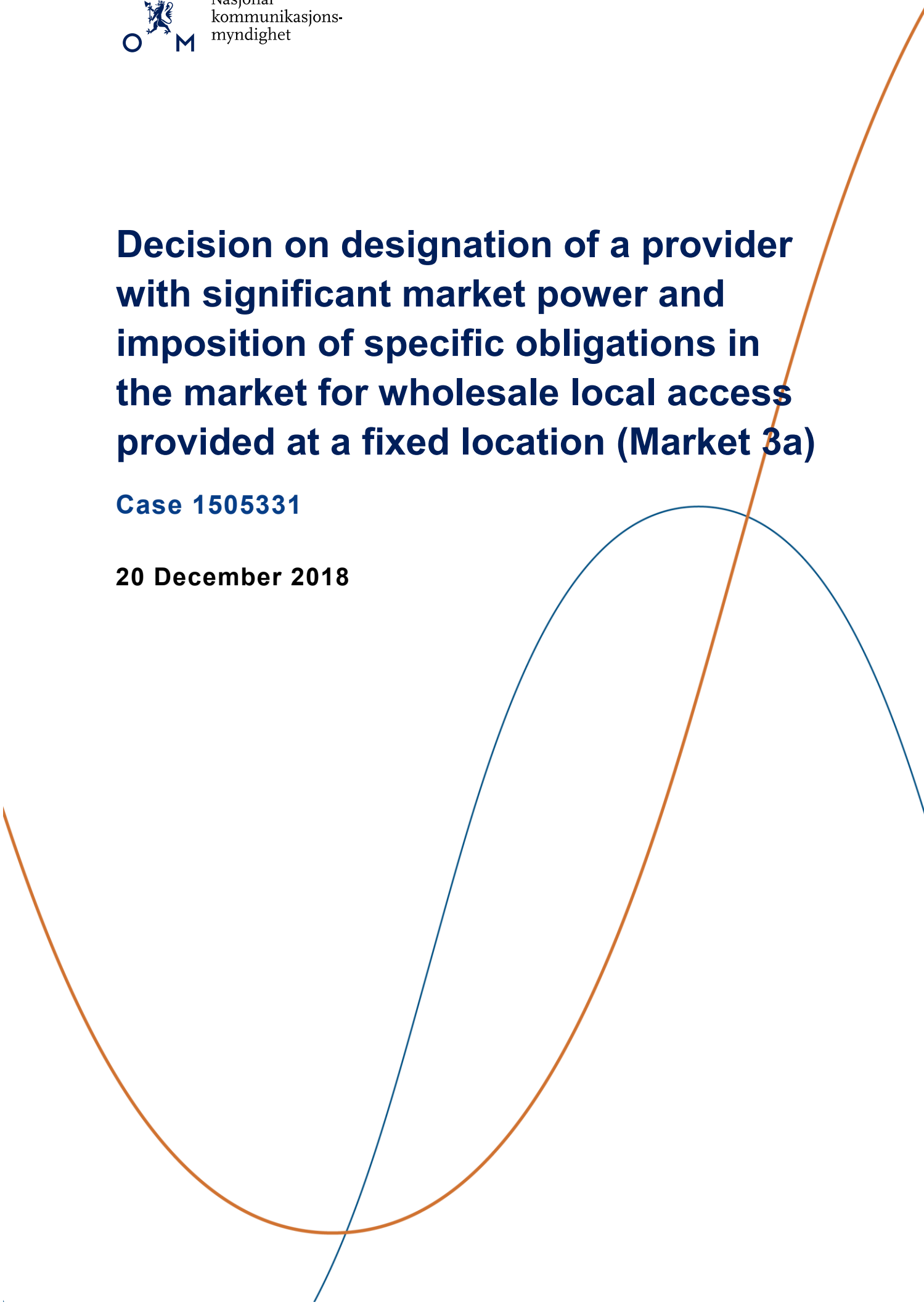
Nasjonal kommunikasjons-myndighet

Decision on designation of a provider with significant market power and imposition of specific obligations in the market for wholesale local access provided at a fixed location (Market 3a)

Case 1505331

20 December 2018



Summary

Based on an analysis of the market for wholesale local access provided at a fixed location (Market 3a), the Norwegian Communications Authority (Nkom) designates Telenor ASA (Telenor) as a provider with significant market power in Market 3a pursuant to Section 3-3 of the Electronic Communications Act.

Nkom has identified a number of actual and potential competition problems in the market for wholesale local access provided at a fixed location. The competition problems are linked to vertical leveraging between markets and single market dominance. With regard to vertical leveraging, it is primarily various forms of discriminatory behaviour that pose the greatest competition problems. This includes both price-related discrimination that could subject Telenor's rivals to a margin squeeze in downstream markets, and discrimination relating to other circumstances that could restrict competitors' opportunities. In the case of single market dominance, the main potential competition problems are entry-deterring behaviour through, for example, an increase in the cost of switching provider at both wholesale and retail levels, and exploitive behaviour through overpricing and price discrimination.

Goals related to providing investment incentives and promoting more sustainable infrastructure competition in the broadband market argue in favour of using regulatory principle 3 for both the copper-based and the fibre-based parts of Market 3a. At the same time, Nkom also wants to continue to encourage competition in areas where Telenor is the only access provider, regardless of whether the access network is based on copper or fibre. In light of this, Nkom has concluded that the use of remedies in Market 3a, regardless of access technology, should be designed both to provide incentives for investments that contribute to attainment of the high-speed network coverage goals defined in the government's electronic communications policy plan, while continuing to foster competition in the retail market based on access to Telenor's networks. This means that Nkom does not find it appropriate to draw an absolute conclusion regarding whether to base regulation of Market 3a on regulatory principle 2 or regulatory principle 3.

Nkom has assessed whether, despite the fact that Market 3a is geographically defined as the whole of Norway, it is nevertheless appropriate to impose different obligations on Telenor in different parts of the country as a result of variations in the degree of infrastructure competition. Because of the dynamics of the roll-out of NGA networks, including any upgrading of the copper network, which may not necessarily be limited to specific geographical areas in Norway, combined with the absence of stable geographical boundaries for the roll-out of fibre, Nkom believes that a continuation of uniform wholesale regulation throughout the whole country in Market 3a is best suited to achieve the objectives of regulation. Nkom has concluded that it is more appropriate to continue national obligations in Market 3a, than to attempt to introduce geographically differentiated use of remedies based on multiple uncertain assumptions about future infrastructure competition and market share developments in

different geographical areas that cannot be delimited on the basis of counties, municipalities or urban settlements.

New technology makes it possible to offer far higher transmission capacity in copper-based access networks compared to before. Among other things, the technology consists of pulling fibre closer to the end user and using noise cancellation, so-called vectoring. However, effective use of the new technology means that the accesses must be controlled by a single provider. Upgrading the copper access network consequently has an aspect against monopolising the possibility of providing broadband services over own equipment. The Broadband Forum was established in January 2016 with, among other things, the aim of recommending solutions to this and other types of issues that arise in connection with upgrading the copper access network. The parties to the Broadband Forum did not reach comprehensive consensus on this issue.

Telenor had plans to upgrade the copper access network to a relatively large extent when the Broadband Forum was established. However, while working in the Broadband Forum, Telenor expressed the opinion that it is most relevant to upgrade the copper access network in areas where end users currently have poor broadband services, which implies upgrading of a more limited scope on Telenor's part. The interest of the access buyers in upgrading the copper access network themselves increased during the dialogue in the Broadband Forum, partly in line with Telenor's reduction of its ambitions for the scale of the upgrade, and partly because Telenor has stated that the company only wants to upgrade with VDSL technology and vectoring.

However, during the hearing process, the access buyers stated that they will not take the initiative to upgrade Telenor's copper access network on a larger scale. In this context, the access buyers point out, among other things, that the opportunities to upgrade the copper access network will come too late in view of the rapid expansion of the fibre access network. Nkom has therefore come to the conclusion that there is no need for a comprehensive regime to upgrade the copper access network as outlined in the notification of decisions. One important consequence of this is that buyers of access will not be able to upgrade Telenor's copper access network with exclusionary effect. The parts of the regime that applied to this aspect have therefore been removed. However, other parts of the regime have been retained to facilitate an upgrading of the copper access network in light of what appears to be the likely scope in the upcoming regulatory period.

Nkom still sees the need to have some rules regarding the allocation of points in the network to be upgraded. By virtue of its ownership of the network, Telenor will be given an opportunity to have first choice on the points the company is to upgrade. If Telenor does not take advantage of its right of choice, the principle of "first in time, first in right" will apply.

Telenor will be able to upgrade points in the copper access network with exclusionary effect provided the company offers the access buyers relevant substitute products.

Nkom believes that it is necessary to continue an access obligation to Telenor's network at a local level in the wholesale market to ensure that providers without their own network will still be able to represent a competitive factor in the retail market. Telenor will continue to be obliged to accommodate any reasonable request for local, physical access to copper-based access networks. This applies to full and shared access to the copper-based access network (LLU), including access to sub-loops (SLU).

By upgrading the copper network by utilising the technological capabilities that are available to offer higher capacity to end users, Telenor will no longer be able to offer LLU and SLU in the areas being upgraded. The obligation to offer LLU and SLU therefore lapses in these areas. Instead, Telenor must provide a replacement product that ensures buyers of access local, virtual access to copper-based access networks (VULA copper). At a minimum, VULA copper is to be offered in the areas of Telenor's copper network being upgraded.

In case of fibre-based access networks, Telenor will still obliged to accommodate any reasonable request for local, physical access to fibre-based point-to-point networks. Furthermore, Telenor shall accommodate any reasonable request for a local, virtual fibre-based access product (VULA fibre).

Telenor shall also provide access to backhaul services, co-location, civil engineering infrastructure and information and support systems.

Nkom has further developed the LRIC model for access networks and believes that the model now forms a good basis for determining price caps for local, physical access to copper-based access networks in Market 3a. On the basis of modelled costs, Nkom sets the following maximum prices for LLU full access for the next few years:

- From 1 February 2019: NOK 73 per month
- From 1 January 2020: NOK 75 per month
- From 1 January 2021: NOK 77 per month

The price for shared access will continue to be set at half of the calculated price for full access (same product type), less the special costs for the establishment and operation of full access, with the addition of special costs for the establishment and operation of shared access.

Nkom's LRIC model also provides an opportunity to calculate costs for sub-loops (SLU). The model results will be the basis for price cap regulation for sub-loops, and maximum prices for sub-loops are set at:

- From 1 February 2019: NOK 58 per month
- From 1 January 2020: NOK 60 per month
- From 1 January 2021: NOK 62 per month

For VULA copper, Nkom Telenor imposes price regulation in the form of an obligation to offer access to prices which ential that the access buyer is not subject to margin squeeze. In order to ensure that the prohibition on offering access prices which make the access buyer subject to margin squeeze is observed, Nkom will undertake margin squeeze tests. This is appropriate in order to take account of how price regulation of various types of NGA network must be investment-neutral, and also to balance the investment consideration against the consideration that access buyers must be able to compete effectively. As far as possible, Nkom will apply the same principles to the margin squeeze test for VULA copper as apply to the margin squeeze test for VUA fibre in Market 3b.

Since there are still very few fibre accesses available for local, physical access in Telenor's point-to-point network, Nkom believes that it will still not be proportional to impose the use of margin squeeze tests or another form of price regulation for local , physical access to the fibre-based access network.

For VULA fibre, Nkom imposes price regulation in the form of an obligation to offer access to prices which ential that the access buyer is not subject to margin squeeze. To ensure that the prohibition on offering access prices which subject the access buyer to margin squeeze is observed, Nkom will undertake margin squeeze tests and gross margin tests and apply the same principles to the margin squeeze test for VULA fibre as apply to the margin squeeze test for VUA fibre in Market 3b.

Nkom believes that it is necessary to regulate the price Telenor must be able to claim from the access buyer for the establishment of drop cables to "homes passed" households. Nkom believes that Telenor's fixed establishment fee for fibre connections (retail price) can be used as an estimate of Telenor's internal settlement price and considers it appropriate to use this price as the starting point when determining the price regulation for "homes passed". The fixed establishment fee (excluding VAT) will in principle be regarded as a price cap for the price that Telenor may charge the access buyer for the establishment of drop cables to "homes passed". To ensure the transparency and notoriety of the applicable establishment fees, Telenor's lists of "homes passed" must be updated at all times with the current establishment fee that Telenor's own retail activity will charge on any densification sale.

The prices for the establishment of an agreement on access to copper-based access lines, the establishment of access lines, the management of the agreement on access to copper-based access lines, operator change, access to information and support systems and other relevant services related to local, physical access to the copper-based access network, must continue to be cost-oriented, based on fully distributed, historical costs.

The pricing of co-location and access to infrastructure routes must continue to be based on the principle of cost orientation. Telenor is also required to offer access to backhaul services at cost-oriented prices.

Nkom upholds Telenor's obligation to keep cost accounts based on fully distributed historical costs for local, physical access to copper-based access networks. Telenor will also continue to prepare cost accounts for co-location in fixed networks, including infrastructure routes, in line with current practice. In addition, Telenor will prepare cost accounts for backhaul services.

Nkom also imposes on Telenor an obligation on non-discrimination for access in Market 3b. The obligation of non-discrimination applies between internal use and external provision, as well as between different external buyers of access. Nkom has assessed whether to impose on Telenor an obligation of non-discrimination based on equivalence of input in Market 3b, but has concluded that, from a cost–benefit perspective, it is neither necessary nor proportionate to impose this kind of non-discrimination obligation. However, Nkom finds it necessary to clarify and partially sharpen the requirements regarding documentation of non-discrimination in the market. Telenor will therefore be required to conduct a technical replicability test. This means that prior to launching a new or substantially modified retail product, Telenor must send documentation to Nkom proving that a test has been carried out that shows that it is technically possible for external buyers of access to replicate the retail product.

Nkom is continuing the obligation imposed on Telenor to prepare and publish reference offers. Nkom finds that in some areas it is necessary to further specify the requirements regarding the content of the reference offers beyond what is stated in the Electronic Communications Act and the Electronic Communications Regulation. Nkom has also further specified the requirements regarding publication of key performance indicators (KPIs) in more detail. The reason for this is to ensure that the KPIs for the external wholesale provision and Telenor's internal use are comparable.

In this decision, Nkom is imposing new provisions regarding notice. The new notice provisions must be seen in the light of the discussion in the Broadband Forum about the notice Telenor provided regarding changes to the copper access network. Nkom finds that it is necessary to impose on Telenor an obligation to provide three years' notice of changes to its copper access network in cases where the company is going to make changes that result in the loss of accesses. However, if the access buyer is offered a relevant replacement product in connection with upgrades and other changes to the copper access network that cause accesses to be lost, a notice period of six months is sufficient. Planned changes that do not affect granted access require three months' notice.

Nkom imposes new requirements on Telenor's fault correction policy in the decision. The new requirements must be seen in the context of Nkom's opinion that there is a potential for Telenor to have a fault correction policy that undermines the considerations on which the notice provisions are based.

Telenor will continue to be subject to an obligation of accounting separation for local, physical access to fibre-based access networks in order to monitor compliance with the obligation of non-discrimination. The purpose is to clarify whether buyers of this type of access can operate

in the retail market for fibre-based broadband with a positive result based on the current access prices, given that they are equally efficient in their operations as Telenor. Telenor will also be subject to an obligation of accounting separation for local, virtual access to fibre-based access networks (VULA fibre) in order to monitor compliance with the obligation of non-discrimination.

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Annex 5: Modelling the costs of copper networks in the Norwegian context

Annex 6: Technical specifications for VULA Cu

Annex 7: Process description for location data requests

Annex 8: Comments from ESA

1 Introduction and background

1.1 Introduction

1. Pursuant to Sections 3-2 and 3-3 of Act no. 83 of 4 July 2003 relating to Electronic Communications (Electronic Communications Act), the Norwegian Communications Authority (Nkom) has been directed to define and analyse relevant product and service markets and geographical markets in accordance with the EFTA Surveillance Authority's (ESA) recommendation on relevant markets (the Recommendation)[1] and identify any providers with significant market power. Pursuant to Section 3-4 of the Electronic Communications Act, at least one of the specific obligations provided for in Chapter 4 of the Electronic Communications Act will be imposed on providers that are deemed to have significant market power. Such obligations will henceforth be known as specific obligations. Specific obligations are imposed after a proportionality assessment based on actual and potential competition problems in the relevant market.

2. The Recommendation defines the following wholesale markets for access at a fixed location:

- Market 3a: Wholesale local access provided at a fixed location
- Market 3b: Wholesale central access provided at a fixed location for mass-market products
- Market 4: Wholesale high-quality access provided at a fixed location

3. This decision applies to Market 3a.

4. Nkom has conducted an analysis of Market 3a (see Annex 1). The analysis has been performed in accordance with the Recommendation. This is the first analysis of Market 3a.

5. Market 3a is based on the former market for wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location (former Market 4). The relationship between these markets is explained in more detail in Section 1.1 of the market analysis.

6. Nkom has issued decisions on the designation of Telenor ASA (Telenor) as a provider with significant market power in the market for wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location three times: on 20 February 2006, 3 April 2009 and 20 January 2014. In these decisions, specific obligations were imposed on Telenor.

[1] EFTA Surveillance Authority Recommendation of 11 May 2016 on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with the Act referred to at point 5cl of Annex XI to the EEA Agreement (Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services), as adopted by Protocol 1 thereto and by the sectoral adaptations contained in Annex XI to that Agreement

7. In a letter dated 22 February 2016, Nkom invited the operators to provide feedback on several issues related to definition and delimitation of the product markets for Markets 3a, 3b and 4. Nkom received responses from Broadnet AS (Broadnet), NextGenTel ASA (NextGenTel), Telenor and Telia Norge AS.

8. In the period 12 January 2018 to 12 March 2018, Nkom conducted a national consultation process concerning Markets 3a, 3b and 4. Nkom received consultation responses from Broadnet, NextGenTel and Telenor. Nkom invited the operators to comment on the received consultation responses by 4 April 2018. Nkom received comments on the consultation responses from Broadnet, Get AS / TDC AS, NextGenTel and Telenor.

9. On the basis of the notification and the consultation response, Nkom has drawn up a draft market decision. The draft was translated into English and notified to ESA on 1 November 2018, cf. Section 9-3 of the Electronic Communications Act, Article 7 of the Framework Directive and ESA's Article 7 recommendation.[2] On 3 December 2018, ESA submitted its comments concerning Nkom's notification, see Annex 8. ESA's comments pertained to the following aspects:

- The development of competition from fibre and declining interest in investments in copper networks, see Section 2.3.2.7 of the market analysis in Annex 1.
- The need for notification of product characteristics and prices for virtual access products, as well as clarification of deadlines, see Sections 7.2.5.6 and 7.2.7.4.4 below.
- The need to expand the proportionality assessment related to the "homes passed" access obligation and to reassess the price regulation for the establishment of drop cables, see Sections 7.2.9 and 7.3.6 below.
- Effective monitoring of the non-discrimination obligation in order to ensure technical replicability, see Section 7.4.5 below.
- The need to monitor the impact of the method of cost accounting for copper access prices, see Section 7.3.2.7 below.

10. Nkom has reviewed ESA's comments and on this basis made certain adjustments to the assessments resulting in Nkom's conclusions in the decision. The main content of ESA's comments and Nkom's assessment of the comments are included in the market analysis and the decision, as specified above.

11. In the analysis of Market 3a, Nkom concluded that Telenor has significant market power in this wholesale market. The analysis has a horizon of two to three years.

[2] EFTA Surveillance Authority Recommendation of 2 December 2009 on notifications, time limits and consultations provided for in Article 7 of Directive 2002/21/EC on a common regulatory framework for electronic communications networks and services.

1.2 Legal basis

12. The regulatory framework for electronic communications in Norway is based on five directives adopted by the European Union (EU)[3]. The directives have been implemented in Norwegian law through the Electronic Communications Act and associated regulations, including the Regulations of 16 February 2004 on electronic communications networks and services (the Electronic Communications Regulation).

13. According to these regulations, the obligations for providers with significant market power are determined individually on the basis of a market analysis and with a limited forward-looking time horizon[4]. Particular attention must be paid to the expected pro-competitive effect of the relevant remedies.

14. In choosing specific obligations, Nkom has taken into account the considerations discussed in Nkom's revised remedies document of 12 June 2009[5]. This document is based on "Revised ERG Common Position on the Approach to appropriate remedies in the ECNS regulatory framework", drawn up by the Body of European Regulators for Electronic Communications (BEREC). The guidelines and principles embodied in BEREC's remedies document are intended to stimulate the development of the single market for electronic communications networks and services as well as facilitate a uniform and consistent regulatory practice in the various member states.

1.3 Structure of the document

15. This decision consists of a main document, which contains an assessment of the need and grounds for imposing specific obligations, and eight annexes. Annex 1 contains an analysis of Markets 3a and 3b. Annex 2 contains the results of Nkom's national consultation on the notification of the decisions in Markets 3a and 3b. Annex 3 and Annex 4 contain documentation of the LRIC model used as the basis for the price controls. Annex 5 contains a memo from Analysys Mason regarding the LRIC model. Annex 6 is Telenor's product specification for VULA Cu. Annex 7 contains a process description for location data requests. Annex 8 contains ESA's comments to Nkom's draft decision.

16. In Chapter 2, Telenor is designated as a provider with significant market power. The designation was made on the basis of the market analysis in Annex 1. Chapter 3 provides a

[3] 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).

[4] See further details about the time horizon in the ESA guidelines for market analyses and assessment of significant market power, paragraph 20.

[5] The document is published on Nkom's website www.Nkom.no under "Market regulation (SMP)".

brief overview of the regulatory starting point for the choice of remedies, while Chapter 4 provides an overview of the current obligations for Telenor in the market for wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location. Chapter 5 provides a description and overview of potential competition problems in Market 3a. General principles for the use of remedies are discussed in Chapter 6, including possibilities for duplicating infrastructure and the proportionality principle. Based on the preceding chapters and the market analysis in the annex, Nkom discusses the choice of specific obligations in Chapter 7. Chapter 7 imposes also the specific obligations. Chapter 8 contains information about the relationship to the current decisions in former Market 4. Chapter 9 contains information on the implementation of the decision and the right to appeal.

2 Designation of a provider with significant market power

17. Based on the market analysis in Annex 1, Nkom designates Telenor ASA as a provider with significant market power in the market for wholesale local access provided at a fixed location (Market 3a) pursuant to Section 3-3 of the Electronic Communications Act. For further justification, see the analysis in Annex 1.

3 Regulatory basis for the choice of remedies

18. It follows from Section 3-4, first paragraph, of the Electronic Communications Act that a provider that has significant market power shall be subject to one or more specific obligations that follow from Sections 4-1 and 4-4 to 4-10. Relevant obligations for the market for wholesale local access provided at a fixed location are:

- Access obligations (cf. Sections 4-1, 4-4 and 4-5 of the Electronic Communications Act)
- Obligation of non-discrimination (cf. Section 4-7 of the Electronic Communications Act)
- Obligation to publish reference offers (cf. Section 4-6 of the Electronic Communications Act)
- Obligation of transparency (cf. Sections 4-6 and 4-8 of the Electronic Communications Act)
- Obligation of accounting separation (cf. Section 4-8 of the Electronic Communications Act)
- Price controls and obligation of cost accounting (cf. Section 4-9 of the Electronic Communications Act)

19. In special cases, obligations may also be imposed beyond what follows from these provisions, provided the consultation procedure in Section 9-3 of the Electronic Communications Act is followed.

20. In its remedies document, Nkom has reviewed the principles that in general will guide Nkom in its choice of remedies. The four principles are:

Principle 1: Substantiated decisions shall be prepared in accordance with the regulatory authority's obligations pursuant to the directives.

Principle 2: The interests of consumers shall be protected when duplication of infrastructure is not assumed to be feasible.

Principle 3: In markets where Nkom considers it likely that duplication of infrastructure may be attained over time, Nkom will ensure that its use of remedies supports the transition to a market characterised by sustainable competition.

Principle 4: Remedies shall be formulated to incentivise compliance.

21. In accordance with the general principles of administrative law and the proportionality principle in Community law, the obligations Nkom imposes on providers with significant market power shall be appropriate to, and not go further than necessary for, furthering the purposes of the Electronic Communications Act. The basic purposes are stated in Section 1-1, which reads:

> *"The purpose of the Act is to secure good, reasonably priced and future-oriented electronic communications services for the users throughout the country through efficient use of society's resources by facilitating sustainable competition, as well as fostering industrial development and innovation."*

22. In addition to this basic purpose, a special purpose provision is set out in Section 3-4, third paragraph. The provision stipulates special, relevant considerations for imposing specific remedies:

> *"Obligations pursuant to the first and second paragraphs that are imposed in the individual case shall be appropriate to promote sustainable competition as well as facilitate national and international development in the market. The Authority may amend obligations imposed."*

4 Current specific obligations

23. In Nkom's decision of 20 February 2014, Telenor ASA was designated as a provider with significant market power in the market for wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location (former Market 4). The specific obligations that currently apply to Telenor in this market are largely:

- An obligation to meet all reasonable requests for access to the products full and shared access to the copper access network (local loop unbundling, LLU), including subloop

unbundling (SLU). Such access also includes access to backhaul services, co-location and other associated services. Refusals to grant such access must be justified and documented.

- An obligation to meet all reasonable requests for local loop unbundling (LLU) access to fibre access lines. Such access also includes access to backhaul services, co-location and other associated services. Refusals to grant such access must be justified and documented.
- An obligation to set the price for full access to the copper-based access network in accordance with a price cap of NOK 85 per month. An obligation to set the price for shared access at half of the estimated price for full access (same product type), less special costs for establishing and operating full access, with an addition for special costs for establishing and operating shared access.
- An obligation to set prices for establishing agreements on copper-based LLU, establishment of full and shared access line, management of agreements on copper-based LLU, operator switching, co-location, access to information and support systems, and other related services, based on the principle of cost orientation.
- An obligation to compile cost accounts for copper-based LLU and for co-location.
- An obligation not to discriminate with regard to price and other terms. The obligation applies to non-discrimination both between external operators and between internal and external operators.
- An obligation to prepare and publish reference offers for copper and fibre-based LLU access, including for co-location, information and support systems, backhaul and other associated services. This obligation follows directly from Section 4-6, third paragraph, of the Electronic Communications Act and Sections 2-5 and 2-6 of the Electronic Communications Regulation. The reference offer must contain provisions on reasonable compensation for failure to meet the agreed quality level, the notice period in connection with substantial changes to the access network, and the notice period in connection with decommissioning of copper access lines.
- An obligation to publish key performance indicators (KPIs) for LLU access based on both copper and fibre access networks.
- An obligation to establish accounting separation for fibre-based LLU.

5 Competition problems

5.1 Competition problems in general

24. A provider with significant market power would be able to engage in behaviour with the purpose or consequence of restricting competition, including driving competitors out of the

market, preventing new operators from entering the market, or exploiting consumers. This kind of anti-competitive behaviour is also referred to as competition problems.

25. Specific obligations imposed on providers with significant market power must be suited to remedy actual and/or potential competition problems in the relevant market. The imposition of specific obligations is not conditional on the abuse of market power actually having occurred. It is sufficient that a competition problem might potentially arise under given conditions.

26. Nkom's remedies document contains a general description of potential competition problems within the market for electronic communication.

27. Nkom's market analysis (Annex 1) concluded that there is not sustainable competition in the market for local access provided at a fixed location (Market 3a). Telenor can, to a large degree, act independently of competitors, customers and consumers, and has therefore been designated as a provider with significant market power. This chapter describes the competition problems within the relevant market, which then form the basis for the imposition of specific obligations.

28. When assessing the competition problems in the market, Nkom will have to consider behaviour and strategies that may arise if the market is not regulated. Nkom's remedies document also specifies that the assessment of competition problems is linked to the operators' "possible behaviour" within the decision's time horizon. National regulatory authorities do not need to establish that an operator has previously abused its market power in order to be able to impose specific obligations. In the assessment of potential competition problems, it is useful to examine what incentives the market structure would give the provider with significant market power in the absence of regulation.

29. The potential competition problems are described in a general manner in order to capture as many specific situations as possible that may arise in the absence of regulation. Nkom cannot anticipate every specific competition problem that might arise in the absence of regulation.

