 Mbit/s or more. Of these, about 96% are covered by fixed, cable-based access technologies based on copper, fibre and/or HFC networks (hybrid fibre coaxial, also referred to as cable television networks)⁸.

33. More than 2 million households had chosen to purchase fixed broadband access at the end of first half of 2018, which constitutes 85 % of Norwegian households. The number of residential broadband subscriptions has gradually increased in recent years. From the end of first half of 2017 to the end of first half of 2018, the number of subscriptions increased by 46,000, while the corresponding growth from the end of first half of 2016 to the end of first half of 2017 was 62,000 subscriptions.

34. In addition, at the end of first half of 2018 there were almost 128,000 subscriptions for fixed broadband access in the business market, a decrease of roughly 1,600 subscriptions from the end of first half of 2017. In recent years there have been only minor changes in the number of fixed broadband subscriptions in the business market.

35. However, the business market for fixed access is more complex than the residential market and in addition to fixed broadband subscriptions also includes other access solutions. Companies' purchase of standardised broadband access, equivalent to broadband subscriptions in the residential market, has been categorised as fixed broadband access in Nkom's annual electronic communications statistics. If companies purchase other fixed access solutions with additional features or functionality beyond standardised broadband access, such as IP-VPN services, this is categorised as data communication services in Nkom's electronic communications statistics. At the end of 2017, the electronic communications providers

⁸ "Broadband coverage 2018" from September 2018, prepared by Analysys Mason on assignment from Nkom.

reported approximately 72,000 subscriptions at the retail level for data communications services. There have been no major changes in this figure in recent years. These data communication services usually also include access to the internet. In this context, it is therefore natural to regard these services, and the business customers that make use of these data communications services, as part of the retail market for fixed access.

36. The same is true for companies that buy different capacity products from electronic communications providers for use in the companies' access solutions. In Nkom's annual electronic communications statistics, these kinds of products are included in the product category leased lines. However, it has proven difficult for providers of leased lines to report a distinction between products that the customers use for terminating and trunk purposes respectively. Consequently, Nkom does not distinguish between terminating and trunk segments of leased lines in the annual electronic communications statistics. At the end of 2017, total sales of leased lines in the retail market amounted to 15,000 lines. The proportion of these lines that are included in the access solutions of companies that purchase leased lines is included in the retail market for fixed access. However, the available information from the electronic communications providers does not provide grounds for further quantification of this proportion.

37. This means that the available information from the electronic communications providers about data communication services and terminating segments of leased lines does not allow quantification of the portion of the retail market for fixed access for these products as unambiguously as the part of the market that includes standard fixed broadband access in the residential and business markets.

2.2.2 Customer developments broken down by different access technologies in the retail market for fixed access

38. Figure 1 shows the development in the number of fixed broadband subscriptions in the residential market, broken down by access technology, for the period first half of 2006 to first half of 2018.

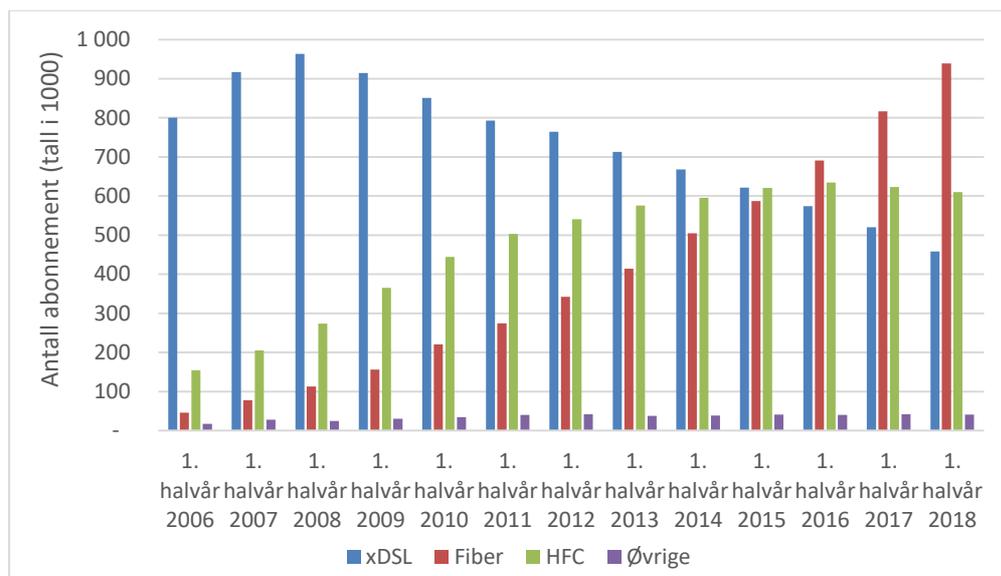


Figure 1: Fixed broadband subscriptions aimed at the residential market, broken down by access technology. (Source: Nkom's electronic communications statistics for first half of 2018)

39. There were 458,000 residential broadband subscriptions based on xDSL at the end of first half of 2018, a decrease of roughly 62,000 compared with the end of first half of 2017. Together xDSL constituted 22.4% of the total number of subscriptions in the residential market, compared just over 26% at the end of first half of 2017. Broadband based on VDSL amounted to 35.5% of the xDSL subscriptions at the end of first half of 2018, a decrease from 36,3% from the end of first half of 2017.

40. Broadband access based on xDSL is no longer the largest access technology in the residential market. Broadband access via fibre has grown most in recent years and has been the most widely used access technology in residential broadband subscriptions since first half of 2016. At the end of first half of 2018 there were 939,000 fibre-based subscriptions in the residential market, an increase of just over 122,000 subscriptions from the end of first half of 2017. Nearly 46% of the residential broadband subscriptions were based on fibre, up from 41% at the end of first half of 2017.

41. Broadband access via HFC network was the second largest form of access in the residential market with more than 610,000 subscriptions at the end of first half of 2018. This is a decrease of almost 13,000 subscriptions compared with the end of first half of 2017. There has been an increase in the number of broadband subscriptions via HFC network for many years, but from first half of 2010 the growth has been diminishing, and from the first half of 2017 there has been a decline in the number of accesses. Broadband via HFC network constituted approximately 29.8% of the total number of subscriptions in the residential market at the end of first half of 2018.

42. Figure 2 shows the development in the number of fixed broadband subscriptions in the business market, broken down by access technology, for the period first half of 2006 to first half of 2018.

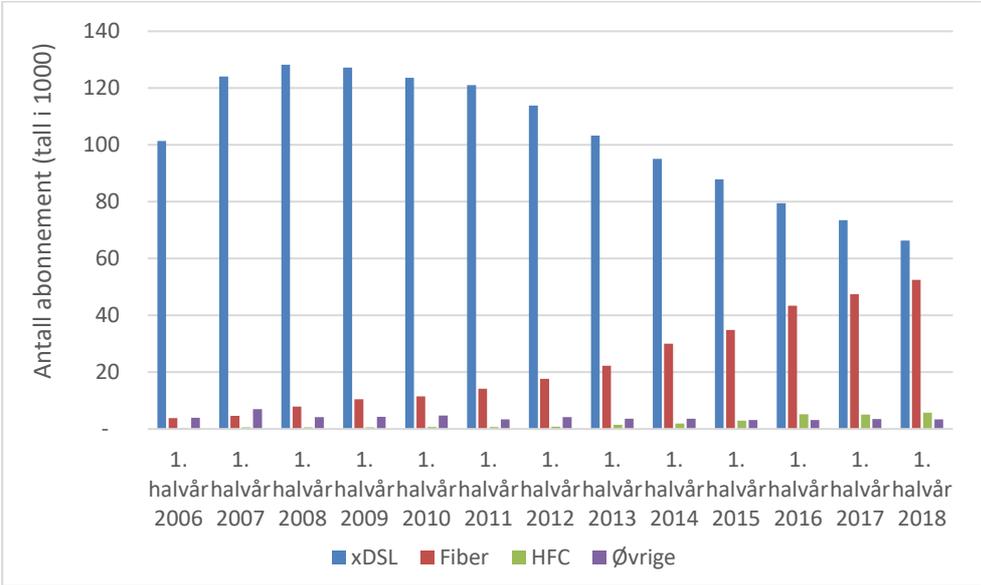


Figure 2: Fixed broadband subscriptions aimed at the business market, broken down by access technology. (Source: Nkom’s electronic communications statistics for first half of 2018)

43. There were approximately 66,000 broadband subscriptions based on xDSL in the business market at the end of first half of 2018, a decrease of roughly 7,200 subscriptions compared with the end of first half of 2017. xDSL-based broadband subscriptions accounted for approximately 51.8% of the total number of fixed broadband subscriptions in the business market at the end of first half of 2018, compared with just under 56.8% at the end of first half of 2017.

44. In the business market too, broadband access via fibre is the connection form that has had the greatest growth in recent years. At the end of first half of 2018 there were more than 52,000 fibre-based subscriptions in the business market, an increase of 5,000 subscriptions compared with the end of first half of 2017. This means that 41% of the business subscriptions were based on fibre at the end of first half of 2018, up from around 37% at the end of first half of 2017.

45. Figure 3 shows that the number of subscriptions for fixed broadband access in the combined residential and business market amounted to over 2,175,000 at the end of first half of 2018. These subscriptions were distributed as follows: approximately 24% via xDSL, 46% via fibre access, 28% via HFC network and 2% via fixed radio access.

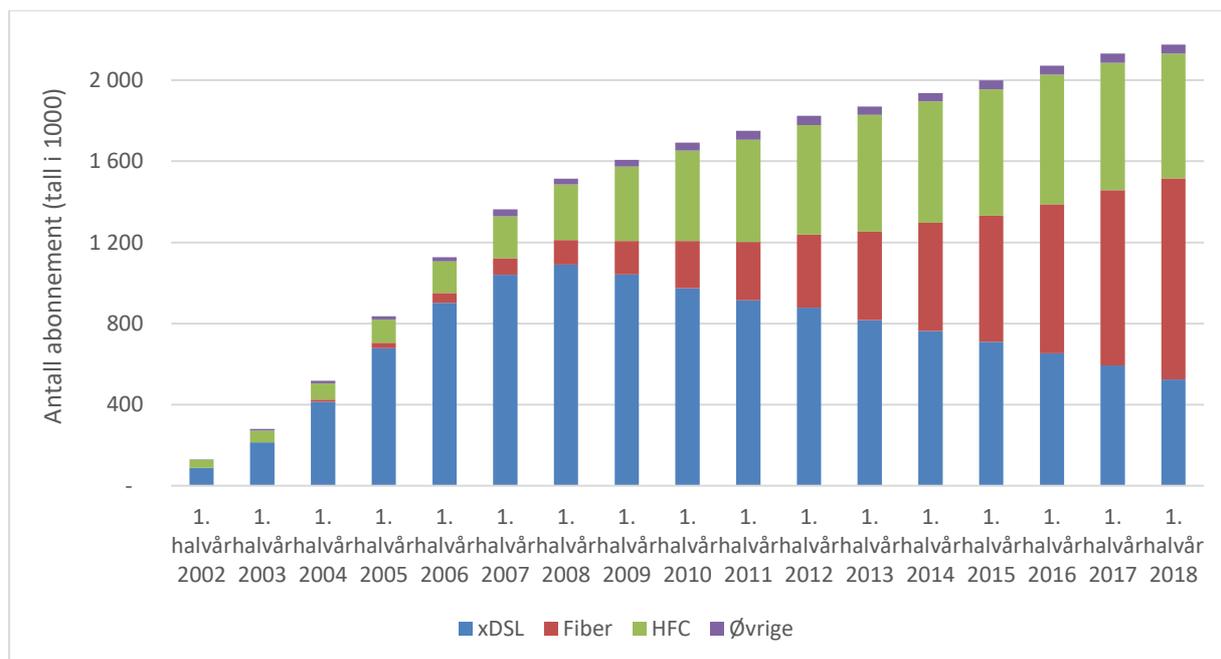


Figure 3: Fixed broadband subscriptions aimed at the residential and business market, broken down by access technology. (Source: Nkom's electronic communications statistics for first half of 2018)

46. As previously mentioned, portions of the business market cover their needs for fixed access by requesting access products or solutions such as IP VPN and leased lines, instead of a fixed broadband subscription. These kinds of access solutions are realised through a mix of copper and fibre accesses, depending on the capacity needs of the individual company location and the access options available. There is no available information from providers of IP VPN solutions and leased lines for access that allows quantification of the relative developments in copper and fibre accesses included in these kinds of access products and solutions. However, there are grounds to assume that there has been a gradual migration from copper to fibre accesses also in this part of the market in recent years, in the same way as in both the residential market and the business market for fixed broadband subscriptions.

2.2.3 Developments in broadband customers' choice of access products and speeds

47. A variety of products are offered in the retail market for fixed broadband access. The different products have different subscription prices. The price differences reflect different downstream and upstream access speeds and different degrees of additional services. Several providers of fixed broadband access aimed at the residential market also offer product packages that in addition to Internet access also include VoIP, TV packages, video-on-demand services and various cloud services.

48. Figure 4 shows the capacities bought by broadband customers in Norway. At the end of first half of 2018, 67.5% of broadband customers had a subscription with a marketed downstream speed of 30 Mbit/s or more. The number of subscriptions with a marketed

downstream speed of 30 Mbit/s or more increased from over 1,290,000 subscriptions at the end of first half of 2017 to over 1,440,000 subscriptions at the end of first half of 2018. The number of subscriptions with a marketed downstream speed of less than 10 Mbit/s decreased from 297,000 to 157,000 in the same period.

49. In terms of upstream speed, 621,000 broadband customers had a subscription with a marketed upstream speed of between 10 Mbit/s and 30 Mbit/s at the end of first half of 2018 , compared with 583,000 at the end of first half of 2017. At the end of first half of 2018, 18.6% of broadband customers had chosen to buy a subscription with a marketed upstream speed of 100 Mbit/s or more, while the corresponding figure at the end of first half of 2017 was approximately 10%.

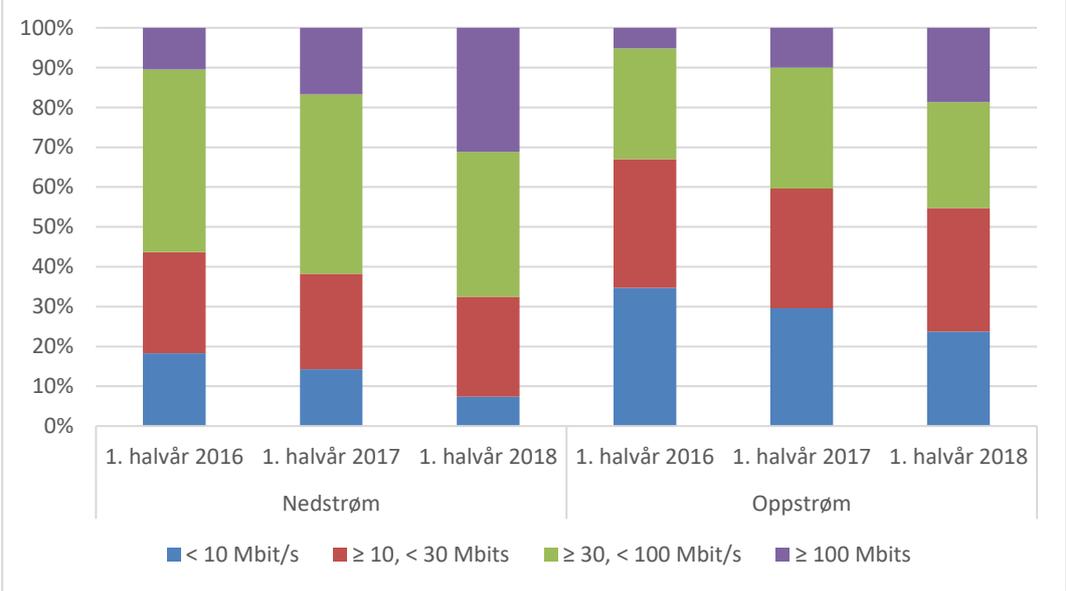


Figure 4: Fixed broadband subscriptions aimed at the combined residential and business market, broken down by speed. All access technologies. (Source: Nkom’s electronic communications statistics for first half of 2018)

50. This shows that Norwegian broadband customers are buying fixed broadband access with ever higher speeds. The need for increased capacity has grown gradually over several years and is related to the fact that ever more broadband customers are using their broadband subscription for services that require more bandwidth. In the residential market, a major driver behind the increased demand for high-capacity broadband access is increased use of various OTT services, such as streaming of TV series, films and sporting events. Figure 5 shows that more of the fibre customers in the residential market buy access products with higher speeds than broadband customers with broadband access based on xDSL or HFC network, but it also shows that demand for higher capacities increased from first half of 2016 to first half of 2018 for all three access technologies.

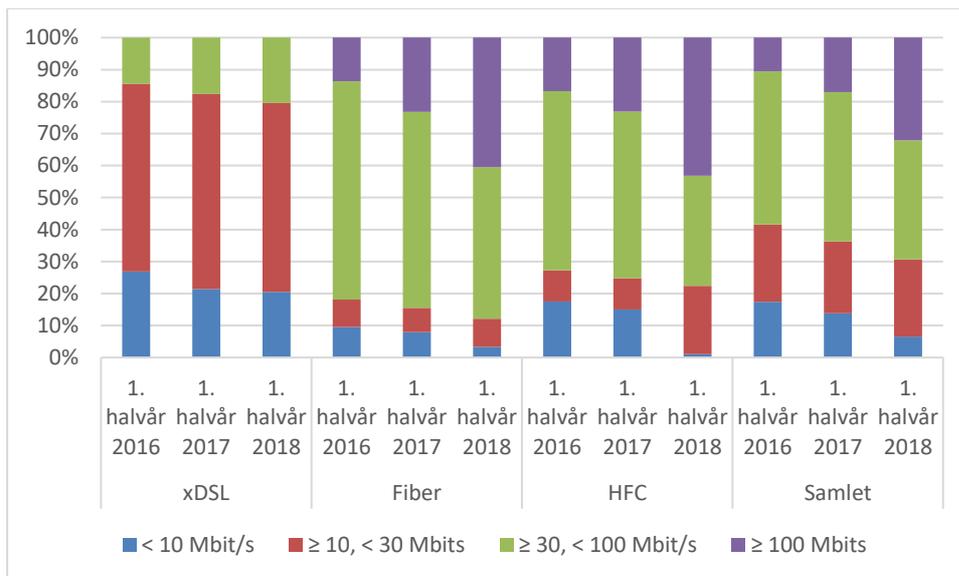


Figure 5: Subscriptions for fixed broadband access broken down by speed. Residential market. Downstream speed (Source: Nkom's electronic communications statistics for first half of 2018)

51. The same trend in terms of higher demand for increasingly higher capacities is also observed in the business market. Increased use of different forms of cloud services is a major reason for this. Figure 6 nevertheless shows that more households than companies choose to buy fixed broadband access with the highest speeds. For example, at the end of first half of 2018 69.4% of the broadband customers in the residential market had purchased a broadband subscription with a marketed downstream speed of 30 Mbit/s or more, while the corresponding proportion in the business market was only just over 38.2%.