30. The potential competition problems in the market can be subdivided into three categories: vertical leveraging (category 1 in Nkom's remedies document), horizontal leveraging (category 2 in Nkom's remedies document) and single market dominance (category 3 in Nkom's remedies document).

31. A review follows below of the various competition problems of relevance to Market 3a. The potential competition problems in Market 3a are primarily linked to vertical leveraging of market power and single market dominance. The overview is not exhaustive, but contains potential competition problems that Nkom has identified.

5.2 Vertical leveraging

32. Vertical leveraging[6] is the term we use to refer to a situation where a vertically integrated provider with significant market power in the wholesale market (the upstream market) attempts to transfer market power from the wholesale market to a related downstream market (for example, the retail market or an underlying wholesale market) by shutting out or counteracting competitors in favour of its own operations in downstream markets.

33. For vertical leveraging to represent a problem, the provider must for some reason be prevented from fully exploiting its dominance in the upstream market. If, for example, the dominant operator in the upstream market is subject to price controls, the operator may have incentives to transfer market power to related downstream markets. It is generally assumed that the more strictly the relevant upstream market is regulated, the more problems related to vertical leveraging are likely to increase in scope in downstream markets. Nkom would, however, point out that the purpose of regulation at the wholesale level is to prevent an operator with significant market power in a wholesale market taking advantage of its market power, with a view to ensuring equal terms of competition in downstream markets. This means that wholesale regulation will not necessarily increase the need for regulation in the related downstream markets. Indeed, it is more likely to have the opposite effect.

34. Market 3a is an upstream market with several related downstream markets, including the market for wholesale central access provided at a fixed location (Market 3b) and the retail market for standardised broadband access.

35. Nkom considers it likely that Telenor, as a provider with significant market power, will not generally be able to fully exploit its dominance in this market. This follows directly from prohibition provisions in the Competition Act, among others. In addition, any specific obligations imposed pursuant to the Electronic Communications Act (such as price controls and obligations of non-discrimination) will reduce Telenor's opportunity to exploit its market power in this market. Various forms of vertical leveraging will therefore represent potential competition problems in the market. The most important of these competition problems are discussed below.

36. With regard to choice of remedies, it is helpful to distinguish between three types of (strategies for) vertical leveraging:

- Denial of access
- Leveraging by means of non-price variables
- Leveraging by means of pricing

[6] Vertical leveraging may be defined as "...any dominant firm's practice that denies proper access to an essential input it produces to some users of this input, with the intent of extending monopoly power from one segment of the market (the bottleneck segment) to the other (the potentially competitive segment)" (Rey/Tirole 1997, quoted in the BEREC document).

5.2.1 Denial of access

37. An established provider with significant market power in an upstream market may try to leverage market power by denying access to operators that offer competing services in the related downstream market, thus restricting competition in these markets. By cutting off competitors from essential upstream inputs, the dominant operator may, to a certain extent, protect its own downstream operations against effective competition. Nkom finds that Telenor may have an incentive to deny other operators access to necessary wholesale products in this market.

38. This competition problem includes situations where the wholesale provider with significant market power refuses to deal with competitors, as well as cases where access is offered, but on unreasonable terms.

39. For denial of access to represent a problem, it must lead to weakened competition downstream. If there is sufficient competition in the downstream markets, for example, due to potential competition from alternative networks and/or technologies, denial of access will not necessarily weaken the competition downstream.

40. Nkom nevertheless finds that in many contexts Telenor's rivals in related downstream markets will be dependent on access in this wholesale market to be able to offer competitive solutions to end users in competition with Telenor. Furthermore, it is assumed that any denial of access in the wholesale market would lead to significant weakening of the competition in the retail market.

41. The prevalence of alternative access networks has continued to grow since Nkom issued decisions on specific obligations in the LLU market (former Market 4) in 2014. Prior to the decision in 2014, xDSL was still the most widely used access technology with approximately 44% of all broadband subscriptions in the retail market. Although copper-based access is no longer the dominant access technology, the copper access network is still used as an input factor for approximately 26% of all fixed broadband subscriptions in the retail market[7]. Nkom believes that any denial of access at the local level to Telenor's copper-based access network could substantially weaken the downstream market. It is also important to emphasise that the copper access network is the only nationwide access network. In the absence of an imposed obligation of access, denial of access therefore still represents a potential competition problem in Market 3a.

42. Fixed broadband can also be provided via fibre access networks, HFC networks (hybrid fibre coaxial, also referred to as cable television networks) and fixed radio access (such as fixed LTE[8]and WiMax[9]), as well as via the copper access network. The prevalence of

[7] Cf. Nkom's electronic communications statistics for 2017.

[8] For more information on fixed LTE, see the newsletter from Telenor, published in April 2016: http://app.emarketeer.com/ext/webpage/show.php?p=274290a94fb0bf954a6a2b621eed8926416f02c&from=groupmessage&isappinstalled=0&ic_source=fmwc17&ic_medium=hwdc

[9] WiMax is a standardised wireless technology for the provision of broadband accesses.

alternative access networks has increased dramatically in recent years. There has been especially strong growth in the number of customers receiving broadband via fibre access networks, and fibre-based broadband is now the most widespread access technology. In addition, the existing HFC networks have been significantly upgraded, also contributing to more broadband customers via the HFC networks. In 2014, Nkom based its decision in former Market 4 on the assumption that the competition problems that denial of access to Telenor's copper access network would represent could largely also apply to denial of access to Telenor's fibre access and HFC networks.

43. On several occasions, Telenor has indicated an increased commitment to fibre-based broadband and has expressed a target of 800,000 homes passed by fibre in 2020.[10] This will lead to lower prioritisation of the copper network. Nkom finds it probable that Telenor will build fibre accesses to most new homes and commercial buildings in the coming years, while a growing number of copper accesses will be replaced by fibre accesses. Furthermore, it is possible that Telenor will buy up competitors that have fibre access networks, as was the case with the acquisition of LOS Bynett and Bynett Privat. In this way, Telenor will be able to maintain its market share and market power even if utilisation of the copper access network is reduced. This kind of development, combined with the fact that it is commercially uninteresting to duplicate already established access networks based on fibre, means that Nkom still finds that denial of access to Telenor's fibre access network represents a potential competition problem in Market 3a.

44. In the current regulatory period, Nkom has processed cases related to denial of access. In September 2013 and in May 2014 respectively, NextGenTel and Broadnet complained that Telenor had denied requests to use SHDSL.bis in Telenor's copper access network (cf. Section 3.6.1 of the market analysis). In its decision dated 10 November 2014, Nkom concluded that NextGenTel's and Broadnet's requests to use SHDSL.bis in Telenor's copper access network were reasonable. Telenor was therefore ordered to meet requests to use SHDSL.bis. Telenor appealed Nkom's decision. In a decision dated 3 June 2015, the Ministry of Transport and Communications upheld Nkom's conclusion that Telenor must meet requests to use SHDSL.bis in Telenor's copper-based access network.

5.2.2 Leveraging by means of non-price variables

45. Leveraging by means of non-price variables refers to various types of discriminatory behaviour between internal and external customers in the wholesale market. This is especially relevant if an operator with significant market power in an upstream market is subject to regulated access charges that render price discrimination difficult or impossible.

46. Competition problems of this type include delaying tactics, undue requirements, quality discrimination, and discrimination or misuse related to information. These competition

[10] See, for example, the presentation from Telenor's Capital Markets Day in February 2017: https://www.telenor.com/wp-content/uploads/2017/02/Telenor-CMD-2017-Telenor-Norway.pdf

problems are described in more detail below. For instance, these types of competition problems can often give the established operator a “first mover advantage” over rivals in the downstream market, thereby restricting the competitors’ opportunities in the downstream markets.

47. One potential competition problem is delaying tactics, such as lengthy negotiations or unreasonably long delivery times. If, as part of an access obligation, there are no requirements for negotiations for access to be implemented without unnecessary delay or for delivery times to be the same for external wholesale customers as for its own downstream operations, Telenor may have an incentive to use various forms of delaying tactics to slow down access. These kinds of delays could potentially represent a competition problem.

48. Undue requirements and quality discrimination are also potential competition problems. Undue requirements to access buyers may be intended to shut them out from the market. Examples of undue requirements include demanding large bank guarantees, strict sales requirements with a repayment obligation if the sales requirement is not met, and unnecessary information requirements. Quality discrimination refers to the opportunity to ensure better quality for its own downstream operations than for access buyers. Varying fault correction times is an example of quality discrimination.

49. Potential competition problems in Market 3a related to information management may include discriminatory use or withholding of information and misuse of information. In respect of discriminatory use or withholding of information, Telenor may have an incentive to provide its downstream operator with information that they do not provide to external wholesale customers, or refuse to provide information necessary for the wholesale customers to be able to provide services in downstream markets. For example, Telenor may have an incentive to furnish only its own retail operations, and not its external wholesale customers, with information about the wholesale operations’ roll-out plans. This could be particularly problematic if Telenor plans upgrades or other changes to the access network affecting external wholesale customers that buy access from Telenor. These operators need predictability to protect their investments. If changes are made in network structures etc. that affect the access buyers, the latter need information about this so that they have sufficient time to adapt to the changes.

50. In terms of misuse of information about rivals, Telenor receives customer growth forecasts from the wholesale customers in Market 3a. Telenor’s wholesale business needs them to be able to operate and develop the access network in the most efficient manner possible. These forecasts give Telenor’s wholesale operations a certain amount of information about the marketing plans of external wholesale customers. This is information that could potentially be misused by Telenor if it becomes available to Telenor’s own retail operations.

51. In the current regulatory period, Nkom has processed several complaints relating to possible discrimination between internal and external downstream operations. In May 2015,

Broadnet complained that Telenor was in breach of several key obligations in Nkom's decisions in former Markets 4 and 5 (see Section 3.6.7 of the market analysis). The complaint pertained to, among other things, Telenor's information and support systems, set-up fees in connection with placing an order, cancellation fees, delivery times and cancellation of orders.

52. Furthermore, there have been conflicts between Telenor and access buyers in connection with notice periods for changes as a result of Telenor's upgrading of the copper network (see Section 3.6.4 of the market analysis). Telenor provided six months' notice of the changes, even in cases where the changes were relatively major and would partially deprive the wholesale customers of the opportunity to provide services to their own end users from the main exchange. Nkom issued a decision on 8 July 2016, ordering Telenor to change the notice period in those cases where the changes to the access network are of a scope that, according to regulations, requires a notice period of three years. Telenor appealed the decision, but Nkom's decision was upheld in the Ministry of Transport and Communications' appeal decision of 19 December 2017.

53. All in all, it is Nkom's view that all seven competition problems from 1.2 to 1.8 as referred to in Nkom's remedies document and BEREC's remedies document could potentially arise in Market 3a.

5.2.3 Leveraging by means of pricing

54. This kind of vertical leveraging includes behaviours whose purpose or effect is to increase competitors' costs, limit their sales in downstream markets, or subject competitors to a margin squeeze. Below is a discussion of the most likely forms of leveraging by means of pricing in the relevant market.

55. A common feature of competition problems of this kind is that they pertain to the relationship between prices in the market for wholesale local access (Market 3a), the market for wholesale central access (Market 3b) and the retail market for standardised broadband access respectively, and not the price level in the respective markets per se. In Nkom's view, it is important that the prices are balanced so as to facilitate efficient investment decisions and effective competition where possible, in the best interests of the end users. This means that for an efficient operator it must be possible to enter the market at different levels of access and compete with Telenor in these markets on equal terms.

5.2.3.1 Price discrimination

56. A vertically integrated provider with significant market power in the wholesale market will have an incentive and the opportunity to discriminate on price between different providers and between its own and external operations. Basically, price discrimination occurs when the wholesale provider charges different prices for the same services. However, it can also take place more indirectly; for example, if the price plans at the wholesale level are formulated so that in practice it is difficult for rivals to have a competitive price structure in the retail market.

57. One possible consequence of price discrimination is that the costs for one or several competitors will be higher than the costs for the dominant operator's own retail operations, thus subjecting competitors to a margin squeeze. In this context, margin squeeze is defined as differences between access charges in Market 3a and the vertically integrated provider's retail prices that entail that the margin becomes so small that efficient competitors cannot earn a reasonable rate of return and are therefore at risk of being squeezed out of the market.

58. Nkom has conducted three rounds of margin squeeze calculations linked to Telenor's fibre-based Broadband access obligation (see Section 3.6.6 of the market analysis). On all occasions the results of the margin squeeze tests showed that an effective access buyer would not be able to replicate Telenor's retail products. Nkom therefore found it necessary to order Telenor to adjust its prices for access to the product VULA in order to meet the regulatory requirements associated with non-discrimination in terms of prices. Decisions on the correction of access charges were made on 9 May 2016, 21 February 2017 and 20 April 2018. Telenor appealed all Nkom's decisions. In the first case, the Ministry of Transport and Communications ruled that Telenor's rates must be reduced by 24.7%. The appeal of Nkom's other decisions is currently being considered by the Ministry.

59. Price discrimination per se does not necessarily constitute a competition problem. For example, volume discounts based on objective criteria will often not constitute a competition problem. However, if the threshold for the discounts is set so high that only Telenor's own downstream operations receive discounts, price discrimination in the form of volume discounts may nevertheless constitute a competition problem.

60. Nkom finds that price discrimination is a potential and real competition problem in Market 3a. In Nkom's opinion, in the absence of regulation, Telenor would have an incentive and the opportunity to discriminate between internal and external operations such that Telenor's internal downstream operations would base its production on lower prices than external competitors in relevant downstream or retail markets.

5.2.3.2 Cross-subsidisation

61. In this context, cross-subsidisation may occur between Market 3a and its related downstream markets. In this context, both the retail market for standardised broadband access and Market 3b will be downstream markets. This competition problem is related to and partly overlaps with the competition problem price discrimination.

62. In the event of cross-subsidisation linked to vertical leveraging, a dominant operator would typically be able to charge a price that is considerably higher than the underlying costs in the wholesale market, while the price in the downstream market is lower than the costs.

63. For example, cross-subsidisation can occur by Telenor setting (excessively) high prices in Market 3a and (excessively) low prices in the retail market for standardised broadband access. In this case, Telenor would be able to use income from Market 3a to cover losses in the retail market, while potential rival providers in the retail market would be subject to a

margin squeeze. In this context we refer to the presentation of Nkom's margin squeeze tests for fibre-based Broadband access in Section 5.2.3.1 above.

64. Cross-subsidisation may also occur by Telenor setting (excessively) high prices in Market 3a and (excessively) low prices in Market 3b, entailing that potential rival providers in Market 3b (i.e. operators with their own access infrastructure and operators that buy access in Market 3a from Telenor) are in a disadvantaged position in terms of their ability to offer a competitive wholesale product. If Telenor cross-subsidises between Market 3a and Market 3b, this can be a strategy to steer demand from wholesale customers towards the access form that Telenor would prefer to offer.

65. In Section 5.2.3 Nkom pointed out that it is important that the prices in Market 3a, Market 3b and the retail market for standardised broadband access are balanced so as to facilitate efficient investment decisions and effective competition where possible, in the best interests of the end users. In Nkom's opinion, cross-subsidisation between these markets may have the opposite effect.

66. Nkom believes that cross-subsidisation between Market 3a and the relevant downstream markets is a potential and real competition problem. In Nkom's opinion, in the absence of regulation, Telenor would have an incentive and the opportunity to use cross-subsidisation, thereby subjecting its rivals to a margin squeeze.

5.2.3.3 Predatory pricing

67. Like cross-subsidisation and price discrimination, Telenor can use predatory pricing to leverage market power from Market 3a to the retail market for standardised broadband access and/or to Market 3b.

68. In the event of predatory pricing linked to vertical leveraging, a dominant operator would typically be able to charge a price in the downstream markets that is considerably higher than the underlying costs.

69. For example, predatory pricing can occur by Telenor setting (excessively) low prices in the retail market for standardised broadband access in order to subject rival providers in the retail market to a margin squeeze.

70. Predatory pricing may also occur by Telenor setting (excessively) low prices in Market 3b, entailing that potential rival providers in Market 3a (i.e. operators with their own access infrastructure and operators that buy access in Market 3a from Telenor) are in a disadvantaged position in terms of their ability to offer a competitive wholesale product. If Telenor practises predatory pricing in Market 3b, this may also be a strategy to drive demand from wholesalers into this market.

71. Like cross-subsidisation, predatory pricing can cause an imbalance in the prices in Market 3a, Market 3b, and the retail market for standardised broadband access, which may in turn prevent efficient investment decisions and effective competition where possible.

72. Nkom believes that predatory pricing in the downstream markets related to Market 3a is a potential competition problem. In Nkom's opinion, in the absence of regulation at the wholesale level, Telenor would have an incentive and the opportunity to use predatory pricing, thereby subjecting its rivals to a margin squeeze.

5.3 Single market dominance

73. In addition to potential competition problems associated with vertical leveraging between markets, there are also potential competition problems associated with an operator's strong position in a particular market. As mentioned in Nkom's remedies document, it is appropriate to distinguish between three types of single market dominance:

- Entry-deterring behaviour
- Exploitative behaviour
- Inefficient production

5.3.1 Entry-deterring behaviour

74. This type of behaviour encompasses situations where a dominant operator tries to erect new entry barriers to potential newcomers in the market, for example by increasing the cost of switching operator through restrictive contractual terms, such as unreasonably long lock-in or notice periods.

75. In Nkom's assessment, competition problems of this nature are unlikely for copper-based access in Market 3a.[11] Nkom believes Telenor will not have incentives to try to create new entry barriers in this part of Market 3a, as establishment of new copper accesses is considered unlikely.

76. With respect to entry-deterring behaviour related to alternative access networks, such as fibre access networks for example, this could be a potential competition problem. Nkom considers it likely that Telenor may want to increase operator switching costs at the wholesale level and retail level in the broadband market to complicate the establishment of alternative access networks.

5.3.2 Exploitative behaviour

77. Exploitative behaviour is situations where the dominant operator exploits customers through excessive pricing or price discrimination.

78. According to economic theory, prices can be considered excessive if they enable the provider of a product to sustain profits over time higher than it could expect to earn in a competitive market (super-normal profits). Operators with significant market power may set prices that are higher than the underlying costs warrant. Excessive pricing may appear to be

[11] Competition problems of this type will be more likely in related downstream markets, for example, Market 3b.

the “next best thing” for operators that are obligated to give rival providers access to wholesale services.

79. Nkom regards overpricing as a serious potential competition problem in this market. In Nkom’s assessment, Telenor will have incentives to set high prices in this wholesale market, compared with the price that would prevail in a market with effective competition, in order to achieve higher profits in the wholesale market. An excessive price in the wholesale market may also spread to the retail market for standardised broadband access, entailing that end users on average pay an excessive price for the service and deterring some end users from purchasing broadband access. Overpricing could thus result in a decline in socioeconomic welfare and reduced competition. In this context we refer to the presentation of Nkom’s margin squeeze tests for fibre-based Broadband access in Sections 5.2.3.1 and 5.2.3.2 above.

80. Like exploitative behaviour, price discrimination can encompass various forms of differentiation of prices and/or price structures between different categories of customer and between internal and external access buyers. In Market 3a, price discrimination will primarily be a strategy for leveraging market power downstream, and less a problem related to exploitation of retail customers.

5.3.3 Inefficient production

81. This type of competition problem refers to different types of product inefficiencies due to lack of competition. The reason is that the market lacks the disciplining effect that exposure to competition is assumed to have on production efficiency. Potential competition problems of this sort include lack of investment, cost inefficiency and low quality.

82. Nkom does not consider it likely that lack of investment is a relevant competition problem in Market 3a. In recent years Telenor has made investments to increase, for example, the prevalence of VDSL, but has, as previously mentioned, stated that investments in the copper access network will have lower priority going forwards. However, significant investments in alternative infrastructure (such as fibre access networks) from both Telenor and other operators mean that inefficient production due to lack of investment is not considered a competition problem in Market 3a.

83. Nor does Nkom consider it likely that cost inefficiency and low quality will pose serious problems in Market 3a. In theory, a dominant operator in a market where there is little or no real or potential competition may have little incentive to operate cost-effectively. While Telenor is, in practice, the only provider of copper-based LLU, competition from providers that use alternative access technologies will give Telenor relatively strong incentives to operate cost-effectively in this part of the market. However, in areas where the copper access network is overlapped by Telenor’s fibre or HFC network, it may nevertheless be likely that Telenor has no incentive to strive for cost-effective operations, but would prefer to wind up operation of the copper access network. However, this is not a question of whether cost-effectiveness and low

quality pose a competition problem, but rather about the choices Telenor makes regarding use of infrastructure available to them in these kinds of areas.

5.4 Summary of potential competition problems

84. The potential competition problems in Market 3a are linked to vertical leveraging between markets and single market dominance.

85. With regard to vertical leveraging, it is chiefly various forms of discriminatory behaviour that pose the greatest competition problems. This includes both price-related discrimination that could subject Telenor's competitors to a margin squeeze in downstream markets, and discrimination relating to other circumstances that could limit competitors' opportunities in downstream markets. In this context, the most relevant downstream markets will be Market 3b and the retail market for standardised broadband access.

86. In the case of single market dominance, the main potential competition problems are entry-deterring behaviour through, for example, an increase in the cost of switching provider at both wholesale and retail levels, and exploitive behaviour through overpricing and price discrimination.

6 Choice of remedies in general

87. In the following, Nkom gives an account of some factors of a general nature relating to the choice of remedies in Market 3a. The actual choice of specific obligations is discussed in detail in Chapter 7.

6.1 Scope for duplication of infrastructure in the market

88. According to the review of principles 2 and 3 in Nkom's remedies document, key to the choice of remedies will be whether or not duplication of the infrastructure used in the relevant market is deemed possible. If infrastructure duplication is not deemed possible, the consumers' interests must be protected by making the best possible use of the existing infrastructure (principle 2). With this alternative, more static efficiency is attained. In markets where Nkom considers it likely that duplication of infrastructure could be achieved over time, a balance will have to be struck between the objectives of competition in the short and the long term.

89. Nkom based its decision from 2014 in former Market 4 on different regulatory principles for Telenor's copper network and high-speed networks based on different access technologies. Nkom concluded that copper-based access fell under principle 2, whereas for other access technologies it was not appropriate to draw an absolute conclusion with regard to

regulatory principle 2 or 3. The use of remedies for fibre-based access networks was therefore designed to safeguard investment incentives to the maximum extent possible, while fostering competition based on wholesale access. One of the reasons for the distinction was that Nkom considered it unlikely that Telenor's rivals would find it appropriate to establish a parallel copper-based access network, as opposed to the case for roll-out of high-speed networks based on access technologies other than copper.

90. It is stated in the Norwegian government's electronic communications policy plan in "Digital agenda for Norway" from 2016 (Report no. 27 to the Storting (2015-2016) that an overarching goal for the government's electronic communications policy is that 90% of Norwegian households should have an offer of 100 Mbit/s broadband, based on commercial development in the market, by the end of 2020, and that the long-term goal is that all households have an offer of high-speed broadband. The report "Broadband coverage 2017"[12] shows that approximately 80% of households in Norway had an offer of at least 100 Mbit/s downstream speed in 2017, and that 100 Mbit/s coverage has increased gradually in recent years (from 73% in 2015 and 78% in 2016). A number of new fibre networks are still being planned and rolled out in Norway, and several providers have expressed interest in upgrading the copper network by means of vectoring and/or G.fast. Against this backdrop, Nkom expects that 100 Mbit/s coverage will also increase in the coming years, in line with the objectives defined in the government's electronic communications policy plan.

91. This trend indicates that the current regulation of the wholesale markets for fixed access has not affected the roll-out of high-speed networks in Norway in a negative direction, and that use of remedies aimed at both providing incentives for new investments (regulatory principle 3) and ensuring competition based on access to Telenor's networks (regulatory principle 2) seems to have had the intended effect. Nkom therefore deems it natural to use the conclusions reached in connection with the 2014 decision as a starting point.

92. There is still much to suggest that duplication of the copper-based access network is neither likely nor desirable. In areas where new infrastructure is going to be established to provide broadband and internet access in the retail market, other more modern technologies are used. Nkom assumes that new infrastructure will continue to be based on technologies other than copper and regards it as unlikely that rivals to Telenor would find it appropriate to establish a parallel copper-based access network.

93. At the same time, there has been new interest in upgrading parts of the copper network in recent years. This kind of upgrade will necessarily require investments, in connection with the roll-out of remote micronodes, among other things. Although duplication of the copper access network is not more likely today than it was in 2014, the goal of ensuring investment incentives linked to upgrading suggests that it is no longer natural to differentiate between the regulatory principle used for copper and that used for other access technologies. On the

[12] Report prepared in September 2017 by Analysys Mason on assignment from Nkom.

contrary, it will be important in the coming years that the use of remedies in the wholesale regulation of Telenor's copper access network serves to both provide investment incentives for upgrading the copper network and continue to foster access-based competition in the retail market.

94. The scope of alternative access networks, especially fibre-based networks, has continued to increase since 2014. At the end of the first half of 2017, approximately 43% of fixed broadband subscriptions were based on fibre, while some 26% were based on copper. Nkom expects significant investments in the development of alternative access networks, particularly based on fibre, from both Telenor and other operators. As previously mentioned, Telenor has indicated on several occasions that it is going to increase its investments in fibre-based broadband.

95. Nkom considers continued roll-out of high-speed networks based on other access technologies than copper both desirable and probable, and regulation of Market 3a should therefore pave the way for a development towards maximum sustainable infrastructure competition. As a result, in its formulation of specific obligations in this market Nkom will attach importance to incentives for further investment in high-capacity broadband networks.

96. There is growing competition among the developers of high-capacity broadband networks. In addition, there is reason to assume that mobile broadband will increasingly become an alternative to fixed broadband for a growing number of broadband users in the coming years, even if the degree of substitutability is not yet considered large enough to warrant defining mobile broadband access as part of the relevant wholesale markets for fixed network based broadband access. In addition, OTT operators represent competition on the service side of the broadband market, entailing that parts of the infrastructure owners' service offerings will be more exposed to competition than in previously. These factors suggest that the assessment of remedies linked to other access technologies than copper in Market 3a ought to be based on regulatory principle 3.

97. At the same time, Nkom wants to prevent new competition problems arising after Telenor establishes more access networks based on alternative access technologies. Nkom regards it as unlikely that new broadband networks will be duplicated in areas where Telenor establishes fibre access networks. As long as Telenor's copper access network is maintained in the relevant areas, access obligations in the copper network will nevertheless help ensure competition in these areas. However, new competition issues may arise from the time that Telenor chooses to decommission the copper-based broadband offering in an area. In this case, the competition from broadband providers that rely on access to the copper access network will disappear, unless some form of access to the fibre access network is granted. Nkom expects that Telenor's increased investments in fibre-based access networks may entail decommissioning of the copper access network in an increasing number of areas. This is a factor that suggests that regulation of Market 3a ought to be based on regulatory principle 2, regardless of access technology.

98. Similarly, new competition problems may arise if fibre access from Telenor is the only broadband infrastructure established when new residential and commercial developments are built. In these kinds of situations, broadband users' interests must be safeguarded through regulation paving the way for the best possible utilisation of the established infrastructure. This argues in favour of regulatory principle 2.

99. In summary, considerations of investment incentives and the goal of more sustainable infrastructure competition in the broadband market suggest using regulatory principle 3 for both the copper-based and the fibre-based part of Market 3a. At the same time, Nkom also wants to continue to encourage competition in areas where Telenor is the only access provider, regardless of whether the access network is based on copper or fibre.

100. In light of this, Nkom has concluded that the use of remedies in Market 3a, regardless of access technology, should be designed both to provide incentives for investments that contribute to attainment of the high-speed network coverage goals defined in the government's electronic communications policy plan, while continuing to foster competition in the retail market based on access to Telenor's networks. This means that Nkom does not find it appropriate to draw an absolute conclusion regarding whether to base regulation of Market 3a on regulatory principle 2 or regulatory principle 3.

6.2 Proportionality

101. The principle of proportionality is discussed in more detail in Proposition no. 58 (2002-2003) to the Odelsting in the remark concerning Section 3-4 of the Electronic Communications Act. This remark contains the following comments on the proportionality assessment that the national regulatory authority is obligated to carry out in connection with the imposition of obligations:

> *"The obligations imposed shall be proportionate, non-discriminatory, based on objective and fair criteria and be publicly available. Proportionate means that obligations imposed regarding access or significant market power with appurtenant conditions are suitable to compensate for a lack of sustainable competition and will help to promote consumer interests and, where possible, contribute to national and international development. The burdens of the remedies imposed are to be proportionate with regard to what they seek to achieve. This also permits the authorities to link the obligations to certain areas of the relevant market if appropriate."*

102. This principle means that when choosing from several alternatives, all of which could promote the objectives equally effectively, Nkom should choose the least burdensome alternative. Under the circumstances, an absolute requirement will also have to be put in place not to impose obligations that are disproportionately burdensome.

103. The content of the proportionality principle is also described in relative detail in Nkom's remedies document. This document states that the principle of proportionality implies that

measures should be suited to realise their underlying objective, should not be in excess of what is necessary in each case, and should result in benefits which outweigh the burdens.

104. However, neither the principle of proportionality nor the principle of minimal regulation may be cited in support of the argument that Nkom should not or cannot impose burdensome obligations on providers with significant market power. The core of these principles is that stricter obligations than are necessary shall not be imposed. However, the imposition of more burdensome obligations, such as price controls, could very well be proportionate or necessary where other less burdensome obligations are not considered adequate to achieve the objective of regulation.

6.3 Assessment of the need for geographically differentiated use of remedies

105. In the market analysis (Annex 1), Nkom has concluded that the geographical wholesale market for local access provided at a fixed location is delimited to the whole of Norway. The analysis on which this conclusion builds is based on both different networks' coverage and the competition situation in the retail market.

106. According to the Explanatory Note (page 14), in this kind of situation it may nevertheless be assessed whether it is appropriate to differentiate the use of remedies geographically. Different levels of infrastructure competition in different parts of the country are highlighted in the Explanatory Note as a circumstance that might provide grounds for geographically differentiated use of remedies:

> *"In a situation where NRAs could not clearly identify substantially and objectively different conditions stable over time in order to define wholesale sub-national markets, the existence of geographically differentiated constraints on a SMP operator who operates nationally, such as different levels of infrastructure competition in different parts of the territory, are more appropriately taken into account at the remedies stage by imposing a geographically differentiated set of obligations."*

107. Against this backdrop, Nkom has assessed whether, despite the fact that Market 3a is geographically delimited to the entire country, it is nevertheless appropriate to impose different obligations on Telenor in different parts of Norway as a result of variations in the degree of infrastructure competition.

108. As shown in the attached market analysis, there are variations in the degree of infrastructure competition in the Norwegian market for broadband access. This implies that Telenor meets varying degrees of competition from alternative broadband developers in the retail market around the country. Nkom has therefore assessed whether Telenor's obligations in Market 3a ought to be differentiated based on a distinction between areas with competition and areas with limited infrastructure competition.

109. In those parts of the country where operators other than Telenor have established NGA networks and where Telenor's market share in the retail market at the same time has declined considerably in recent years, there may be an argument for relaxing wholesale regulation in Market 3a. An important prerequisite for this kind of geographically differentiated use of remedies would be that it is possible to distinguish clearly between areas with competition and areas with limited infrastructure competition, based on documentable criteria. In addition, Nkom believes that any such differentiation must be operational and proportionate, in the sense that any geographical areas in which obligations are differentiated be reasonably large and cohesive.

110. The attached market analysis shows that it is not possible at the county or municipal level to distinguish clearly between areas with competition and areas with limited infrastructure competition (cf. Section 2.5.3.2 of the market analysis). However, the market analysis does identify differences in the various networks' and access technologies' coverage in urban settlements and rural settlements respectively. This applies in particular to technologies that offer higher capacities (cf. Section 2.5.3.3 of the market analysis). This may indicate that it would be appropriate to define urban settlements (as defined by Statistics Norway) as areas with competition and with less need for wholesale regulation, while areas that are not urban settlements (referred to as rural settlements in the coverage report cited in the market analysis) are defined as areas with limited infrastructure competition and with a greater need for wholesale regulation.

111. At the same time, Section 2.5.3.3 of the market analysis states that the largest relative increase for combined fibre, HFC and VDSL coverage in recent years has been in rural settlements, and that in recent years several fibre providers have started using roll-out models that have been adapted for use outside urban settlements. Although the coverage report reveals a difference in the roll-out of higher speeds between urban settlements and rural settlements, this indicates that the development is towards a closing of this gap. In the market analysis, Nkom has therefore found there is no basis for concluding that the competition situation in urban settlements and rural settlements is so different that this distinction could be used as the starting point for defining different geographical markets.

112. Nkom holds that the same reasoning can also be used when assessing whether the use of remedies in Market 3a ought to be differentiated between urban settlements and areas that are not urban settlements. Pursuant to the attached market analysis, there is no basis for defining all areas that are not urban settlements as areas with limited infrastructure competition. Similarly, the degree of infrastructure competition varies within several urban settlements. For example, there are areas within several urban settlements that have neither fibre nor HFC coverage from operators other than Telenor, where wholesale regulation is necessary to ensure effective competition. This implies that the removal or relaxing of the wholesale regulation of Telenor's copper and fibre networks in urban settlements might have negative competitive effects in certain areas within the urban settlements.

113. Against this backdrop, Nkom finds that a distinction between urban settlements and areas that are not urban settlements is not an appropriate starting point for geographically differentiated use of remedies in Market 3a.

114. This means that specific assessments of the degree of infrastructure competition and developments in market shares must be made on a level other than county, municipality or urban settlement if Telenor's obligations in Market 3a are to be differentiated geographically. As mentioned above, Nkom wants to ensure that any geographically differentiated use of remedies is operational and proportionate. In a situation where neither the counties, municipalities, nor urban settlements can be used as a basis for distinguishing geographical areas with different needs for wholesale regulation in Norway, Nkom believes that the principle of operational and proportionate use of remedies implies that it is not appropriate to adopt geographically differentiated use of remedies in Market 3a.

115. Because of the dynamics of the roll-out of NGA networks, including any upgrading of the copper network, which may not necessarily be limited to specific geographical areas in Norway, combined with the absence of stable geographical boundaries for the roll-out of fibre, Nkom believes that a continuation of uniform wholesale regulation throughout the whole country in Market 3a is best suited to achieve the objectives of regulation in this decision period.

116. Further, Nkom believes importance should be attached to the fact that the current national obligations in these wholesale markets have not impeded the development of alternative NGA infrastructure in Norway. On the contrary, figure 29 in the market analysis shows that Norway has achieved the highest fibre to the home (FTTH) penetration in Europe despite the national obligations imposed on Telenor in the wholesale markets for broadband access (former Markets 4 and 5). Nkom finds that this indicates that the design of the wholesale regulation in the Norwegian broadband market has both provided a basis for increased competition based on access to Telenor's networks throughout the entire country and still provided the necessary incentives for NGA development. This means that national obligations in the wholesale markets for broadband access cannot be said to have had unintended negative effects on competition in the retail market.

117. In light of this, Nkom has concluded that it is more appropriate to continue national obligations in the wholesale markets for broadband access, including Market 3a, than to attempt to introduce geographically differentiated use of remedies based on multiple uncertain assumptions about future infrastructure competition and market share developments in different geographical areas that cannot be delimited on the basis of counties, municipalities or urban settlements.

7 Choice and content of specific obligations

118. In this chapter, Nkom assesses the specific obligations that are to be imposed on Telenor as a provider with significant market power in the market for wholesale local access provided at a fixed location (Market 3a). The aim is to determine the obligations that are best suited to fulfil the objectives of the Electronic Communications Act and to counteract identified competition problems, while at the same time ensuring that the remedies are proportionate.

7.1 Recommendations from the European Commission and BEREC

7.1.1 The NGA Recommendation

119. Originally the European Commission's Recommendation on regulated access to next Generation Access Networks (the NGA Recommendation[13]) applied to regulation of former Market 4 and former Market 5. However, in the Explanatory Note (page 50), the Commission points out that the NGA Recommendation is also relevant for Markets 3a and 3b.

120. The purpose of the NGA Recommendation is to provide incentives for investment and innovation in NGA and at the same time ensure competition and predictable regulation. The Recommendation builds on the EU's Digital Agenda, which defines a goal of increasing NGA coverage.

121. The Commission defines NGA as fixed access networks consisting wholly or partly of optical elements and capable of delivering broadband connectivity with enhanced properties (such as higher speeds) compared with the existing copper-based access network. In this context, increased NGA coverage primarily means the roll-out of optical fibre, but also includes upgrading of the existing copper access network in combination with fibre. The Commission regards it as important that regulation is consistent across national borders to avoid bias within the single market and to ensure predictability for the operators in the market.

122. The specific recommendations in the document are largely obligations linked to fibre networks for operators that are considered to have significant market power in the relevant markets.

123. Firstly, the Recommendation states that operators with significant market power ought to be obligated to provide LLU access to fibre accesses:

> *"22. In accordance with the principles provided for in Directive 2002/19/EC, where the SMP operator deploys FTTH NRAs should in principle mandate unbundled access to the fibre loop. […]"*

124. It is further specified that this applies regardless of the network architecture:

[13] Commission Recommendation of 20 September 2010 on regulated access to Next Generation Access Networks (NGA) (2010/572/EU)

"23. NRAs should mandate unbundled access to the fibre loop irrespective of the network architecture and technology implemented by the SMP operator."

125. The NGA Recommendation also states that access to fibre accesses should be granted at cost-oriented prices:

"25. The price of access to the unbundled fibre loop should be cost-oriented. […]"

126. The NGA Recommendation also addresses access obligations beyond the actual fibre accesses and recommends that access obligations ought to be linked to co-location, civil engineering infrastructure and backhaul. In the case of co-location and backhaul, the Recommendation states:

"22. […] The imposition of unbundled access to the fibre loop should be accompanied by appropriate measures assuring co-location and backhaul. […]"

127. In respect of access to civil engineering infrastructure, it states:

"13. Where duct capacity is available, NRAs should mandate access to civil engineering infrastructure. […]"

and

"14. NRAs should ensure that access to existing civil engineering infrastructure is provided at cost oriented prices […]."

7.1.2 Recommendation on consistent non-discrimination obligations and costing methodologies[14]

128. The European Commission's Recommendation on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment, which was published on 11 September 2013 (the 2013 Recommendation) provides additional guidance regarding regulation of access to broadband networks. As a starting point, the Recommendation applies to regulation of former Market 4 and former Market 5 and builds on the EU's Digital Agenda. As was the case for the NGA Recommendation, the Commission points out in the Explanatory Note (page 50) that this Recommendation is also relevant to Markets 3a and 3b.

129. The purpose of this Recommendation is to provide incentives for investment and innovation in NGA and at the same time ensure competition and predictable regulation in the member states. It is considered important to create a common framework for national regulatory authorities on regulation of NGA with a view to fostering competition in the market, but also to increase willingness to invest in order to increase the pace of development of new infrastructure. The Commission regards it as important that regulation is consistent across national borders to avoid bias within the single market and to ensure predictability for the operators in the market. The specific recommendations in the document largely pertain to

[14] See http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:251:0013:0032:En:PDF

designing obligations related to copper and fibre access networks for operators regarded as having significant market power in the relevant markets.

130. The NGA Recommendation includes a number of details regarding which types of access should be offered as wholesale products, and requires that the offered products be priced on the basis of cost orientation. In the Recommendation on consistent non-discrimination obligations and costing methodologies, the Commission eases the requirement regarding cost-oriented prices in the relevant wholesale markets to a certain extent. The Commission expresses, for example, that in connection with access to NGA, cost orientation should not be imposed if there are requirements on strict non-discrimination, and the Commission specifically highlights “equivalence of input” (EoI) as a strict form of non-discrimination. In brief, equivalence of input means that the access products offered to external wholesale customers are exactly the same as those delivered internally to own retail operations, and that support systems for ordering, operational support, etc. are identical for external and internal deliveries. In the current regulation of former Markets 4 and 5, it is a requirement that wholesale access offered in the market must provide wholesale customers with the opportunity to offer the same end products in the market as Telenor. This type of non-discrimination obligation can be described as “equivalence of output” (EoO).

131. In this Recommendation, the Commission also provides a detailed description of the method that must be used to calculate wholesale prices for access to copper access networks and NGA. At the same time, the Commission states that the use of this method will provide stable prices for full access to copper-based LLU in the price band EUR 8-10 per month. The purpose of this price range is to prevent the copper prices in different member states from being too high or too low and having unfortunate consequences for competition and development of new infrastructure. It is also an objective to harmonise the copper prices in the various member states.

7.1.3 BEREC recommendations

132. In 2012 BEREC published a Common Position on regulation of former Market 4[15]. The document provides recommendations on obligations that ought to be imposed on a provider with significant market power in this market. Although the document was prepared for former Market 4, Nkom finds that it is also relevant for Market 3a. Nkom has therefore referred to BEREC’s recommendations in connection with assessing what obligations ought to be imposed on Telenor in Market 3a.

[15] BEREC Common Position on Best Practice in remedies on the market for wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location imposed as a consequence of a position of significant market power in the relevant market, BoR (12) 127.

133. In addition, in 2016 BEREC published a Common Position on Layer 2 Wholesale Access Products[16] (Layer 2 referring to the OSI model[17]). Nkom has also referred to this document in preparing the obligations.

7.2 Access

7.2.1 The statutory basis

134. The general provision in the Electronic Communications Act regarding access[18] is defined in Section 4-1 of the Act. The first paragraph of the provision reads:

> *"The Authority may order a provider with significant market power to meet any reasonable request to enter into or amend an agreement on access to electronic communications networks and services."*

135. In addition, the Act has its own provisions for certain special forms of access, such as Section 4-4 on co-location and Section 4-5 on information and support systems.

136. The extent to which a specific request for access is reasonable must be evaluated according to the criteria in Section 4-1, second paragraph, of the Electronic Communications Act:

> *"In considering whether a request is reasonable an assessment shall be undertaken inter alia of the provider's interest in control over its own infrastructure against the need to give others the access necessary to be able to offer competing services. In the assessment of what is necessary, account shall be taken of whether in the light of market trends it is technically and commercially possible to install or use competing infrastructure. In the assessment of whether a request is reasonable, account shall also be taken of:*
>
> 1) *available capacity*
> 2) *the provider's investment in relation to the risk with which the investment has been associated*
> 3) *sustainable competition*
> 4) *the need to sustain the network's integrity*
> 5) *intellectual property rights*

[16] BEREC Common Position on Layer 2 Wholesale Access Products, BoR (16) 162.

[17] See Annex 1, Section 2.4.1, for a description of the OSI model.

[18] Access means making facilities and/or services available to other providers, on certain terms, with the objective of offering electronic communication services. The term covers, inter alia, access to networks, network elements and related facilities that can involve connection of equipment by cable or radio-based connection, access to physical infrastructure, including buildings, cable channels and masts and access to relevant software systems, including operating support systems. The term does not include access for end users.

6) establishment of pan-European services."

137. The preparatory works to the Electronic Communications Act emphasise that this list is not exhaustive[19].

138. When assessing the imposition of access obligations, the interest of the infrastructure owner in having control over its own network must be weighed against other providers' needs to have access to facilities that are necessary in order to offer competing services. Imposing obligations that increase competition in the short term should not reduce the competitors' incentive to invest in alternative infrastructure that in turn may boost competition in the long term.

139. Section 1-1 of the Electronic Communications Act also states that considerations relating to sustainable competition should be accorded weight in the assessment of whether or not a request for access is reasonable. The objective is to create a market that generally manages itself without regulatory intervention other than that pursuant to ordinary competition law.

140. Section 4-1 of the Electronic Communications Act provides the legal authority to set requirements regarding fairness, whether a request is reasonable, and compliance with deadlines in connection with access. Article 12, no. 1, third paragraph, of the Access Directive explicitly states that the regulatory authority may impose such obligations on an operator. Nkom holds that Section 4-1 of the Electronic Communications Act provides sufficient legal authority to set a general requirement that Telenor must not set unreasonable requirements or use unreasonable terms of contract in connection with acommondating a reasonable request for access and to set specific requirements relating to fairness, reasonableness and timeliness. The Ministry of Transport and Communications's decision in the appeal case dated March 9, 2018 in former Market 15 also confirms that the Electronic Communications Act authorises the Authority to impose such obligations.

141. Like other obligations, access obligations are subject to proportionality requirements. This is stated both in Article 12, no. 1, of the Access Directive (cf. Article 8, no. 4) and in Article 12, no. 2.

7.2.2 General comments on need for access obligation

142. In Chapter 5, Nkom assessed actual and potential competition problems in this wholesale market. One of the competitive issues identified is denial of access. To ensure that a vertically integrated provider with significant market power in a wholesale market does not shut competitors out of the retail market by denying or limiting competitors' access at the wholesale level, it will normally be necessary to impose access obligations on this provider in the relevant wholesale market. Such an access obligation may include direct access to the

[19] Proposition no. 58 (2002-2003) to the Odelsting, p. 101.

relevant market and access that is necessary to support an access obligation in the relevant market, such as access to backhaul.

143. Access to Telenor's copper-based access network has been regulated at the local level since the current framework for sector-specific ex-ante regulation in the ecom sector was introduced through the new Electronic Communications Act in 2003. Several of Telenor's competitors have based their retail offerings of broadband access on wholesale access at the local level in Telenor's copper network. Nkom's 20 January 2014 decision on the designation of undertakings with significant market power and imposition of specific obligations in the wholesale market for full and shared access to fixed access networks (formerly Market 4) also imposed access obligations to the fibre-based access network on Telenor.

144. Although infrastructure competition is growing in the retail market for standardised broadband access, Telenor still has significant market power in the wholesale market for local access to fixed access networks, cf. the market analysis in Annex 1. A continuation of the access obligation to Telenor's access network at the local level will ensure that providers who do not, or only to a limited extent, have their own access network will also have the opportunity to offer nationwide services in the retail market in the years ahead. The market analysis shows that buyers of access in this wholesale market constitute a major competitive factor in the retail market. The presence of operators who have based all or part of their business model on wholesale access to Telenor networks thus helps to ensure effective competition at the retail level throughout the country. This is especially true in areas where Telenor's infrastructure encounters little competition, but also in areas with parallel access infrastructure.

145. At the same time, it is imperative that access obligations in this wholesale market are designed so that they are not liable to limit the development of alternative access networks where such development is possible. The purpose of the access obligation is thus to balance the considerations of facilitating competition from providers without their own network and ensuring incentives for continued development of alternative networks. The access obligation in former Market 4 does not appear to have had negative effects on the incentives for the development of alternative access networks. At the end of 2013 there were 488 825 fibre accesses in Norway, compared with 928 560 at the end of 2017. This means that 439 735 new fibre accesses have been added during this period. Of these, 326 005 fibre accesses have been rolled out by Telenor's competitors, while the remaining 113 730 fibre accesses have been established by Telenor.

146. Although a growing share of the retail offering of broadband access is based on access infrastructure other than Telenor's network, Nkom believes that access to Telenor's copper-based access network at the local level will continue to be essential for competition in the broadband market in the years ahead. The possibility of an upgrade of the copper access network may help limit the decrease in the number of copper-based end user accesses. In areas where such upgrading is being carried out, broadband access via the copper network

will be able to achieve increased competitive power compared with broadband access over other technologies.

147. At the same time it is clear that Telenor is highly focused on the development of fibre-based access networks. Telenor is by far the largest single provider of fibre-based broadband and has expressed an ambition to grow further in this part of the market. Continued access to Telenor's fibre-based access network is expected to have a large and growing impact on the competition in the retail market for standardised broadband access.

148. For this reason, Nkom believes that it is necessary to continue an access obligation to Telenor's network at the local level in the wholesale market to ensure that providers who do not, or to only a limited degree, have their own access network will still be able to represent a competitive factor in the retail market. However, the access obligation must be proportionate to the identified competition problems. Below, Nkom has undertaken a further assessment of the obligations on access to Telenor's copper access networks and fibre access networks, as well as for additional services required to sufficiently contribute to the access-based competition in the retail market.

7.2.3 Upgrading of copper-based access networks

7.2.3.1 New possibilities for upgrading copper-based access networks

149. New technology makes it possible to offer far higher transmission capacity in copper-based access networks compared to before. The new technology thus provides the opportunity to offer significantly higher transmission capacity without having to establish new access networks. On shorter copper distances, this will provide an opportunity to achieve transmission capacity on par with fibre-based access networks. The technology also provides an opportunity to offer end users who have previously had low transmission capacity due to long stretches of copper cabling to the exchange, much higher transmission capacity than in the past.

150. The new technology is based on three main elements. The first element is to pull fibre to distribution points that are closer to the end user, and install mini-DSLAMs on remote micronodes. The copper-based portion of the broadband service offered to the end user will thus be shorter. The second element is to use noise cancellation in the access network, so-called vectoring. Use of vectoring removes crosstalk between copper pairs and thus helps ensure that the frequencies used for transmitting the broadband service can be utilised more effectively. The third element is to utilise frequencies in higher frequency bands in order to achieve greater bandwidth.

151. Remote micronodes can be utilised using different types of technology. The most relevant technologies are different variants of VDSL and the relatively new G.fast standard. VDSL utilises lower frequency bands than G.fast and can thus work efficiently at longer distances. The VDSL technologies can furthermore be combined with noise cancellation to

provide additional increased capacity. The G.fast technology utilises frequencies in higher frequency bands than VDSL and has noise cancellation as an integral part of the standard. The G.fast technology thus has potential for higher bandwidth than VDSL and can on shorter distances be used to offer end users speeds comparable to those offered in fibre-based access networks. Because G.fast utilises higher frequency bands than VDSL and thus has a shorter range, G.fast nodes must be positioned closer to the end user in order to utilise the spectrum to attain higher capacity.

152. Whether or not it is most relevant to upgrade the copper network by the use of VDSL and noise cancellation or G.fast may be connected with the areas to which the upgrade applies. In areas with a larger customer base and the possibility of achieving shorter copper distances, it may be more relevant to use G.fast, while in areas where the customer base is more limited and where the copper distances are not sufficiently short, it may be more relevant to use VDSL.

7.2.3.2 Impacts on physical access

153. The upgrading of copper access networks may affect the possibility of access. First, the signals from the mini-DSLAM on the micronode may disturb the signals from DSLAMs placed farther back in the network. The scope of this potential problem mainly depends on the signal strength used on the micronode. Effective use of the equipment on the micronode could therefore have an adverse effect on the quality of broadband services produced from the local exchange and could in the worst case render other providers who have equipment placed farther back in the network unable to use the equipment to provide broadband services.

154. Electromagnetic interference can limit the capacity of the copper-based broadband network to a significant extent. Vectoring is a form of signal processing that removes electromagnetic interference, also referred to as crosstalk, between the copper pairs by means of noise cancellation. The effective use of such signal processing requires all the wire pairs on which noise cancellation is carried out to be connected to the same equipment. Given the current state of vectoring technology, effective noise cancellation therefore means that one provider must control all the copper accesses covered by noise cancellation. If an operator uses such technology, it means in practice that other providers cannot offer broadband services via their own equipment to the affected accesses in the frequency band where the noise cancellation is carried out.

155. Frequency filtering, also termed “shaping”, can be used both in connection with VDSL and G.fast. Frequency filtering means that the DSLAM does not use certain defined frequency bands and is largely standard functionality on newer equipment. Frequency filtering can either be performed directly on the hardware or by using software.

156. Frequency filtering can be used in combination with noise cancellation. Since noise cancellation is only done in the frequency bands used to produce the broadband service, it will be possible to offer broadband services in the part of the frequency spectrum not covered by

noise cancellation. In practice, it means, for example, that the use of VDSL with vectoring on a remote micronode does not preclude offers of ADSL or SHDSL services from a DSLAM placed on the main connection, if the VDSL providers filter out frequencies used for ADSL and SHDSL. Similarly, it means that the use of G.fast on a remote micronode does not preclude a provider with equipment placed in the local exchange from offering broadband services based on VDSL technology if the G.fast providers filter out the use of frequencies in the VDSL band. However, the use of frequency filtering will mean that it is not possible to utilise the full potential of the relevant technologies, thus limiting the value of the investment in the new technology.

7.2.3.3 Broadband Forum

157. The Broadband Forum was established 20 January 2016 with two subgroups: the Working Group for Further Development of the Copper Access Network and the Working Group for Access to Fibre-based Networks. The Working Group for Further Development of the Copper Access Network (hereinafter referred to as the Broadband Forum) was established on the basis that the providers had the best prerequisites for reaching solutions to challenges that arise in connection with upgrading the copper access network. Another prerequisite was that the parties had sufficient shared interests in making arrangements to enable the upgrading of the copper access network to where it was appropriate to see whether it was possible to reach consensus on solutions in such a forum. In the event that the Forum should nonetheless not arrive at an agreement that could be considered sufficiently extensive, both in terms of the matters agreed on and how broad the agreement was, it was found that these issues would have to be resolved in connection with Nkom's regulation. In that way the work of the Forum would be included as part of Nkom's case preparation.

158. The mandate for the Working Group for Further Development of the Copper Network was to consider and recommend solutions to relevant issues arising in connection with the upgrading of Telenor's copper access network. Among other things, the group was to take a position on how the development of micronodes should be organised, planned and implemented, whether new access products are needed, and which arrangements/procedures should apply when migrating to new products.

159. The work of the Working Group for the Further Development of the Copper Network has been extensive and was carried out from February 2016 to October 2017.

160. During the period, the Working Group discussed a wide range of issues related to the upgrading of Telenor's copper access network. Issues associated with notification and notification times for development, consequences for existing customers, various aspects of the scale of the upgrade, characteristics and prices of products that will replace physical access, technology choices, the possibility for access buyers to influence where Telenor upgrades, including upgrading of points as per order by access buyers and the possibility for

upgrading Telenor's copper access network for providers other than Telenor itself have been key parts of the work.

161. The Working Group has discussed various models of how the upgrading of the copper access network should be organised. Among other things, Telenor has proposed that access buyers should influence where Telenor should upgrade. When Telenor reduced the scope of its desire to upgrade the copper access network during the work, this option became less interesting to the access buyers.

162. Telenor has furthermore proposed that the company should upgrade the copper access network for the account of the access buyers. The access buyers were negative to this model in part because it meant that the value of the investment in the copper access network would fall to Telenor. Insufficient confidence that such an upgrade would be carried out in time was also an issue. These objections were further exacerbated by the fact that the model, which was primarily relevant for the development of G.fast, required the use of frequency filtering ("shaping") of all bands up to and including the VDSL band. Telenor's rationale for such frequency filtering was that it was necessary to protect the service production of VDSL and ADSL from connection points behind the upgraded micronode. The access buyers believed that this model would limit the value of the investment in G.fast because the potential of the technology could not be fully utilised. The investment would therefore be a less relevant alternative to fibre rollout. The reduction this caused in the value of the investment, was, in the access buyers' view, so strong that there would not be sufficient investment willingness to upgrade with G.fast.

163. Another model discussed was that the access buyers could upgrade the copper access network with G.fast. This model involved starting with frequency filtering, which would be phased out later. Such a model would entail that remote points could be upgraded with G.fast without affecting existing service production since the existing service production occurs in bands that are filtered out on the G.fast node. There was furthermore agreement that such a model had to assume the provision of access to a relevant virtual replacement product. With such a model it was also a key point for the access buyer to have the predictability that it could end frequency filtering at a later time and use the entire frequency band. Telenor believed that such a model was problematic and referred, among other things, to their own customer obligations, particularly in the business segment, and to the fact that with such a model the company must to some extent base its services on buying access from other providers. The company did not want to conclude an agreement which had such an effect. Telenor also pointed out that the company cannot accept an agreement-based solution that entails losing the right to use its own network. Telenor consequently rejected the model.

164. In short, the concrete outcome of the work of the Broadband Forum was that the parties reached agreement within some of the issues, but did not reach comprehensive agreement. The key agreement concerned the technical specification of the access product that would replace physical access to the copper access network, VULA copper (also referred

to as VULA Cu). Further details about the work of the working group are described in a joint statement from participants dated 26 October 2017. This is found on Nkom's website along with the minutes of the meetings.[20]

7.2.3.4 Examples from other countries in the EEA

165. Upgrading copper access networks is a current issue in several countries in Europe. However, the role that the copper access network plays for the establishment of high-capacity networks for broadband varies somewhat from country to country. While the fibre access network is very dominant in some places, the copper access network is dominant in other places. Below, Nkom gives a brief account of regimes for upgrading copper access in certain European countries where the copper access network has a key position for high-capacity broadband services.