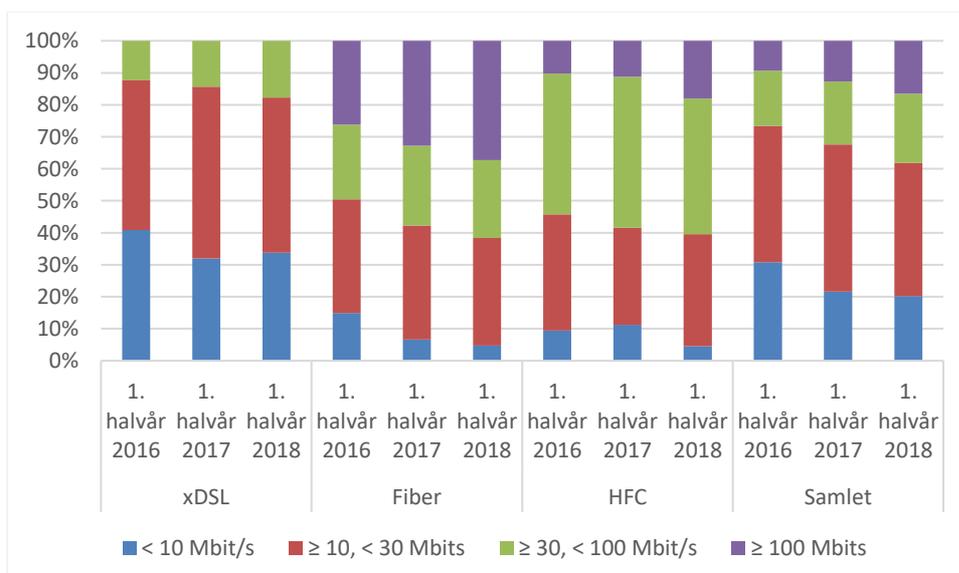


Figure 6: Subscriptions for fixed broadband access broken down by speed. Business market. Downstream speed (Source: Nkom's electronic communications statistics for first half of 2018)

52. This concurs with figures from Statistics Norway’s internet survey⁹, which indicate that the median speed of broadband subscriptions in the residential market increased from 32.5 Mbit/s in the second quarter of 2017 to 47.9 Mbit/s in the second quarter of 2018, while the median speed of broadband subscriptions in the business market increased from 15.9 Mbit/s to 19.1 Mbit/s in the same period. Figure 7 shows the change in median speed of broadband subscriptions in the residential and business markets respectively from the second quarter of 2009 to the second quarter of 2018.

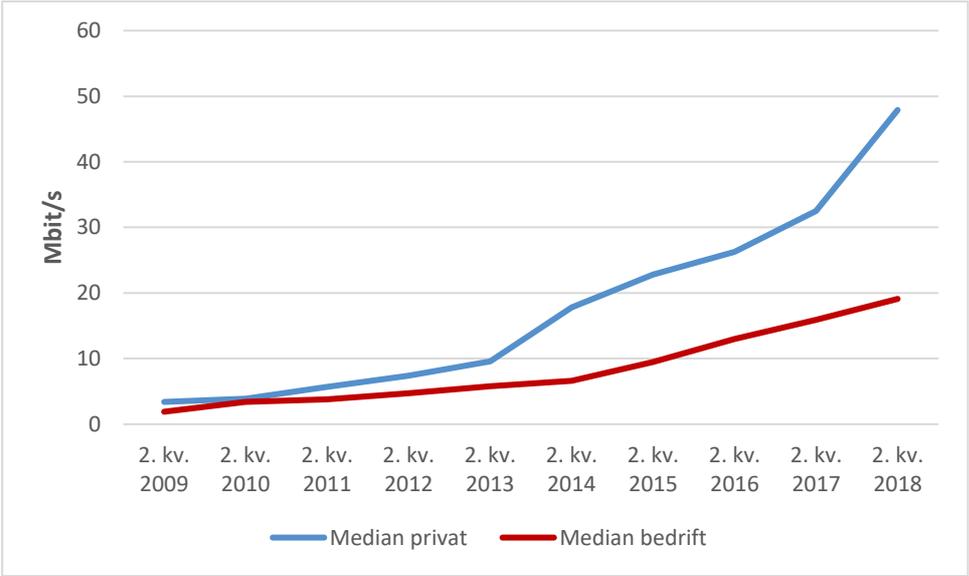


Figure 7: Capacity of broadband subscriptions, residential and business. Average and median. Downstream speed (Source: Statistics Norway’s internet survey)

53. Although the median speed when purchasing standard broadband subscriptions is lower in the business market than in the residential market, the capacity need seems significantly more heterogeneous in the business market. For example, figure 6 demonstrates that over half of the companies with a broadband subscription via fibre purchase a broadband access with capacities above 30 Mbit/s. In addition, there is reason to assume that most of the companies that meet their access needs via products and solutions such as IP VPN and leased line access, and that are therefore not represented in either Nkom’s or Statistics Norway’s figures for speeds of standard broadband subscriptions, have capacity needs that are significantly greater than the average capacity needs of the companies that buy standard broadband subscriptions.

2.2.4 Different customer segments in the retail market for fixed access

54. Providers of fixed broadband access differentiate in their marketing between standard access products for the residential market and the business market. Providers operating in both the residential and the business market, however, generally offer the same broadband capacities to both households and companies. Where prices vary for provision of the same

⁹ Statistics Norway: Internet survey, second quarter 2018

capacity to households and businesses, this generally reflects differences in the product. For example, business subscriptions may differ slightly from residential subscriptions or contain additional features and services that it is not natural to include in a residential subscription.

55. Parts of the demand side of the retail market will nevertheless experience the difference between the fixed broadband access products marketed to the residential and business markets as relatively minor. These are standard products that are offered to both households and businesses, with corresponding standard price lists and standard terms. For many small businesses, and especially sole proprietorships with the same address as the self-employed person's home address, there seems to be a high degree of substitutability between fixed broadband access packages marketed to the residential market and the business market respectively. Although households and businesses comprise different customer segments for the suppliers in the retail market for fixed broadband access, several factors thus indicate that these two customer segments are in fact part of the same relevant product market at the retail level, cf. Section 2.3 below where the relevant product markets are defined.

56. With regard to business customers that require access solutions with quality and/or functionality beyond what is included in the above-mentioned standard broadband subscription, this customer segment differs from the rest of the demand side in the retail market for fixed access. These are often companies with multiple locations and/or units, or companies with high demands regarding quality, availability and/or service level. For these kinds of companies, it is not an option to purchase a standard broadband subscription. These are companies that fall into the category that the Commission calls the retail high-quality market on page 36 of the Explanatory Note (hereinafter referred to as "the high-quality market"). For example, these companies want IP VPN products, Ethernet VPN products, capacity products such as leased lines and wavelengths / optical channels or dark fibre to establish access solutions that meet more advanced communication needs than companies that want a standard broadband subscription have.

57. In addition to significant differences in needs on the demand side, the high-quality market differs from the standard broadband subscription market in that the individual company's requirements form the basis for the products and prices offered by the providers in the retail market. In the high-quality market, the purchase process usually includes some form of dialogue or negotiation between the company and the relevant providers, and the company's specified requirements form the basis for the concrete solution offered in the individual case. This entails a completely different purchase process than that in the market for standard broadband subscriptions.

58. On this basis, the distinction between standard broadband subscriptions and access products requested by companies with more advanced communication needs is the clearest distinction between customer segments in the retail market for fixed access. Although providers of standard broadband subscriptions also differentiate between offers to households and businesses, it is not as obvious that this distinction will lead to the standard broadband

subscriptions to the residential and business markets being defined as different relevant product markets, cf. Section 2.3 below on the definition and delimitation of product markets.

2.2.5 The providers' market shares in the retail market for fixed access

Standard fixed broadband access

59. Figure 8 shows that Telenor is by far the largest provider of fixed broadband access in the residential market, with a market share of 39.8% in first half of 2018, measured by sales revenue. Telenor's market share has stabilised in recent years at this level. Get is the second largest provider with a market share of 14.3% in first half of 2018, followed by Lyse Fiber¹⁰, NextGenTel¹¹, Broadnet¹² and Eidsiva Bredbånd with market shares of 11.4%, 4.7%, 3.3% and 2.8% respectively. It should be noted that the supply side in the residential market consists of a large number of small providers, including several local and regional operators, which together represent, just under a quarter of the fixed broadband accesses in the residential market.

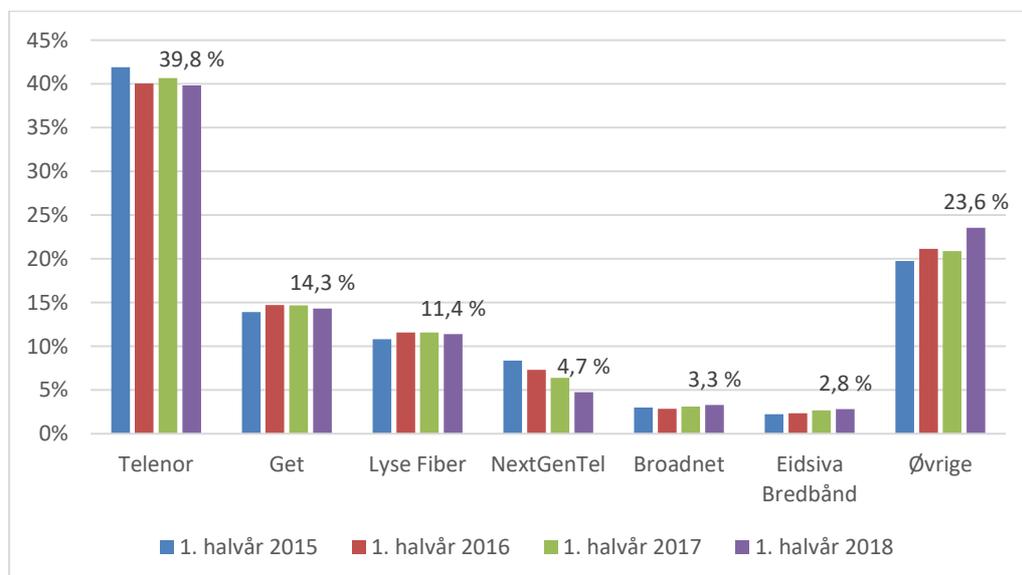


Figure 8: Market shares for fixed broadband aimed at the residential market, measured by sales revenue. (Source: Nkom's electronic communications statistics for first half of 2018)

60. Figure 9 shows the market shares in the residential market, measured by number of subscriptions. A comparison of figures 8 and 9 shows that there are no major differences in relative market shares in the residential market based on sales revenue and number of subscriptions. The biggest difference is in Get's market share. It is assumed that this difference is largely due to the fact that Get has relatively more housing cooperative customers

¹⁰ Viken Fiber, Signal Broadband and StayOn are part of Lyse Fiber, since Lyse Fiber has a stake of more than 50% in these companies.

¹¹ Kvantel is part of NextGenTel, since NextGenTel had a stake of more than 50% in this company at the time of reporting. Kvantel was sold to Broadnet on July 1, 2018.

¹² DataGuard, Homenet, Powertec Information Systems, Lynet Internet and Xfiber are included in Broadnet, as Broadnet has a stake of more than 50% in these companies.

than most of the other providers. Given that the subscription rates for housing cooperatives other commonhold associations are on average slightly lower than for individual homes, this explains why Get's market share is higher when measured by number of subscriptions than when measured by sales revenue.

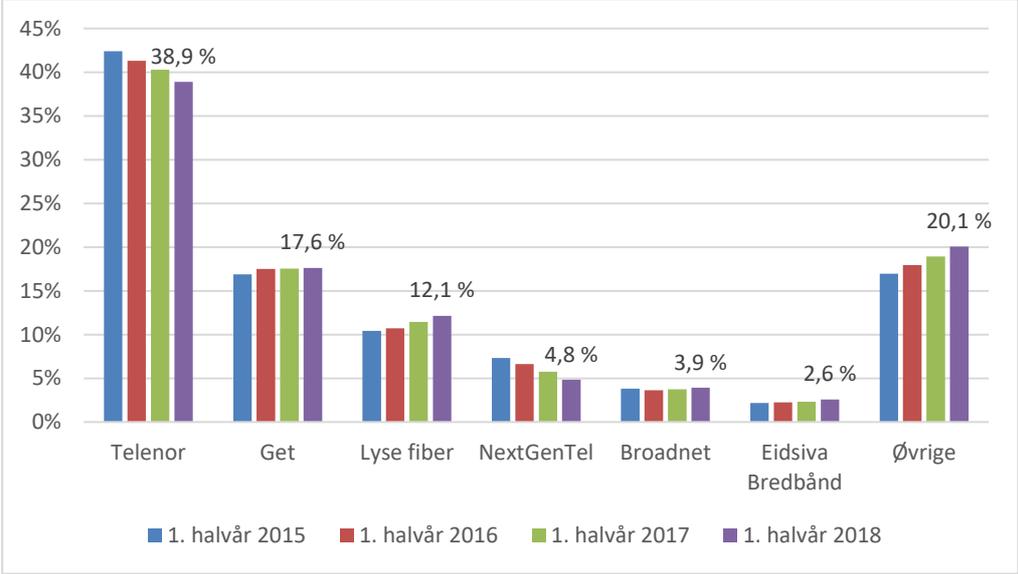


Figure 9: Market shares for fixed broadband aimed at the residential market, measured by number of subscriptions. (Source: Nkom's electronic communications statistics for first half of 2018)

61. Nkom collects information about the number of broadband subscriptions for businesses and related sales, but does not differentiate between high-quality and standardised broadband access in the electronic communications statistics. Nkom does not, therefore, have precise information about the number of subscriptions or sales revenue for standard broadband access in the business market. Nkom nevertheless assumes that a large proportion of the broadband subscriptions in the business market can be regarded as standard broadband access.

62. Figure 10 shows that in the business market too Telenor is the largest provider of fixed broadband access measured by sales revenue, with a market share of 27.4% in first half of 2018. Broadnet acquired DataGuard in October 2015 and Powertech in February 2016, giving it a market share of 21.1% in the business market, measured by sales revenue. Lyse Fiber's and BKK Digitek's market shares were 8.5% and 4.1% respectively, while NextGenTel and Get's market shares have dropped to 3.4% and 3.1% respectively. The other providers have a combined market share of 32.5%, measured by sales revenue.

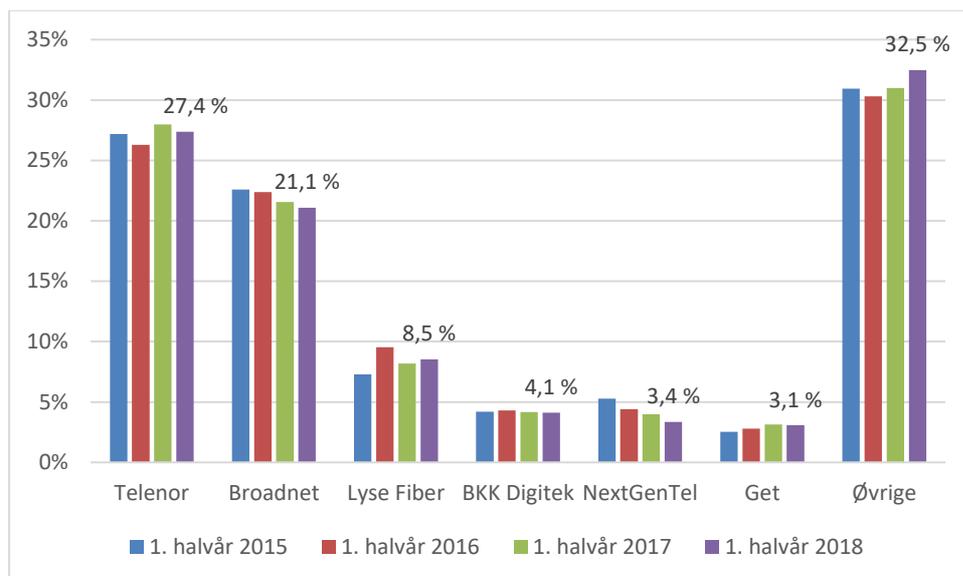


Figure 10: Market shares for fixed broadband aimed at the business market, measured by sales revenue. (Source: Nkom's electronic communications statistics for first half of 2018)

63. Figure 11 shows the market shares in the business market for fixed broadband access, measured by number of subscriptions. A comparison of figure 10 and figure 11 shows that the market share distribution looks rather different if the market shares are calculated on the basis of number of subscriptions instead of sales revenue. In this case, Telenor's market share increases by approximately 13 percentage points to 40.6%, while the category "Other" decreases by 9.4 percentage points. Also for the other providers, there are some major differences in market shares based on the two methods of measurement.

64. Nkom assumes that the main reason for the major differences in market share measured by sales revenue and measured by number of subscriptions is the significant heterogeneity in the business market. Major differences in the composition of access products and speeds with associated supplementary products that the various providers sell in this market explain the difference in market shares for several of the providers based on the two different measuring methods.

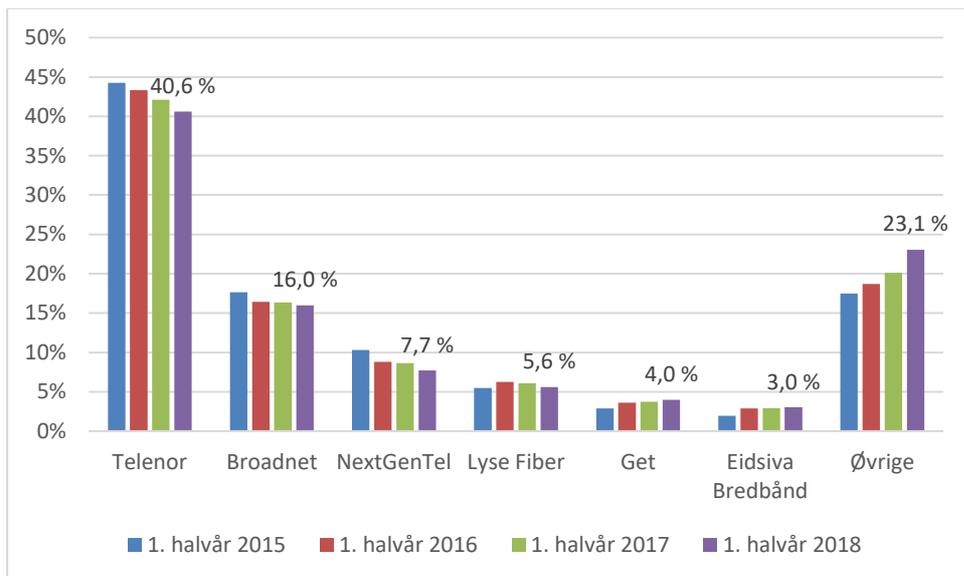


Figure 11: Market shares for fixed broadband aimed at the business market, measured by number of subscriptions. (Source: Nkom's electronic communications statistics for first half of 2018)

65. Figure 12 shows that Telenor has a market share of 37.5% measured by sales revenue in the combined residential and business market for fixed broadband access. The second largest provider in the combined market for fixed broadband access is Get, with a market share of 12.2%. Four other providers have market shares of between 10.9% and 2.8% each, while the other providers of fixed broadband access together represent around ¼ of this market.