166. In Germany, the regulator (Bundesnetzagentur) has divided the area around the exchange into an immediate area and a distant area. The border between the two areas is set at 550 metres. In the immediate area it is primarily Telekom Deutschland (provider with significant market power) that, on certain conditions, can upgrade the copper network and use vectoring. Allocation of points for upgrading in the distant area, where other providers can largely compete, is based on the first in time, first in right principle. Other providers that roll out remote nodes and adopt vectoring must offer access to other competitors.

167. In Greece, the regulator (EETT) has prepared a three-part procedure for allocating points (in practice street cabinets) that can be upgraded with vectoring. In the first phase, OTE (provider with significant market power) will be applying for exchanges where the company wants to upgrade its connected points. In the second phase, other providers may apply for exchanges not allocated in the first phase. Providers participating in the second phase must undertake to upgrade more than 50 per cent of the street cabinets linked to the exchange. The third phase is symmetrical in the sense that both OTE and other providers can apply for exchanges that have not been awarded in the first and second phases. EETT's requirement in the third phase is that more than 30 per cent of the street cabinets need to be upgraded. The three phases are supplemented with an annual allocation of exchanges that are still available, where both OTE and other providers can participate. No requirements as to the scope of the upgrade are stipulated in this allocation.

168. In Denmark, the regulator (ERST) has decided that TDC (provider with significant market power) shall stipulate a quarterly production capacity for vectoring. The quarterly production capacity is to be divided between TDC and access buyers, with 65 and 35 per cent, respectively. If TDC or the access buyers do not wish to use the allocated capacity, the capacity goes to the other party. The access buyers may mutually allocate their share of the

[20] https://www.nkom.no/marked/markedsregulering-smp/bredbandsforum/arbeidsgruppe-videreutvikling-av-kobbernettet/_attachment/30716?_ts=15f58242d4d

capacity. TDC shall accommodate requests for vectorising according to the principle of first in time, first in right, i.e. based on the order in which they are received.

7.2.3.5 Upgrading of copper-based access networks in Norway

169. It is possible to achieve high-speed broadband on different infrastructure, and as mentioned above, new technology makes it possible to offer high-capacity broadband in the copper access network.

170. Telenor possesses copper access networks, fibre access networks and HFC networks. In addition, Telenor has a nationwide mobile network with a high penetration of 4G. Telenor thus has access to multiple platforms when the company is to consider its business strategy for high-capacity broadband offers. Access to multiple platforms is liable to provide Telenor an advantage when it designs its business strategy. Nkom believes it is imperative that regulation is directed at providing access buyers with more equal preconditions as Telenor in the choice between investing in different types of high-capacity broadband infrastructure. Such equivalence helps to equalise a competitive advantage for Telenor and thus support a development towards sustainable competition.

171. In the market analysis, Nkom assumed a technology-neutral definition of the relevant markets. Nkom thus believes that the regulation should not be designed to support the establishment of specific types of infrastructure for high-capacity broadband, but that as a clear starting point the regulation should allow this choice to be made by the market operators based on business assessments and on a neutral basis.

172. In the Broadband Forum, Telenor has stated that the company views it as most relevant to upgrade the copper access network in areas where end users currently have poor broadband services, and where in Telenor's assessment it is not cost effective to pull fibre right up to the end user. Telenor has expressed that this mainly applies to rural areas, and that in such areas it is most expedient to upgrade the copper network by establishing remote nodes with VDSL technology and vectoring. This means that Telenor's ambitions for upgrading the copper access network are far less extensive than the ambitions the company had in the first part of the work of the Broadband Forum.

173. In the aftermath of the national consultation, Nkom has asked Telenor[21] about the plans the company now has to upgrade the copper network. In its response, Telenor made reference to what the company has communicated in the market about mobile and fibre being its priority investment areas. However, Telenor could neither confirm nor deny the existence of concrete plans to upgrade the copper network.

174. The interest of the access buyers in upgrading the copper access network themselves increased during the dialogue in the Broadband Forum, partly in line with Telenor's reduction

[21] Conference call with Telenor 24 April 2018

of its ambitions for the scale of the upgrade, and partly because Telenor has stated that the company only wants to upgrade with VDSL technology and vectoring.

175. Access buyers who participated in the Broadband Forum, and particularly Broadnet and NextGenTel, stated during the dialogue that they thought it would also be profitable to upgrade the copper network in urban areas where there is a greater concentration of end users. According to the two providers, the upgrading of the copper network was relevant as an alternative to the establishment of fibre accesses in some areas and as a supplementary alternative in areas where fibre is also being laid right up to the end user. The companies were clear that such an upgrade assumes that they can upgrade by establishing remote nodes with G.fast technology and have predictability that they can use the entire frequency spectrum at some point in the future.

176. Based on the consultation responses from Broadnet and NextGenTel to Nkom's notification of decisions in Market 3a and 3b, Nkom has asked the companies whether they are still looking at implementing the upgrading of the copper access network and, if so, to what extent. NextGenTel expressed that the regime for copper upgrading will come too late and that the company no longer envisions that they will utilise an option to upgrade the copper access network. Broadnet expressed that any upgrading of the copper access network from their side would be limited to sporadic upgrading in the form of remote nodes. Broadnet further specified that such an upgrading is predicated on the regime for copper upgrading having tighter time limits than what followed from Nkom's notification of decisions.

177. Nkom has explained above that the upgrading of the copper access network may affect the possibility of service production over existing equipment and limit the possibility of physical access. However, the discontinuation of physical access will be compensated through access to functional replacement products on transparent and non-discriminatory terms. In order to prevent the upgrading of copper accesses from entailing a form of monopolisation of the provision of services on the upgraded accesses, it might therefore be necessary to ensure that providers that upgrade will offer relevant substitute products for the access product that disappears as a result of the upgrade.

178. In the national consultation, Nkom gave notice of a regime allowing both Telenor and buyers of access to be able to upgrade the copper access network. The notification was based on the information that emerged in the Broadband Forum and thus on an interest expressed by both Telenor and access buyers to provide high-capacity broadband by upgrading the copper access network. The notification was furthermore based on the premise that equal opportunity to upgrade the copper access network would be important in supporting the goal of sustainable competition. Two basic elements of the notified regime were the right, both for Telenor and for access buyers, to adopt exclusionary technology on more specific terms and the associated obligation to provide relevant substitute products. The regime was also aimed at balancing the considerations for, among other things, predictability, verifiability and the possibility of relatively rapid implementation.

179. In order for access buyers and Telenor to have equal opportunities to implement their stated intentions to upgrade the copper network, Nkom gave notice of a relatively detailed regime for implementing the upgrade. At the same time, Nkom noted that there might be a need for further details in the subsequent market decision. The notified upgrading regime would involve a cost both for providers and for Nkom as the regulator. In Nkom's assessment, the regulatory cost of the notified regime was proportionate, given the positive effects that upgrading the copper network was expected to have in order to support the goal of sustainable competition.

180. The response Nkom has received in connection with the national consultation gives limited reason to assume that the copper access network in Norway will be upgraded to a considerable extent. It seems clear here that the access buyers see only a very limited possibility of using the notified possibility to carry out such upgrading themselves. The assumptions on which the notified upgrading regime was based thus seems to have changed.

181. A factor that helped complicate the regime for upgrading was the notified right of access buyers to carry out upgrading with exclusionary technology, with an associated obligation for access buyers to provide access themselves. In view of the feedback Nkom has received from the access buyers after the national consultation, Nkom believes that equal opportunity for access buyers to adopt exclusionary technology in the copper network can no longer be expected to be decisive for supporting the goal of sustainable competition. The limited interest of access buyers in undertaking such upgrading further indicates that the notified regime is not proportionate. In addition, a very limited scope of upgrading by access buyers will also likely increase the relative cost of both providing and buying access. Nkom consequently concludes that Telenor shall not be ordered to accommodate requests for access that involve use that has an exclusionary effect on the existing production of services. The notified access obligation with associated obligations for access buyers that upgrade the copper access network is thus not upheld.

182. In Section 7.5 about publication and reference offers Telenor is ordered to give notice with further specified deadlines about changes in, among other things, their copper-based access networks. The notification rules constitute a restriction in Telenor's right of disposal. Even if the information that Telenor has provided about the company's ambitions for upgrading has been further reduced in relation to what was applicable when the work of the Broadband Forum was concluded, Telenor has not expressed that the company is no longer interested in carrying out some upgrading of the copper network. Nkom points out here that Telenor stated in the Broadband Forum that the company wanted to upgrade in areas where it was not likely that fibre would be established right up to the end user within a relatively long time horizon. Nkom believes for this reason that it is still reasonable to allow Telenor to carry out an upgrade of the copper access network, given that access buyers can achieve relevant access to the upgraded copper accesses. The right to upgrade the copper network entails an exception to

the notification rules that would otherwise apply. The further details of Telenor's right to carry out such upgrading is set out in Section 7.2.3.6 below.

183. The changes in the notified regime for upgrading the copper network are justified in amended information about factual matters. Nkom does not see any reason to uphold the notified regime with associated procedures in the event that the actual circumstances should again change. However, Nkom notes that the notified regime, or a variation of it, may be introduced should a basis for it subsequently arise.

7.2.3.6 Further details about Telenor's right to upgrade copper-based access networks

184. Nkom believes it is imperative that access buyers can also make use of access to remote micronodes in Telenor's network and has ordered Telenor to provide so-called SLU access below. The access buyers' use of SLU access could conflict with Telenor's need to use remote micronodes. Similarly, Telenor's use of remote nodes could conflict with the access buyers' need for SLU access. At the same time, Nkom believes that the need for a very detailed process for allocating points for upgrading, on which the notification was based, is greatly reduced as a result of the more limited interest of providers in upgrading the copper network. Even if the upgrading is expected to take place in a more limited extent than Nkom assumed in the notification, Nkom believes that there is reason to maintain that there is a need for some regulation in this area. In this section, Nkom will describe the specific details of the access regulation connected with Telenor's upgrading of the copper access network. The specific details of the regulation of the right of access buyers to use SLU follow from Section 7.2.4.3.2 below.

185. Upgrading of copper-based access networks, as it should be understood in this chapter, has two elements. The first element is to install the mini-DSLAMs on remote micronodes, thereby offering increased capacity to the end users connected to the point, compared with the capacity that can be offered from points more centrally located in the network. The second element is to adopt noise cancellation (vectoring) on the remote micronodes. Such technology can be either be an integral part of a standard, such as with G.fast, or be utilised to make the standard that is used more efficient, typically when using VDSL technology.

186. The special regulation of Telenor's right to upgrade the copper access network concerns upgrading where both of the above-mentioned elements are applicable, i.e. both access to remote nodes and use of noise cancellation (vectoring). This means that the upgrading concept does not include upgrading with vectoring of local exchanges in the copper access network.

187. In the notification of decisions that was circulated for national consultation, Nkom laid plans for a process for allocating points for upgrading where Telenor would have the opportunity to first select the points the company wanted to upgrade. The right of choice would then fall to the access buyer with the most customers under that particular point. Additional

points were to be awarded according to the principle of first in time, first in right. Nkom made further plans for detailed guidance for the implementation of this right of choice based on an announcement. In isolation, Nkom mainly received support for this approach in the consultation responses. In view of the more limited interest in upgrading and that access buyers are in principle not granted the right to upgrade with technologies that have exclusionary effect, Nkom nevertheless does not see a reason to uphold the notified allocation regime.

188. The absence of the right to adopt technology that has an exclusionary effect entails a limitation of the access buyer's ability to use SLU access in relation to what was notified. The right to SLU access that this decision gives access buyers is, in that respect, less intrusive towards Telenor. A right of choice for Telenor will furthermore mean that the access obligation at the SLU level will in practice be postponed. In addition, Telenor must be considered to have a full view of its own infrastructure, and thus have the information necessary to decide how the company wants to utilise the copper network. In light of this, Nkom will not maintain an initial right of choice for Telenor.

189. The principle of first in time, first in right is a well-known legal principle and might be suitable as a principle in this context. To the extent a provider will utilise an SLU point in a way that renders other providers unable to use the point at the same time, the principle means that the right to utilise the point falls to the operator who first announces its interest. This principle must be deemed to coincide with the principle Telenor currently uses if there is a need to distinguish between requests for access from external-access buyers, including requests for SLU access. In Nkom's assessment, allocation of points based on the principle of first in time, first in right will also be possible to check and verify with relatively modest use of resources. Nkom consequently concludes that allocation of points for upgrading shall be done pursuant to the principle of first in time, first in right and that this shall apply both to Telenor and to access buyers.

190. In order to avoid potential conflicts connected with the use of SLU access, Nkom believes that it is imperative to facilitate transparency about utilisation of such access.

191. With respect to the question of which provider must be considered to have first requested access to a given SLU point, Nkom will for Telenor's part base itself on the notification rules, cf. Section 7.5.5 below. This means that Telenor is considered to have requested a given SLU point first if Telenor has notified its utilisation of SLU access before the company has received a request from an external access buyer for access to the points covered by the notification. If necessary, Nkom will refer to the minimum unit of time that is necessary to determine who requested a given access first. If there is insufficient verifiability around a unit of time required to distinguish between the times for the submission of requests for access, Nkom will be able to determine this by drawing lots. An advantage of using the notification date as the cut-off date is that there is a high degree of verifiability concerning the date. Considering that Telenor must be considered to have a full overview of its own network,

Nkom believes that it cannot be considered a disadvantage for Telenor in relation to the access buyer that this time is used.

192. Nkom concluded in the notification that there is no need to set requirements for the purpose of limiting the number of points that can be upgraded from a single provider. Nkom demonstrated in this respect that it would be an advantage in terms of achieving sustainable competition to facilitate the establishment of more effective competitors, as long as the number of competitors is sufficient. That the interest in carrying out upgrades now seems to be far more modest than Nkom assumed in the notification, indicates in Nkom's assessment that the conclusion from the notification should be upheld. Nkom will therefore not require Telenor to limit the number of points the company wishes to upgrade.

193. Since access to SLU points is a limited resource, Telenor may have the incentive to drag out the possibility for external access buyers to gain access to given points. For example, this can happen by giving the impression that more points will be upgraded than is the actual intention. Although the ambitions for upgrading appear to be more limited than Nkom initially assumed, Nkom sees reason to remedy this potential competition problem by requiring a notified upgrade to be carried out within the specified time. Nkom furthermore sees reason to require that the notified time for completion shall be based on requiring a notified upgrading to be carried out without undue delay. Telenor shall therefore ensure verifiability around the time of completion of a given upgrade. Telenor shall also give notice in the event of a more than insignificant deviation from the notified date of completion. In this regard, Nkom refers to Section 7.5.5 below. In such cases, Telenor shall also send Nkom a reason for the deviation without undue delay, cf. Section 10-3 of the Electronic Communications Act. Any deviation from the notified time of completion will have to be considered specifically and may be deemed to be a violation of Telenor's obligation to offer SLU access. Nkom refers in this connection to that a violation of the access obligation can be sanctioned in the form of an infringement fine under Section 10-13 of the Electronic Communications Act.

194. If Telenor upgrades a point using exclusionary technology, it will affect access that the access buyers already use. Nkom's assessment of Telenor's obligation to offer a virtual access product is set out in Section 7.2.5 below.

7.2.4 Local, physical access to copper-based access networks

7.2.4.1 Access to access lines (LLU)

195. Local, physical access to copper-based access networks gives other providers physical access to the access lines in Telenor's network through the leasing of copper pairs. The main forms of local, physical access to copper-based access networks are local loop unbundling (LLU) and sub-loop unbundling (SLU).

196. LLU access is provided in the local exchange. LLU access provides access to an unrefined access line from the access point in the local exchange and to the network

termination point of the end user. The access buyer installs its equipment, DSLAM and DSL modem, in the exchange and at the end user, respectively.

7.2.4.2 Access to sub-loops (SLU)

197. SLU access is provided in a distribution point in the access network that is located between the exchange and the network termination point. This point has a relatively short distance to the network termination point and is also referred to as a remote node/unit. SLU access provides access to an unrefined access line from the access point in the distribution point to the network termination point at the end user. The access buyer installs its equipment, DSLAM and DSL modem, in or by the distribution point and at the end user, respectively. As a result, access to SLU implies increased flexibility for the access buyer in terms of where it can install its own DSLAM.

198. SLU access has traditionally been used in combination with various DSL variants (e.g. VDSL). Telenor's Operator Access Agreement (Appendix 2) requires a measurement assignment to be carried out before SLU access is given. The measurement assignment should reveal whether the signals from the access buyer's transmission equipment in or by the distribution point interfere with signals from DSLAMs installed in the exchange. In the event of such interference, the signal effect from access buyers' transmission equipment must be reduced to a level that does not harm the existing production of services. Services from other providers have thus coexisted with SLU access.

199. SLU access can also be used in combination with the relatively new Vplus and G.fast technologies. VDSL2 and Vplus can be combined with vectoring to achieve further increased capacity, while G.fast has vectoring as an integral part of the standard. Effective use of G.fast assumes that the access buyer will be given the exclusive right to use the entire frequency spectrum on the point. However, the use of the entire frequency spectrum will prevent other providers from delivering services from the exchange and out to end users connected to that particular point.

200. A main distinction with respect to the effects of SLU access will be related to whether vectoring is adopted since this could have exclusionary effect for other providers' ability to produce services over their own equipment. However, the use of frequency filtering makes it possible to continue to produce some DSL variants from the exchanges. Nkom refers to Section 7.2.3.2 where the effects on physical access are explained.

201. SLU access can for this reason be used:

- In combination with various DSL variants and Vplus, without vectoring.
- In combination with the use of VDSL with vectoring, Vplus with vectoring or G.fast (which has vectoring built into the standard). These variants can be used with or without frequency filtering.

7.2.4.3 Need for local, physical access to copper-based access networks

7.2.4.3.1 LLU access

202. Telenor has had an obligation to provide physical access to the copper-based access network (LLU access) since 2001, and the obligation has been continued in several market decisions, see Section 1.2 of the market analysis. In the last 10 years, the number of subscriptions based on copper accesses has seen a steady decline as the number of subscriptions based on fibre and HFC networks have increased. The question can therefore be asked whether there is still a need to impose access to LLU.

203. Although the number of broadband accesses over the copper network is falling, the nationwide copper access network is still key and accounts for approximately 26% of the accesses in the retail market. By the end of 2017, this corresponds to 559 047 subscribers. Of this number, 377 316 are Telenor subscribers, while 181 731 subscribers are based on regulated access to Telenor's copper access network.

204. For some providers, the regulated access to Telenor's copper access network forms the main basis for activities in the retail market. This is especially true for providers who have a minimal or no access network of their own. NextGenTel, the largest external buyer of copper-based LLU access, is such a provider.

205. Other providers use the regulated access to Telenor's copper access network as a supplement to their own access network. The access allows these providers to provide services to end users outside of the geographic areas covered by their own access network.

206. In their consultation response, both Broadnet and NextGenTel maintained that it will still be important for other players to gain access to LLU in order to compete with Telenor in the retail market. Both companies have emphasised this view in subsequent meetings with Nkom. In its consultation response, Telenor did not have objections to being obliged to accommodate requests for access to LLU.

207. Nkom believes that access to Telenor's copper-based infrastructure will continue to be a determining factor in allowing other operators to have a nationwide offer of broadband services, and thereby able to compete effectively with Telenor in the retail market. Nkom concludes that Telenor shall be ordered to accommodate any reasonable request for LLU access to its copper-based access network.

7.2.4.3.2 SLU access

208. Telenor has had an obligation to accommodate requests for access to SLU in several of the previous decisions on the designation of Telenor as a provider with significant market power in the wholesale market for full and shared access to fixed access networks. However, demand for such access has been relatively low.

209. In some European countries (Belgium, the Netherlands and Denmark), the obligation to offer access to sub-loops (SLU) has been revoked or revocation has been proposed. The lapse of the access obligation must likely be seen in connection with the fact that there have been few or no requests for access to SLU and that interest in upgrading the copper access network at this level has primarily come from the provider with significant market power. For example, in Denmark, TDC is no longer obliged to offer access to SLU, and only TDC has the possibility to upgrade the Danish copper access network. However, when the upgrade takes place, TDC will take both its own and access buyers' needs into account. In practice, it means that TDC is supposed to allow access buyers to select a fixed share of the accesses that are to be vectorised in a specific year.

210. In the national consultation, Nkom gave notice of a regime for upgrading the copper access network that meant that the access buyers could make use of SLU access and install equipment with exclusionary effect pursuant to more specific conditions. However, in light of the information Nkom has received after the consultation it seems clear that the interest access buyers have in being able to do this type of upgrade is very limited.

211. When it comes to other types of use of SLU access, it is difficult to predict the extent to which access buyers will request this in the upcoming regulatory period. Access buyers stated in their consultation response that it is important that physical access to the copper access network is continued. At the same time, Telenor's objections against SLU access are primarily connected with SLU access in combination with use that has exclusionary effect.

212. Although Nkom concluded in Section 7.2.3.5 above that Telenor shall not be ordered to accommodate requests for access that entail the use of exclusionary technology, it will be possible to use SLU access to offer high-capacity broadband. Nkom points out that even without the use of vectoring the VDSL2 and Vplus technologies will be able to provide new possible uses for SLU access. The same applies to G.fast with filtering of frequencies that are in use. The use of such technology will also be considerably less costly than the creation of new access networks.

213. In the notification of decision circulated for national consultation, Nkom emphasised that the opportunity for access buyers to upgrade the copper network would help give access buyers and Telenor more equal preconditions with regard to being able to invest in different infrastructures for high-speed broadband. The fact that in light of new information Nkom has concluded that it is not proportionate to order Telenor to accommodate requests access which involves the use of exclusionary technologi does not imply that this argument cannot still be applicable. In Nkom's assessment, SLU access in combination with new technology could be important as a supplement to the access buyers' other production of broadband services. SLU-level access will give the access buyers an opportunity to choose where to place their investments in Telenor's copper access network. This applies even if the access buyer is not entitled to adopt exclusionary technology. Nkom accordingly believes that such access to SLU

is also likely to facilitate infrastructure investments from access buyers and contribute to more investment-neutral prerequisites between the access buyer and Telenor.

214. Nkom concludes that Telenor shall be ordered to accommodate any reasonable request for SLU access to its copper-based access network.

215. In Section 7.2.3.5, Nkom concluded that it is reasonable to allow Telenor to carry out an upgrade of the copper access network, provided that access buyers can achieve relevant access to the upgraded copper accesses. The obligation to provide access to SLU will not apply to points that Telenor has upgraded by adopting exclusionary technology, unless the access buyer's utilisation of SLU access is compatible with the use that Telenor has of the point.[22]

216. Concerning access buyers' ability to utilise SLU access by adopting exclusionary technology, Nkom refers to Section 7.2.3.5 above. Telenor shall accordingly not be ordered to accommodate requests for SLU access that involve uses that have an exclusionary effect on the existing production of services.

7.2.4.3.3 Further details on certain conditions related to SLU access

217. Telenor possesses all information about the condition of its copper access network and thus has the necessary prerequisites for assessing whether and possibly which points the company wants to upgrade. To enable access buyers to utilise their right to SLU access effectively, it is necessary that access buyers be provided with certain information. This information will hereinafter be referred to collectively as location data. Such information is necessary even if the access buyer is not granted the right to use exclusionary technology.

218. In order to support the access obligation at the SLU level, Telenor shall on request provide all the information necessary to enable the access buyer to select the points to which it wishes to buy access. In order to ensure that the access buyer can utilise access at the SLU level in a timely manner, the information shall be given within a reasonable period of time and without undue delay. At a minimum, the information should include a distribution point overview, cable overview and associated end-customer addresses as well as geographic coordinates for each individual distributor and end customer.

219. Even though there is uncertainty concerning the extent to which the access buyers will require SLU access in the coming regulation period, it cannot be ruled out that some access buyers will be able to require SLU access in all or large parts of Telenor's fixed network. The information required by the access buyer in such cases might be of such a nature and scope that the information should be concealed under the Norwegian Act relating to Protective

[22] Ref., for example, that Nokia states that Vplus is compatible with VDSL2 with vectoring, https://networks.nokia.com/solutions/vplus

Security Services (the Security Act)[23]. The obligation to perform a specific assessment of whether the requested information must be deemed to be classified will be held by Telenor.

220. If Telenor concludes that the information is classified, further processing of the information will depend on whether the requesting provider is subject to the Security Act. If the provider is subject to the Security Act, Telenor will be able to disclose classified location data.

221. To enable Telenor to release classified location data to providers not subject to the Security Act, Nkom gave notice that Telenor can require access buyers that receive such data and are not subject to the Security Act to enter into a security agreement. A basic principle of the notified security agreement was that it would place the access buyer in a position as if it was subject to the Security Act. In its response to the national consultation, Telenor stated that it is unclear how information security is to be safeguarded when it has not been specified who and what gives the right to such information. Telenor was furthermore of the opinion that the company could be at risk of acting in violation of the Security Act by complying with Nkom's notified orders pursuant to the ecom regulations.

222. Nkom has met with Telenor after the national consultation to arrive at a solution that addresses both Telenor's concern and the considerations the notification sought to safeguard. Nkom maintains that it is necessary for access buyers to have the right to enter into a security agreement and that the security agreement shall be based on a principle of placing the access buyer in a position as though it was subject to the Security Act. However, access buyers who need a security agreement shall enter into the security agreement with Nkom. Nkom will furthermore handle the authorisation of personnel at the relevant provider and will follow up to ensure that the classified location data is processed appropriately. In addition, Nkom will enter into an overall agreement with Telenor. The agreement with Telenor will in principle describe the process associated with the exchange of classified data with regard to any provider that is not subject to the Security Act.

223. Nkom concludes that Telenor is obliged to disclose classified location data, both to access buyers subject to the Security Act and to access buyers that have entered into a security agreement with Nkom. In cases where the access buyer must enter into a security agreement in order to access the classified location data, the data must be exchanged via Nkom, unless otherwise agreed with Nkom.

224. Nkom has drawn up a process description for requests for location data. The process description is attached as Annex 7 to this decision. Nkom will draw up the security agreement for access buyers and the overall agreement with Telenor as soon as this decision comes into force.

225. The type of standard information the access buyer receives will be clarified in a subsequent decision by Nkom. However, Nkom will in each instance consider the information the buyer must receive, in what way and whether the information should be limited to specific

[23] A new National Security Act was adopted on 1 June 2018 and is expected to take effect on 1 January 2019.

individuals at the access buyer. Nkom will involve Telenor in this connection. Telenor will ensure that the information in question is correctly classified. Nkom will be responsible for the actual exchange of information to the access buyer. In addition, Nkom will enter into an overarching agreement with Telenor. The overarching agreement will, among other things, describe responsibilities in relation to the disclosure of location data and provide a description of the procedure.

226. Telenor's Operator Access Agreement places a limitation on the access buyer's right to use spectrum higher than the VDSL band. Technologies that use higher frequency bands have not been adopted in Norway, neither by access buyers nor by Telenor. This means that it is possible to adopt G.fast without having an exclusionary effect on existing service production. The prerequisite for that is that any frequencies that are being used have to be filtered out. In effect, this means that there will be a need to filter out frequencies up to and including the VDSL band. A request for access to SLU to use G.fast with filtering of frequencies in use on the affected accesses thus means that existing production of services will be able to continue. In Nkom's assessment, such a request will normally be regarded as reasonable.

227. On the basis that SLU access is a limited resource, in Section 7.2.3.6 Nkom has expressed how Telenor would have the incentive and opportunity to prevent the access buyer from using the right to SLU access, for example by stating that Telenor must upgrade more points than the company actually intends to upgrade. In principle, the same would also apply between various remote access buyers, for example by an access buyer possibly requesting SLU access at more points than it actually has the intention of upgrading (hoarding).

228. Access buyers' opportunity to use the SLU access obligation for hoarding would, however, in Nkom's assessment, be deemed to be more limited than for Telenor. Nkom refers to how Telenor as network owner has information concerning which accesses the various access buyers use in different areas, and thereby to information of potential strategic value. Nkom also refers to how Telenor, in contrast to an access buyer, will not incur a direct cost by laying claim to more SLU points than the company actually has the intention of upgrading. The potential competition issue associated with hoarding therefore appears to be more related to Telenor's use of SLU access than to use by remote access buyers.

229. That the access buyer actually makes use of the access given can be seen as a precondition for access. This must be deemed to apply in particular to access which entails that other people cannot use the access in the same way. On this basis, Nkom believes that, in the agreement on such use of SLU access, Telenor should be able to require the access buyer to use the access within a reasonable deadline. For the right to such use of SLU access to fulfil its purpose, it will be furthermore be appropriate that the access agreement gives Telenor the right to withdraw SLU access if the conditions for access are not fulfilled.

230. A right for Telenor to withdraw SLU access would also ential potential misuse of the right. Nkom therefore finds it necessary to require that a procedure for withdrawal of access

should be proportional and transparent. Nkom furthermore refers to how a procedure that does not fulfil these requirements might be deemed to be in conflict with the prohibition against unfair claims and unfair terms, cf. Section 7.2.14.

231. Nkom refers to how, under the operator access agreement, Telenor already reserves the right to terminate access and shared access lines that are not used[24]. In Nkom's assessment, any such right would be sufficient to remedy that access buyers request SLU access at more points than they actually intend to use.

232. Because G.fast utilises vectoring, Nkom finds that many providers will not be able to establish G.fast on the same point. Nor will there likely be an economic basis for such an establishment of parallel infrastructure. Any request for access to SLU to use G.fast on a point where a different provider already has or is in the process of establishing G.fast, will in Nkom's assessment not normally be reasonable. This means that the possibility for using SLU access to adopt G.fast with frequency filtering will follow the principle of first in time, first in right. The date for submission of a request for access to the point in question will if needed be used as a cut-off point to determine which provider submitted its request first.

233. Access buyers who install equipment on a remote node should be ensured a certain amount of predictability for the investment. Telenor should normally not be able to make changes in the underlying copper access network that will cause the access buyers to lose access to the relevant sub-loops after a short period of time. Nkom addresses this issue under the requirements for notification in Section 7.5.

7.2.5 Local, virtual access to copper-based access networks

7.2.5.1 Need for obligation to offer local, virtual access to copper-based access networks

234. New technology provides opportunities for more efficient use of the copper access network. The new possibilities for upgrading copper-based networks are described in Section 7.2.3.1 above.

235. However, upgrade of copper-based networks might have negative effects on physical access to such networks and thus create problems for access buyers. This is described in Section 7.2.3.2 above.

236. On this background, the issue will be whether Telenor shall be obliged to offer local, virtual access to copper-based access networks as a replacement for the degradation or loss of LLU access and SLU access.

237. Telenor should have the opportunity to upgrade the copper network and take advantage of the technological possibilities available to provide higher capacity to end users.

[24] General terms and conditions of agreement on separate access to Telenor's access lines in Norway, clause 16.6.4.

However, this should not affect alternative providers' opportunities to compete with Telenor. LLU access and SLU access have to date provided alternative providers with a high degree of ability to control and develop their own retail services. Nkom therefore believes that Telenor should be ordered to provide virtual access as a substitute for loss or degradation of physical access to the copper access network. If the replacement product is to be genuine, it must have characteristics that are comparable with physical access to the copper access network.

238. As mentioned above, Telenor proposed a virtual access product named "VULA Cu" in the Broadband Forum, and discussions about the characteristics of this product have been a key topic in the forum. As also mentioned above, Telenor has reduced the level of ambition for the company's upgrading of the copper network.

239. In view of the fact that Telenor's upgrading of the copper network appears to be considerably more limited than originally planned, it may be questioned whether it is proportionate to impose an obligation on Telenor to provide local, virtual access to the copper access network. In this connection, Nkom shows that even though the number of planned upgrades of micronodes has been reduced, the upgrade will still result in a relatively large number of accesses being affected. This includes not only the accesses connected with the micronode, but also accesses connected to the exchange where the micronode is connected. The loss of the physical access to these accesses will therefore impair the ability of the access buyers to compete with Telenor. Although there will be development costs associated with providing a virtual access product to meet the need for access that arises when physical access ceases/degrades, it is Nkom's assessment that the benefit of a relevant replacement product for the competition more than outweighs this drawback.

240. Nkom is furthermore of the opinion that it cannot be ruled out that Telenor will change its ambitions related to upgrading the copper network in the light of how the market is evolving differently than what Telenor expects at this time.

241. BEREC's Common Position on Layer 2 Wholesale Access Products CP1 stipulates that a virtual access product on Layer 2 shall be offered in Market 3a if:

> *"i. an operator holds a position of significant market power (SMP) on market 3a and an access-remedy is considered to be necessary and proportionate; and*
>
> *ii. access to passive infrastructure (e.g. ducts, copper unbundling, fibre unbundling) or access to wavelength unbundling of an FTTH NG-PON2 as well as wholesale access remedies on market 3b are not sufficient to ensure effective competition at the retail level."*

242. In the market analysis, Nkom concluded that Telenor has significant market power in Market 3a. Nkom cannot see that access to passive infrastructure will be sufficient to ensure effective competition in the retail market. For example, the scope of accessible civil engineering infrastructure in the access network may not provide alternative providers a basis for competing with Telenor in the retail market. Moreover, physical access to fibre accesses is

only possible where Telenor has point-to-point networks. This concerns relatively few accesses. Nkom also argues that unbundling based on wavelengths in the next-generation PON network probably will not constitute a genuine alternative in this regulatory period in light of the fact that this is an evolving technology. Access to wholesale products in Market 3b is also not considered to be sufficient to ensure effective competition in the retail market.

243. Nkom therefore believes that the conditions set out in BEREC's Common Position for ordering Telenor to grant access to the virtual access product are met.

244. Nkom believes on this basis that it is proportionate to order Telenor to provide a relevant replacement product. This means that Telenor shall offer local, virtual access to its copper-based access network. To provide greater clarity about the content of this access obligation, Nkom will discuss certain circumstances below that are of particular relevance to this form of access.

7.2.5.2 Further details about a product for local, virtual access to copper-based access network

245. Physical access to the copper network provides as mentioned access to an unrefined access line between the end user and the access point. This gives access buyers great freedom to design their own retail services. If virtual access is to serve as a satisfactory replacement for physical access, the characteristics of the virtual access product must be as similar as possible to the characteristics of the traditional physical access products. The characteristics that such an access product must have must therefore be taken into further consideration.

246. Based on a proposal by Telenor, the participants in the Broadband Forum have agreed on the technical specifications of the virtual access product VULA Cu. The technical specifications for VULA Cu[25] are attached to this decision (Annex 6). This raises the question of whether an offer of VULA Cu will be sufficient to meet the obligation to offer local, virtual access.

247. Nkom believes that the characteristics of the VULA product must conform to the criteria set out in the Commission's Explanatory Note for virtual wholesale products in Market 3a, i.e. local access, "uncontended" connection, service independence and connection control. The product must also comply with the technical requirements listed in BEREC's Common Position on Layer 2 Wholesale Access Products.

248. The conditions concerning local access, "uncontended" connection, service independence and connection control are explained in more detail in Section 2.4.3 of the market analysis.

[25] In an email dated 4 December 2018, Telenor has verified that the specifications attached are those that were last discussed in the Broadband Forum as a group.

249. The technical requirements in BEREC's Common Position on Layer 2 Wholesale Access Products are as follows:

- The product shall be based on Ethernet (CP3).
- Access buyers shall be able to use and configure their own terminal equipment. Applies under a precondition that the equipment meets certain requirements, e.g. to ensure that the equipment operates in the wholesale provider's network (CP4).
- Access buyers shall have the ability to control the speed of their services within the capacity limits related to the subscriber's access line (CP5).
- The bandwidth must be "uncontended" or provide sufficiently high quality of service. The quality of service should be at least as high as the wholesale provider provides to its own retail business (CP6).
- Access buyers shall be given the possibility to prioritise traffic (CP7).
- Multicast is to be offered if this is proportionate and necessary to ensure technical and financial replicability with competing offers in the retail market (CP8).
- Access buyers shall have the possibility to use several VLANs per end user (CP9)
- Access buyers shall have the possibility to identify their end users (CP10)

250. The reason why the VULA product must have the above characteristics is because the product must be a functional substitute for physical access.

251. The product characteristics of VULA Cu evolved in response to a dialogue between the providers that participated in the Broadband Forum. It must therefore be assumed that the characteristics that the parties have agreed to balance the interests between the needs of access buyers and Telenor in a satisfactory manner.

252. According to how VULA Cu is specified in the Broadband Forum, it will be possible to supply the product in both an "uncontended" and "contended" version. The version that is "contended" will not meet the VULA criteria in the Explanatory Note, and such a wholesale product will thus not be included in Market 3a.

253. In the case of "uncontended" VULA Cu, Telenor will not overbook the connection between the connection point and the extended micronode. The total bandwidth will thus be sufficiently dimensioned in view of the number of end users. On this basis, Nkom considers that VULA Cu in this version meets the requirement for an "uncontended" connection.

254. Access to "uncontended" VULA Cu will furthermore give the wholesale customers a high level of ability to configure parameters for their customer accesses, such as speed, access profiles (DLM) and factors related to multicast. Wholesale customers will also have possibilities to monitor their own accesses and correct faults. On this basis, Nkom considers that the wholesale customers will have adequate control over the connection.

255. Quality of service (QoS) has been an important part of the discussions in the Broadband Forum. The quality of VULA Cu should be at least as high as the quality of the corresponding product Telenor delivers to its own retail business. Wholesale customers who participated in the Broadband Forum brought up many needs concerning the quality of VULA Cu services. Telenor has addressed most of these needs through the proposed product specification. In view of this, Nkom believes that VULA Cu meets the requirement for quality of service.

256. The wholesale customers will be able to use their own terminal equipment (CPE) in connection with VULA Cu. This, and other factors such as speed and quality of service, will give the wholesale customers possibilities to differentiate their service offerings. Nkom therefore believes that VULA Cu may be deemed to be service independent.

257. On this basis VULA Cu meets the criteria of the Commission's Explanatory Note about "uncontended" connection, quality of service/independence and connection control. The local connection criterion is assessed below in Section 7.2.5.4. Nkom furthermore considers that VULA Cu essentially complies with the technical requirements of BEREC's Common Position on Layer 2 Wholesale Access Products. To the extent that there are deviations from the requirements, Nkom notes that VULA Cu was negotiated by the parties to the Broadband Forum.

258. On this basis, Nkom believes that an offer for VULA Cu will be sufficient to fulfil the obligation to offer local, virtual access to copper-based access network in Market 3a. Provided that Telenor upgrades the copper access netrwork with exclusionary effect, cf. Section 7.2.3.5, Telenor must develop a specific wholesale product based on the product description agreed by the parties to the Broadband Forum (Annex 6).

259. If Telenor believes that a need has arisen to make changes to the VULA Cu product description, Telenor must inform Nkom of this in writing. Nkom specifies that this applies to any change in the product description. If the change is of such a nature that it changes the characteristics of the access product on which the providers agree in the Broadband Forum, Telenor must furthermore involve the access buyers.

260. Below, Nkom denotes the access obligation for local, virtual access to copper-based networks as VULA copper.

7.2.5.3 Where VULA copper is to be offered

261. The question of whether VULA copper should be available throughout Telenor's copper-based access network was raised in the Broadband Forum. The access buyers initially expressed an interest in this, in part because such a solution would provide greater choice. A position must therefore be taken on whether VULA copper should be available throughout Telenor's network or be limited to accesses in the parts of Telenor's network that are being upgraded.

262. Telenor's obligation to offer virtual, local access to the copper network shall primarily resolve the competition problem that arises when Telenor establishes remote micronodes and the offer for physical access lapses. This indicates that the obligation can be limited to these areas. Danish and Swedish electronic communications authorities have made the same assessment.

263. The access buyers will not be able to supply services from their own DSLAM to end users connected to the remote micronode. In this way, Telenor will offer VULA copper to these accesses, so that access buyers are offered a functional replacement product.

264. The establishment of remote micronodes will also potentially reduce the customer base and thus also the business potential for access buyers' DSLAM in the local exchange. VULA copper shall therefore also be offered on accesses in the underlying exchange.

265. The high capacity that follows from the establishment of remote micronodes and use of noise cancellation technology will not be available in those parts of the copper access network that will not be upgraded. Any access to VULA copper will therefore not be able to provide an improved service offering to end users in areas that will not be upgraded.

266. Some of the technical characteristics of VULA copper depend on a "uncontended" connection between the connection point and the remote micronode. If VULA copper is to be offered throughout Telenor's copper access network, the access must be connected through Telenor's IP network. This means that the technical characteristics of VULA copper (e.g. time delay) may vary depending on whether a central or local access point is utilised.

267. It will still be possible in parts of the copper network that will not be upgraded to install or maintain proprietary DSLAMs and buy physical access from Telenor in the form of LLU.

268. The Broadband Forum concluded that it was sufficient to allow VULA copper to be offered only in the parts of Telenor's network being upgraded.

269. Nkom believes on this basis that VULA copper shall, at a minimum, be offered in the parts of Telenor's network that will be upgraded with exclusionary effect. This means that VULA copper shall be offered on accesses that are connected to the remote micronodes that will be upgraded. Furthermore, the VULA product shall be offered on accesses connected to the exchange/main connection to which the remote micronode is connected.

7.2.5.4 Particular comments about connection points for VULA copper

270. A special issue is where access buyers can connect to the VULA copper product in Telenor's network.

271. Telenor has outlined that access buyers can gain access to VULA copper at the BNG (Border Network Gateway) level. The number of access points at this level is approximately 150.

272. Some access buyers expressed the opinion in the Broadband Forum that they would like access at the level of the local exchange. This may be relevant for access buyers who have laid their own fibre up to the local exchange (to their own DSLAM). Another possible connection point is on the remote micronode.

273. Access to the remote micronodes will provide connectivity to few end users, and it will not normally be profitable for the wholesale customers to have the traffic delivered to their own network in this point. For Telenor, the access obligation at this level will result in increased costs, for example in the form of that the number of access ports must be increased and that the temperature of cabinets in which equipment is installed must be regulated. Participants in the Broadband Forum agreed that the introduction of such an access point did not have high priority. Experiences from Denmark also show that the use of access to remote micronodes is low. Nkom is accordingly of the opinion that Telenor shall not be obliged to provide access on the remote micronodes.

274. Telenor stated in the Broadband Forum that it will be the most cost-effective to provide access buyers with access to the VULA product at the BNG level. In this way, the company will be able to reuse the ODP (Oprator Distribution Point) solution for today's VULA product for fibre to the maximum extent possible.

275. According to the Commission's Explanatory Note, local connection means that the traffic is being delivered "*at a level which is much closer to the customer premises than access at the national or regional level as generally granted with traditional bitstream access. Such "localness" is typically given in a scenario where access is granted at or close to the central office/MDF (including newly built ODF) or the street cabinet.*"

276. The number of VULA copper connection points does not appreciably deviate from the number of access points for Telenor's wholesale product "DSL Broadband access" (bitstream access). It will therefore in principle not be possible to characterise connection points at the BNG level as local access.

277. However, access to VULA copper will involve an "uncontended" connection and meet the other VULA criteria specified in the Explanatory Note. Nkom believes that the level of local connection is not decisive and therefore considers that the product will be a functional substitute for physical access to the copper network. The discussions that have taken place in the Broadband Forum also suggest that access at the BNG level will meet the need of larger access buyers, such as NextGenTel. Nkom therefore believes that Telenor should be obliged to offer access at the BNG level.

278. The BNG level is more central in the logical network structure than the local exchange level. DSLAMs that are installed in local exchanges may have different forms of connection to BNGs. They can be directly linked to the BNG or linked to the BNG via a different DSLAM. Furthermore, DSLAMs can in some cases be co-located with BNGs (i.e. a router where BNG functionality is implemented) on local exchanges

279. Concerning the question of whether access buyers should be able to gain access at the local exchange level, it may be appropriate to consider this according to the form of connection between DSLAMs in the local exchange and BNGs.

280. Telenor shall grant access to a local exchange in those cases where the BNG is co-located on a local exchange. Nkom considers that it will be simple and not a great burden on Telenor to facilitate such access as this will be at the same physical location.

281. Concerning DSLAMs in local exchange linked to the BNG via a different DSLAM, Telenor has stated that while developing a VULA Cu product, they will verify that a solution satisfies the technical values for the "VULA Dedicated VLAN Uncontended" product. In the event that this should not be verifiable, Nkom believes that Telenor shall be obliged to offer access at the local exchange level if this is necessary to provide "VULA Dedicated VLAN Uncontended".

282. In those cases where DSLAM in a local exchange is directly connected to the BNG, it will be a question of whether an access obligation to a local exchange shall also be required.

283. According to the Explanatory Note, local connection will typically imply that access is granted at or near the local exchange or in a distribution point even closer to the net termination point ("street cabinet"). This suggests that there should be an access obligation at the local exchange level.

284. On the other hand, access at the BNG level will provide access buyers with access to a VULA product that may be deemed a functional substitute for physical access.

285. Nkom refers to the fact that the Danish Business Authority has ordered TDC to provide access at the level of the remote micronodes (in addition to access at the local exchange level), cf. also Explanatory Note stating that local access may involve access to "the street cabinet". Nkom therefore believes based on a "greater subsumes the lesser" approach that Telenor should be ordered to provide access at the local exchange level.

286. Telenor has stated in the Broadband Forum that they have at least one port free for external access on their DSLAMs in a local exchange. The need to gain access at the local exchange level is as mentioned above connected with the fact that certain access buyers would like to use their own fibre cable up to the connection point. It is obvious that it is providers with their own fibre network near the local exchange that have found it profitable to lay such a fibre cable. Demand for access at the local exchange level will on this basis depend on individual conditions. There is therefore probably no need for Telenor to arrange for many providers to be able to gain access to each local exchange.

287. Nkom believes that Telenor shall offer access to a local exchange with at least two ports reserved for external access. On the whole, Nkom believes this would be able to cover the access buyers' need to take advantage of the investments they have already undertaken related to their broadband offering.

288. Nkom believes that such a limited access regime on a local exchange would not be very burdensome for Telenor.

289. In summary, Nkom has concluded that Telenor shall be obliged to provide access to VULA copper at the BNG level. Telenor shall furthermore be obliged to offer access to a local exchange with at least two ports reserved for external access. However, Telenor shall not be obliged to offer access at the level of the remote micronode.

7.2.5.5 Obligation of "uncontended" access between connection and remote node

290. If the connection point is more central than the local exchange, the connection between the access point and a remote micronode must be "uncontended" if the access product is to be a functional substitute for physical access and therefore a product in M3a.

291. Such "uncontended" access can be secured by making requirements of the access product and/or by requiring an "uncontended" connection on the relevant section in the network.

292. A VULA copper product in Market 3a must be "uncontended". To ensure this, Nkom believes that it is necessary to make an explicit requirement that the connection on the section from a remote micronode to a decentralised connection point shall be "uncontended". Such an obligation is necessary to ensure that it is a reality that the VULA copper product is a functional replacement product for physical access.

293. In this connection, Nkom refers to the fact that the Danish Business Authority has imposed an obligation on TDC to offer "uncontended" access between connection and a remote micronode.

7.2.5.6 Further details on the obligation and the date for when Telenor shall offer virtual access

294. As there is uncertainty concerning Telenor's specific plans for the upgrading of the copper network with exclusionary effect, cf. Section 7.2.3.5, Nkom believes that it is not proportional to give Telenor an unconditional order to develop and launch a wholesale product that will fulfil the requirements for VULA copper within nine months following the entry into force of this decision, as was notified.

295. Exclusionary effect entails, as described in Section 7.2.3.2, that physical access to the copper access lines lapses.

296. In its comments on Nkom's notification of the draft decision in Markets 3a and 3b, ESA has asked Nkom to clarify the timeline for when virtual access products must be available. Below, Nkom has clarified the timeline for each phase that Telenor must undertake in order to be able to offer VULA copper as a substitute for physical access to the copper access network.

297. It will be unfortunate if periods occur where access buyers lack access to a relevant wholesale product. This could weaken the competition in the retail market and give Telenor

advantages by being the first to offer a better offer to end users. It must therefore be possible for VULA copper to be taken into use by the access buyer's end users, i.e. be operational, by no later than the date on which the physical access lapses.

298. It would furthermore be unfortunate if the access buyers are not given sufficient time to prepare the transition from physical to virtual access. Telenor must therefore have both a reference offer, including prices, and an access product ready for ordering in sufficient time before the physical access lapses.

299. Nkom believes that it is sufficient for the reference offer for VULA copper to be ready by no later than at the same time as Telenor notifies changes to the access network which entail that the access given lapses, cf. Section 7.5.5.2. In practice this entails that Telenor's reference offer must be ready by no later than six months before the physical access lapses.

300. For the access to the new access product to function effectively, it will be necessary for the access buyer to be aware of and have the opportunity to try out the relevant order procedure. It is therefore necessary for Telenor to make it possible for the access buyers to order the new product during a certain period of time before the physical access lapses. Nkom concludes that it must be possible to order the new product no later than three months prior to the lapse of the physical access.

301. Affected access buyers might be interested in alternatives to VULA copper, in order to replace the lapse of physical access. An alternative might, for example, be a wholesale product in Market 3b. Nkom believes that the parties, i.e. Telenor and affected access buyers, should be able to enter into agreements regarding such alternatives. The establishment of any such agreement will entail that Telenor will have no obligation to offer VULA copper to the relevant access buyers.

7.2.5.7 Migration

302. *Telenor shall offer* migration between products in Market 3a and between products in Market 3a and Market 3b.

303. Telenor's obligation to provide migration applies regardless of which technology platform the access is based on. This means, for example, that Telenor shall offer migration from copper products to fibre products covered by Telenor's access obligations. The obligation to offer migration applies both to the single end user level and to simultaneous migration of one or more groups of end users, so-called mass migration.

304. Telenor shall offer migration on timely, reasonable and non-discriminatory terms. It entails, among other things, that Telenor shall ensure all reasonable measures to ensure that downtime is avoided in connection with the migration.

305. Migration shall take place at cost-oriented prices and reflect that the costs of the migration may be lower than by ordinary establishment of access, cf. the requirements for non-discrimination and price regulation.

7.2.6 Local, physical access to fibre-based access networks

7.2.6.1 Point-to-point network

306. Through Nkom's decision of 20 January 2014 in former Market 4, Telenor was ordered to accommodate all reasonable requests for LLU access to fibre access lines. Telenor developed the LLU Fibre Access product to accommodate this access obligation. LLU Fibre Access is only available in Telenor point-to-point networks in systematically developed fibre access areas. In point-to-point networks, subscribers have their own dedicated fibre cable from the exchange.

307. There has been little demand for LLU Fibre Access from access buyers. The question can therefore be asked whether it is necessary and proportionate to continue an obligation for local, physical access to Telenor's fibre-based point-to-point network.

308. The number of accesses in Telenor's point-to-point network is relatively few. It can therefore be argued that access to these accesses will have little impact on the access buyers' ability to compete with Telenor. This is a potential argument against the continuation of the obligation.

309. However, it cannot be ruled out that the ratio between point-to-point and PON accesses in Telenor's portfolio of fibre access networks may change over time. Telenor has stated in various contexts that the company wants to strengthen its position within fibre-based broadband access in the years to come and has, among other things, specified its growth ambitions through a stated goal of 40% market share of fibre access by 2020. If part of this growth comes from the acquisition of fibre operators with existing point-to-point networks, it could result in an increase in the number of point-to-point accesses in Telenor's fibre network. This is a factor that suggests that the access obligation for fibre at the local level in former Market 4 should be continued in Market 3a.

310. Imposing access for only one type of fibre network topology will affect technology choices in the future. Nkom therefore believes that local, physical access to fibre access lines in point-to-point networks should be maintained in order to secure wholesale customers physical access to fibre access networks in case Telenor should change its main focus on PON networks or otherwise increase the number of fibre accesses in point-to-point networks.

311. Nkom believes for this reason that Telenor shall be obliged to accommodate any reasonable request for local, physical access to fibre-based point-to-point networks.

7.2.6.2 PON networks

312. PON networks (passive optical networks) are point-to-multipoint networks, which means that the splitter point to which the individual subscriber line connects is located farther out in the network than in a point-to-point network. While the subscribers of a PON network utilise a joint fibre cable from the exchange to a passive splitter point, the subscribers of the point-to-point network have their own dedicated fibre cable from the exchange.

313. The possibilities for physical unbundling of point-to-multipoint networks, and especially PON networks, are limited. This is related to the fact that signals from the fibre exchange up to the passive splitter are transmitted in a single fibre cable.

314. Although the possibilities are limited, in its 2017 market decision in Market 3a the Danish Business Authority (ERST) ordered TDC to provide local, physical access to fibre networks. This applies regardless of the fibre network's topology. TDC shall ensure that access buyers can install their own equipment in PON networks in order to gain access to the "first fibre distribution point". If this is not possible, TDC shall, on behalf of access buyers, set up a splitter in the splitter point and transport the traffic from that point to a more central point in the network. If practical conditions make it impossible to install equipment on the point, TDC shall offer local, virtual access to fibre instead of physical access.

315. It will be difficult in Telenor's PON-network to provide equivalent access. This is because Telenor utilises equipment in its fibre network that is less suitable for physical connection. For example, Telenor uses "all-welded" passive splitters. Nkom deems that it would be both impractical and disproportionate to order Telenor to break up such splitters to provide access to others. This must also be seen in light of the fact that there are relatively few customers that are connected to passive splitters at central points in the network.

316. Wavelength multiplexing is a technology that makes it possible to send multiple optical signals with different wavelengths into a single fibre. This technology basically makes it possible to unbundle a PON network by providing access buyers with access to a wavelength that can be used to transmit signals from the fibre exchange to the net termination point/end user ("wavelength unbundle").

317. Both PON networks and wavelength multiplexing are under development, and the technology is in the process of being standardised. The technology must still be regarded as immature and, in Nkom's assessment, it will therefore be too early to introduce this form of access at the present time. This also appears to be the perception in other countries with which Norway can compare itself.

318. However, Nkom will monitor developments in this area and re-examine the possibility of an introduction of this form of access if it appears that it is being standardised and commercially available within the time horizon of the decision.

7.2.7 Local, virtual access to fibre-based access networks

7.2.7.1 Background – Today's VULA product from Telenor

319. In the 2014 decision in former Market 5, Telenor was ordered to accommodate any reasonable request for access to Broadband access in fibre-based access networks. Telenor developed the wholesale product VULA to accommodate this access obligation. The access product was launched in January 2015 and provides access to Telenor's PON network at the BNG-level. Nkom believes the characteristics of today's VULA product indicate that this

wholesale product is part of Market 3b. In connection with this, Nkom refers to the market analysis in Section 2.4.4. Nkom's assessment of the question of whether Telenor's obligation to offer such access shall continue is set out in the decision in Market 3b.

320. When Telenor submitted the agreements for the VULA product in former Market 5 in 2014, the access buyers had objected to the fact that the product only provided a connection option at the BNG level. Part of the reason for the objection was that this would make the access obligation less applicable and entail a limitation in the ability to design its own services. Nkom assessed at the time that the access product Telenor put forward was sufficient to fulfil the access obligation in the relevant wholesale market. At the same time, Nkom stated that this standpoint could be reconsidered in view of future market and technological advances. In the time since Telenor launched its VULA product in 2015, Nkom is not aware that requests for access to Telenor's fibre access network have been made at more local levels.

321. As described in Section 7.2.6.1, Telenor is required to accommodate any reasonable request for local, physical access to fibre-based point-to-point networks. However, there is currently a relatively limited number of accesses where access buyers can gain such access.

322. Telenor's fibre-based access networks are mainly PON networks. Nkom concluded in Section 7.2.6.2 that Telenor will not be ordered to provide local, physical access to PON networks in, for example, the form that access buyers should, as in Denmark, be able to connect to the splitter in the PON network. Nkom furthermore believes that it is not relevant as of today to order Telenor to provide access based on wavelength multiplexing. The access buyers therefore collectively have no possibilities to gain direct physical entry to Telenor's GPON fibre network.

7.2.7.2 Effect of ESA's new recommendation on market definition from 2016

323. The distinction between physical access products/"separate access" and more refined Broadband access/"bitstream" products that formed the basis for the delimitation between former Market 4 and Market 5, has been changed as a result of the current product market definition, cf. ESA's recommendation for new market definitions from 2016. Market 3a can thus contain both physical and virtual access products. The issue here is whether there is a need to impose an obligation on Telenor to provide local, virtual access to the company's fibre-based access network.