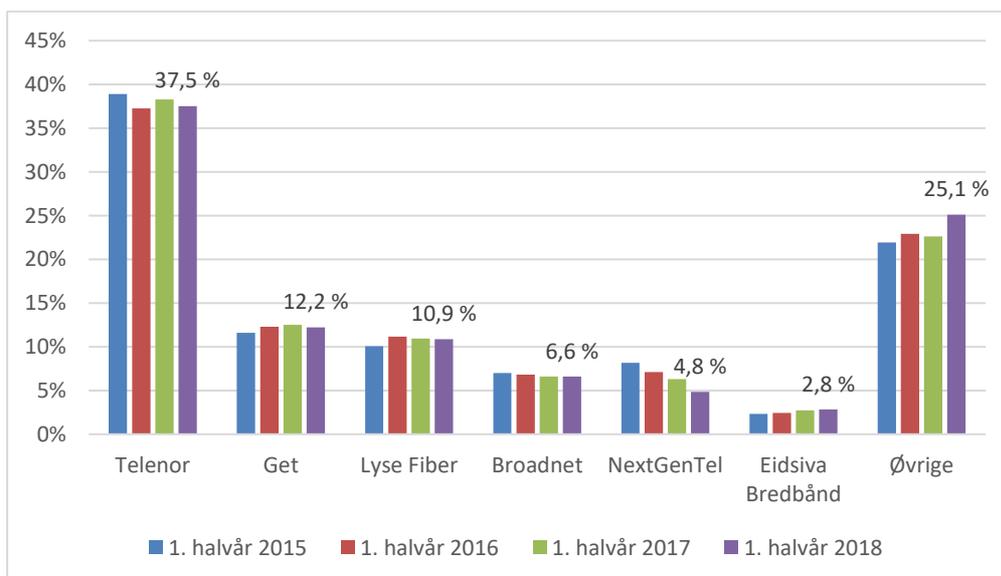


Figure 12: Market shares for fixed broadband aimed at the combined residential and business market, measured by sales revenue. (Source: Nkom's electronic communications statistics for first half of 2018)

66. Figure 13 shows the market shares in the combined residential and business market for fixed broadband access, measured by number of subscriptions. A comparison of figure 12 and figure 13 shows that Telenor’s market share is slightly higher when measured by number of subscriptions than when measured by sales revenue (37.5% compared with 39%). This is related to the above-mentioned difference for the two measurement methods in the business market. Similarly, it is assumed that Get’s higher market share measured by number of subscriptions than by sales revenue is mainly due to the relative difference in the proportion of housing cooperative customers in the residential market mentioned above.

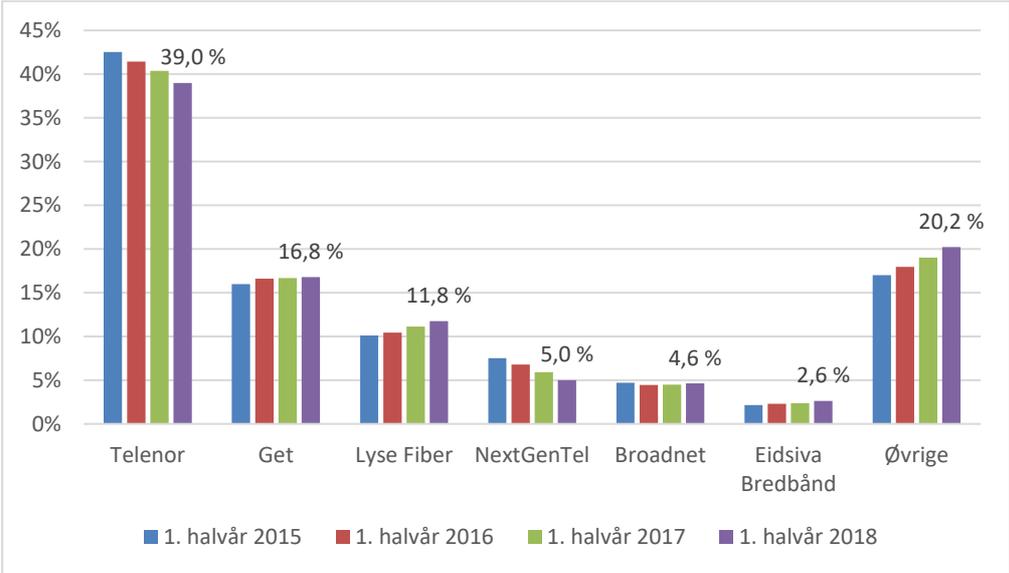


Figure 13: Market shares for fixed broadband aimed at the combined residential and business market, measured by number of subscriptions. (Source: Nkom’s electronic communications statistics for first half of 2018)

High-quality access

67. As described above, many business customers request access solutions with greater quality and/or functionality than is included in a standard broadband subscription. These are often companies with multiple locations and/or units, or companies with high demands regarding quality, availability and/or service level. These kinds of companies want capacity products such as leased lines and wavelengths / optical channels, dark fibre or data communication products such as IP VPN and Ethernet VPN, in order to establish access solutions that meet more advanced communication needs than companies that request a standard broadband subscription.

68. See Section 2.3 below for a more detailed definition and delimitation of the relevant product market for high-quality access products, i.e. the retail market associated with the market for wholesale high-quality access provided at a fixed location. In this context, only different market share distributions for access products not included as *fixed broadband* in the electronic communications statistics are described.

69. Figure 14 shows market shares for retail sales of capacity products, i.e. leased lines and wavelengths / optical channels, measured by sales revenue. In this context, TampNet’s market share must be assessed in view of the fact that TampNet’s operations are mainly intended for a delimited customer segment linked to offshore oil operations in the North Sea. This means that TampNet cannot really be regarded as a provider that affects the competitive situation in mainland Norway, with the exception of that part of the market that includes companies in oil-related sectors.

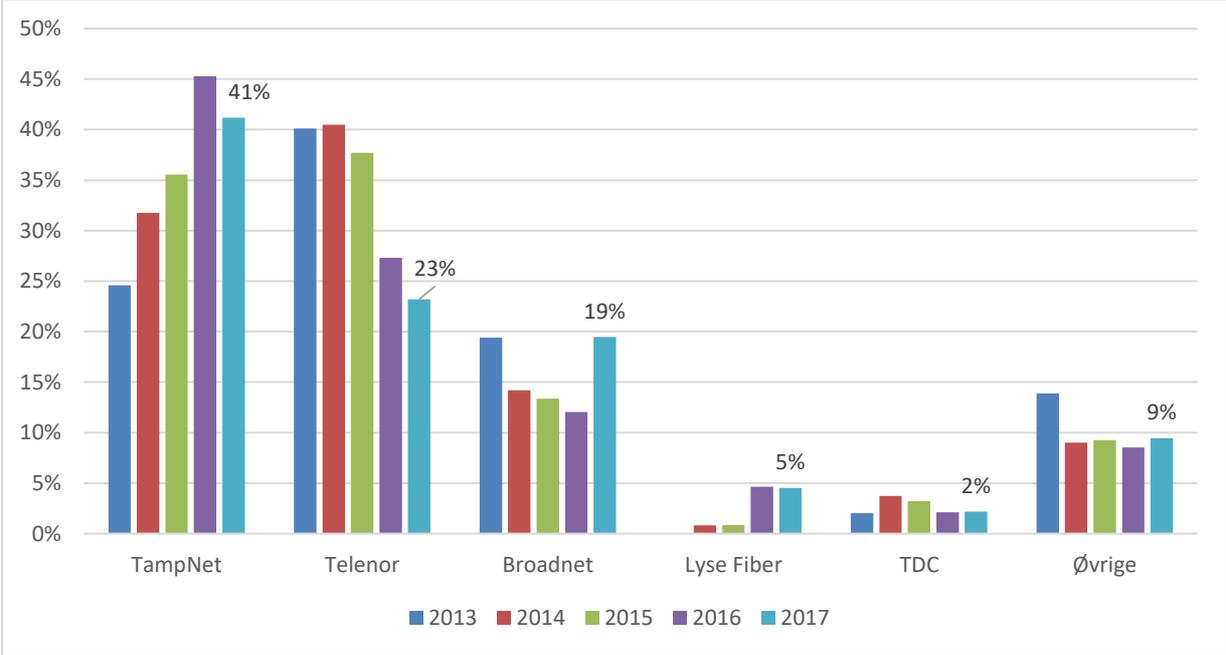


Figure 14: Market shares for retail sales of capacity products, i.e. leased lines and wavelengths / optical channels, measured by sales revenue (Source: Nkom’s electronic communications statistics for 2017)¹³

70. Figure 15 shows the market shares for retail sales of dark fibre, measured by sales revenue.

¹³ Lyse Fiber’s market shares also include Signal Bredbånd. The market share figures for Broadnet also include Xfiber and DataGuard.

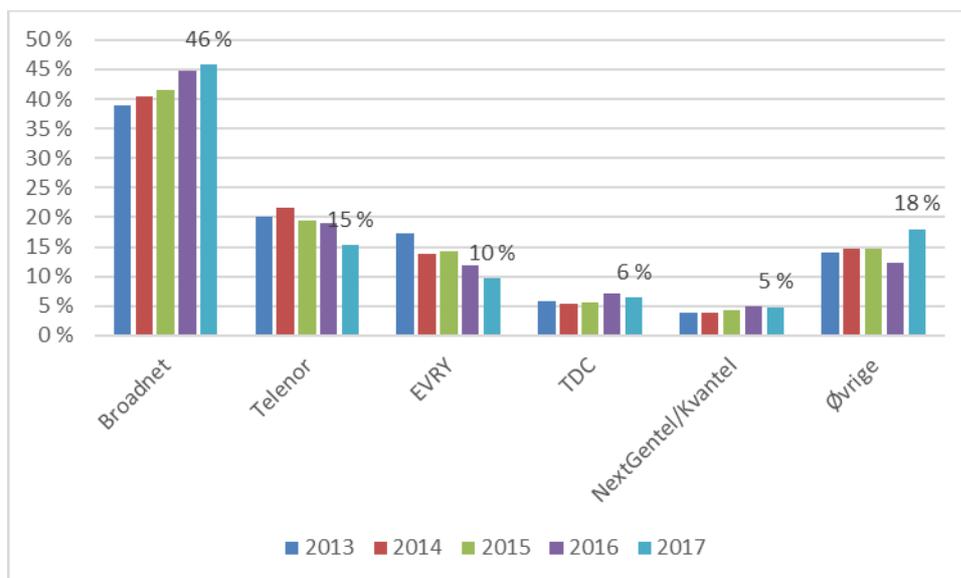


Figure 15: Market shares for retail sales of dark fibre, measured by sales revenue. (Source: Nkom's electronic communications statistics for 2017)

71. In Nkom's electronic communications statistics access solutions based on IP VPN and Ethernet VPN products are categorised as *data communication services*. Figure 16 shows the market shares based on sales revenue in this retail market.

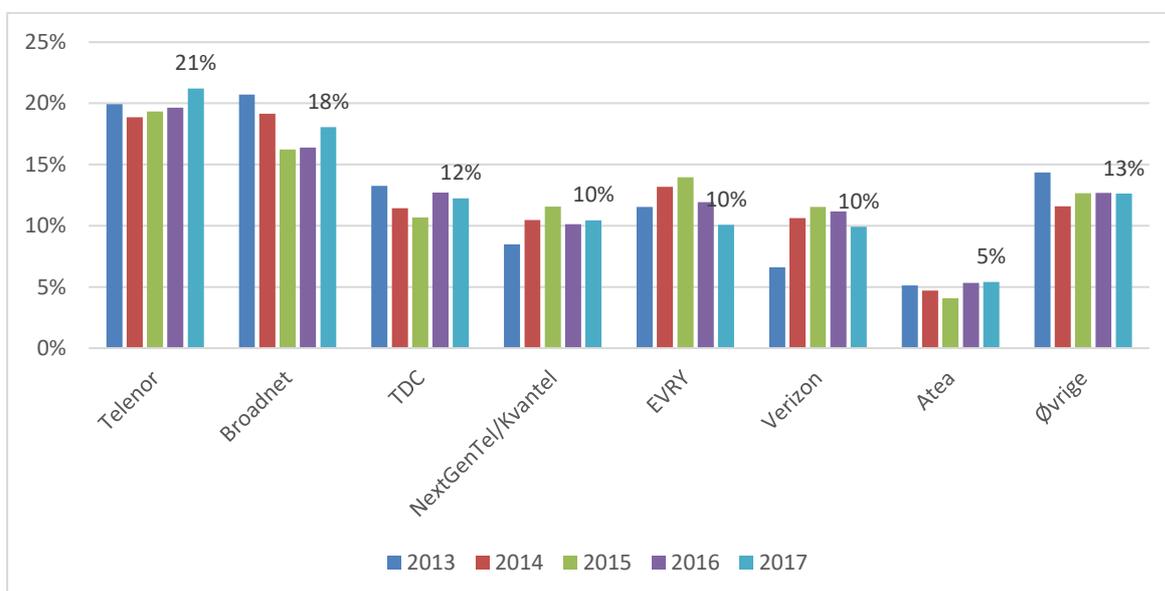


Figure 16: Market shares for retail sales of data communication services, measured by sales revenue. (Source: Nkom's electronic communications statistics for 2017)

72. According to the electronic communications statistics for 2017, total revenue from retail sales was NOK 442 million for capacity products, NOK 209 million for dark fibre, and NOK 1,736 million for data communications services. Figure 17 shows the market shares based on the providers' combined revenue from retail sales for capacity products, dark fibre and data communication services.

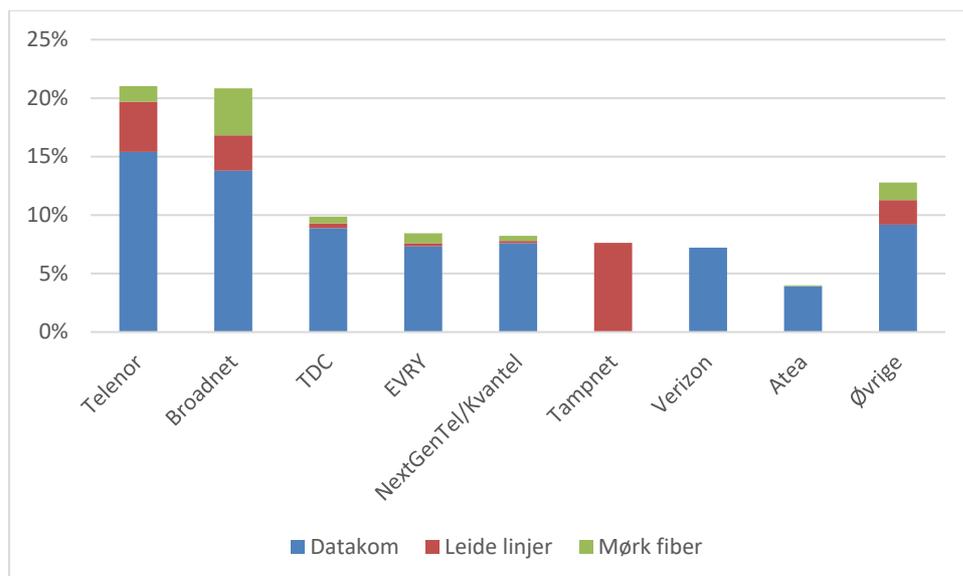


Figure 17: Market shares for retail sales of capacity products, dark fibre and data communication services, measured by sales revenue. (Source: Nkom's electronic communications statistics for 2017)

73. Figure 17 shows that no providers in this combined retail market have a market share of over 25%. Telenor, Broadnet, TDC and EVRY are the four largest providers measured by retail sales of capacity products, dark fibre and data communication combined. These four providers each have market shares of between 8 and 21%.

74. In figure 17, Tampnet's share of the sales revenue is approximately 8%. As Tampnet's operations are primarily focused on a limited customer segment related to offshore oil operations in the North Sea, TampNet cannot really be regarded as a provider that affects the competitive situation in mainland Norway, with the exception of that part of the market that includes companies in oil-related sectors. Excluding TampNet's sales of capacity products from the total retail sales of capacity products, dark fibre and data communications gives the market share distribution shown in figure 18.

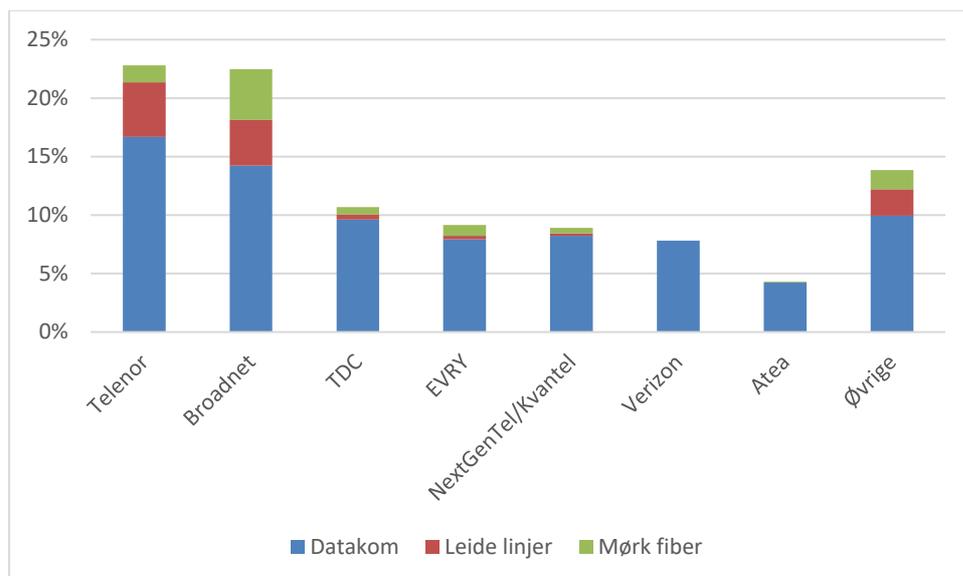


Figure 18: Market shares for retail sales of capacity products, dark fibre and data communication services, excluding TampNet's share, measured by sales revenue. (Source: Nkom's electronic communications statistics for 2017)

75. Figure 18 shows that even when TampNet's sales of capacity products are excluded, there are still no providers in this combined retail market with a market share of more than 25%.

2.2.6 Development trends in the retail market for fixed access

76. The developments in technology enable ever higher speeds in broadband networks, and the growth in the demand for high-speed broadband is expected to continue in the years ahead as a result of increased use of capacity-intensive broadband services, dynamic service development and digitalisation of ever more value chains in different sectors.

77. In the following Nkom has summarised the main developments on the demand side and the supply side in the retail market for fixed access.