324. As shown above, the relevant markets are defined differently in this decision compared with 2014, so that local, virtual access is now relevant to consider in Market 3a. Nkom refers to the assessments above where Nkom concludes that Telenor shall offer local, virtual access to the copper-based access networks. As a starting point, Nkom believes that local, virtual access to fibre-based access networks is suited to remedying some of the same competitive restrictions that local, virtual access in the copper access network remedies in the absence of physical access. In this context, Nkom points to the cumulative criteria that a product

according to the Explanatory Note must satisfy to be in Market 3a, cf. Section 2.4.3 in the market analysis:

- Access to the product is provided locally
- Access to the product implies that the access buyer is granted a service-agnostic transmission capacity that is "uncontended" in practice
- Access to the product gives the access buyer sufficient control over the transmission network to allow for product differentiation and innovation similar to that for LLU

325. In Section 2.4.2 of the market analysis, Nkom concludes that access at BNG level is considered to be the local connection level for fibre-based virtual access products.

326. Telenor has stated to Nkom that the company has not taken into account that the GPON network must be able to offer so-called "uncontended" connections and has pointed out that the maximum shared capacity in certain GPON trees is limited to 2.4 Gbit/s downstream and 1.2 Gbit/s upstream. Telenor has furthermore pointed out that the company also does not offer VULA carriage with an "uncontended" connection between OLT and ODP. Telenor states in that connection that the GPON network has essentially been built to meet demand in the private market and that there is no willingness to pay for services where the GPON technology's concentration capabilities are not utilised. Nkom finds that Telenor refers to that there is no willingness to pay in the private market for the higher price that would result from increasing the concentration of GPON trees by allowing each individual tree to have fewer connected accesses. However, Telenor states that it cannot be ruled out that such more concentrated GPON trees will be built to meet demand in the business market where the willingness to pay will be sufficient.

327. There has been limited demand for the VULA product in former Market 5. In Nkom's assessment, there is reason to assume that the price of the access product may have contributed to this[26]. In Nkom's assessment, there is also reason to assume that the limited demand is related to the fact that the customer base available via the VULA product is far smaller than the customer base with access to Telenor's copper network and that the possibility of reaching business customers via the VULA product is more limited. At the same time, Nkom believes that the response from the access buyers to the current VULA product indicates that the limitations in functionality for the access product are also significant.

328. The need for a fibre-based VULA product in Market 3a has been discussed to a limited extent in Norway. There is therefore some uncertainty relating to whether there will be demand for such an access product. At the same time, Nkom points out that it is expedient in Telenor's fibre access network to have an access product that provides a sufficiently increased

[26] After the completion of margin squeeze tests, Nkom made three decisions ordering Telenor to reduce the price of the VULA product. Telenor has appealed all the decisions. In the first case, the Ministry of Transport and Communications issued a decision that Telenor's rates must be reduced by 24.7%. The appeals against the other two decisions are under consideration by the Ministry.

opportunity for access buyers to differentiate their service offerings and thereby strengthen their competitiveness. Nkom furthermore refers to the response from access buyers on the limitations of today's VULA product, cf. above. In Nkom's assessment, there is reason to assume that access buyers still see a need to control their own service production to a higher degree. A VULA product that meets the criteria for local, virtual access in Market 3a will give the access buyers greater control of the retail product compared to the current VULA product from Telenor, and thereby provide a greater opportunity to offer differentiated services.

329. Nkom refers to that the Commission had serious doubts concerning FICORA's "non imposition of VULA in case of PON networks in market 3a" in case FI/2017/1991. The Commission pointed out that it is important to impose virtual local access in PON networks in order to avoid bitstream access to such networks being the only competition opportunity for alternative providers. The Commission also believed that imposing virtual local access would promote product differentiation and increase competition in the retail market.

330. In view of the limitations in functionality of the current VULA product from Telenor, Nkom also believes that it is necessary to require Telenor to offer a further developed VULA product that fulfils the criteria for virtual local access in Market 3a, so that the access buyers gain greater opportunities for product differentiation, thereby strengthening their competition opportunities in the retail market.

331. Nkom believes on this basis that Telenor shall be ordered to provide a virtual fibre-based access product in Market 3a.

7.2.7.3 Further details about the requirements for VULA fibre access in Market 3a

332. The requirement for the possibility of service development and innovation means that a request for access to new or expanded functionality on the current VULA product may be reasonable even if it requires functionality that Telenor's own retail business does not benefit from, for example other speed profiles than those offered in today's VULA product. Market and technology developments will create new needs and provide new opportunities to give the access buyers a better opportunity to engage in product development and innovation closer up to what the physical access allows. Telenor is therefore ordered to prepare a process for handling requests for changes and additions to the reference offer for today's VULA product. The description of this process shall be included as part of the reference offer.

333. One major reason to impose access to a layer-2 product, according to BEREC's Common Position on Layer 2 Wholesale Access Products, is the regulated provider's rollout of NGA networks. Fibre networks based on GPON are named by BEREC as an example of where it may be relevant to impose access to a layer-2 product. BEREC's Common Position sets a number of technical requirements for a layer-2 product. These are listed above in Section 7.2.5.2.

334. BEREC points out that there are cases in which Layer 2 products with access at both the local level and the regional/national level have been imposed in connection with the regulated operator's NGA rollout:

> "*ANOs can use the L2 WAP with local PoH if they have sufficiently large economies of scale at the local level and the L2 WAP with regional/national PoH otherwise. This allows them to offer the same products on a national basis.*"

335. Based on the above, Telenor shall accommodate any reasonable request for a local, virtual fibre-based access product (VULA fibre).

336. Telenor is ordered to prepare a process for handling requests for changes and additions to the reference offer for the VULA product in Market 3a. The description of this process shall be included as part of the reference offer.

7.2.7.4 Development of a wholesale product for virtual access to fibre networks that fulfil the requirements for products in Market 3a

7.2.7.4.1 Concerning control of the transmission networks - product differentiation and innovation

337. At the present time, Nkom believes that Telenor's surveillance of the traffic load in the GPON networks and of backhaul capacity between OLT and the handover point at BNG level (ODP) gives access buyers sufficient control of the transmission network.

338. The traffic load is well below the saturation point in all of Telenor's GPON networks, and it has therefore not been necessary to determine explicit dimensioning rules. Telenor is, however, required to publish criteria for the capacity expansion of GPON networks in the same way as Telenor has done for the traffic monitoring of backhaul from OLT to BNG/ODP.

339. In order to facilitate product development and innovation, Telenor is required to define a product development process to handle enquiries from access buyers concerning changes to the product, including the development of new speed profiles.

340. Telenor is furthermore required to allow the access buyer to use their own ONTs at the end-customer. In order to maintain network integrity, Telenor must establish a list of already approved ONTs and develop a process to assess new ONTs for approval.

341. Telenor must enable access buyers to monitor the status of the individual access line in real time.

342. Today's product VULA from Telenor facilitates control of the product specification for the end customer product and service quality through the choice of speed profile, any development of new speed profiles, and separate priority handling for IPTV through its own VLAN for this service.

343. In accordance with BEREC's Common Position on Layer 2 Wholesale Access Products, multiple VLANs per end customer must be offered and priority management of traffic

must be facilitated, for example through the use of priority bits in the Ethernet protocol. Telenor has informed Nkom that the company considers the opportunity for the access buyer to prioritise between different services at IP level, combined with control of traffic load in GPON networks and on backhaul, gives the access buyer sufficient flexibility.

344. Since such a solution is not in line with BEREC's Common Position, Nkom sees a need for a more detailed discussion with the industry in order to determine any further requirements that Telenor's wholesale products must fulfil in order to have sufficient control of the specification for the end-user product and service quality to be able to qualify as a product in Market 3a.

7.2.7.4.2 Concerning generic access and offer of service-agnostic transmission capacity "uncontended in practice"

345. At the present time, Nkom has no indications that Telenor's surveillance of traffic loads and the dimensioning rules are insufficient to ensure that the capacity is "uncontended in practice" in the current VULA product, or indications that the product does not provide generic access.

346. Both the demand for bandwidth-requiring services and potential new services with stricter requirements in terms of delay and other service quality parameters can change this, however.

7.2.7.4.3 Concerning access level

347. In Section 2.4.2 of the market analysis, Nkom concludes that access at BNG level is considered to be the local connection level for fibre-based virtual access products. Transparency and the need for flexibility in traffic management in backhaul could nonetheless entail a need to impose the handover point at OLT level. The industry dialogue after final decision aimed, at determining final functionality requirements for virtual local access in Market 3a with regard to traffic prioritisation and service development, will clarify this issue, cf. Section 7.2.7.4.1.

7.2.7.4.4 Industry dialogue to determine final requirements for VULA fibre in Market 3a

348. In Section 7.2.7.4.1, Nkom presents individual requirements made of VULA fibre and expresses how there is a need for more extensive industry dialogue in order to assess changes in today's VULA product. Nkom assumes that any such dialogue can take place under the auspices of the Broadband Forum. To ensure the fastest possible introduction of local, virtual access in Market 3a, Nkom will invite dialogue in the industry shortly after this decision comes into effect, with the aim of completion of the dialogue during the first four months of 2019.

349. The outcome of the industry dialogue could to lead to further requirements concerning virtual local access in Market 3a. In such case, Nkom will draw up an additional decision to

stipulate the overall requirements of VULA fibre, including when the access product must be completed. An additional decision will be sent to interested parties for consultation, cf. Section 9-2 of the Electronic Communications Act, and notified to ESA, cf. Section 9-3 of the Electronic Communications Act.

350. In its comments on Nkom's notification of the draft decision in Markets 3a and 3b, ESA has urged Nkom to clarify the timeline for when virtual access products must be available. Nkom find it difficult, however, at the present time to specify a clear timeline for when VULA fibre must be available. This is partly due to the fact that Telenor, in contrast to a number of regulated providers in other countries, has not adopted prioritisation at Layer 2/Ethernet for own end-customers in the mass market, except for IPTV. It is furthermore uncertain which prioritisation functionality access buyers will request. When these matters have been clarified after the dialogue in the Broadband Forum, Nkom will set a more detailed timetable for the development of VULA fibre. This will be undertaken in the additional decision. Nkom aims to send the additional decision for national consultation before 1 June 2019.

351. As Section 7.3.5 shows, Nkom will use a margin squeeze test for VULA fibre. Nkom aims for the margin squeeze test for VULA fibre to be taken into use when the VULA product has been fully developed.

352. Nkom will assess the need to maintain or adjust the obligation to provide access in Market 3b for fibre-based access networks (VUA fibre) when the requirements for virtual local access in Market 3a have been determined.

7.2.8 When the obligation of access in Telenor's systematically developed fibre network applies

353. A particular problem in connection with access to Telenor's fibre-based access network has been to determine when the obligation of access should apply from and therefore also whether the access buyer's and Telenor's retail operations are to be treated equally during the development of new fibre access networks. Whether the obligation of access applies during this period will affect, for example, whether the access buyer will be able to establish end-user agreements during this phase, including whether the access buyer is entitled to information that will be necessary to provide broadband services on equal terms with Telenor's own retail operations.

354. The question of when the obligation of access is to apply from was considered by the Ministry of Transport and Communications in its appeal decision on 18 December 2014 in former Markets 4 and 5. The Ministry gave the following assessment of this issue in the appeal decision:

> *"The Ministry refers to the fact that, in principle, the obligation of non-discrimination means that Telenor should not discriminate between its own retail operations and other providers. The core of the question here is, in the Ministry's opinion, whether the obligation of non-discrimination implies that the same information that will be available*

to Telenor's own retail operations ahead of the establishment of new access networks, i.e. in the planning phase and/or sales phase, before the new network is established, should also be made available to Telenor's wholesale customers.

The Ministry of Transport and Communications refers to the fact that it is currently established practice that fibre developers conduct advance sales in areas where they are considering rolling out fibre before they make any major investment decisions. The level of coverage they achieve in the advance sales is a key element in the company's decision to invest in the individual area. There is often competition between several network providers to win a sufficient proportion of the households before they start building.

Establishing infrastructure for electronic communications usually requires major investments and normally involves significant risks for the developer. In the Ministry's opinion, caution should be exercised when imposing regulation that may reduce the incentives for further development when development is socially desirable. As a provider with significant market power, Telenor should be able to participate in the competition for the roll-out of new modern broadband networks on an equal footing with other developers, while at the same time paving the way for competition for the customers in the downstream market, i.e. end users.

The Ministry has considered whether an obligation of non-discrimination in connection with the sales process would reduce the incentives for further development. If it is considered profitable to develop a fibre access network in an area and roll-out is planned, it may, in the Ministry's opinion, entail a heightened risk for the project if the developer is obliged to share information about these plans with other providers in the same market. We believe that an obligation for Telenor to share information about development plans prior to the establishment of new networks will entail a risk of lower levels of development in some areas. In light of this, the Ministry has concluded that an obligation to grant access and an associated obligation of non-discrimination, which only come into effect after the access network has actually been established, strikes an appropriate balance between the need to safeguard Investment incentives and the need to ensure sufficient competition in the downstream market. The Ministry understands that, in practice, this conclusion will mean that Telenor will have the opportunity to get new subscribers to sign up with a normal lock-in period of one year for fibre access networks that Telenor builds in geographical areas where Telenor does not already have an established fibre access network. At the same time, it will also entail that the company will pave the way for competition after the lock-in period has expired or if there is no lock-in agreement."

355. The Ministry concludes its discussion as follows:

"Against this backdrop, the Ministry further specifies PT's decision as follows: The obligation of access (cf. Section 4-1 of the Electronic Communications Act) in Markets 4 and 5 in respect of fibre only applies to already established access networks."

356. In the appeal decision the Ministry assumes that Nkom, in its next market review of the relevant broadband markets, will reassess the need for any changes in the scope of the obligation of access.

357. The question Nkom must address is therefore whether the obligation of access in the fibre-based network is to apply from an earlier point in time than the time when the fibre network has been established, and thus whether Telenor shall be obliged to share information with its wholesale customers in the planning phase and/or the sales phase, before a new fibre network is established.

358. Nkom recognises that obligations of access in the fibre access network before the network has been established, including an obligation to share detailed information on the area the network will cover, will entail increased risks associated with the project. In this context, Nkom refers to the fact that Telenor may be competing with another provider on the establishment of the relevant fibre network, or other relevant infrastructure, and the fact that Telenor cannot refuse a request for access on the basis of which provider is seeking access. Nkom therefore assumes that sharing information about its own plans would undermine Telenor's ability to compete with other potential developers and thus weaken Telenor's incentives to invest in some areas.

359. Nkom therefore concludes that the obligation of access to Telenor's fibre-based access network shall apply from the date the fibre access network is established. A fibre access network is regarded as established when it is being used to deliver broadband services to end users.

7.2.9 Access for connection of "homes passed" in Telenor's systematically developed fibre access network

360. When Telenor establishes systematically developed fibre access networks, there will generally be some potential customers in the defined geographic development area that choose not to connect to the network during the establishment phase. Such potential customers are often referred to as "homes passed". For a developer of fibre access networks, "homes passed" will be potential future end users, and so-called densification sales directed at such groups are common. In those cases some "homes passed" customers desire fibre access, a fibre connection must be established from the existing fibre network in the area up to the relevant building. The connection that connects the building to the existing fibre network is hereinafter referred to as a drop cable.

361. In its 18 December 2014 decision in the complaint case in former Markets 4 and 5, the Ministry of Transport and Communications concluded that the applicable access obligation for fibre in these wholesale markets is limited to already established access networks. This means

that Telenor is first obliged to offer access to systematically developed fibre access networks when the initial sales process has ended and the fibre network is rolled out in the relevant area.

362. In Section 7.2.8 above, Nkom upheld the Ministry's conclusion, and has placed decisive emphasis on the fact that equal access for access buyers in the establishment phase may restrict Telenor's investment incentives in the fibre access network. However, the reasons that indicate that an access obligation should not be imposed in unestablished fibre access networks do not apply in the same way to access to connect "homes passed". Nkom points out that in cases where it is relevant to request access to connect "homes passed", the fibre access network as such will already be established.

363. Densification sales directed at "homes passed" will be carried out after a systematically developed fibre access network has been established in a defined geographic development area. The need for non-discrimination between access buyers and Telenor's own retail business indicates that access buyers should have equal opportunities as Telenor's own retail business to carry out densification sales vis-à-vis "homes passed" in Telenor's established fibre access network. Equal opportunities suggest in this context that Telenor should be ordered to provide access to the establishment of drop cables to "homes passed" located within the defined development area of the relevant fibre access network. Such an access obligation is necessary if access buyers are to have an equal opportunity to conclude agreements for the delivery of fibre-based retail services to "homes passed" customers through densification sales and will not be achievable by a less intrusive remedy. In Nkom's view, such an access obligation for the connection of "homes passed" in established fibre access networks will also be in Telenor's interest as it can help increase the number of customers within the development area for a systematically developed fibre access network.

364. Nkom has reviewed various alternative designs of the access obligation for connection of "homes passed". A possible alternative would be for access buyers themselves to undertake the establishment of drop cables. Nkom believes, however, that any such approach has several significant drawbacks:

- To a great extent, Telenor's expansion of fibre networks is undertaken by contractors and installers that are not owned by Telenor, and it is likely that there will be geographical variations in terms of choice of contractors/installers. From both a quality and cost perspective, it will be an advantage to avoid many different contractors/installers being involved in the same fibre network development project.
- Until now, the current access buyers have been providers with limited own infrastructure. The transaction cost of identifying and hiring contractors for excavation and installers for laying drop cables for a GPON tree[27] is probably a major barrier to

[27] For an installer, security clearance may be required.

establishment, compared to accessing the same services through Telenor's framework agreements in each individual development area.

- In general, the risk associated with investing in a drop cable will be higher for an access buyer than for Telenor, particularly since normal practice in the Norwegian market is for the establishment price to be subsidised to a great extent by the provider establishing the access, cf. Section 7.3.6. If the end user decides to terminate the agreement with the access buyer, the investment in the drop cable will in principle be lost. On the other hand, Telenor will still be able to earn income from the access through the sale of wholesale access, if the end user terminates its agreement with Telenor.
- Permitting an access buyer to establish a drop cable in a GPON network that is otherwise operated as a network might lead to an unclear distribution of responsibility.

365. Another possible approach could be to require Telenor to make it possible for access buyers to use Telenor'a contracts with contractors/installers. However, this would probably require changes in Telenor's current contracts. Since Telenor has different contract partners in different areas, the transaction costs for the access buyers might be very high.

366. Nkom has also assessed the possibility of access buyers being invited to order the installation of drop cables to their end users before Telenor enters into agreements with end customers in a given area. This approach was proposed by the Commission as a less intrusive solution in conjunction with the Danish Business Authority's imposition of a similar obligation on TDC[28]. Here, Nkom refers to our assessment in Section 7.2.8, which shows that, in view of Telenor's investment incentives, the access obligation concerning Telenor's fibre-based access network must apply as from the establishment of the fibre access network. Nkom therefore does not consider any such solution for the establishment of drop cables to be relevant.

367. On the basis of these assessments, Nkom believes that the least intrusive alternative for Telenor will be for Telenor itself to undertake the establishment of drop cables to "homes passed", at the request of access buyers. Nkom also believes that any such solution will also be the most appropriate for the access buyers.

368. Nkom has furthermore considered how an obligation to provide access for connection of "homes passed" should be arranged. One option used by some other regulators is to link the obligation to a maximum distance from the established fibre access network to the particular building where the drop cable must be established, for example 30 or 50 metres. Nkom has concluded that such a distance limitation is not practical. This is related to the fact that in some areas with systematically developed fibre networks there can be buildings that lie within the selected distance limit, whether it is 30 or 50 metres, which was not considered

[28] https://circabc.europa.eu/ui/group/2328c58f-1fed-4402-a6cc-0f0237699dc3/library/0a8b8d46-ca2b-4479-952f-07ef8f14d98a/details

expedient for connecting the relevant fibre access network when it was planned and realised. High costs connected with crossing roads or similar may be reasons why buildings relatively close to the established fibre access network were not considered relevant upon the establishment of the network. In such cases, conduits, splice points, etc. will normally not be established to connect to the building in question, and the establishment of a drop cable will then involve extensive adaptations with associated significant costs.

369. At the same time, other geographic areas may have buildings more than 50 metres from the established fibre network that were offered connection during the initial sales process, and where the network is planned and rolled out so that it is already ready for the establishment of a drop cable to the relevant "homes passed" at a later date. This could, for example, be the case in areas outside densely populated areas, where there is a relatively long distance between the buildings.

370. For this reason, Nkom believes that it is proportionate to delineate an access obligation for the connection of "homes passed" to end users who are potential densification customers in a systematically developed fibre access network for Telenor's own retail business, regardless of the distance from the established network to the household in question.

371. Telenor has established a regime for densification sales followed by Telenor's retail business. In order for the access buyer to have an opportunity equal to Telenor's own retail business to undertake densification sales, and thus reach these potential customers, Nkom believes it is expedient that access buyers can enter into this regime. In Nkom's assessment, such a delineation of the access obligation will allow the access buyer to compete on equal terms with Telenor's own retail business on "homes passed" customers in Telenor's fibre access network, and be sufficient at the same time, but not go further than the purpose dictated by the regulation.

372. Entering into the same regime that Telenor's retail business observes in the case of densification sales means, among other things, that access buyers shall be given access to the same "homes passed" list (the HP list) that Telenor's own retail business uses. The HP list shall furthermore be made available at the same time as for Telenor's retail business and have the same quality. Any changes to the HP list shall also be communicated to access buyers in a similar manner as to Telenor's own retail business.

373. That Telenor shall allow access buyers to enter into the "homes passed" regime also means that Telenor must establish a regime for access buyers' sales to "homes passed" customers that ensures non-discrimination between access buyers and Telenor's own retail business with respect to:

a) authorisation limits for entry costs for densification sales

b) possibility of so-called mini-development in an area, if the entry cost for a single customer exceeds the authorisation limits

c) access to contractor capacity in areas with systematically developed fibre access networks

d) requirements for delivery times in densification sales

e) ability to communicate with the end customer during the establishment process after densification sales, from the date of sale to the start-up of the delivery of the service

f) any restrictions on the possibility for densification sales in the initial period after a development project has been concluded in a geographic area

374. On this basis, Telenor shall accommodate reasonable requests for access for connection of “homes passed” in established, systematically developed fibre access networks, with associated establishment of drop cables to relevant buildings. Nkom emphasises that a request for access to “homes passed” will normally be deemed reasonable in cases where the particular building exists on the updated HP list, while the remaining prerequisites and framework conditions in Telenor’s regime for densification sales that apply to both access buyers and Telenor’s own retail business are met.

375. In order to ensure that the access buyer’s ability to use the access obligation to “homes passed” on equal terms is real, it is imperative that the regime described above is established as quickly as possible and without undue delay. Telenor shall therefore establish this regime within 30 days of the entry into force of this decision. Telenor shall also send Nkom and access buyers a description of the regime.

376. In order for the access obligation for connection of “homes passed” to be sufficiently effective, it is necessary that the access obligation is supported by a requirement that Telenor shall provide access buyers with information about which buildings are candidates for densification sales within each systematically developed fibre access network, and provide information about other prerequisites and framework conditions in Telenor’s regime for densification sales. This means it is necessary for access buyers to have access to up-to-date, transparent and readily available HP lists for the development areas for Telenor’s fibre access network, and that the prerequisites and framework conditions in the densification sales regime are communicated to access buyers in a clear and predictable manner. Such a transparency obligation is set out in Section 7.5.4. Furthermore, Nkom believes it is necessary for Telenor to document the requirement for equal treatment between access buyers and Telenor’s own retail business, and will therefore clarify that the requirement for the disclosure of KPIs as stated in Section 7.5.4.2 also applies to the access obligation for connection of “homes passed”.

377. Nkom cannot see that less intrusive remedies can address the potential competition problems arising from the first-mover advantage Telenor has in fibre deployment projects. At the same time Nkom believes that the chosen approach, where access buyers enter into the same regime for “homes passed” as Telenor’s own retail business, does not imply a

disproportionate burden for Telenor. Telenor will only be obliged to establish new infrastructure in cases where Telenor itself has identified the location as relevant for densification sales.

378. For the price regulation of access to “homes passed”, Nkom refers to Section 7.3.6 below.

379. In its comments on Nkom’s notification of the draft decision in Markets 3a and 3b, ESA has invited Nkom to expand the proportionality assessment related to the access obligation concerning “homes passed”. ESA writes, among other things, the following:

> “*In this regard, the Authority invites NKOM to include additional proportionality considerations in its final measure, such as those set out in its reply to the Authority’s second RFI, in order to show that the proposed obligation is based on the competition problems identified and is the least intrusive measure available.*”

380. On the basis of ESA’s comments, Nkom has extended the assessments in this section, including by highlighting other alternative designs of the access obligation.

7.2.10 Access to backhaul services

381. Nkom regards the transmission capacity between the interconnection points for Market 3a access and more central aggregation points in the network (hereinafter referred to as “backhaul”) as an important service to ensure effective access to Market 3a products, in the same way as it was in former Market 4. For virtual access products with connection at BNG level, there is still not considered to be any need for backhaul.

382. The significance of backhaul was underlined and discussed in Nkom’s decision in former Market 4 of 20 January 2014. There it was pointed out that access to backhaul will enable operators that do not themselves have this infrastructure to establish themselves as a provider in the broadband market. In some geographical areas, there may be other possible providers of backhaul services than Telenor, but there will also be areas where in practice Telenor is the only possible provider. In 2014 Nkom therefore concluded that it was necessary to continue the obligation for Telenor to provide backhaul in connection with deliveries in former Market 4. Nkom pointed out at the time, in line with the Commission’s NGA Recommendation, that access seekers ought to be able to choose the solution that best meets their need for backhaul. Against this backdrop, Nkom found it necessary to impose an obligation on Telenor that it must meet all reasonable requests by offering dark fibre or other relevant solutions for backhaul in former Market 4. The decision from 2014 referred to other solutions, such as leased lines or Ethernet. In this context, Nkom noted that access to civil engineering infrastructure (so-called “duct access”) was regarded as a co-location service, not a backhaul service.

383. On this basis, an obligation was imposed on Telenor to provide backhaul services in relation to both copper-based and fibre-based LLU in the decision for former Market 4 in 2014.

384. Nkom finds that the reasoning behind the obligation to provide backhaul services in former Market 4 also applies in Market 3a. Although the market definition has changed slightly, there is the same need for backhaul services for wholesale customers in Market 3a as there was in former Market 4. If Telenor's wholesale customers in Market 3a are denied access to backhaul services in connection with the purchase of access products in this wholesale market, this may constitute a significant competition problem for operators that do not have this kind of infrastructure themselves. If Telenor is the only provider of relevant backhaul services in a geographical area, denial of a request for access to backhaul services may in the worst case cause the operator to be excluded from the retail market in this geographical area.

385. After the decision in 2014 in former Market 4, several operators in the Norwegian broadband market have made additional investments in fibre, which may create a basis for increased competition for backhaul services from Telenor's interconnection points for Market 3a products. This means that buyers of access in this wholesale market can use alternatives to Telenor's backhaul services at an increasing number of interconnection points in Telenor's networks. At the same time, there are still many interconnection points for Market 3a access without effective competition on the provision of backhaul. These points do not appear to be concentrated in delimited geographical areas in Norway. On the contrary, coverage analyses of fibre roll-out in Norway suggest that it is not possible to draw clear, stable boundaries between geographical areas with and without effective competition for backhaul services for access buyers of Market 3a products. Therefore, Nkom does not find it appropriate to conduct a detailed geographical analysis to identify areas with competing backhaul offers from Telenor's interconnection points for Market 3a access.

386. Nkom assumes that even if access buyers in this wholesale market will be able to use alternative backhaul solutions from some interconnection points in Telenor's networks, Telenor's backhaul services will still be required to ensure effective competition based on local access in Telenor's networks and predictability for access buyers' investments relating to such access.

387. In light of this, Nkom has concluded that Telenor shall have an obligation to meet any reasonable request for backhaul services to both copper-based and fibre-based access products included in Market 3a, with the exception of virtual access products with connection point at BNG level

388. In principle, the obligation of access for backhaul services applies to all the components further upstream in the network from the interconnection points for Market 3a products that are required for Market 3a access to be effective. In addition to the examples of alternative solutions for backhaul referred to in the 2014 decision in former Market 4 (i.e. dark fibre, leased lines or Ethernet), Nkom finds reason to mention radio lines as a further example of a possible backhaul solution that may fulfil the obligation to meet all reasonable requests for backhaul services in Market 3a.

7.2.11 Access to co-location

7.2.11.1 Regulatory basis

389. It follows directly from Section 4-4, fifth paragraph, of the Electronic Communications Act that a provider with significant market power in this wholesale market must meet any reasonable request for co-location:

> *"A provider with significant market power in the market for the products full and shared access to the fixed access network[29] shall offer co-location to other providers following reasonable request for such access."*

390. Proposition no. 58 (2002-2003) to the Odelsting, page 104, further specifies that this means that:

> *"providers shall … (cf. Section 4-6)…prepare reference offers that at a minimum shall include the following services and facilities in relation to co-location: information on relevant addresses where co-location is offered, alternatively virtual co-location, requirements for equipment that is to be co-located, safety requirements, personnel requirements, rules for distributing available space, terms for access to information and support systems (cf. Section 4-5)".*

391. In Nkom's view, the obligation to offer co-location includes all the services necessary for provision of effective local access to the fixed access network.

392. When assessing whether a request for access to co-location is reasonable or not, the circumstances must be weighed up in compliance with Section 4-1, second paragraph, of the Electronic Communications Act (cf. Section 4-4, sixth paragraph). Telenor must justify and document any denial of requests for access to co-location and other shared uses of infrastructure (cf. Section 4-4, sixth paragraph). It is the party requesting access that is entitled to documentation and justification. The explanation must describe the assessments on which the denial was based.

393. Section 2-6 of the Electronic Communications Regulation on co-location and publication specifies the additional information that a provider with significant market power in the market for wholesale local access provided at a fixed location shall make available for co-location offers.

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[29] The wording of Section 4-4, fifth paragraph, of the Electronic Communications Act has not been updated to reflect the new market definitions that ensue from the ESA Recommendation on relevant markets from 2016. As explained in the market analysis (Annex 1), Market 3a is based on former Market 4. Former Market 4 was the market for wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location. Against this backdrop, Nkom holds that Section 4-4, fifth paragraph, of the Electronic Communications Act must be interpreted to mean that the provision provides a statutory basis for imposition of an obligation to offer co-location in Market 3a. Several other provisions in Chapter 4 of the Electronic Communications Act and Chapter 2 of the Electronic Communications Regulation apply correspondingly.

7.2.11.2 Assessment of the need for an obligation of co-location beyond that provided by the Act and Regulation

394. The majority of the access buyers in Market 3a rely on co-location to be able to use wholesale products in this market to effectively compete with Telenor on equal terms in the associated retail market. This implies that co-location in Telenor's exchanges and interconnection points in the access network is important for the obligation of access in this wholesale market to have the intended competition-promoting effect in the broadband market at the retail level. Co-location facilitates joint, cost-effective use of production locations in Telenor's access network and is an essential prerequisite to ensure effective competition in the retail market for standardised broadband access based on local access to Telenor's fixed access networks.

395. In the discussion of competition problems in Chapter 5 above, denial of access is identified as a potential competition problem. Given that co-location is usually a prerequisite for the effective use of Market 3a products by Telenor's competitors in the associated retail market, Nkom finds that an ex-ante obligation of co-location is necessary to counteract denial of access as a potential competition problem in Market 3a.

396. Since the obligation of co-location in this wholesale market follows from the Electronic Communications Act, Nkom has considered whether or not it is necessary to define a separate obligation of co-location as part of the access obligations in this Market 3a decision.

397. Nkom believes it is important that the obligation to provide local access to the copper-based and fibre-based access networks is as precise as possible. This will ensure the maximum possible degree of predictability in terms of the content and scope of the obligation, for both the supply side and the demand side in Market 3a. Nkom also finds that there is a greater need for further specification of the obligation defined in the Electronic Communications Act to meet any reasonable request for co-location now than there was in the previous decision in the LLU market. This is due to the possibility of an upgrade of Telenor's copper access network. Upgrading the copper access network raises several new issues relating to the access obligation in Market 3a that will also affect the content and scope of the obligation of co-location. This implies that there is a need for an obligation of co-location in this decision that specifies the obligation of co-location in greater detail than is provided by the Act and Regulation.

398. Nkom would also point out that experience from other markets, including the market for access and call origination on public mobile telephone networks, suggests that it is appropriate to specify the access obligation as precisely as possible to ensure that regulation has its intended effect. This argues in favour of a more precise formulation of the obligation of co-location in Market 3a than is provided by the Act and Regulation.

399. Against this backdrop, Nkom has concluded that a separate obligation of co-location is necessary as part of the obligation of access in this Market 3a decision.

7.2.11.3 Specification of the content of the obligation of co-location and justification

400. In accordance with Section 4-4 of the Electronic Communications Act, Telenor must meet all reasonable requests for access to co-location in this wholesale market and any refusal to grant such access must be justified and documented. The provisions of the Act form the basis for Nkom's further specification of the content of the obligation of co-location in Market 3a.

401. When assessing whether a request for access to co-location is reasonable or not, the circumstances must be weighed up in compliance with Section 4-1, second paragraph, of the Electronic Communications Act (cf. Section 4-4, sixth paragraph). This means that if cases arise in which Telenor and one or more buyers of access have different interpretations of the content of the obligation, including how far the obligation of co-location extends, this will have to be decided through an assessment of what is reasonable in the specific case.

402. With a view to limiting the number of disputes about the content and scope of the obligation of co-location and to increase predictability associated with assessments of whether a request is reasonable in cases where the supply side and the demand side in Market 3a have different interpretations of what the obligation entails, in the following Nkom defines more precisely what might normally be regarded as reasonable requests for co-location in this market. These specifications are not exhaustive for the content of the obligation, but are considered to cover key issues related to the obligation of co-location in Market 3a in coming years.

403. The obligation of co-location must be seen in the context of the interconnection points for wholesale products covered by the obligation of access in Market 3a. Telenor's obligation of co-location therefore includes all locations in the network with possible interconnection points for Market 3a products. For a further description of the possible interconnection points for the obligation of copper-based access in Market 3a, see Sections 7.2.4 and 7.2.5 above, while a corresponding description of the interconnection points for the obligation of fibre-based access can be found in Sections 7.2.6 and 7.2.7.

404. Although the obligation of co-location is limited to locations with potential interconnection points for Market 3a access, and the obligation of co-location will be designed to support compliance with the obligation of access in this relevant wholesale market, Nkom finds grounds to specify that the access buyer can nevertheless modify or extend the use of the location, as long as this is done in a manner that complies with reasonable requirements from Telenor regarding the use of the location, including reasonable safety and security requirements. This means, for example, that the obligation of co-location applies even if an access buyer that originally used only the current location for Market 3a products to support its own retail operations in the broadband market expands its use of the location to also include offering wholesale products to third parties. In these kinds of cases, the obligation of co-location in Market 3a entails that the access buyer must be given the opportunity to allow a

third party access in order to install and maintain equipment at that location, provided this is in compliance with reasonable requirements regarding safety, security, etc. that Telenor sets for all providers that are co-located at this location.

405. The obligation of co-location applies to all locations with possible interconnection points for Market 3a access that Telenor owns, rents or otherwise controls. This obligation is not limited to the co-location facilities that Telenor itself uses to provide broadband access in the retail market. At the same time, Nkom would clarify that it is up to Telenor to choose how a reasonable request for co-location is to be met. This means, among other things, that Telenor can choose whether the obligation of co-location in a specific case is to be met through offers of placement of equipment in the existing exchange or cabinet, through expansion of the existing exchange or cabinet, or through establishment of new exchanges or cabinets.

406. In respect of requests for co-location requiring establishment of new locations, Nkom would further specify that, as a starting point, these kinds of requests will not be deemed reasonable if the location for co-location does not exist, or has not been planned, at the place in Telenor's network where the access buyer requests co-location. At the same time, Nkom would point out that requests for co-location that require expansion of the capacity at existing locations may be deemed reasonable on the basis of an overall assessment. It is natural that, in an assessment of whether a request is reasonable, account is taken of whether there is available capacity at the location for which co-location is being requested, but Nkom would stress that the request is not automatically unreasonable if there is no available capacity. A lack of available capacity may entail that the request is not considered reasonable, but it is not a requirement that there is available capacity at the existing location for the request to be considered reasonable. Available capacity is only one of several factors in this kind of assessment of whether a request is reasonable and thus not a prerequisite for the obligation of co-location in Market 3a. A request for co-location involving development or expansion of the capacity at the existing location can thus be deemed reasonable if other factors included in the assessment of whether the request is reasonable are afforded greater weight in the specific case.

407. If it is not considered proportionate in the specific case to fulfil the obligation of co-location through expansion of the capacity at existing co-location points, the obligation shall be met through virtual co-location. Virtual co-location must enable access buyers to have the same access, with the same functionality, as was requested, but at a different location. An obligation of virtual co-location with these provisos is necessary to ensure equal terms of competition between Telenor's own retail operations and the access buyers in cases where there is no capacity available at the requested location and it is not considered proportionate to meet the obligation of co-location through expansion of the capacity at the requested co-location site.

408. Nkom would further specify that Telenor's co-location offer must be adapted to the individual access buyer's co-location needs. This entails, among other things, that access

buyers in Market 3a should not have to buy greater co-location capacity than they need. For example, Telenor must offer co-location in the form of the right to place equipment in existing racks if this is sufficient to meet the access buyer's needs at the location in question.

409. Nkom finds that there are also grounds to specify that it is part of the obligation of co-location for Market 3a that Telenor shall ensure that access buyers can link up their co-located equipment in an appropriate manner at the location in question. Nkom would point out that this includes both internal cabling between an access buyer's own equipment and between own and third-party equipment at the location, including cabling for backhaul purposes. Nkom believes this is necessary to ensure cost-effective connection of the access buyer's own equipment at the location and to enable cost-effective interconnection with other providers' equipment that can then provide a basis for increased competition at both the wholesale and the retail level in the broadband market.

7.2.11.4 Summary of the obligation of co-location

410. For Telenor's competitors that rely on wholesale products in Market 3a, access to co-location is a precondition for being able to offer broadband access in the retail market on equal terms with Telenor's own retail operations.

411. It follows directly from Section 4-4, fifth paragraph, of the Electronic Communications Act that a provider with significant market power in this wholesale market must meet any reasonable request for co-location. Nkom finds it important that this obligation is formulated as precisely as possible. This will ensure the maximum possible degree of predictability in terms of the content and scope of the obligation, for both the supply side and the demand side in Market 3a. Nkom is of the opinion that there is a greater need for a further specification of the obligation defined in the Electronic Communications Act to meet any reasonable request for co-location now than there was in the previous decision in the LLU market.

412. Assessments of whether requests for access to co-location in Market 3a are reasonable will be based on weighing up several factors, as described in Section 4-1, second paragraph, of the Electronic Communications Act (cf. Section 4-4, sixth paragraph). In the following, Nkom specifies what would normally be considered reasonable requests for co-location in this wholesale market. These specifications are not exhaustive for the content of the obligation, but are considered to cover key issues related to the obligation of co-location in Market 3a in coming years:

- In principle, Telenor's obligation of co-location includes all locations in the network with possible interconnection points for Market 3a products.
- Although the obligation of co-location is limited to locations with possible interconnection points for Market 3a access, and the obligation of co-location will be designed to promote compliance with the obligation of access in this relevant wholesale market, the access buyer can nevertheless modify or extend the use of the location as

long as this is done in a manner that complies with reasonable requirements from Telenor regarding the use of the location, including reasonable safety and security requirements.

- The obligation of co-location in Market 3a entails that the access buyer is given the opportunity to allow a third party access in order to install and maintain equipment at that location, provided this is in compliance with reasonable requirements regarding safety, security, etc. that Telenor sets for all providers that are co-located at this location.
- The obligation of co-location applies to all locations with possible interconnection points for Market 3a access that Telenor owns, rents or otherwise controls. This obligation is not limited to the co-location facilities that Telenor itself uses to provide broadband access in the retail market.
- It is up to Telenor to choose how a reasonable request for co-location is to be met. This means, among other things, that Telenor can choose whether the obligation of co-location in a specific case is to be met through offers of placement of equipment in the existing exchange or cabinet, through expansion of the existing exchange or cabinet, or through establishment of new exchanges or cabinets.
- In respect of requests for co-location requiring establishment of new locations, these kinds of requests will not, as a starting point, be deemed reasonable if the location for co-location does not exist, or has not been planned, at the place in Telenor's network where the access buyer requests co-location.
- Requests for co-location that require expansion of the capacity at existing locations may be deemed reasonable on the basis of an overall assessment. A request for co-location involving development or expansion of the capacity at the existing location may be deemed reasonable if other factors included in the assessment of whether a request is reasonable are afforded greater weight than existing available capacity in the specific case.
- If it is not considered proportionate in the specific case to fulfil the obligation of co-location through expansion of the capacity at existing co-location points, the obligation must be met through virtual co-location. Virtual co-location must enable access buyers to have the same access, with the same functionality, as was requested, but at a different location.
- Telenor's co-location offer must be adapted to the needs of the individual access buyer's co-location needs. This entails, among other things, that access buyers in Market 3a should not have to buy greater co-location capacity than they need.
- It is part of the obligation of co-location for Market 3a that Telenor shall ensure that access buyers can link up their co-located equipment in an appropriate manner at the

location in question. This includes both internal cabling between an access buyer's own equipment and between own and third-party equipment at the location, including cabling for backhaul purposes.

7.2.12 Access to civil engineering infrastructure

413. In the current decision in former Market 4 of 20 January 2014, it was stressed that the obligation to grant access to co-location also includes access to civil engineering infrastructure, street cabinets, etc. (cf. paragraphs 160–163 of this decision). Reference was made to the fact that access to Telenor's civil engineering infrastructure means that other operators will be able to use parts of Telenor's infrastructure as the basis for their own investments in next generation access networks, and it was pointed out that in the NGA Recommendation the Commission attaches great importance to access to these kinds of facilities.

414. Nkom finds that several factors indicate a need for a more detailed assessment of the necessity of an obligation of access to civil engineering infrastructure, street cabinets, etc. in this decision for Market 3a. First, it is expected that the proposed Broadband Development Act[30] will be adopted in the near future. This Act will implement an EU Directive from 15 May 2014 with measures to reduce the costs of establishing high-speed networks for electronic communications in Norwegian law. Nkom therefore regards it as appropriate to assess whether it is still necessary for the obligation to grant access to co-location in this wholesale market to include an obligation of access to civil engineering infrastructure. In addition, Nkom holds that if the obligation of access to civil engineering infrastructure is to be continued from former Market 4 to Market 3a, it should be assessed whether it is appropriate to specify the obligation of access in slightly more detail than in the 2014 decision in former Market 4, to ensure greater predictability with regard to the content and scope of the obligation.

7.2.12.1 Assessment of the need for an obligation of access to civil engineering infrastructure beyond what will ensue from the Broadband Development Act

415. In June 2016, the Ministry of Transport and Communications sent to draft of the Broadband Development Act out for consultative hearing, but at the time of writing it is unclear when this new Act will enter into force. The fact that the date of entry into force has not yet been determined, and that we have no experience of how the Act will work in practice means that Nkom holds that it cannot simply be assumed that the Broadband Development Act will fully remedy the competition problems that have previously justified the obligation of access to civil engineering infrastructure in this wholesale market.

416. The main aim of the Broadband Development Act is to facilitate and incentivise the roll-out of high-speed electronic communications networks by promoting the joint use of existing physical infrastructure and by enabling a more efficient deployment of new physical

[30] See Section 3.14.1 of the market analysis for a description of the Ministry of Transport and Communications' consultative hearing with proposals for a new Broadband Development Act.

infrastructure through better coordination of construction, excavation and civil engineering projects. This means that there may be a certain degree of overlap between the purpose of the new Act and an obligation of access to civil engineering infrastructure as part of this Market 3a decision. At the same time, Nkom is of the opinion that continuing the obligation of access to civil engineering infrastructure from former Market 4 as part of the obligation of access in this Market 3a decision provides an opportunity to further specify Telenor's obligation regarding access to civil engineering infrastructure in this wholesale market, such that the obligation will be more targeted towards identified competition problems in this market than the new Act will be. Nkom finds that developments in the market since the 2014 decision in former Market 4 suggest that it is appropriate to specify the details of the obligation of access to civil engineering infrastructure more precisely. Nkom has therefore concluded that it is necessary to continue an obligation of access to civil engineering infrastructure in this Market 3a decision, even if the Broadband Development Act is expected to enter into force soon.

7.2.12.2 Specification of the content of the obligation of access to civil engineering infrastructure and justification

417. The obligation of access to civil engineering infrastructure in the 2014 decision in former Market 4 is formulated very generally. Nkom finds it necessary to specify this obligation in this Market 3a decision more precisely to ensure increased predictability in terms of the content and scope of the obligation.

418. Access to Telenor's copper-based and fibre-based Market 3a products facilitates access-based competition in the associated retail market. As a result of the fact that several of Telenor's competitors have established a large amount of fibre infrastructure around the country in recent years, Nkom believes that in the years to come, it will be important to ensure that Telenor's physical infrastructure from local interconnection points for Market 3a access to broadband customers in the associated retail market can pave the way for increased infrastructure competition in the associated retail market. Excavation often constitutes a high proportion of the set-up costs for infrastructure operators that build fibre-based broadband access for the retail market. Nkom therefore finds that access to Telenor's physical infrastructure in the access network will be able to pave the way for more effective competition in the broadband market in the years to come.

419. Article 13 of the Commission's NGA Recommendation states that an obligation to provide access to civil engineering infrastructure should be imposed on providers with significant market power in this wholesale market, given that there is duct capacity available. Article 11 of the NGA recommendation defines civil engineering infrastructure as follows:

> *"'Civil engineering infrastructure' means physical local loop facilities deployed by an electronic communications operator to host local loop cables such as copper wires, optical fibre and co-axial cables. It typically refers, but is not limited to, subterranean or above-ground assets such as sub-ducts, manholes and poles."*

420. Nkom finds it is natural to use this definition in the NGA Recommendation as a starting point when specifying the obligation of access to civil engineering infrastructure more precisely in this decision. On this basis, Nkom will use the term “civil engineering infrastructure” for all types of passive physical infrastructure installed by Telenor to carry cables in access networks. Civil engineering infrastructure may be above or below ground and are typically, but not exclusively, pipes, cable ducts, manholes, enclosures and poles.

421. Requests for access to civil engineering infrastructure in the form of physical infrastructure in Telenor’s access network must be reasonable, in the same way as for any other access obligations in this decision. With a view to limiting the number of disputes about the content and scope of the obligation of access to civil engineering infrastructure and to increase predictability associated with assessments of whether a request is reasonable in cases where the supply side and the demand side in Market 3a have different interpretations of what the obligation entails, in the following Nkom specifies more precisely what might normally be regarded as reasonable requests for access to civil engineering infrastructure in this market. These specifications are not exhaustive for the content of the obligation, but are considered to cover key issues related to the obligation of access to civil engineering infrastructure in Market 3a in coming years.

422. The NGA Recommendation states that the obligation to provide access to civil engineering infrastructure in this wholesale market applies to *physical* infrastructure in Telenor’s access network. As a starting point, Nkom finds it both proportionate and appropriate to delimit the obligation to *passive, physical* infrastructure. This is because in cases where Telenor has already established fibre-based access up to end-user locations, other players will be able to compete for these end users based on wholesale products that Telenor is required to offer for local physical or virtual access to fibre-based access networks. In addition, Nkom assumes that there is little dark fibre available for access buyers in Telenor’s access networks in areas where Telenor does not itself provide fibre-based access to end users.

423. Nkom believes that, in areas where Telenor is required to provide local access to its fibre-based network, it is not in principle reasonable to also impose on Telenor an obligation to provide access to civil engineering infrastructure for the establishment of parallel fibre-based access networks as part of the access obligation in Market 3a. The purpose of the access obligation in this wholesale market is to help ensure that, in areas where Telenor does not offer fibre-based wholesale products for local access, other operators can build fibre access networks to end users as cost-effectively as possible. In light of this, Nkom holds that it is both proportionate and appropriate to delimit the obligation of access to civil engineering infrastructure in Market 3a to those parts of Telenor’s access network where Telenor does not offer local, physical or virtual wholesale access to its own fibre-based access network.

424. The NGA Recommendation’s definition of civil engineering infrastructure mentioned above uses the term “local loop” to delimit which parts of the network are covered by the obligation of access to civil engineering infrastructure. Nkom finds grounds to clarify that the

obligation of access to civil engineering infrastructure in Market 3a must be seen in the context of the interconnection points for the wholesale products covered by the obligation of access in this market. Telenor's obligation to grant access to civil engineering infrastructure therefore applies, in principle, to all stretches *from* locations in Telenor's network with possible interconnection points for Market 3a products *to* end-user locations. This kind of delimitation will also ensure a clear distinction between the obligation of access to civil engineering infrastructure and the obligation of access to backhaul services in this decision. In Section 7.2.10, it is specified that the obligation of access to backhaul services applies to transmission capacity *from* the interconnection points for Market 3a access *to* more central aggregation points in the network. This means that the obligation of access to civil engineering infrastructure in this wholesale market includes stretches *from* interconnection points for Market 3a access *to* end-user locations (i.e. within the *local loop*), while the obligation of access to backhaul services includes stretches *from* interconnection points for Market 3a access and upstream in the network *to* more central aggregation points.

425. Nkom also finds grounds to clarify that the obligation to grant access to civil engineering infrastructure includes reasonable requests for access to both the *whole* and *parts of* the stretch from interconnection points for Market 3a access to end-user locations. This is regarded as an important clarification, as in some cases it may be that operators that request access to civil engineering infrastructure in Telenor's access network would like to use their own or a third party's fibre infrastructure for part of the stretch between the interconnection points for Market 3a access and end-user locations when establishing fibre-based access networks in a geographical area.

426. In the attached market analysis, Nkom has concluded that there are not any grounds to include wholesale access to HFC networks in Market 3a, given the criteria of local access, control over the connection, service independence and uncontended connection, all of which must be met for a virtual access product at the wholesale level to be regarded as belonging to Market 3a. The market analysis nevertheless shows that broadband access via an HFC network represents a significant competitive factor in the Norwegian retail market for standardised broadband access, and about one third of broadband customers currently buy broadband access via an HFC network. Nkom therefore holds that even if neither physical access at the local level to an HFC network nor wholesale access that meets the above-mentioned four criteria for virtual access in Market 3a is regarded as technically or commercially feasible within the time horizon covered by this analysis, this does not prevent the obligation to meet all reasonable requests for access to civil engineering infrastructure in Telenor's access networks from in principle also applying to Telenor's HFC-based access network.

427. Nkom would point out that in the attached market analysis, the characteristics "control over the connection" and "uncontended connection" in particular were regarded as being unrealistic at the wholesale level in HFC networks in the next few years. These are not

properties that are relevant for the obligation of access to passive infrastructure in this wholesale market. To the extent that it is deemed reasonable to grant access to civil engineering infrastructure in the form of passive infrastructure in HFC networks, Nkom therefore holds that, in principle, the obligation of access to civil engineering infrastructure should include all Telenor's broadband access networks where Telenor does not offer local physical or virtual wholesale access to its own fibre-based access networks, including HFC-based access networks. The assessment of whether a request is reasonable will be based on the same criteria as apply to other access in Market 3a.

428. Experience from recent years has shown that it can be difficult for operators that want to offer fibre-based broadband access to housing cooperatives, commonhold associations and other housing associations that currently have broadband access via an HFC network to use the passive access infrastructure linked to the established HFC networks to lay fibre cables. Nkom therefore holds that access to civil engineering infrastructure in the form of passive infrastructure in HFC-based access networks may serve to remedy a significant competition problem in the associated retail market. Nkom would also point out that the Commission, in its definition of "civil engineering infrastructure" in the NGA Recommendation, has included physical infrastructure linked to copper-based, fibre-based and HFC-based access networks, even though the Commission has concluded that there is no basis for imposition of an obligation of access to HFC-based access products in this wholesale market.

429. For the sake of clarity, Nkom would point out that requests for access to civil engineering infrastructure must take into account existing restrictions under private law, regardless of the access technology that is currently used to offer broadband access to the retail market in the relevant area. This includes, for example, agreements that Telenor has already signed with landowners containing provisions that restrict the possibility to allow other operators access to civil engineering infrastructure. At the same time, Nkom would point out that it will not be in accordance with this decision to enter into new agreements that contain such limitations.

7.2.12.3 Summary of the obligation of access to civil engineering infrastructure

430. Assessments of whether requests for access to civil engineering infrastructure in Market 3a are reasonable will be based on weighing up several factors as described in Section 4-1, second paragraph, of the Electronic Communications Act (cf. Section 4-4, sixth paragraph). In the following, Nkom specifies what would normally be considered reasonable requests for access to civil engineering infrastructure in this wholesale market. These specifications are not exhaustive for the content of the obligation, but are considered to cover key issues related to the obligation of access to civil engineering infrastructure in Market 3a in coming years:

- Telenor's obligation to grant access to civil engineering infrastructure is, as a general principle, delimited to passive, physical infrastructure.

- As a starting point, the obligation to grant access to civil engineering infrastructure is delimited to those parts of Telenor's access network where Telenor does not offer local physical or virtual wholesale access to its own fibre-based access network.
- Telenor's obligation to grant access to civil engineering infrastructure applies, in principle, to all stretches *from* locations in the network with possible interconnection points for Market 3a products *to* end-user locations. The obligation to grant access to civil engineering infrastructure includes reasonable requests for access to both the *whole* and *parts of* the stretch from interconnection points for Market 3a access to the end-user locations.
- The obligation to grant access to civil engineering infrastructure covers, in principle, all Telenor's broadband access networks where Telenor does not offer local physical or virtual wholesale access to its own fibre-based access network, including both copper-based and HFC-based access networks.
- Requests for access to civil engineering infrastructure must take into account existing restrictions under private law, regardless of the access technology that is currently used to offer broadband access to the retail market in the relevant area. At the same time, it will not be in accordance with this decision to enter into new agreements that limit the possibility to offer access to civil engineering infrastructure in accordance with this obligation in Market 3a.
- Denial of requests for access to civil engineering infrastructure must be justified and contain documentation proving that it is not reasonable to meet the request.

7.2.13 Access to information and support systems

431. Access to information and support systems is a necessity in this wholesale market, on a par with co-location, for Telenor's competitors that rely on access to Telenor's access network to be able to offer broadband services in the retail market.

432. Section 4-5, second paragraph, of the Electronic Communications Act imposes an obligation on a provider with significant market power in the market for full and shared access to fixed access networks to provide access to information and support systems. Section 2-5, second paragraph, of the Electronic Communications Regulation imposes an obligation on this kind of provider to publish information on the terms and conditions for access pursuant to Section 2-4 of the Electronic Communications Regulation. This may include access to systems for operational support, databases for obtaining information before ordering, delivery, orders, maintenance, fault handling and invoicing.

433. According to Section 4-5 of the Electronic Communications Act, Telenor must, as a provider with significant market power in Market 3a, grant access to information and support systems in connection with local physical and virtual access to copper and fibre-based access networks. Telenor must also publish its terms and conditions for this access (cf. Section 2-5, second paragraph, of the Electronic Communications Regulation). Publication and reference offers are discussed together in Section 7.5 of this decision.

434. Requests for access to information and support systems must be reasonable, in the same way as for the other access obligations in this decision. With a view to limiting the number of disputes about the content and scope of the obligation of access to information and support systems and to increase predictability associated with assessments of whether a request is reasonable in cases where the supply side and the demand side in Market 3a have different interpretations of what the obligation entails, in the following Nkom defines more precisely what might normally be regarded as reasonable requests for access to civil engineering infrastructure in this market. These specifications are not exhaustive for the content of the obligation, but are considered to cover key issues related to this obligation in coming years.