Developments on the demand side

78. In the residential market, changing patterns of use and development of services related to household's TV consumption in particular will affect the capacity needs in broadband networks in the future. The migration from linear TV as the sole platform for TV entertainment to a situation where linear TV is competing with on-demand TV, streaming of films and TV shows, and other OTT entertainment is expected to continue in the coming years. In addition, it is also assumed that the use of video-based content in various social media will increase. Other examples of services that will drive the need for capacity in the residential market are online games with increasingly advanced graphics and cloud-based storage of video, photos, etc.

79. Strong competition on the service level in broadband networks is expected between OTT actors and access providers in the years to come. Network neutrality provides the basis for increased service diversity and increased freedom of choice for broadband customers. The consumer authorities' requirements regarding separate sales of internet access and TV packages in HFC networks will further support this trend.

80. On this basis, it will be important to pave the way for access to high-capacity broadband networks across the whole country. This is reflected in the government's electronic communications policy plan, which defines an overarching target of 100 Mbit/s coverage for 90% of Norwegian households by 2020. In the long term, the goal is for all households to have an offer of high-speed broadband.

81. In the business market and in the public sector, it is assumed that an increasing portion of service production, data processing and data storage will be cloud-based in the coming years. In addition, an increasing number of new value chains and processes will be digitised and automated. The realisation of concepts such as "smart cities" and "smart municipalities" will also increase the capacity needs in broadband networks, and the market for the Internet of Things is now starting to emerge. In sum, these trends are expected to lead to increased demand for high-capacity broadband in the business market in the coming years, in both the private and the public sector.

Developments on the supply side

82. The coverage survey for 2018 showed that around 82% of Norwegian households had access to broadband with speeds of 100 Mbit/s or more, up from 80% in 2017. Fibre coverage was 59% in 2018, while 49% had access to broadband over an HFC network. Approximately 60% of the households had access to VDSL.

83. Further fibre roll-out is expected in the next few years. Telenor has communicated a goal of increasing its market share in fibre to approximately 40% in 2020. At the same time, Lyse and the Altibox partners are continuing their roll-out of fibre in those parts of the country where Altibox is represented, and the other local and regional fibre operators in Norway are also expected to contribute to increased fibre coverage in the next few years. However, the extent of the future fibre roll-out is uncertain. Most of the most densely populated areas in Norway already have fibre, and the remaining geographical areas are thus less attractive for fibre investments.

84. One factor that may contribute to increased fibre coverage is the roll-out of the next generation mobile network (5G). The 5G network will probably be rolled out with fibre to significantly more base stations in the mobile networks than is currently the case. The roll-out of fibre to base stations may thus provide the foundation for increased fibre coverage in the residential and business markets in the same geographical areas.

85. The upgrade of the copper network will also increase 100 Mbit/s coverage. However, the scope of this upgrade is currently uncertain. Firstly, regulatory issues may affect the scale

of the upgrade of the copper network. Furthermore, investment decisions related to additional fibre roll-out by both Telenor and other fibre operators may affect the degree to which the copper network is upgraded.

86. New HFC networks are not expected to be rolled out to any significant extent. It is assumed that any new access networks HFC providers might build will be fibre networks. However, new versions of DOCSIS will increase the capacity of the existing HFC networks, and it is assumed that the competition between HFC networks and fibre networks will continue in the coming years. It is currently uncertain whether, and if so when, there will be a large amount of conversions from coaxial cable to fibre in the customer accesses in HFC networks.

2.3 Definition of the product market for high-quality access products at retail level.

87. As described in Section 2.1, Nkom will first delimit the relevant product market at the retail level, in order then to derive the relevant product market at the wholesale level.

88. The delimitation of product markets is based on the description of the market and competitive conditions in the retail market, cf. Section 2.2. In addition, Nkom's market delimitation will be based on ESA's assessments of this retail market and the accompanying description of the relevant markets, and the Commission's Explanatory Note to the Recommendation on relevant markets.

2.3.1 Delimitation between standardised broadband access and high-quality access products in the retail market

89. In the Explanatory Note, the Commission has defined one retail market for standard access products and another retail market for high-quality access products. The description of different customer segments in the Norwegian retail market for fixed access in Section 2.2 above shows that in the Norwegian market, several factors indicate that, on the basis of a substitutability assessment, it is natural to distinguish one product market for standard broadband subscriptions and another product market for access products requested by businesses in need of access solutions with greater functionality and/or quality than is provided by the standardised mass-market products.

90. Since it is functionality and quality, as opposed to price, that appear to be the most decisive purchasing criteria for businesses that want high-quality access products rather than a standard broadband subscription, Nkom assumes that a small, non-transitory price increase on high-quality products will not cause business customers to any great extent to switch from high-quality products to standard products that do not have similar functionality and quality. This indicates limited demand-side substitutability between standardised broadband access and high-quality access products.

91. In terms of supply-side substitutability, Nkom assumes that a small, non-transitory price increase on high-quality products will not lead to providers of standardised broadband access that do not already offer high-quality access products to establish such an offering as a result of the price increase to any significant degree. This is due to the fact that offering high-quality access products will require providers of standard access products to establish new processes and build new competencies linked to products, sales and delivery. The increased complexity entailed by provision of access solutions to companies with greater functionality and/or quality requirements than are afforded by the standardised mass market products indicates limited degree of supply-side substitutability.

92. Like ESA and the Commission, Nkom has concluded that there is not sufficient substitutability on either the supply side or the demand side for standardised broadband access and high-quality access products to belong to the same relevant product market. Standardised broadband access and access products requested by companies that need access solutions with greater functionality and/or quality than is provided by the standardised mass market products thus constitute two different product markets.

93. As regards the degree of substitutability between standard access products marketed separately to residential and business customers, it is apparent from the description of the different customer segments in Section 2.2 above that there are several factors that argue in favour of a high degree of demand-side substitutability between these standard access products, even if the providers themselves differentiate between offers for residential customers and business customers. This is especially true for small businesses with few employees and without advanced broadband needs. Nkom finds that a share of these small businesses will switch to a standard residential subscription on a small, non-transitory price increase on standard business subscriptions.

94. In Nkom's opinion, there is also a high degree of supply-side substitutability related to standard broadband subscriptions marketed to the residential and business markets respectively. Although some of the providers of standardised broadband access have a primary focus on either the residential or the business market, standard broadband subscriptions are generally offered to the entire market. This implies, for example, that most providers that have initially targeted their operations towards the residential market also tend to have a standard offering for companies that do not request greater functionality and/or quality than is provided by mass-market products.

95. Like ESA and the Commission, Nkom has concluded that there is sufficient substitutability on both the supply side and the demand side that standardised broadband access marketed to the residential market and the business market, respectively, belong to the same relevant product market.

96. Against this backdrop, Nkom finds that the distinction drawn up in the ESA Recommendation between standardised broadband access and high-quality access products

in the retail market is also applicable to the Norwegian market. This means that the wholesale markets for standard access products (Market 3a and Market 3b) and the market for wholesale high-quality access provided at a fixed location (Market 4) will be derived from two different product markets at the retail level.

2.3.2 Definition of the retail market for high-quality access products

97. In the Commission's description of this retail market in the Explanatory Note (Section 4.2.1, page 36) it is noted that many business customers demand more advanced and reliable access products than standardised broadband access in order to be able to link different units/locations together and for intra-company communication. The Explanatory Note further states that these services would typically be offered with high-quality service level guarantees, guaranteed availability and often symmetric upload and download speeds:

"Many non-residential customers may also demand quite standardized services. On the other hand, many business customers need more advanced and reliable services to link their business units and locations and allow for internal communication. This especially applies to large, multiple site businesses. It does, however, not exclude other non-residential customers, such as, for example, SMEs with more sophisticated needs. These services would typically be offered with high-quality service level guarantees, guaranteed availability and often symmetric up-and download speed."

98. With this as the starting point, the Explanatory Note finds that the retail market for high-quality access products consists of a variety of different products that cover the above-mentioned needs of business customers, based on specified product characteristics:

"The Retail high-quality market would, therefore, include a variety of products that are geared towards the specific needs of these individual customers. A high quality of service level, and guaranteed availability, sufficiently high upload and download rates, limited contention and range, for example, are important characteristics of these retail products. The typical services enterprises would seek are a high-quality, high-bandwidth connection to the Internet with limited contention, additional desk support, short repair times, mobile connection for employees, IP telephony, data centres and back-up, and, in Case of multi-site companies, dedicated, uncontended data connections between several nation-wide sites. Many business users would also demand a value-added service, for example, virtual private networks."

99. The Commission's description of this retail market in the Explanatory Note further states that high-quality access products are typically provided over leased lines or equivalent copper-based or fibre-based connections.

"Those retail high-quality services are typically provided over leased lines or equivalent copper-based or fibre-based connections (e.g. LLU, Ethernet connections)."

100. The Commission's description of the retail market for high-quality access products in the Explanatory Note provides the starting point for Nkom's definition of this retail market in Norway.

101. Products that are part of this retail market consist of one or more accesses to the location(s) of business customers¹⁴. In addition, the products must have features linked to quality (QoS), availability (for example, guaranteed availability), service level (for example, fault correction procedures), guaranteed capacity etc. that are superior to the standardised broadband subscriptions that are offered in the mass market.

102. If one compares the description of this retail market in the Explanatory Note (pages 36-37) with product descriptions from operators that offer fixed access to companies that require quality/functionality superior to mass market products in the Norwegian market, it is Nkom's view that the retail market for high-quality access products includes IP-VPN products, Ethernet-VPN products and capacity products such as leased lines and optical channels (wave lengths) that include the product characteristics that are referred to in the Explanatory Note. Products that provide high-quality, dedicated access to the internet for companies are also included in this market. Such products are often provided over individual fibre accesses that are developed based on demand from companies with special requirements.

103. These products are marketed and sold with different product names in the Norwegian retail market. For example, Telenor uses the term *Bedriftsnettverk (Business Network)* as a collective term for the products *Nordic Connect* and *Ethernet Connect*. The products known as *Bredbånd Bedrift Fiber Premium (Broadband Business Fibre Premium)* and *Bredbånd Bedrift Fiber Pluss (Broadband Business Fibre Plus)* offer high-quality, dedicated access to the internet. In addition, Telenor offers the product *Optisk kapasitet (Optical capacity)* and an extensive range of leased lines in the form of leased terminating segments. Among other things, Broadnet operates with the products *Ethernet*, *IPVPN* and *Dedikert kapasitet (Dedicated capacity)*, while NextGenTel uses the term *Datanett (Data network)* and offers the product *NGT DataNet*. TDC is also a provider in this market with its *T DC Nordic IP VPN* product. Under the *Datakom (Data communications)* product category, Kvantel offers products such as *Ethernet*, *IP-VPN*, *Bølgelengde (Wave length)* and *Cloud connect*. Some of the Altibox partners also have a presence in this market with, among others, the products *Altibox IP VPN* and *Altibox Optisk kapasitet (Altibox Optical capacity)*. Equivalent products are also offered by several local/regional fibre operators outside the Altibox partnership. In many instances, these are energy companies that have commenced fibre development with the primary objective of offering internet, TV and telephony services in the retail market, but also to some extent offer services in the business market based on their fibre networks. High-quality access products that are part of the data communication products of system integrators such as EVRY and

¹⁴ Business customer in this context refers to both private companies and the public sector, including both state, county and municipal enterprises and agencies.

Atea are also included. These operators base their operations on the purchase of different wholesale products that they further refine and sell in the retail market to companies and they do not have much of their own physical infrastructure. Several of the above-mentioned operators also offer high-quality, dedicated internet access over fibre access solutions.

104. The degree of substitutability on the demand side in the retail market between the above-mentioned products can vary between different customer segments in the business market. Some of the products are most suitable for large companies with many geographically scattered locations, while other products are oriented more towards smaller companies with only one or a small number of locations. However, there are no clear boundaries between either the different customer segments or between products adapted to different segments in this market. Nkom is therefore of the view that there is a large degree of substitutability on the demand side between the above-mentioned products among companies that demand access products with superior functionality/quality to standard broadband subscriptions.

105. Nkom also considers there to be a large degree of substitutability on the supply side for the above-mentioned capacity and data communication products. As shown by the examples provided above of products in this retail market in Norway, most providers in this market have a product portfolio consisting of different capacity and data communication products adapted to different types of companies that require access products with functionality/quality superior to standard broadband subscriptions, as well as products that provide high-quality, dedicated access to the internet. The supply side is therefore not characterised by any of the providers only offering capacity products, while others only offer data communication products. It also does not appear to be the general rule that providers offer access products to a limited customer segment in this market. The exception is Tampnet which has largely oriented its business activities towards a defined customer segment linked to oil activities in the North Sea.

106. Based on the above-mentioned assessments, Nkom has found that all types of capacity and data communication products that are offered to companies that require access products with functionality/quality superior to standard broadband subscriptions are included in this market. The same applies to products that provide high-quality, dedicated access to the internet.

2.3.2.1 Delimitation between high-quality access products and dark fibre at retail level

107. Nkom has conducted a separate assessment of whether dark fibre is considered to be part of the relevant retail market for high-quality access products. In this assessment, Nkom has used the description of the retail market for high-quality access products in the Explanatory Note (page 36-37) as a basis. This description does not mention dark fibre as an example of a product in this market. The purchase of dark fibre requires the company itself to light the fibre and that the company takes responsibility for operating the access solution. This means that dark fibre does not have the product characteristics linked to functionality/quality

that, according to the Explanatory Note, typify products in this relevant market. In principle, Nkom considers this to be a factor that suggests dark fibre is not a part of this product market.

108. In connection with the preparation of the report “Survey and assessment of infrastructure that can be used by data centres”¹⁵, in autumn 2016 Nkom assessed the demand for dark fibre and other transmission products in connection with the data centre activity. Nkom’s findings show that only the largest data centres and the largest customers, often international operators such as Apple, Facebook and Google, presently require long-distance dark fibre. As a general rule, the need for dark fibre will be based on a desire to have as much control as possible over the transmission itself. For this customer group, optical channel or other capacity products are most probably not genuine alternatives. The need for dark fibre can also be linked to a desire to be easily able to expand capacity without incurring unpredictable price increases. Even though the assessment was primarily focussed on transmission requirements over longer distances, Nkom is of the view that the information that has emerged is also relevant to access products.

109. As Nkom sees it, an assessment of substitutability on the demand side suggests that dark fibre can only be deemed to be a substitute for a limited proportion of the companies that demand access products with functionality/quality superior to standard broadband subscriptions. It will only be the companies that wish to light the fibre and operate the access solution itself that consider dark fibre to be a substitute for the above-mentioned capacity and data communication productions. For companies that demand access solutions with features as mentioned on page 36 of the Explanatory Note, dark fibre is not a substitute for capacity and data communication products that include requirements for the provider linked to quality, availability and service level.

110. The degree of substitutability between dark fibre and high-quality access products as these are described in the Explanatory Note appears somewhat greater on the supply side than on the demand side in the Norwegian market. It is not clear that providers which, as a starting point, only offer dark fibre, will be simply able to change their production to also include capacity and data communication products in response to a marginal change in price. This is due to the capacity and data communication products comprising more functionality and thereby other requirements for product and delivery organisations, with associated processes, for the provider of dark fibre. On the other side, many of the providers of dark fibre in Norway already also offer capacity and/or data communication products. Nkom therefore finds that there is a somewhat greater degree of substitutability on the supply side than on the demand side between dark fibre and the above-mentioned capacity and data communication products.

111. Despite a certain degree of substitutability on the supply side, Nkom is of the view that there is not sufficient substitutability on the demand side for dark fibre to be considered as part

¹⁵ The report is available at Nkom’s website: <http://www.nkom.no/aktuelt/nyheter/nkom-foresl%C3%A5r-tiltak-for-%C3%A5-styrke-markedet-for-gr%C3%B8nne-datasentre>

of the retail market for high-quality access products. As a general rule, substitutability on the demand side shall be assigned greater weight than substitutability on the supply side when defining relevant markets. Nkom has also placed emphasis on the description in the Explanatory Note of the features and characteristics of products in this retail market not indicating that dark fibre be included in the relevant product market. Based on this, Nkom has found that dark fibre is not a product that is included in the retail market for high-quality access products.

2.4 Definition of the product market for wholesale high-quality access provided at a fixed location

112. In this chapter the Nkom will determine the relevant product market at wholesale level based on the retail market for high-quality access products. The Commission's description of the market for wholesale high-quality access provided at a fixed location in the Explanatory Note, together with Nkom's definition of the associated retail market in Section 2.3.2 above, form the basis for Nkom's definition of this wholesale market in Norway.

113. In the Commission's description in the Explanatory Note (Section 4.2.2.3) it states that this wholesale market includes different wholesale products which providers in the retail market use as input factors to offer high-quality access solutions to companies that request such solutions. These wholesale products include leased lines with both traditional and alternative interfaces, independent of underlying infrastructure, and other wholesale products which fulfil certain quality characteristics.

"To be able to meet the demand of retail business customers for high-quality access and, very often, connect their multiple sites (including cross-border), alternative operators use a number of different wholesale inputs, ranging from leased lines using traditional or alternative interfaces, independently of the underlying infrastructure, to other wholesale access products which fulfil certain quality characteristics."

114. The Explanatory Note further states that typical product characteristics for leased lines are that they provide a dedicated connection without overbooking and symmetrical upstream and downstream capacity. Leased lines can be based on different technical solutions. The traditional interfaces include analogue and digital connections with highly variable bandwidth, for example, via SDH/PDH or TDM-based solutions. These are normally point-to-point connections (PtP). Leased lines based on Ethernet are increasingly being offered, which provide greater flexibility at lower costs and which can be both PtP and point-to-multipoint (PtMP):

"The distinguishing product characteristics of leased lines are their ability to provide dedicated, and uncontended connections, and symmetrical upload and download speeds. Leased lines may be provided using a range of technologies. Legacy options

(so-called "traditional" interface leased lines) include low-bandwidth analogue leased lines and digital lines at a wide range of bandwidths, for example, via SDH/PDH or TDM-based technologies. These are usually point-to-point connections. Increasingly, leased lines are offered over Ethernet-based technologies, allowing more flexibility ", normally at a lower cost, and can be both PtP and PtMP. Ethernet-based leased lines, in particular carrier-grade Ethernet with larger frames, have been found substituteable to legacy traditional leased lines in most Member states."

115. The Explanatory Note also states that wholesale products that are overbooked and asymmetrical and which are offered over copper or hybrid infrastructure can also be deemed as substitutes to leased lines for wholesale customers if such wholesale products are offered with sufficiently high quality in terms of:

- i. guaranteed availability and high service quality in the form of SLAs, 24/7 customer support, short fault correction times and redundant conveyance routes,
- ii. high-quality internet monitoring, including backhaul, that ensure adequate upstream capacity with low overbooking factor,
- iii. option of internet access at connection points that are defined based on the company's location and not based on household location, and
- iv. option of being able to offer different VLAN solutions to the business customers.

"Other, typically contended and asymmetric wholesale access products offered by a network owner to a wholesale access seeker over copper or hybrid infrastructures, can be regarded by access seekers as substitutes to leased lines, when they display certain advanced quality characteristics at the wholesale level, 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; (iv) the possibility to offer separate Ethernet continuity (e.g. through an additional header allowing for several layers of virtual LANs)."

116. Based on this, the Explanatory Note makes reference to it being reasonable from a forward-looking perspective to define a wholesale market for high-quality access products that includes a broad range of access products that cover the needs of the providers in the retail market (and the business customers that request the retail products) and which satisfy the above-mentioned quality requirements:

"Therefore, it appears appropriate, on a forward-looking basis, to define a wholesale market for high-quality access, which includes a widening range of access products necessary to fulfil the needs of business services providers (and ultimately large retail Business customers) and which displays the service characteristics described above."

117. The substitutability assessment forms the basis for defining product markets, and for this relevant wholesale market, Nkom takes the following approach for assessments of substitutability which appear in the Explanatory Note:

"These access products are not necessarily all direct substitutes of each other. However, they may still form part of the same market, provided they are in a so-called "chain of Substitution". At one end, there are the terminating segments of traditional interface leased lines, which have been found substitutable to "carrier-grade" Ethernet services for all but the most demanding business applications. At The other end, users that can make some concessions on certain quality-of-services aspects could switch to a high-quality access service, which is not necessarily a terminating segment of a leased line. Nevertheless, as a result, the products we find at both ends of the chain belong to the same market as they are both constrained by the same product(s)."

118. Based on the above-mentioned descriptions and assessments in the Explanatory Note, Nkom has evaluated the substitutability between different wholesale products to determine how the Norwegian market for wholesale high-quality access provided at a fixed location shall be defined.

119. Nkom is of the view that in the Norwegian market there is a large degree of substitutability on the demand side between different capacities in this wholesale market. The wholesale customer's choice of capacity depends on each end-customer's need for quality/functionality and the alternative access technologies available in the relevant instance. All capacities that are adequate for satisfying the requirements of the end-customer will therefore be able to create a chain of substitution in this market. Nkom therefore cannot see that there is, in principle, a basis for dividing this product market into different capacity classes based on an assessment of substitutability on the demand side.

120. When viewed from the supply side in this wholesale market, a provider of a certain capacity can relatively easily offer different capacities. This indicates that an assessment of substitutability on the supply side in this market also suggests that all capacities in this wholesale market are included in the same product market.

121. Nkom is also of the view that there is a large degree of substitutability on the demand side between different dedicated capacity services in this wholesale market in Norway. The wholesale customers' choice between capacity services with dedicated capacity based on traditional interface (TDM/PDH/SDH) or Ethernet interface is therefore primarily made based on what is best suited for the communications solutions of the individual end-customers. Migration is occurring from traditional SDH-based capacity services to Ethernet-based capacity

services and, based on a forward-looking perspective, there is thus considered to be a large degree of substitutability on the demand side between these services. When viewed from the supply side in this wholesale market, there also appears to be a large degree of substitutability between capacity products based on different interfaces.

122. The above-mentioned substitutability assessments indicate that all wholesale products that form the basis for high-quality access products in the retail market and which also satisfy the above-mentioned requirements for product characteristics associated with quality, availability and service level are, in principle, a part of this wholesale market, irrespective of the capacity and technical interface of the dedicated connections. At the same time, an overall assessment of the following product characteristics is necessary for determining whether or not a specific wholesale product is part of the relevant product market:

- Dedicated connection.
- Option of symmetrical upstream and downstream capacity.
- SLA with requirement for guaranteed availability and high level of service quality.
- Other product characteristics linked to quality, availability or service level that differ from wholesale product adapted to standardised broadband access in the mass market.

123. An assessment of these product characteristics is also important for differentiating wholesale products in Market 4 from the wholesale products in Markets 3a and 3b. Wholesale products in Market 3a/3b do not meet the product characteristic requirements. Since these product characteristics are a central part of the definition and delimitation of Market 4, an assessment of product characteristics will be an important starting point when determining whether a specific wholesale product belongs to Market 3a/3b, Market 4 or another wholesale market.

124. Market 4 otherwise differs from Market 3a/3b in that Market 3a/3b products provide the wholesale customer with access to an *access network* from a connection point that allows the wholesale customer to establish competing retail offerings to all the broadband customers in a geographical area that is connected to the relevant access network, whereas Market 4 products normally consist of individual access connections that the wholesale customer purchases to provide an access product or access solution to a specific end-customer that requires quality and functionality beyond that afforded by standard broadband subscriptions.

2.4.1 Delimitation between high-quality access products and dark fibre at wholesale level

125. In Section 2.3.2.1 Nkom concluded that dark fibre is not a product that is included in the retail market for high-quality access products. Nkom has assessed whether dark fibre can still be included in the relevant product market at wholesale level even if it was not deemed to be sufficiently substitutable between high-quality access products and dark fibre at retail level.

126. Nkom assumes that dark fibre can be an alternative input factor for wholesale customers in this market who wish to offer high-quality access products to companies in the retail market. This indicates that, at wholesale level, there can also be a certain degree of substitutability between dark fibre and capacity products that form the basis for high-quality access products in the retail market. At the same time, in this context, Nkom finds reason to place decisive weight on the above-mentioned product characteristics that have to be in place for a wholesale market to be deemed part of Market 4. These product characteristics also explicitly appear in the description of the relevant product market in the Explanatory Note.

127. Dark fibre is characterised by it being the wholesale customer that lights the fibre and that the wholesale customer itself is responsible for producing products with the features and characteristics that typify the wholesale products in Market 4. Nkom is therefore of the view that dark fibre does not satisfy the requirement for product characteristics that is a key part of the market definition of this wholesale market.

128. Based on this, Nkom has found that dark fibre shall also be delimited from high-quality access products at wholesale level. Dark fibre is therefore not included in Market 4.

2.4.2 Delimitation between terminating and trunk segments of leased lines at wholesale level

129. It states on page 49 of the Explanatory Note that the definition of a terminating segment of a leased line will depend on the network topology in each country. It is also noted that it is important to have a clear distinction between the terminating and trunk segment at wholesale level:

“What constitutes precisely a terminating segment of a leased line will depend on the network topology specific to a particular Member State. Most Member States have defined terminating segments of leased lines as the part between end-users’ premises and the closest exchange of a service provider. However, a clear distinction between the terminating and trunk segment is important as the market for wholesale trunk segments of leased lines has been removed from the list of markets susceptible to ex ante regulation in the 2007 recommendation.”

130. Since the first analyses and decisions regarding significant market power in the wholesale market for leased lines in 2007, NKOM has defined the wholesale market for leased lines as lines with speeds up to and including 8 Mbit/s and the wholesale market for trunk segments of leased lines as lines with speed above 8 Mbit/s. The reasons for this are described in more detail in the analyses of these markets from 2007 and 2012.

131. Based on how Market 4 is defined and delimited above, it is no longer natural to use speed to distinguish between terminating segments and trunk segments of leased lines. Despite it still having proven difficult to obtain figures from the providers in this wholesale market that differentiate between terminating segments and trunk segments of leased lines,

Nkom is of the view that this cannot be assigned decisive weight for the delimitation of Market 4.

132. All wholesale leased lines that are used in the retail market for access for business customers that demand access products and solutions with functionality/quality superior to standard broadband subscriptions, are included in Market 4. This entails that wholesale products that are covered by the definition above and which are used as terminating segments of leased lines for companies in the retail market are included in Market 4. Wholesale products with the above-mentioned product characteristics, but which are not used as terminating segments of leased lines for companies in the retail market, will therefore be considered trunk segments of leased lines in this context.

133. If, in a specific instance, doubt arises about where to draw the line between terminating segments and trunk segments of leased lines, the starting point will be that the trunk segments of leased lines extend from the end-customer's address to the first network node where the relevant trunk segment is connected to the wholesale customer's network, irrespective of whether this network is based on own or leased infrastructure. In this context, network node refers to a point on the network where the wholesale customer connects to a physical interface to take over the terminating segments of leased lines. See Figure 19.

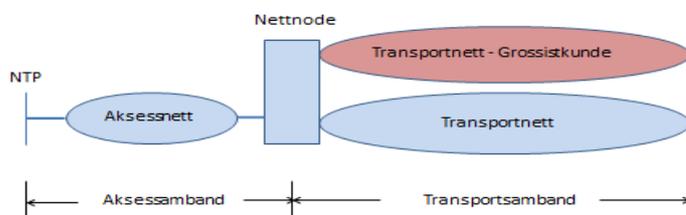


Figure 19: Description of the delimitation between terminating segments and trunk segments of leased lines.

2.4.3 Internal sales

134. Nkom concludes that in the markets for wholesale local access and wholesale central access provided at fixed location (Market 3a and 3b) the internal sales of the providers must be included in the markets. In these wholesale markets there is a close correlation between the wholesale products and the products that are offered in the associated retail market. In Markets 3a and 3b, Telenor is, in reality, the only provider at wholesale level and Telenor's wholesale services are the result of a regulatory order to offer access. In order to not underestimate the competition-related importance of the services of vertically integrated

operators in the retail market, all of the providers' internal sales are included in these wholesale markets.

135. In Market 4 there is not an equally clear connection between the wholesale products and the products that are offered in the retail market for high-quality access products. For example, leased lines and optical channels are used as input factors in other types of electronic communications networks (for example, fixed and mobile telephony). The same applies for different types of data communication services. It will be challenging to identify what parts of the internal sales that should potentially be included in a calculation of market shares in Market 4 and there will be a great deal of uncertainty if internal sales were to be included in the calculation of market shares.

136. Equivalently, the provision of high-quality access products in the retail market may consist of a number of different wholesale products. Some of these can be self-produced and others can be purchased from several different wholesale providers. For example, the provision of IP-VPN to a company with multiple locations can be developed based on several different access solutions, some of which are based on own infrastructure and others are purchased in the wholesale market.

137. In addition, Market 4 consists primarily of products that have not been subject to regulation in the past few years and the market therefore appears to be more of a genuine wholesale market. Unlike Market 3a and 3b, there are a number of providers in Market 4 and Nkom is of the view that this wholesale market largely provides genuine choice with regard to purchasing from different providers.

138. Based on this, Nkom does not consider it appropriate to include internal sales in the market for wholesale high-quality access provided at a fixed location. The assessment of market shares will therefore be carried out based on external sales in the market.

2.5 Geographical delimitation of the market for wholesale high-quality access provided at a fixed location

2.5.1 General comments on the geographic market

139. Nkom can define local or national markets. The jurisdiction for defining transnational markets is vested with ESA. In the previous market analysis of the wholesale market for leased lines with capacities up to and including 8 Mbit/s dated 20 April 2012, Nkom concluded that the geographic market is national.

140. In accordance with paragraph 57 of the Guidelines, the geographic market may be defined as that area in which the relevant product is offered on approximately similar and sufficiently homogeneous conditions of competition. The degree of substitutability both on the supply and the demand side may be taken into consideration in the assessment of the

geographic market and, as a part of such a substitutability assessment on the demand side, preferences and geographic purchase patterns should be taken into account. However, paragraph 60 of the Guidelines points out that geographic markets in electronic communications have traditionally been defined by reference to the relevant network's area of coverage as well as the effective boundaries (jurisdiction) of the legal regulation of the market.

141. Further reference to Norway as a jurisdiction should be taken to mean mainland Norway, cf. the description of the Electronic Communications Act's geographical jurisdiction in Section 2.1.2.

142. It might make sense in the case of some product markets to divide them into geographic markets smaller than the national market, since there are local providers of electronic communication services covered by the relevant product market. ERG published its "Common Position on Geographic Aspects of Market Analysis (definition and remedies)" (ERG Common Position) in October 2008, in which ERG recommends a step-by-step process for geographic definition of the market. The first step in this process is to identify whether it is necessary to undertake a detailed geographic analysis.

143. In June 2014, BEREC published "Common Position on geographical aspects of market analysis" (BEREC Common Position). This document is based on the same main principles as the ERG Common Position, but also takes into account developments from 2008 to 2014 that are relevant in an assessment of definitions of geographic markets, including the roll-out of new NGA networks and upgrades to existing broadband networks.

144. The BEREC Common Position recommends that the geographical analysis be preceded by an assessment of developments in competition in the retail market. BEREC has identified the following indicators as the most relevant when national authorities shall determine whether it is necessary to conduct a complete geographic analysis in order to assess whether it is appropriate to define local markets:

- Geographical differences in providers' networks and coverage.
- The number of providers in the retail market and their market shares in different geographic areas.
- Geographic differences in prices and products offered.

145. In accordance with BEREC Common Position, the choice of geographical units that are going to be used as the basis for definition of a different geographic market than national markets, ought to meet the following four criteria:

1. The geographical units must be mutually exclusive.
2. It must be possible to map the network structure of all relevant network providers and their service offerings within the geographical units.
3. There must be clear and stable boundaries between the geographical units.

4. The geographical units must be small enough that the competitive conditions will not vary significantly within the unit, but at the same time large enough for the burden on the providers and the authorities with regard to data collection and analysis is reasonable.

2.5.2 Definition of the relevant geographic market

146. Definitions of relevant geographic markets can be made with different levels of detail. In the market analysis of Market 3a and 3b, Nkom has carried out a rather detailed and extensive geographic analysis based on BEREC Common Position, in which we first made an assessment of the competitive development in the retail market for standardised broadband access, including an analysis of price differences in different geographical areas and then used the relevant indicators that BEREC has defined to analyse the degree of homogeneity in the competitive conditions. Based on this geographical analysis for the retail market linked to Market 3a and 3b, Nkom has concluded that there are no grounds for defining local geographic markets for these two wholesale markets and the relevant geographic markets for Market 3a and 3b will therefore be deemed to be national.

147. Market 4 is based on a different retail market than Market 3a and 3b and the geographic analysis for the latter market can therefore not simply be used as a basis for Market 4. At the same time, a conclusion that local geographic markets in wholesale markets 3a and 3b would have been an element that indicated that Market 4 should also have been subject to an equally detailed geographic analysis as for the 3a and 3b wholesale markets

148. The retail market for high-quality access products is characterised by parts of the demand side desiring access solutions that link units/departmental offices that are located at different sites in Norway. The geographical placement and number of locations will vary from company to company. There is thus a large degree of heterogeneity on the demand side in this retail market with regard to the number of accesses that are included in desired access solutions and the geographic spread of each company's location. Based on this, it is not possible to draw clear and stable boundaries between geographic units that are mutually exclusive in this retail market. This indicates that the retail market for high-quality access products is national.

149. Even though there are geographic differences between the networks and coverage of different providers, this does not appear to be a factor that prevents the providers in this retail market from offering access solutions based on the needs of the individual end-customers. The different providers base themselves on different combinations of own infrastructure and wholesale products from one or more wholesale providers, adapted to each end-customer's qualitative/functional requirements at different geographic locations.

150. The largest providers in this retail market supply high-quality access products in the entire country, based on own infrastructure, leased infrastructure or a combination of own and leased infrastructure. The price for access to different geographical locations can vary, but this

can only be due to factors other than different degrees of competition. The distance to central hubs on the network, i.e. the length of the access connection, and cost differences resulting from this, are considered to be an important factor in this context.

151. The number of operators that offer capacity services varies in different parts of the country. Broadnet and Telenor have nationwide services. TDC offers services that cover parts of the country. In addition, a number of fibre operators offer services in local/regional areas. Several of these collaborate to achieve a larger coverage area.

152. There are many operators present in the Oslo area and there appears to be a high level of competition between the providers. In connection with Nkom's assessment of the demand for transmission products in connection with the data centre activity, the data centre operators in the Oslo area have stated that there are many alternatives and that different transmission services are offered at acceptable prices. In many instances there will be between 10 and 20 providers that can supply capacity and/or data communication products and the competition appears to be strong. In other parts of the country the number of possible providers is often significantly lower and the competition therefore less and this is reflected in higher prices. Data centres that are located in remote areas have expressed the view that it is difficult to have the requested products delivered and that the prices for transmission to Oslo or other central points are unreasonably high. It can therefore appear as if the competitive conditions vary in different parts of the country.

153. At the same time, it is not certain that price differences between the Oslo area and other parts of the country are exclusively due to different levels of competition. The demand in the Oslo area is greater than in other parts of the country and it will therefore be easier to achieve good utilisation of the infrastructure than in areas where there is lower demand. In other words, it will be easier to achieve economies of scale and lower unit costs in the Oslo area. Furthermore, higher prices in remote areas may also be the result of higher development costs due to longer distances to central points on the network. The combination of long distances and low volumes indicate that the price will be high.

154. Despite the fact that the degree of competition in the Oslo area is different to other parts of the country, it is Nkom's view that the majority of companies that request high-quality access solutions that include access to geographically spread locations, will be able to make use of alternative, competing services from different capacity and data communication providers. In this retail market there do not appear to be clear and stable boundaries between areas with different degrees of competition. Nkom therefore finds that there are no geographic differences in terms of competitive conditions that make it necessary to define multiple geographic retail markets for high-quality access products in Norway.

155. The development in market share in the retail market for high quality access products in recent years, cf. Figure 14-18 above, does not indicate that different levels of competition at wholesale level in different geographic areas have had significant competition-limiting effects

for providers that are dependent on basing their retail services on the purchase of wholesale products. This is supported by conversations Nkom has had with system integrators without their own access infrastructure who have significant market shares in this retail market. These system integrators have stated that they use wholesale products from multiple wholesale providers when they offer data communication solutions to companies with several locations. Despite the fact that Telenor may have a certain competitive advantage in this wholesale market when the end-customer's locations are scattered over the entire country, the largest system integrators have not expressed the view that this has resulted in stable and uniform differences in the competitive conditions between clearly defined geographic areas in the country.

156. Nkom is of the view that the Norwegian market for high-quality access products is not characterised by such different geographical competitive conditions at retail level that it is necessary to define local geographical markets for Market 4 in Norway. Furthermore, at wholesale level the situation is that Telenor's product and price structure for leased lines in the wholesale market applies to the entire country. Insofar as deliveries are based on contract agreements, Nkom has not been able to uncover evidence that Telenor is operating with different price structures in different geographic areas. Nkom thus has no reason to believe that Telenor is significantly differentiating the price on the basis of geographic criteria or the local market situation.

157. Broadnet also offers services with virtually nationwide coverage, with a price structure that is largely the same as Telenor's price structure. In addition, local and regional operators have in recent years constructed fibre networks at multiple locations in the country. This applies to both central areas and in areas where settlements are more spread out. Despite the fact that, until now, most of these local and regional fibre operators have focussed on offering fibre access to the residential market, the fibre infrastructure that these operators have developed also enables leased lines to be offered at both retail and wholesale level. Several of these fibre operators therefore represent potential competition in Market 4 in their geographic areas and many of them have already commercialised leased line services. The electronic communications statistics show that there has been an increase in the number of providers of leased lines in recent years, i.e. from 29 providers in 2008 to 55 providers in 2017. Most of the new providers during this period were local/regional fibre operators. Nkom finds that this is a factor that can have a disciplining effect on the nationwide wholesale providers' pricing of products in Market 4.

158. Based on this, Nkom has found that it is not necessary to conduct an equally detailed geographic analysis in Market 4 as for the wholesale markets 3a and 3b. Several of the criteria in BEREC Common Position for local markets which are referred to in Section 2.5.1 are not satisfied for Market 4 in Norway. Nkom has therefore concluded that the wholesale market for high-quality access provided at a fixed location is national.

2.6 Conclusion concerning market definition

159. Based on the assessments above, it is Nkom's view that the relevant product market includes wholesale sales of access products that form the basis for high-quality access products in the retail market and that also satisfy requirements for product characteristics linked to quality, availability and service level as stipulated in Section 2.4. Wholesale sales of leased lines, optical channels and data communication services (including IP-VPN and Ethernet-VPN) are examples of products included in this market. Dark fibre does not satisfy the above-mentioned requirements for product characteristics and is therefore not included in Market 4. The same applies to wholesale products that are included in Market 3a and 3b.

160. The market is also defined geographically as national.

3 Three-criteria test

3.1 Background to the three-criteria test of the market for wholesale high-quality access provided at a fixed location

161. In the most recent Recommendation for relevant markets, the Commission identified the market for wholesale high-quality access provided at a fixed location as a relevant market for sector-specific ex ante regulation. ESA published an identical Recommendation for the EEA/EFTA states on 11 May 2016. In its Explanatory Note (Section 4.2.2.3, page 52) the Commission conducted a three-criteria test which is used as a basis for identifying Market 4 as a relevant market for sector-specific ex ante regulation.

162. The Explanatory Note (Section 2.3, page 11) states that the national sector authority does not need to conduct its own three-criteria test of markets that are identified as qualifying for ex ante regulation in the Recommendation. Reference is also made to the fact that the national sector authority can consider it expedient to conduct a separate three-criteria test based on national conditions.

163. In the assessment of whether it is expedient to conduct a separate three-criteria test based on Norwegian conditions, Nkom has, among other things, referred to Section 2.4 of the Explanatory Note. It states here that a three-criteria test focuses on overarching market characteristics and market structure with the objective of identifying markets that qualify for ex ante regulation. Based on the description of market shares and market share development in the associated retail market in Section 2.2.5 above, Nkom has found that since Market 4 is a new relevant market in the Recommendation and it is only leased lines with capacity up to and including 8 Mbit/s that have been subject to sector-specific regulation in Norway since 2012, it is expedient to conduct a three-criteria test to determine whether Market 4 qualifies for sector-specific ex ante regulation in Norway.

3.2 General information regarding three-criteria tests

164. For a market to qualify for sector-specific ex ante regulation, three cumulative criteria must be satisfied:

1. The presence of high and non-transitory structural or regulatory barriers to entry.
2. The market structure does not tend towards effective competition within the relevant time horizon.
3. General competition law is insufficient to adequately safeguard the considerations behind the sector-specific regulation.

165. The starting point in assessing whether the three criteria are fulfilled will be based on a “Modified Greenfield Approach”. This entails that the criteria must be assessed under the precondition that the relevant market is not subject to ex-ante regulation. Regulation in adjacent markets shall nevertheless be taken into account.

3.3 First criterion: High and non-transitory entry barriers

166. Entry barriers may have different characteristics and arise for different reasons. Entry barriers restrict competition by reducing the opportunities of new service providers to establish themselves in the market. This section provides an assessment of structural and regulatory entry barriers.

3.3.1 Structural entry barriers

167. In the Explanatory Note, structural barriers to entry are described as follows:

“A structural barrier to entry exists when the state of the technology and the nature of the network, with its associated cost structure, and/or the level of demand, are such that they create asymmetric conditions between operators, preventing market entry or expansion of competitors. For instance, high structural barriers may be found to exist when the market is characterised by absolute cost advantages, substantial economies of scale and/or economies of scope, capacity constraints, and high sunk cost. Such barriers can be found in sectors that rely on the deployment of networks, such as fixed networks for electronic communications.”

168. In the assessment of structural barriers to entry, Nkom analysed the following factors:

- Control of infrastructure that is not easily duplicated
- Investments and sunk costs
- Economies of scale and scope
- Access to financial resources
- Access to distribution and sales channels

3.3.1.1 Control of infrastructure that is not easily duplicated

169. If an operator controls infrastructure that is not easily duplicated, and this infrastructure represents an important input factor in the relevant market, this could constitute a substantial entry barrier for potential competitors. Without taking a view on whether the relevant infrastructure in this market may be seen as an “essential facility” in relation to competition law, Nkom has assessed whether control of infrastructure not easily duplicated can be seen as an entry barrier in this relevant market.

170. Telenor’s copper-based access network is virtually nationwide and has historically constituted infrastructure that has been difficult to duplicate. However, in recent years it has been shown to be both technically and commercially possible in Norway to establish physical access infrastructure in parallel with Telenor’s copper access network in large parts of the country. These new access networks have primarily been developed to cover the access requirement in the residential market and can therefore not, in principle, be considered as duplication of infrastructure for high-quality access products to the business market.

171. Another difference between Telenor’s copper network and the alternative access networks is that local and regional fibre operators largely develop networks within defined geographic areas and will therefore not immediately offer nationwide services. Therefore, in practice, the establishment of an adequate alternative to Telenor’s nationwide copper access network would be so resource intensive and time consuming that there still are grounds to assume that Telenor’s nationwide access network is not easily duplicated. At the same time, there are multiple examples of initiatives with regard to market coordination and consolidation among regional and local fibre operators that can change this situation in the coming years. In this context it can be mentioned, among other things, that Altibox has established an extensive fibre network based on agreements with a number of local and regional fibre companies. This network was principally established for Altibox’s own use, but can potentially also be viewed as an alternative to Telenor’s network from a wholesale perspective. In addition, Broadnet has a virtually nationwide network that has been developed over several years and that is based on mergers with and acquisitions of different network developers since deregulation of the telecommunications monopoly commenced almost 20 years ago. Broadnet’s network primarily consists of both trunk segments and access connections to business customers.

172. The Ministry of Transport and Communications conducted a consultation process in summer 2016 with a draft for a new act to facilitate the development of high-speed networks for electronic communications. The act is intended to implement EU Directive 2014/61/EU of 15 May 2014, with measures for reducing the costs of establishing high-speed networks for electronic communications (Broadband Directive) into Norwegian law. The objective of the Broadband Directive is to stimulate the development of more high-speed networks by utilising already existing physical infrastructure. It also facilitates better coordination of projects in connection with the development of new infrastructure. It is therefore expected that high-speed networks can be developed at lower costs than they are at present. The implementation

of this directive into Norwegian law is expected to be able to provide many benefits for society, and new regulations in this areas will contribute to reducing barriers to entry in this market.

173. Furthermore, in summer 2017 the Ministry of Local Government and Modernisation, the Ministry of Petroleum and Energy and the Ministry of Transport and Communications presented proposals for measures to improve coordination etc. in connection with the planning and execution of cable laying under roads, including suggestions for proposed amendments to the cable regulations.¹⁶ The amendments to the cable regulations were approved by the Ministry of Transport and Communications on 24 November 2017 and entered into force on 1 January 2018. More harmonised excavation rules may reduce the costs of establishing new access networks and contribute to reducing barriers to entry.

174. Even with these measures, it will undoubtedly be extremely costly and time-consuming for an individual operator to develop an access network that is equivalent in size to Telenor's copper access network, and from this perspective Telenor's infrastructure can be said to be difficult to duplicate for potential competitors in the market for high-quality access products. On the other hand, a greater degree of collaboration between local/regional fibre network owners in the coming years may contribute to Telenor's control of the copper access network not being as great a barrier to entry in the years ahead as it historically has been.

175. In summary, Nkom is of the view that there are still relatively high barriers to entry for a provider that wishes to establish a service for high-quality access solutions that cover the entire country, based solely on own infrastructure. Despite the fact that there is infrastructure from operators other than Telenor that can be used to establish alternatives in the market, it is Nkom's view that Telenor's control over a nationwide access network must still be viewed as a not insignificant barrier to entry in this market for an operator that wishes to offer high-quality access products in the entire country.

3.3.1.2 Investments and sunk costs

176. Unrecoverable fixed costs ("sunk costs") are fixed costs attributable to an irreversible investment, i.e. a provider cannot expect to recover the investment once it has been made, for example, through the sale of the investment item, if the provider wishes to exit the market. Unrecoverable fixed costs mean that a potential newcomer faces higher decision-relevant costs than the (or those) operator(s) already established. This cost difference can constitute an entry barrier to the potential provider.

177. In the retail market for high-quality access products, a potential provider will, in the absence of regulation, have to base its operations on a combination of own access infrastructure and/or lease access infrastructure from one or more wholesale providers. Telenor can be one of these wholesale providers, but there can also be one or more other network owners. The fact that there are multiple local/regional providers of existing

¹⁶ Regulations no. 1212 of 8 October 2013 on the processing and responsibilities in connection with the laying and moving of cables above, below and alongside public roads.

infrastructure that a potential new provider could base its retail services on, will mean that a new provider such as this is less dependent on sunk costs. If an increasing number of local/regional providers commercialise a wholesale service, this may contribute to restricting this barrier to entry.

178. With regard to potential providers at wholesale level for high-quality access products that already have extensive fibre access networks to the residential market, the sunk costs can rather be seen as promoting competition rather than being barriers to entry. Fibre operators who have thus far focussed on the residential market will have incentives in the coming years to capitalise on investments that have already been made in the residential market by expanding the customer base to also include high-quality access products to business customers. This can either occur by them becoming providers in the retail market or that they establish themselves as providers in the wholesale market and supply access infrastructure as input factors to operators in this retail market.

179. Investments in intangible rights may also be unrecoverable and represent an entry barrier. Investment in brand building (for example through advertising and other marketing) is an example of such investments. Another example is costs relating to research and development (R&D).

180. In Nkom's view, investments in brand building for high-quality access products will not represent a significant barrier to entry at either retail or wholesale level. Potential customers in both the wholesale and retail markets are professional operators and there will therefore not be a need for marketing geared towards a mass market. However, a transition from the sale of standard access products to the mass market to high-quality access products involves other sales and delivery processes with associated systems and expertise. This may require a certain investment relating to sales/marketing to business customers that requires quality/functionality superior to standard broadband subscriptions.

181. With respect to R&D-related costs, Nkom is of the opinion that development of new services in this relevant market does not constitute any appreciable entry barrier.

182. After an overall assessment of the above-mentioned factors, Nkom finds that sunk costs linked to the establishment of infrastructure constitute a certain barrier to entry in the market for high-quality access products at both retail and wholesale level, but that this barrier to entry is lower than it was a few years ago. In addition, Nkom expects that the development in the coming years will further reduce the entry-deterring effect of sunk costs in this market.

3.3.1.3 Economies of scale and scope

183. Economies of scale exist when an increase in production brings a fall in average unit cost. This is characteristic of production based on technology with relatively high fixed costs and low variable costs. Economies of scope are a reduction of the average unit cost when more than one service is produced using shared means of production, for example shared infrastructure or shared administrative systems. Benefits of economies of scale and scope can

work both as entry barriers for new potential operators and as a competitive advantage for established operators in the market.

184. There are without doubt significant economies of scale associated with establishing high-quality access products. The unit costs will, for example, fall sharply as the network capacity of a provider increases. The unit costs may also drop substantially as the number of connections that are established increases. For example, in a ground-based network it is possible to utilise conveyance routes in a far better way if many end users are connected to the network in a given geographic area.

185. Both Broadnet and Telenor have an extensive offer of high-quality access products in the entire country and at both wholesale and retail level. These companies would therefore enjoy economies of scale that would be a challenge for other providers to achieve. Furthermore, Nkom finds that, given its broad portfolio of products, Telenor in particular enjoys greater economies of scope than its competitors. For example, there is reason to believe that Telenor enjoys significant economies of scope related to its nationwide fixed and mobile telephony services and nationwide offer of both transmission and access services.

186. On the other hand, it is not a given that these economies of scale and scope represent an equally significant entry barrier for potential providers within a geographical area. Several of Telenor's competitors in this market may also be able to have not insignificant economies of scale and scope. This is particularly the case for the energy companies that have established wholly or partly owned broadband companies. For example, it will make sense for these broadband companies to use existing masts, buildings and cabling routes, in addition to invoicing and customer service systems already used in connection with the energy companies' core operations.

187. Entering Market 4 requires large initial investments in infrastructure in the access network. For this to be profitable, the prospective provider must have a certain number of customers in the retail and/or the wholesale market within a geographical area. If the prospective provider enters the market, the cost of producing an additional unit will decline as the number of customers increases.

188. Local access will necessarily have a smaller customer base than access at a more central point. There are therefore fewer prospective customers to divide the fixed costs among and the prerequisites for being able to achieve economies of scale and/or economies of scope are considered more difficult.

189. Telenor's nationwide infrastructure and large customer base in both the retail and wholesale markets mean that the company has significant economies of scale and scope compared with competitors that wish to offer local access to an equally large part of the country as Telenor's existing services.

190. Based on this, Nkom is of the view that Telenor in particular, but also Broadnet in part, have economies of scale and scope that entail a certain barrier to entry for new operators in

the market for wholesale high-quality access provided at a fixed location. At retail level, the barrier to entry due to economies of scale and scope is considered to be somewhat lower, particularly in relation to deliveries to business customers who only have locations/units within a geographic area that is also covered by a different provider's already established infrastructure for the retail provision of standard broadband subscriptions to the mass market.

3.3.1.4 Access to financial resources

191. Access to financial resources is important to an operator's possibility of entering markets requiring major initial investment. Differences between operators relating to access to financial resources may constitute an entry barrier.

192. There will be relatively high establishment costs associated with establishing a competitive alternative to Telenor and Broadnet's nationwide offer of high-quality access products at both wholesale and retail level. Both companies can be said to have a strong financial position. On the other hand, highly capitalised potential challengers to Telenor and Broadnet do exist. Local fibre operators, which are often owned by energy companies, also generally have a strong financial position and it is unlikely that there are grounds to claim that Telenor and Broadnet have better access to financial resources than potential competitors in the Norwegian market. Therefore, in Nkom's view, access to financial resources cannot be said to constitute a significant barrier to entry.

3.3.1.5 Access to distribution and sales channels

193. In markets in which the established operators have a well-developed distribution and sales network, this may function as an entry barrier for potential new operators. This applies in particular in markets in which there are major costs associated with establishing distribution and sales channels, or where the established operators have concluded exclusive agreements with the largest/most important distribution channels in the market.

194. Lack of access to distribution and sales channels may primarily be a problem in the residential market. However, customers in this relevant market, both at retail and wholesale level, consist of professional operators that have a relatively good overview of the market and will make decisions based on their knowledge of this. It is therefore unlikely that potential new providers in this market will not enter the market because they consider it difficult to establish sales channels. Nkom therefore believes that access to distribution and sales channels does not represent a significant barrier to entry in this market.

3.3.2 Regulatory entry barriers

195. Regulatory entry barriers exist when market access is limited by regulatory conditions. Examples are requirements concerning licences, resource restrictions or restrictions relating to health, safety and the environment (direct regulatory restrictions). Furthermore, various forms of price control may also have entry-hindering effects.

196. After Telenor's exclusive rights in the electronic communications sector were discontinued, there have been no regulatory restrictions on the establishment of electronic communications networks and services. Local authorities and road authorities can set requirements in connection with excavation work and the like, but this applies equally for all operators in the sector.

197. Until now, Telenor has been subject to price controls in the form of requirements for cost-oriented prices in the wholesale market for leased lines with capacities up to and including 8 Mbit/s (former Market 6). However, these price controls are not considered to have had entry-detering effects on the wholesale provision of high-quality access products.

198. Based on this, Nkom is of the view that there are no significant regulatory barriers to entry in the market.

3.3.3 Conclusion – first criterion

199. Telenor's control over a nationwide access network is considered a barrier to entry in the market for high-quality access products. The development of alternative access infrastructure has contributed to the barriers to entry having been reduced somewhat in recent years, but the alternative access infrastructure is still very fragmented and is primarily oriented towards offering standardised access products to the mass market. Telenor is therefore still the only provider in the Norwegian market with continuous, nationwide trunk and access infrastructure that enables services to be offered in the entire country to companies that demand high-quality access solutions with geographically spread locations. This is still considered to represent a not insignificant barrier to entry in this market.

200. Based on this, Nkom has found that even if some of the factors we have assessed can indicate that the barriers to entry in the market for high-quality access products have been reduced somewhat in recent years, an overall assessment suggests that the barriers to entry are still high. This particularly applies to operators who will compete with Telenor on nationwide services. Nkom has therefore concluded that the first criterion in the three-criteria test has been satisfied.

3.4 Second criterion: The market is not tending towards effective competition

201. The recommendation states that even though a market is characterised by high entry barriers, other structural factors can mean that the market tends towards effective competition within the relevant time horizon.

202. In the assessment of whether the market is tending towards effective competition, Nkom has analysed the following criteria:

- Development in market shares at both the retail and wholesale level

- Prices and price developments
- Product differentiation, switching costs and lock-in mechanisms
- Barriers to growth
- Potential competition, innovation and market dynamics

3.4.1 Development in market shares

203. The development in market shares can provide information on whether the market is trending towards competition. High and stable market shares over time could indicate that there are providers with significant market power, and that competition in the market is thus ineffective. Reduced market shares among the largest providers might, on the other hand, contribute to supporting a conclusion that the market is moving towards effective competition.

204. Below, Nkom assesses the development in market shares at the end-user and wholesale levels, respectively, in the market for high-quality access products.

205. The characteristics of the relevant market will be decisive to determining how market shares are measured. Market shares can be measured, among other things, by number of subscriptions, revenue and number of accesses. From the electronic communication statistics, Nkom collects information about subscriptions and revenue, but not explicit information about the number of accesses.

206. Market 4 consists of a number of different, complex products, and there are major differences in the composition of access products and speeds, with related additional products. A high degree of heterogeneity on the demand side of the end-user market, including with regard to the number of accesses and additional functions included in required solutions, indicates that the number of subscriptions and/or number of accesses will not necessarily provide a correct view of the market. Nkom believes that revenue will provide a better indication of the relative strength of the providers in the market, since this will take greater account of the inequality and size of individual deliveries. In the ongoing analysis, Nkom will therefore use revenue as a measure of market shares.

207. In the description of the end-user market in Section 2.2.5, various different approaches to market shares were presented, both with and without dark fibre in the data basis. Based on the discussions and conclusions in Sections 2.3.2.1 and 2.4.1, dark fibre is not included in Market 4 or the related end-user market. The providers' reported revenue of dark fibre is therefore not included in the data basis for the market share figures below, at neither the end-user nor the wholesale level.

3.4.1.1 Development in market shares at end-user level

208. The end-user market for high-quality access products to a great extent consists of various capacity and data communication products. Products that provide high-quality, dedicated access to the Internet are also included. Nkom collects information on the number of

broadband subscriptions for businesses and related sales, but does not differentiate between high-quality and standardised broadband access in the electronic communications statistics. Nkom does not, therefore, have precise information about the number of subscriptions or revenue for high-quality, dedicated Internet access. Nkom nonetheless assumes that the largest share of the revenue in the end-user market for high-quality access products derives from capacity and data communication services, and Nkom has therefore used revenue from these services to calculate market shares.

209. Figure 20 shows the market share developments for end-user sales of capacity products and data communications products combined during the past four years, measured by revenue.

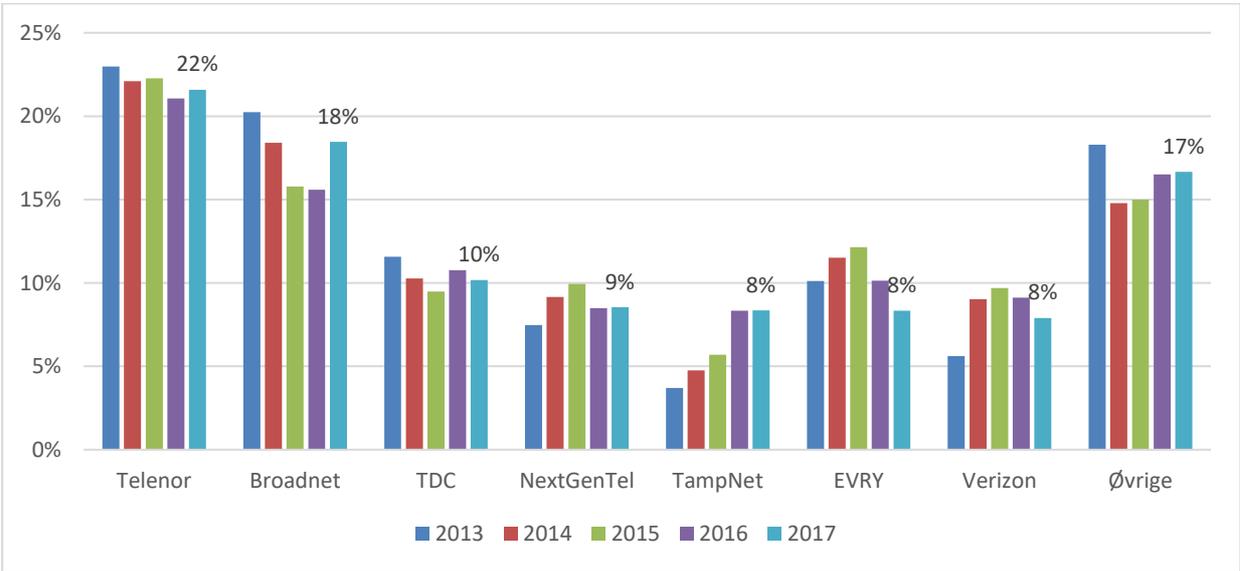


Figure 20: Development in market shares for end-user sales of capacity products and data communication services combined (excluding dark fibre), measured by revenue. (Source: Nkom’s electronic communications statistics for 2017.)

210. Figure 20 shows that Telenor and Broadnet are the two largest providers in this market, with market shares of 22% and 18%, respectively, in 2017. At the same time, there is relatively little difference in market shares between the two largest operators and the five largest challengers in this end-user market.

211. The market share development indicates that this is an end-user market that to a great extent is characterised by effective competition. This development has taken place even though Telenor and Broadnet together accounted for around 80% of the related wholesale market in 2017, see Figure 25 below, and large parts of this wholesale market have not been regulated in recent years (only Telenor’s offer of transfer capacity up to and including 8 Mbit/s has been subject to regulation).

212. On this basis, Nkom believes that the market share development does not indicate that this is an end-user market in which the absence of wholesale regulation has led to significantly

curtailed competition in recent years. On the contrary, the market share development indicates that the competition in this end-user market has become more effective.

213. Since Nkom, in the annual electronic communication statistics, distinguishes between data communication services and capacity products, it is natural to assess the market share development for each of these product categories, in addition to the aforementioned development in the end-user market for high-quality access products in overall terms.

214. Figure 21 shows the market share development for data communication services over the past five years, measured by revenue.

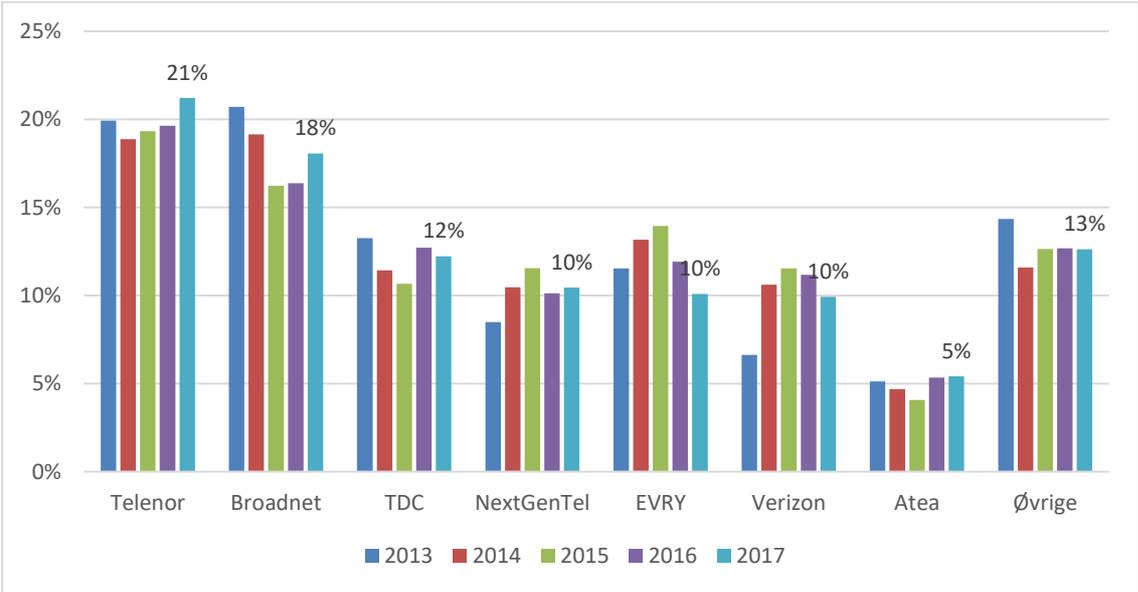


Figure 21: Development in market shares for end-user sales of data communication services, measured by revenue. (Source: Nkom’s electronic communications statistics for 2017.)

215. Figure 21 shows that, in isolated terms, the market share development in the data communication market does not differ significantly from the development in the market for high-quality access products in overall terms. The largest provider (Telenor) has a 21% market share, and there are five providers that each have a market share of between 18% and 10%. This market share development indicates an end-user market with a high degree of effective competition, without providers with stable high market shares.

216. Figure 22 shows the development in market shares for capacity products, measured by revenue.

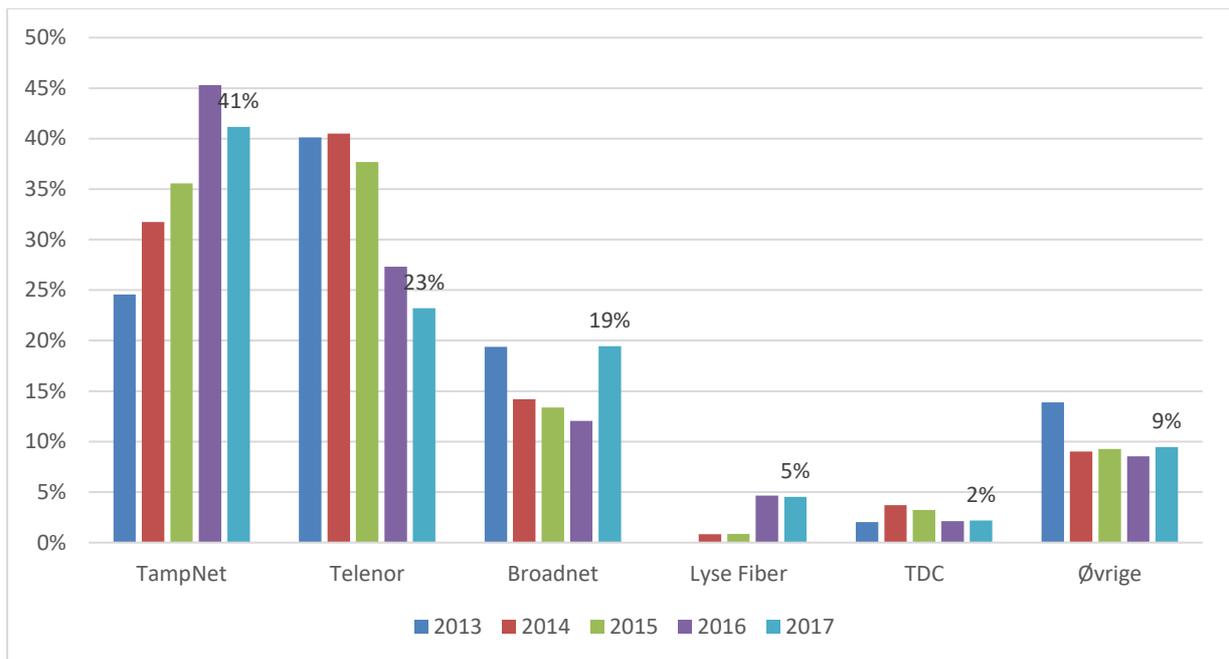


Figure 22: Development in market shares for end-user sales of capacity products, measured by revenue. (Source: Nkom’s electronic communications statistics for 2017.)

217. Tampnet has increased its market share in recent years up to and including 2016, but reduced its market share in 2017. Tampnet is nonetheless the largest provider in this market, based on revenue. As stated in Section 2.2.5, Tampnet’s market share for capacity products must, however, be assessed in the light that Tampnet’s operations are mainly targeted at a limited customer segment linked to offshore oil operations in the North Sea. This entails that TampNet can only to a limited extent be considered to be a provider that influences the competitive situation in mainland Norway, with the exception of the part of the market that concerns companies in oil-related sectors.

218. In order to assess the development in market shares for capacity products, Nkom therefore considers it more relevant to review the market share development during the last five years without Tampnet. Figure 23 shows this market share development, measured by revenue.

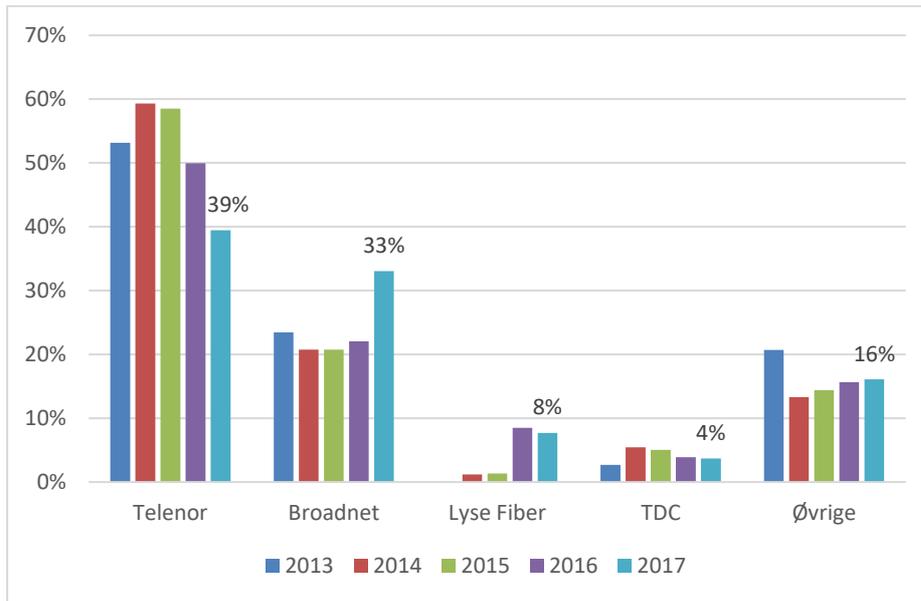


Figure 23: Development in market shares for end-user sales of capacity products, measured by revenue, excluding Tampnet. (Source: Nkom's electronic communications statistics for 2017.)¹⁷

219. Figure 23 shows that Telenor's market share has declined considerably in recent years and is around 39% in 2017. Broadnet is the second-largest provider, and has increased its market share significantly from slightly over 20% between 2013 and 2016, to around 33% in 2017. This entails that the market share development for capacity products gives a different picture with regard to the degree of competition compared to the market share development for data communication services. Since the revenue from data communication services considerably exceeds the revenue from capacity products, in overall terms the market share development for high-quality access products is more similar to the development for data communication services than for capacity products.

220. If Tampnet's revenue from capacity products is removed from the statistical basis for the overall market share development in the end-user market for high-quality access products, ref. Figure 20, this gives a market share development as shown in Figure 24.

¹⁷ Broadnet has increased its revenue from 2016 to 2017. In addition, changes were made to the historical data for Lyse Fiber (Signal Bredbånd) in connection with the reporting for 2017.

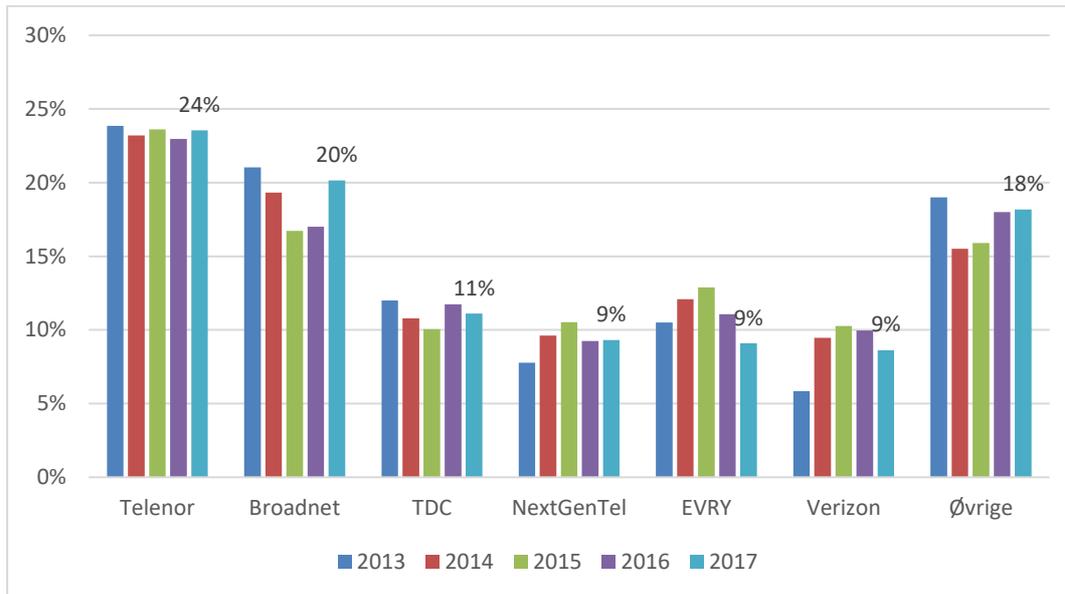


Figure 24: Development in market shares for end-user sales of capacity products and data communication services combined, excluding Tampnet, measured by revenue. (Source: Nkom's electronic communications statistics for 2017.)

221. Even though Telenor's market share increases from 22% to 24% on disregarding Tampnet's revenue in this end-user market, Figure 24 shows market share development which indicates a market with a high degree of efficient competition, where the six largest providers have a market share of between 24% and 9% each.

3.4.1.2 Development in market shares at wholesale level

222. Figure 25 shows the market share developments for external wholesale sales of capacity products and data communication products combined during the past three years.

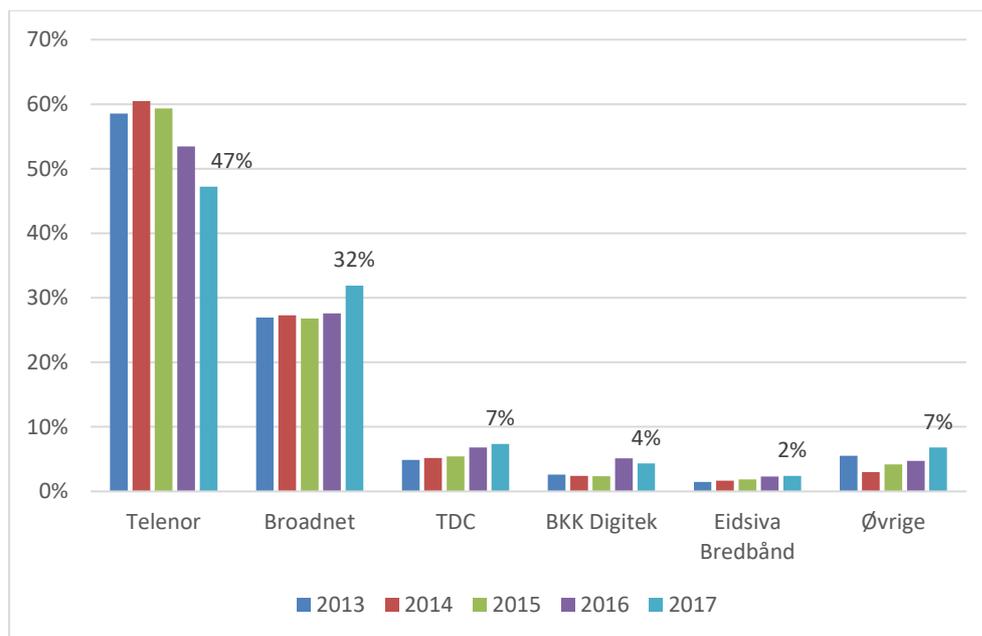


Figure 25: Market shares in 2013-2017 for wholesale sales of capacity products and data communication, measured by revenue. (Source: Nkom's electronic communication statistics for 2017.)

223. Figure 25 shows that the wholesale market is less characterised by effective competition than the corresponding end-user market. Telenor had a relatively stable market share in the period from 2013 to 2015 at just below 60%, but it was reduced to 53% in 2016 and further to 47% in 2017. In the same period, Broadnet had a relatively stable market share at just below 30% up to 2016. In 2017, the ratio increased to 32%, among other things due to the acquisition of the Xfiber company. None of the other providers in this wholesale market have market shares exceeding 7%. At the same time, the 2017 figures show increased market shares for several of the other providers in the wholesale market besides Telenor.

224. As for the end-user market, at wholesale level too, Nkom has obtained figures from the market operators that differentiate between data communication and capacity products, ref. Figures 26 and 27.

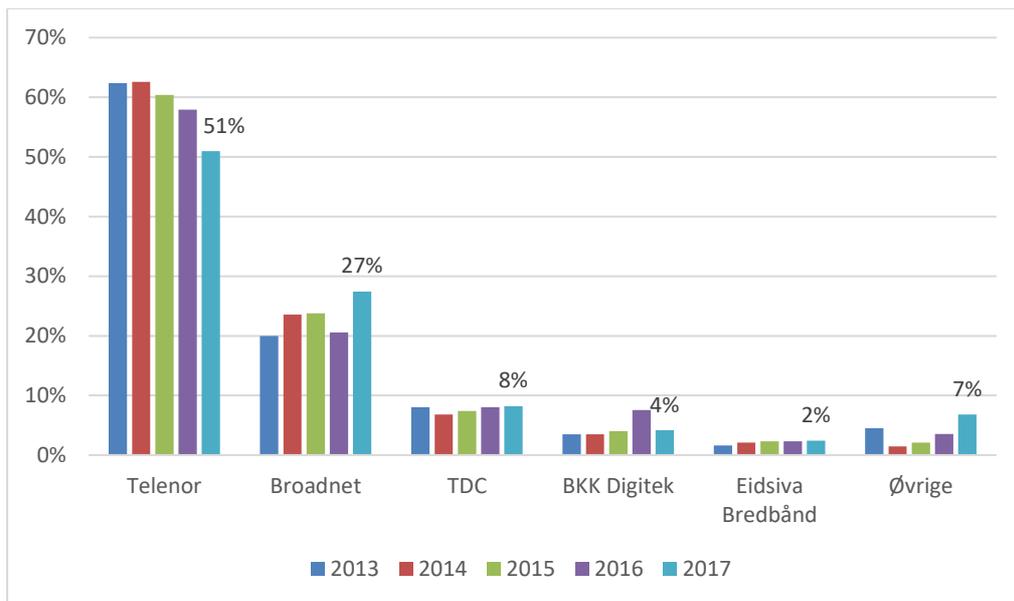


Figure 26: Market share development for wholesale sales of data communication services, measured by revenue. (Source: Nkom's electronic communication statistics for 2017.)

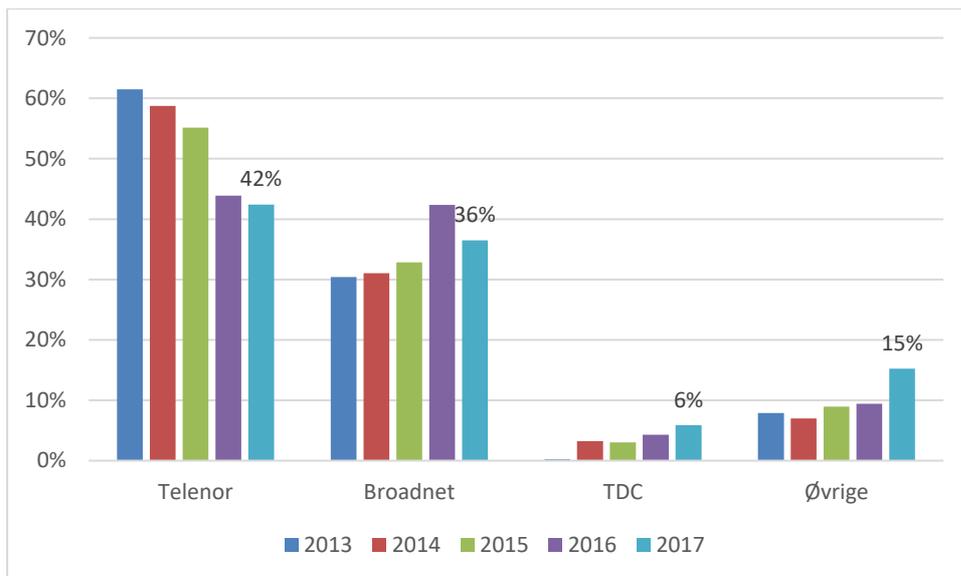


Figure 27: Market share development for wholesale sales of capacity products, measured by revenue. (Source: Nkom's electronic communication statistics for 2017.)

225. Comparison of Figures 26 and 27 shows that Telenor has a stronger position in the wholesale market for data communication services than for capacity products. The market share development in the end-user market for data communication services, ref. Figure 21, shows that Telenor has only a 21% market share in this end-user market. This indicates that Telenor's strong position in the wholesale market for data communication services has not been used to strengthen its position in the end-user market, in the absence of wholesale regulation.

226. It should be noted that the volume of wholesale sales of data communication services is considerably lower than the associated end-user sales. This is assumed to be due to the fact that elements of the end-user sales of data communication services are based on capacity products in the wholesale market and/or Market 3a/3b products, and are not only based on wholesale products that the operators define as data communication sales in their reporting to the electronic communication statistics.

3.4.1.3 Nkom's assessments and quality assurance of the statistical basis for the figures showing the market share development related to Market 4

227. The statistical basis for the figures showing the market share development at end-user and wholesale levels is figures reported by the market operators to Nkom as part of their annual reporting to the electronic communication statistics. For some of the figures, it has been necessary to perform additional assessments and quality assurance before they have been used as the basis for the market share development in this analysis of Market 4. Below, Nkom gives a brief account of the most important assessments that have been made to ensure the most correct statistics possible.

228. With regard to the sale of capacity products, the figures from the electronic communication statistics are subject to uncertainty with regard to the distinction between access and transport communications, as a consequence of insufficient reporting of this distinction by the market operators. In 2016, Nkom therefore chose to obtain supplementary information from the providers of capacity and data communication products, primarily in a new attempt to gain a better picture of the distinction between access and transport for the capacity products. This data collection confirmed the figures from the electronic communication statistics at an overall level, for both the data communication and capacity products, but did not give any basis to distinguish between access and transport communications. Neither Telenor nor Broadnet could distinguish between access and transport communications in their reporting. The same was the case for most other providers of capacity products that responded to Nkom's enquiry in 2016.

229. Furthermore, Nkom has in principle assumed that the reported revenue from data communication services comprises products that contain one or more business accesses. On this basis, all reported revenue from data communication services is included in the calculation of market share for such services in this analysis of Market 4. At the same time, through dialogue with the largest market operators as part of the quality assurance of the statistics in this analysis, Nkom has revealed that there may be some deviations here.

230. For example, there is a sub-category in the reporting of data communication services to the electronic communication statistics ("Other data communication services") which appears to contain revenue figures that are not relevant for Market 4. It is mainly Telenor that has reported revenue in this category, and according to Telenor, this revenue is associated with the E-line and Internet transit products. This is considered to be transport communication, and

not access communication, see the delineation in Section 2.4.2 above. If this revenue is removed from the statistics for the market share calculation for data communication services at wholesale level, this will entail a reduced market share for Telenor. Nkom has nonetheless opted to include all reported revenue from data communication services in the statistics for the market share development in both the end-user and wholesale markets. This is because it has not been possible to verify whether all reported revenue from data communication services from the other providers in this market is solely related to products that contain an access element, or whether elements of some of the other providers' revenue should also have been removed from the statistical basis for the market share development for data communication services. At the same time, Nkom points out that this means that Figure 26 probably shows a slightly higher market share for data communication services for Telenor than the actual market share.

231. When it comes to the distinction between end-user and wholesale revenue from the products included in Market 4, in the spring of 2017 Nkom found reason to specify to the largest providers in Market 4 how this distinction must be understood. The intention was to ensure that the figures which providers report to the electronic communication statistics are based on a consensual understanding of the distinction between end-user and wholesale revenue. Through subsequent dialogue with the largest wholesale providers (Telenor, Broadnet and TDC), Nkom has received adjusted figures for end-user and wholesale revenue for the period from 2014 to 2016, compared with the revenue figures previously reported to Nkom in these years. These adjusted figures, with the corresponding estimate for 2013, are the basis for the market share figures in this analysis, ref. Figures 14-18 and Figures 20-27 above.

232. As a consequence of the aforementioned specification of the distinction between end-user and wholesale revenue from the products included in Market 4, system integrators' revenue from capacity products and data communication services in the business market is included in the figures for the market share development in these end-user markets. Even though the largest system integrators have reported revenue figures to Nkom in recent years, it also seems that some of the smaller system integrators in the Norwegian market have not been registered at Nkom as providers of electronic communication services, and these have thus not been part of the reporting to the electronic communication statistics. On the basis of the aforementioned dialogue with the largest providers at wholesale level in Market 4, it may therefore seem that elements of the system integrators' revenue from capacity products and data communication services in the business market have been reported as end-user sales by Telenor, Broadnet, TDC, etc. This applies particularly to the end-user revenue from system integrators that have not been part of the reporting to the electronic communication statistics.

233. If all system integrators had reported figures to Nkom, the market shares of Telenor, Broadnet, TDC, etc in Figures 21-24 would probably have been somewhat reduced. It is difficult to quantify the extent of this effect. In any case, this circumstance indicates that the

actual market shares of the largest providers in this end-user market are slightly lower than Figure 21-24 shows.

3.4.1.4 Overall assessment of the development in market shares

234. Even though Telenor's market share at wholesale level in principle indicates significant market power, the market share distribution at end-user level does not provide any basis to conclude that new regulation at wholesale level is necessary in this market in order to facilitate effective competition in the end-user market for high-quality access products in Norway. On the contrary, the market share development in this end-user market, ref. Figure 24, shows that this is a market characterised by competition, in which the largest provider has a market share of 24% and five other providers have market shares of between 20% and 9% each.

235. Comparison between market shares at end-user and wholesale levels thus does not indicate that any possible market power in the wholesale market has been utilised to strengthen the position in the end-user market for high-quality access products. The competition in the end-user market therefore appears to be effective, even though the competition at wholesale level is limited, and despite the absence of regulation at wholesale level beyond the transfer capacity of up to and including 8 Mbit/S.

3.4.2 Prices and price developments

236. The development of prices at both the retail and wholesale levels can give indications of whether the market tends toward competition.

237. Standard list prices are not widely used in the retail market for high-quality access products. Since there is a large degree of heterogeneity between the different customers' needs for access solutions in this marketing, including due to a different number of locations at the customers and different geographic placement of the customers' locations, it is difficult to make price comparisons over a specific period of time in this retail market.

238. For the same reason, deliveries in this wholesale market are largely based on so-called contract agreements in which a number of project/customer specific factors and assessments are used as a basis for the pricing. This means that Nkom also does not have sufficient information concerning price developments in the relevant wholesale market to be able to place major emphasis on this aspect in the assessment of whether or not the market is tending towards competition.

239. In response to questions from Nkom, two of the largest system integrators in the retail market for high-quality access products that do not have their own access infrastructure and are therefore significant operators on the demand side in this wholesale market have reported that they are experiencing increased competition at wholesale level and that this has recently been reflected in, at times, significant price reductions. The price competition is described as being greatest in the largest and most comprehensive tender/delivery processes in the retail market.

240. Based on this, it is difficult to draw clear conclusions with regard to whether prices and the price development in this market indicate effective competition. Nkom is still of the view that the assessment of prices and price development is not a factor that indicates that this market does not tend towards effective competition.

3.4.3 Product differentiation, switching costs and lock-in mechanisms

241. "Product differentiation" means a strategy that aims to give a provider's own products characteristics that distinguish it from the products of competing providers. Product differentiation can take place both in the wholesale and retail market. A high degree of product differentiation by a provider may provide a basis for strong customer loyalty and reduce competition in the market. Strong brands can have similar effects. In addition, various types of limitations or costs of switching provider can reduce the competition intensity at both the retail and wholesale levels.

242. In this chapter, Nkom assesses product differentiation, switching costs and lock-in mechanisms in the retail and wholesale markets, respectively, and the significance of these conditions to the assessment of the competition situation.

243. The majority of business customers that require broadband access with superior functionality/quality to the mass market products, enter into agreements of a certain duration with providers of high-quality access products. This is partly due to such tender/purchase processes being resource-intensive and that the companies therefore wish to enter into agreements that shall be applicable for some years, and that the companies can negotiate better prices and conditions for longer contract periods. On the other hand, Nkom does not have information that indicates that these are factors that can be said to represent lock-in mechanisms or barriers for switching providers when viewed from the end-customer's perspective. On the contrary, it is Nkom's impression that the majority of companies have competition for their existing access solutions at regular intervals through tender/procurement processes. Based on this, Nkom finds that product differentiation, switching costs and lock-in mechanisms do not significantly restrict competition in this retail market.

244. In the wholesale market it is only Telenor that can supply access products in the entire country which are always solely based on own infrastructure. This can be considered a differentiator that distinguishes Telenor from the other wholesale providers in this market. This type of differentiator can provide a basis for customer loyalty and thereby contribute to restricting a development towards more effective competition in the wholesale market.

245. In response to questions from Nkom, two of the largest system integrators in the retail market for high-quality access products that do not have their own access infrastructure and are therefore significant operators on the demand side in this wholesale market have described the wholesale market as functioning well. Based on framework/partnership agreements with several of the wholesale providers, the system integrators determine, from customer case to customer case based on the end-customers' needs and preferences, what

wholesale provider(s) has/have the most competitive offer. Nkom has been informed that there are no lock-in mechanisms in the form of exclusivity or similar in these agreements and the wholesale customer is therefore free to purchase its input factors from multiple wholesale providers. In addition, the largest system integrators have stated that local fibre operators in different parts of the country represent potential competition in this wholesale market which, in the long term, can play an increasingly more important role as providers of input factors to the system integrators' retail services.

246. Based on this, Nkom finds that product differentiation, switching costs and lock-in mechanisms are not elements that indicate that this market does not tend towards effective competition.

3.4.4 Barriers to growth

247. A market with major potential for growth is generally more attractive to potential new operators than a market in which the total units sold and/or the number of customers has stagnated or is decreasing (known as a 'mature' market). Operators considering entry into mature markets must largely aim to capture customers from the established operators. Barriers to growth in a market can therefore constitute a possible barrier to entry and thereby have a negative impact on competition.

248. The demand for high-quality access products in the retail market has been relatively stable in recent years. Nkom does not expect major changes in demand when concerning the number of accesses/access solutions in the next few years, despite capacity requirements being expected to increase. At the same time, increased use of cloud services may reduce the companies' need to link geographically scattered locations through data communication/VPN solutions. However, this cannot be said to be a barrier to growth that will have a negative effect on competition in the market. On the contrary, Nkom expects that increased use of cloud services may make local fibre operators more competitive in this market because a company's potential transition from a traditional data communication/VPN solution to cloud-based solutions for linking together geographically spread locations can make Telenor's competitive advantage through its nationwide access network less important.

249. On this basis, Nkom finds that barriers to growth are not a factor that indicates that this market does not tend towards effective competition.

3.4.5 Potential competition, innovation and market dynamics

250. Potential competition relates to whether the operators that are not in the current market can help to create market dynamics within the forthcoming regulatory period. Potential competition will also, among other things, be able to discipline pricing in the retail market, because high prices make entering the market more attractive.

251. As a rule, in markets with a high degree of innovation and strong market dynamics the opportunity to exercise market power will be more limited than in markets with little innovation.

Technological development may therefore be of significance for potential competition in the market. Innovation and market dynamics resulting from technological development can therefore contribute to weakening an operator's position in the market in relation to potential competitors.

252. There are a number of fibre operators in Norway that have expanded the fibre network in their local/regional areas in recent years. These operators have thus far largely focussed on offering standardised broadband products to the mass market, but several of the local/regional fibre operators have also in recent years started to offer high-quality access products in the business market. Existing fibre infrastructure and plans for further fibre development therefore represent potential for these local/regional fibre operators to challenge Telenor and other established operators in this market, both at retail and wholesale level.

253. As mentioned above, the potential competition from local/regional fibre operators may be of limited importance with regard to access solutions to business customers located in different parts of the country. On the other hand, various initiatives and models have also been referred to above for being able to connect the networks of local/regional fibre operators. This can mean that the current rather fragmented alternative fibre infrastructure may, in the coming years, constitute a more uniform competitive force in the market for high-quality access products at both retail and wholesale level.

254. In addition, a technological development that trends towards increased use of cloud services at the expense of data communication/VPN solutions for companies with multiple geographically spread locations, may have a positive effect on competition in the market for high-quality access products. Such a development will entail that it is no longer an equally significant competitive disadvantage to not be able to offer access products in the entire country. When the connection of company locations through data communication/VPN solutions is replaced by cloud-based solutions that are based on access solutions at the individual locations and the connection takes place in the cloud, it is expected that one provider being able to provide the access solution for all locations will become less important. This can result in increased competition from local/regional based fibre operators in this market.

255. Based on this, Nkom is of the view that potential competition and market dynamics can contribute to moving this market in the direction of more effective competition in the years ahead, both at retail and wholesale level.

3.4.6 Conclusion - second criterion

256. In the Explanatory Note (page 37) it states that an assessment of the competitive situation in the related retail market in the absence of regulation must be used as a basis for analyses of wholesale markets:

"As explained in section 2.6, any analysis of a wholesale market must be preceded by an assessment of the competitive conditions on the related retail market absent regulation."

257. Nkom is of the view that most of the factors in the analysis of the Norwegian retail market for high-quality access products indicate that this is a market characterised by a relatively high degree of competition and that the market development instead suggests more rather than less effective competition in the coming years at both retail and wholesale level.

258. Nkom is of the opinion that the assessment of the second criterion in the three-criteria test demonstrates that the competitive situation in Norway for high-quality access products differs significantly from the competitive situation which the Commission used as a basis for ex ante regulation of Market 4 and it is the following description in the Explanatory Note (page 37) in particular that does not apply for high-quality access products in the Norwegian market:

"Evidence gathered through the Article 7 procedure suggests that both retail markets described above, i.e. the mass market as well as the market for high-quality business products, would in general remain characterised by a lack of effective competition in the absence of wholesale regulation in particular where there is only a single fixed network capable of offering access to broadband nationwide. In that case, regulatory intervention at the wholesale level would be required to address the competition failures at retail level. Regarding the mass-market, in the absence of appropriate wholesale regulation the fixed incumbent would in principle be the only operator with a ubiquitous network, which means that in certain areas, where alternative platforms are not present, the incumbent could act as a monopolist, for example by charging excessive prices. With regard to the high-quality business-oriented retail market, the fixed incumbent would be even less constrained, due to the fact that services offered over alternative platforms would typically not be able to compete at retail level and offer products with characteristics such as dedicated capacity and symmetric bandwidth."

259. The development in market share that is described in Section 3.4.1 indicates that the Norwegian retail market for high-quality access products is characterised by effective competition despite the absence of wholesale regulation beyond current regulation of leased lines with capacity up to and including 8 Mbit/s. The infrastructure competition in the Norwegian market is also significantly stronger than what is described in the Explanatory Note and the potential competition in both the retail and wholesale market from the many local/regional fibre operators, ref. Section 3.4.5, means that the market and competitive situation in Norway does not match the Commission's description of the absence of alternative platforms/networks that can offer high-quality access products.

260. An assessment of product differentiation, switching costs, lock-in mechanisms and barriers to growth does not indicate that these are elements that would suggest that the market does not tend towards effective competition.

261. Based on this, Nkom has concluded that the second criterion in the three-criteria test is not satisfied. As a basis for this conclusion, Nkom has placed particular emphasis on the development of market share in the retail market in recent years, the fact that the retail market has moved towards more effective competition during this period despite more restricted competition in the associated wholesale market where the regulation in recent years has only included leased lines with capacity up to and including 8 Mbit/s, and the potential competition from a number of local/regional fibre operators at both retail and wholesale level.

3.5 Conclusion concerning the three-criteria test

262. As stated in Section 3.2, the three-criteria test is cumulative, i.e. all three criteria must be satisfied for a market to qualify for sector-specific ex ante regulation.

263. Nkom is of the view that the first criterion has been satisfied, but has concluded that the second has not been satisfied. On this basis, Nkom does not find reason to assess the final criterion. The three-criteria test is therefore not satisfied for the market for wholesale high-quality access provided at a fixed location (Market 4) in Norway. Thus, this market does not qualify for sector-specific ex ante regulation.