435. Vertical leveraging, including various forms of discriminatory behaviour, has been identified as a potential competition problem in Market 3a. This decision's imposition of an obligation of non-discrimination (cf. Section 7.4) shall ensure that Telenor's wholesale operations provide external buyers of access with equivalent opportunities as Telenor's own retail operations to compete in the downstream market. In order to ensure that external access buyers are not discriminated against in respect of information and support systems, and that the obligation of access to these systems is effective, Nkom finds it necessary to specify the following in this decision:

- Telenor must provide access to information and support systems, in accordance with the principle of non-discrimination. This means, for example, that the information provided by the systems that Telenor offers to external buyers of access must be of the same quality as the information that Telenor's own retail operations have access to, albeit not necessarily identical.
- Telenor must provide external buyers of access in this wholesale market with all the information necessary for the implementation, operation and use of the information and support systems. In this context, Telenor must provide information on administrative procedures to access information and support systems that clearly describes the use of the systems.
- Telenor shall ensure that the information and support systems to which external buyers of access are given access are as reliable as those used by Telenor's own retail operations, and make sure that the systems can be used by external buyers of access in a cost-effective way.
- In connection with improvements to information and support systems used by Telenor's internal retail operations, corresponding to the systems offered to external buyers of access, Telenor must implement similar improvements to the information and support systems used by external buyers of access.
- In connection with modifications and development of the information and support systems that affect the interface with external access buyers' operations, Telenor must

take into account the access buyers' needs and the effects of the changes for the access buyer before these kinds of changes are made. In connection with modifications and development of the information and support systems that entail that access buyers must make major changes to their own interfaces, systems or routines, Telenor must consult the access buyers in respect of how the change can be implemented in an appropriate, functional and reliable manner before any such changes are made. In these kinds of situations, external buyers of access must have access to all the information necessary to make their own changes or adaptations within a reasonable time and no later than 90 days before the changes are made. In addition, external buyers of access should be able to demand reasonable testing of new interfaces and systems before they are put into service. Modified and new information and support systems cannot be implemented until testing has been completed. Telenor can set reasonable requirements that access buyers must participate in an effective test period.

- Telenor must ensure that the information and support systems are up-to-date at all times. Among other things, this means that Telenor must continually ensure that the systems are updated with relevant information, both information that Telenor generates itself and information that Telenor receives from third parties. This also means that Telenor must make arrangements to enable external buyers of access to update the information and support systems with relevant information.
- Through information and support systems Telenor must grant access to information that supports external access buyers' ability to establish, operate and end customer relationships in the associated retail market. The information must be searchable on the basis of indicators such as line number, telephone number and/or address details.
- In the event of errors or downtime in the information and support systems offered to external buyers of access, Telenor must take all reasonable steps to correct the error as quickly as possible.

7.2.14 Prohibition of unreasonable requirements and unreasonable terms of contract

436. Nkom has in Section 5.2.2 identified undue requirements as a relevant competition problem linked to the transfer of market power by means of non-price variables. It is therefore relevant to consider setting requirements that limit the opportunity for such conduct.

437. As a provider with significant market power, Telenor may have incentives and opportunity to setting unreasonable requirements in connection with a reasonable request for access covered by Telenor's access obligations in this decision. Such conditions may have the potential to undermine a development towards effective competition. In some cases, such conditions may constitute a breach of other obligations, including the obligation of non-discrimination. However, to make the access requirement sufficiently effective, Nkom is of the opinion that it is necessary to impose on Telenor an explicit obligation not to set unreasonable

requirements or use unreasonable terms of contract in connection with acommondating a reasonable request for access.[31]

438. When assessing whether a term is unreasonable, the starting point for Nkom will be whether the relevant term may be seen as in line with what would have been offered if the market could be characterised as competitive and if terms which imply limitations on the access seekers may be considered as founded in protectable interests of Telenor. If a condition is widely used in commercial practice, this will in the view of Nkom raise the threshold for finding that the condition in this relation is in breach of the prohibition of unreasonable terms. .

439. The prohibition of unreasonable terms further implies, but is not limited to, that, in connection with the follow-up of the access obligation, Telenor can not introduce procedures, criteria, requirements, definitions or other measures that are capable of delaying, restricting or impeding compliance with the access obligation, unless this is justified in a protectable interest of Telenor.

440. In the view of Nkom, an obligation not to use unreasonable conditions may in itself not be regarded as particularly burdensome. However, such a requirement will reduce the predictability for Telenor. In the view of Nkom, the benefits to the competition by setting such a requirement outweighs the burden for Telenor consisting of reduced freedom of action. Nkom is of the opinion that other obligations are not to a sufficiently extent able to effectively remedy the relevant competition problem.

441. In the light of the above, Nkom finds that it is proportionate to prohibit Telenor to require anything unreasonable or use unreasonable terms in contract in connection with acommondating a reasonable request for access. Therefore, Nkom imposes on Telenor such an obligation, in line with the clarifications above.

7.2.15 Obligation to have service level agreements (SLA) and associated compensation arrangements (SLG)

442. An obligation to prepare service level agreements (SLA) and associated compensation arrangements in the form of service level guarantees (SLG) will incentivise Telenor to ensure the quality of the company's wholesale products. Nkom holds that this should be part of the obligation of access based on Section 4-1 of the Electronic Communications Act. The obligation also promotes compliance with Telenor's obligation of non-discrimination in Section 7.4 and is considered, together with the obligation to prepare and publish KPIs, as a necessary part of a holistic EoO regime.

443. As regards the correlation between requirements related to KPIs and SLAs, SLAs should specify quality targets for wholesale deliveries from Telenor to access buyers, while KPIs should measure various parameters that have been agreed in advance in SLAs between

[31] In what is further referred to as "prohibition of unreasonable terms"

Telenor and access buyers. The purpose of measuring and publishing KPIs is to ensure that quality levels agreed in the SLAs are observed, to facilitate transparency on actual quality levels, and to strengthen the opportunity to verify and document the obligation of non-discrimination between external buyers of access and Telenor's internal retail operations linked to key activities in the supply chain. Service level guarantees (SLGs) will help provide Telenor with incentives to ensure that the actual quality levels provided do not deviate from the levels agreed in the SLAs.

444. Since the purpose of KPIs is to measure parameters that have been agreed in advance in SLAs, it is essential that the requirements to KPIs and the requirements to SLAs in this decision are coordinated. The Commission's 2013 Recommendation stresses that KPIs should be related to key activities in the supply chain and cover the entire chain, including the ordering process, the delivery or provision of the service, quality parameters linked to faults and fault correction times, and migration between different access products.

445. With this as a starting point, Nkom believes that the requirements for SLAs in Telenor's reference offers should be related to the same key activities in the supply chain as the KPI requirements. For a more detailed description of the requirements related to KPIs, see Section 7.5.4.2 below.

446. The SLA requirements in the current decision for former Market 4 (cf. Section 7.5.5 in the decision of 20 January 2014), do not cover all the parameters included in the KPI requirement in Section 7.5.4.2 in this decision. In this light, Nkom finds it necessary to specify more precisely which key activities in the supply chain the SLAs must be related to. An obligation is therefore being imposed on Telenor to prepare SLAs for the wholesale products covered by the obligation of access in this market linked to the following key activities:

a) System access

b) Deliveries

c) Fault management and fault correction times

d) Migration between different access products

447. To support compliance with the requirement for access to be granted on non-discriminatory terms, the SLAs for these key activities should be determined on the basis of the corresponding quality targets for system access, deliveries, fault management and fault correction times, and migration between different access products that apply to Telenor's own retail operations.

448. Specific SLA targets for these key activities should be included in Telenor's reference offer, and the SLAs should as a minimum contain the following elements:

a) System access

- SLA for uptime for Telenor's ordering systems and appurtenant support systems, which are made available to external buyers of access and which are necessary for the access buyers to order wholesale products in Market 3a. These kinds of SLAs must indicate an agreed percentage of uptime (for example, that the systems will be available x% of the time).
- SLAs for response times for Telenor's ordering systems and appurtenant support systems, which are made available to external buyers of access and which are necessary for the access buyers to order wholesale products in Market 3a. These kinds of SLAs must indicate the agreed response time for the individual wholesale product (for example, that the systems respond correctly within x seconds).

b) Deliveries

- SLAs for the supply of Telenor's wholesale products in Market 3a. These kinds of SLAs must indicate targets for the maximum delivery time for the individual wholesale product (for example, delivery of wholesale product x will take place within y working days) and a target for deliveries in accordance with the agreed time.

c) Fault management and fault correction times

- SLAs for fault correction linked to Telenor's wholesale products in Market 3a. These kinds of SLAs must indicate targets for the maximum fault correction time for each individual wholesale product (for example, faults linked to wholesale product x will be corrected within y hours or working days).

d) Migration between different access products

- SLAs for migration between Telenor's various wholesale products. These kinds of SLAs must both set targets for maximum migration time between different wholesale products (for example, migration between two wholesale products will take place within x working days) and targets for migration within the agreed times.

449. Nkom is of the opinion that service level guarantees (SLG) are important to ensure that the actual quality levels do not deviate from the agreed quality goals set out in SLAs (cf. Section 2-5, first paragraph, no. 6, of the Electronic Communications Regulation) requires Telenor to include provisions in the company's reference offers on compensation for failure to comply with agreed delivery times. Nkom finds that in Market 3a it is also necessary to ensure that Telenor's reference offers include provisions on reasonable compensation for any failure to comply with the agreed quality levels for the other key activities for which SLAs must be prepared. Nkom refers to the fact that Section 2-5 of the Electronic Communications Regulation on a general basis imposes on Telenor an obligation to have provisions regarding quality parameters in its reference offers, and requires Telenor to include provisions for reasonable compensation in the event of failure to provide the agreed quality level. In order to

support compliance with the requirement that access to Market 3a is granted on non-discriminatory terms, Nkom finds there is also a need to specify the obligation to provide SLGs linked to the abovementioned SLA obligation in greater detail.

450. It is important that a compensation scheme is established that gives Telenor an incentive to comply with the quality targets defined in SLAs. In order for SLGs to provide a sufficient incentive for achievement of the SLA targets, Nkom finds it necessary that the principles for calculation of compensation are agreed in advance, that the agreed compensation is large enough to have the intended incentivising effect, and that compensation is paid without any unnecessary delay. Nkom also finds it important that the compensation scheme is as simple and predictable as possible, so that in the event of any deviation from agreed SLAs, it will be as clear as possible to both Telenor and the access buyers what the compensation should be.

451. Against this background, an obligation is imposed on Telenor to include provisions in its reference offers on the compensation that will be provided in the event of non-fulfilment of the SLAs on system access, deliveries, fault management and fault correction times, and migration between different types of access products in Market 3a. The principles for calculation of this kind of compensation must be described in the reference offers and be formulated in such a way that they provide the maximum degree of predictability with regard to the compensation sum in the event of non-fulfilment of the agreed SLAs. It must also be stated that the calculation and payment of compensation shall be made without undue delay and quarterly.

452. This obligation implies that a new compensation scheme must be established in the form of new SLG provisions in Telenor's reference offers for Market 3a products. To ensure that this compensation scheme is as straight-forward and predictable as possible, and that it will be as clear as possible to both Telenor and buyers of access what the compensation should be in the event of non-fulfilment of SLAs, an obligation is imposed on Telenor to consult the industry before the content of the new compensation scheme in the reference offers for Market 3a products is decided. The Broadband Forum may be an appropriate venue to obtain views from access buyers. Furthermore an obligation is imposed on Telenor to send the new SLG provisions to Nkom within three months after this decision enters into force. In the event that agreement has not been reached between Telenor and access buyers about a new compensation scheme within expiry of this time limit, Telenor shall send its proposals for new SLG provisions to Nkom, with a description of why agreement has not been reached on the new compensation arrangements.

7.2.16 Timeliness in connection with access requests and deliveries

453. A provider without an incentive to grant access may resort to delaying tactics to delay the processing of other operators' requests. Potentially anti-competitive behaviour of this nature cannot be prevented by an access obligation alone. However, a non-discrimination

obligation will reduce such problems to a certain extent. In connection with imposing access obligations, requirements must therefore be set that negotiations must be concluded without undue delay and that the delivery times from the date an order is placed until the connection is ready must be predictable and binding on the provider with significant market power in this wholesale market.

454. Nkom considers that Section 4-1 of the Electronic Communications Act (cf. Section 4-6) provides sufficient authorisation for setting rules on timeliness. In addition, Article 12, no. 1, second paragraph, of the Access Directive explicitly states that the regulatory authority may impose such obligations on an operator. Imposition of this kind of obligation will also be in accordance with principle 4 in Nkom's remedies document that obligations shall be imposed in a manner that provides incentives for compliance.

455. Pursuant to Section 4-1, third paragraph, and Section 4-4, sixth paragraph, Telenor is obliged to document and justify any refusal of a request for access and co-location. In addition, an obligation will be imposed on Telenor to have reference offers (see Section 7.5). In any case, response time requirements cannot be regarded as being particularly burdensome, compared with the consequences of an unnecessary delay for the other party.

456. Provisions for counteracting delaying tactics can be formulated in various ways. Nkom finds it appropriate to continue the current obligation from former Market 4 in Market 3a that access agreements shall be negotiated without undue delay. Nkom is also continuing Telenor's obligation to document time spent in connection with access agreements, if the rival provider believes that contract negotiations and conclusion are taking a disproportionate amount of time. However, this does not apply to requests made later than three months after the relevant negotiations were concluded. Nkom shall receive a copy of the relevant documentation of time spent. The time spent on contract negotiations may vary depending on the form of access requested. The requirements that access agreements are to be negotiated without undue delay applies regardless of how Telenor chooses to organise its case processing internally. For example, if the company is unable to process a large number of requests for access at the same time because the task is not given priority internally or is not organised in a satisfactory manner, Nkom may order that the situation be remedied and also consider imposing coercive fines or other penalties.

457. Nkom finds that an obligation to provide access within a reasonable period of time and without taking undue time may be of limited value unless a documentation obligation is also imposed on Telenor at the same time. As long as the objective is to prevent delaying tactics, Nkom deems that the documentation obligation is both necessary and proportionate. There is an asymmetry of information connected with access requests. Normally, Telenor alone will possess the information on the amount of time that is necessary. Unless other operators or Nkom have the opportunity to have Telenor document how the time was actually spent, Nkom will have very limited ability to detect and intervene to prevent delaying tactics. Nkom considers that this kind of documentation obligation comes under the conditions that according

to Section 4-6 may be imposed in connection with access requests pursuant to Section 4-1 of the Electronic Communications Act (cf. Article 12 of the Access Directive):

> *"National regulatory authorities may attach to those obligations conditions covering fairness, reasonableness and timeliness."*

458. Nkom also finds it necessary to continue the requirement that delivery must take place without undue delay from former Market 4 to Market 3a, while also maintaining Telenor's obligation to offer its customers clear, predictable delivery times. As was the case in former Market 4, the obligation applies to access to Telenor's copper-based and fibre-based access networks. It is also necessary that Telenor provides clear information about delivery times and any non-compliance in connection with installation at the other party's customers' premises. The obligation to provide SLAs and SLGs regarding delivery times and delivery at agreed times is also discussed in Section 7.2.15 of this decision.

459. Section 11 of the Competition Act may be brought to bear against the use of delaying tactics. However, any order to rectify the matter pursuant to the Competition Act would only have effect after the Competition Authority issued a decision. Nkom is of the opinion that the need for predictability and quick intervention in the market suggests that this provision will be less suited to effectively preventing the use of delaying tactics than imposition of a specific obligation.

7.2.17 Special obligations related to access

460. Nkom refers to the aforementioned assessments concerning which special obligations associated with access must be imposed on Telenor in Market 3a. The special obligations imposed on Telenor ASA (in the remainder of the chapter referred to as Telenor) are stated in this section.

461. As a consequence of the designation of Telenor as a provider with significant market power in this market, Telenor will also have individual obligations associated with access, as a direct consequence of the Norwegian Electronic Communications Act. In these cases, Nkom also has occasion to impose and define such obligations in further detail pursuant to Section 4-4, fourth paragraph, and Section 4-5, fifth paragraph, of the Electronic Communications Act.

462. Pursuant to Section 4-1 of the Electronic Communications Act, Nkom requires Telenor to meet any reasonable request for access to the copper-based access network (LLU), in line with Section 7.2.4.

463. Pursuant to Section 4-1 of the Electronic Communications Act, Nkom requires Telenor to meet any reasonable request for access to sub-loops in copper-based access networks (SLU), in line with Section 7.2.4. The obligation to provide access to SLU will not apply to points that Telenor has upgraded by adopting exclusionary technology, unless the access buyer's utilisation of SLU access is compatible with the use that Telenor has of the point, cf.

Section 7.2.4.3. Telenor is not obliged to meet requests for SLU access that involve uses that have an exclusionary effect on the existing production of services, cf. Section 7.2.4.3.

464. Pursuant to Section 4-1 of the Electronic Communications Act, Nkom requires Telenor to conduct a notified upgrade of SLU in line with Section 7.2.3.6 and also to alert access buyers and Nkom about more than non-significant deviations from the notified time of completion.

465. Pursuant to Section 4-1 of the Electronic Communications Act, Nkom requires Telenor to meet any reasonable request for local, virtual access to copper-based access networks (VULA copper). The obligation is limited to the cases where Telenor's upgrading of copper access networks entails that physical access is degraded/terminates. The access is to be offered in the form of VULA copper, as described in Section 7.2.5.

466. Pursuant to Section 4-1 of the Electronic Communications Act, Nkom requires Telenor to meet any reasonable request for local, physical access to fibre-based point-to-point networks, in line with Section 7.2.6.

467. Pursuant to Section 4-1 of the Electronic Communications Act, Nkom requires Telenor to meet any reasonable request for local, virtual access to fibre-based PON networks (VULA fibre), in line with Section 7.2.7.

468. Pursuant to Section 4-6 of the Electronic Communications Act, Nkom requires Telenor to draw up a process for handling requests for changes and additions to the reference offer for VULA fibre. The description of this process must be included as part of the reference offer.

469. Pursuant to Section 4-1 of the Electronic Communications Act, Nkom requires Telenor to meet any reasonable request for access for connection of "homes passed" in established, systematically developed fibre access networks, with associated establishment of drop cables to relevant buildings, in line with Section 7.2.9. Within three months after this decision enters into force, Telenor must have established a regime for "homes passed".

470. Pursuant to Section 4-1 of the Electronic Communications Act, Nkom requires Telenor to meet any reasonable request for backhaul services for access products included in Market 3a, in line with Section 7.2.10.

471. It follows directly from Section 4-4, fifth paragraph, of the Electronic Communications Act that Telenor must meet any reasonable request for co-location. Nkom finds reason to clarify this access obligation, and pursuant to Section 4-4, fourth paragraph, of the Electronic Communications Act, requires Telenor to meet any reasonable request for co-location, with the clarifications arising from Section 7.2.11.

472. Pursuant to Section 4-1 and Section 4-4, fifth paragraph, of the Electronic Communications Act, Nkom requires Telenor to meet any reasonable request for access to civil engineering infrastructure, in line with Section 7.2.12.

473. It is stated directly in Section 4-5, second paragraph, of the Electronic Communications Act that Telenor wil also provide access to information and support systems. Nkom finds reason to clarify this access obligation, and pursuant to Section 4-5, first paragraph, of the Electronic Communications Act, requires Telenor to meet any reasonable request for access to information and support systems, with the clarifications arising from Section 7.2.13.

474. Pursuant to Section 4-1, first paragraph, cf. Section 3-4, third paragraph, of the Electronic Communications Act, Nkom prohibits Telenor to set unreasonable requirements or use unreasonable terms in contract in connection with acommondating a reasonable request for access, with the clarifications arising from Section 7.2.14.

475. Pursuant to Section 4-1 of the Electronic Communications Act, Nkom requires Telenor to have service level agreements (SLAs) and associated compensation schemes (SLGs), in line with Section 7.2.15.

476. Pursuant to Section 4-1, cf. Section 4-6, of the Electronic Communications Act, Nkom requires Telenor to give access to copper- and fibre-based access networks, backhaul services, co-location, civil engineering infrastructure, and information and support systems, without undue delay, which also includes a duty to finally negotiate necessary agreements without undue delay, in line with Section 7.2.16. On the same basis, Nkom furthermore requires Telenor to document the time spent in connection with providing access to and final negotiation of agreements. Telenor will send Nkom a copy of such requested information. The obligation to document the amount of time spent does not apply to requests made later than three months after the relevant negotiations have been concluded.

477. Pursuant to Section 4-1, cf. Section 4-6, of the Electronic Communications Act, Nkom requires Telenor to offer clear and predictable delivery times, and requires that delivery be made without undue delay, in line with Section 7.2.16.

7.3 Price and accounting regulation

7.3.1 Regulatory basis

478. Vertical leveraging of market power through pricing, including price discrimination, cross-subsidisation and predatory pricing, is referred to as a potential competition problem in the market; see Chapter 5. Single market dominance, including exploitative behaviour in the form of excessive pricing and price discrimination, was also considered such a potential problem.

479. In accordance with Section 4-9 of the Electronic Communications Act, Nkom can impose price obligations on providers with significant market power. This applies, for example, in cases where the undertaking can exploit its market power by maintaining a disproportionately high price level, or by subjecting competing undertakings to price squeezes.

480. In the remarks to Section 4-9 of Proposition no. 58 (2002-2003) to the Odelsting, a 'disproportionately high price level' is defined on page 106:

> *"The maintenance of a disproportionately high price level means that competition has not helped to lower retail prices sufficiently. When assessing whether the price level is disproportionately high, the authorities may compare the price levels in analogous markets, nationally or internationally."*

481. Even if price regulation is considered to be a necessary remedy, price regulation methods must be used that are proportionate and are not unnecessarily burdensome for the provider in question. We refer to the remarks on Section 4-9 of the Electronic Communications Act in Proposition no. 58 (2002-2003) to the Odelsting, page 109.

> *"If, pursuant to the provision's first paragraph, the authority directs an undertaking to offer price-controlled access and imposes on it a method for calculating prices pursuant to the second paragraph, the method must enable the undertaking to obtain a reasonable return on capital employed. The cost method that is chosen is to be appropriate with regard to the need for regulation and to promote sustainable competition, as well as maximise the benefits to the consumer."*

482. In the decision of 20 January 2014 in the former Market 4, Nkom believed that transparency and non-discrimination would not be sufficiently effective remedies to address the competition problems relating to pricing of access to the copper-based access network.

483. In itself, a transparency obligation will hardly be able to reduce a problem relating to excessive pricing. Transparency makes it easier to observe the price in the market, but this in itself is not likely to have any particular disciplinary effect on Telenor's incentive to charge an excessive price. Moreover, the market price will still be relatively observable because the product in this market is homogenous and Telenor is in practice the only provider.

484. A non-discrimination obligation will first of all be able to remedy problems related to price squeezes, i.e. cases where Telenor's competitors in the relevant downstream markets are forced out, or achieve poorer margins than Telenor's own downstream activity. In itself, a non-discrimination obligation will not give Telenor any incentives to reduce the price level. In other words, Telenor will still have incentives to extract monopoly profit in this market, even with a non-discrimination obligation.

485. In the decision of 20 January 2014, Telenor was therefore made subject to a price cap obligation for full and shared access to the copper-based access network and cost-oriented prices for establishment, co-location and other related services. The price regulation was imposed in order to eliminate the risk of excessive pricing and the problems related to vertical leveraging through pricing.

486. For LLU access in Telenor's fibre network, Nkom concluded that no price regulation was necessary or proportional.

487. Below, Nkom will assess the need for price regulation of Telenor wholesale offering in the next few years. Nkom will first assess the need for and design of price regulation for copper based access. Then the need for price regulation for fibre-based access will be assessed, and how this price regulation should in such case be designed. Furthermore, Nkom will assess price regulation in terms of establishment, co-location etc., before finally assessing the need for price regulation of backhaul services.

488. In the light of the conclusions concerning price regulation, the need is then assessed to impose a duty on Telenor to keep cost accounts in Market 3a.

7.3.2 Local, physical access to copper-based access networks

7.3.2.1 Assessment of the need for price regulation

489. The number of broadband customers in the copper-based access network has gradually been reduced in recent years. The further development will depend, among other things, on the development rate for fibre networks in the years ahead and on how the process for the upgrading of copper networks is progressing.

490. At the same time, the copper access network still accounts for around 26% of the accesses in the retail market. For some of the providers, the access to Telenor’s copper access network is a necessary input factor for their broadband offering in the retail market. In addition, access to Telenor’s copper access network is an important supplement for several providers with their own access infrastructure that wish to provide retail services in geographical areas that are not covered by the provider's own infrastructure. This indicates that the pricing of access to copper-based access networks is still of great significance to the competition situation in the related retail market.

491. Even though copper access accounts for a rather lower percentage of the access technologies used in the retail market today than in 2014, Nkom cannot see that there have been significant changes with regard to potential competition problems relating to the pricing of local, physical access to copper-based access networks since the current decision in the former Market 4 was taken.

492. On the basis of the market analysis, cf. Annex 1, and the competition problems described in Chapter 5, Nkom has therefore concluded that it is necessary to continue an obligation for Telenor for price regulation of local, physical access to copper-based access networks in Market 3a.

493. Below, Nkom will assess whether it is appropriate to continue existing price-cap regulation, and also discuss which cost basis and method should in such case be applied to the price regulation of local, physical access to copper-based access networks in Market 3a.

7.3.2.2 Price regulation in the form of price caps

7.3.2.2.1 Background and history

494. In Nkom's decision of 20 January 2014 in former Market 4, a price cap for full access of NOK 85 per access per month was imposed on Telenor. For shared access, a price cap corresponding to half the price of full access, adjusted for special costs, was set.

495. Local, physical access (LLU) has been subject to price regulation since 2001, first in the form of a cost orientation requirement, and since 2006 in the form of price cap regulation. Figure 1 shows the development in the LLU prices from 2000 and up to the present day.

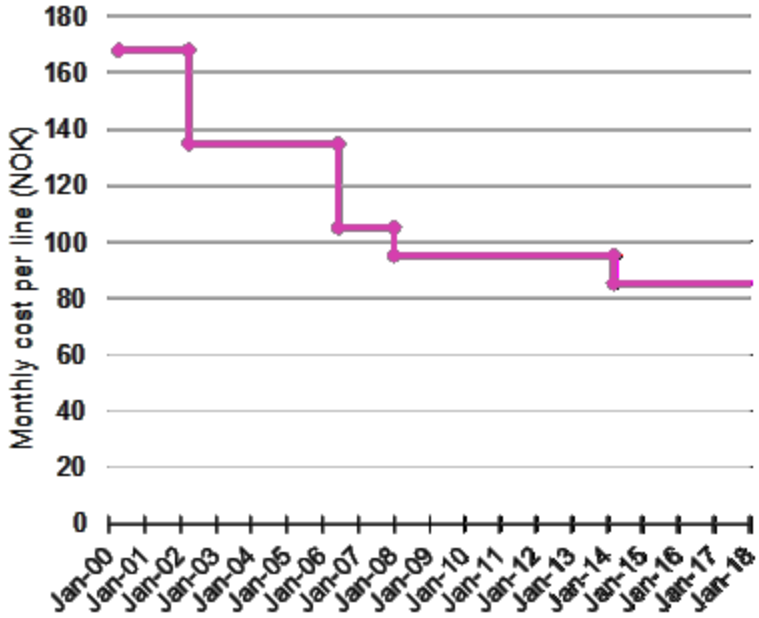


Figure 1. Price for LLU, monthly subscription price for full access[32]

496. In the period from 2001 to 2006, the price regulation was based on an assessment of replacement costs. In Nkom's decision from 2006 in the former Market 11 (in accordance with ESA's first recommendation concerning relevant markets), the price cap was set on the basis of Telenor's cost accounts, i.e.based on fully-redistributed, historical costs. One of the arguments for the change from replacement costs to fully-distributed historical costs as the basis for the price-cap regulation was to avoid Telenor, via the LLU prices, being over-compensated for its costs concerning LLU access. In the decisions in the former Market 4 in 2009 and 2014, respectively, the price cap for LLU was determined on the basis of an overall assessment, but with the main emphasis on information from Telenor's cost accounts.

[32] In the period from December 2007 up to Nkom's decision of 3 April 2009, the regulated price cap was still NOK 105, but at its own initiative Telenor adjusted the monthly price down to NOK 95 during that period. In the decision of 3 April 2009, Nkom stated that the price cap would be lowered from NOK 105 to 95, i.e. a continuation of the price with which Telenor had operated since December 2007.

497. Nkom developed an LRIC model in the 2009-2011 period. This model was not used directly in conjunction with the current decision in the former Market 4 in 2014, but was included as part of the overall assessment:

> "*The LRIC model shows that a calculated price based on replacement costs is considerably higher than a price based on fully-distributed historical costs. Since PT's LRIC model has significant differences from the LRIC model recommended by the Commission, PT's model is given far less weight, however, than the cost accounts in the assessment of the level of the maximum price. In connection with the next round of analysis and decisions in this market, PT will assess the further development of the LRIC model, so that it is more in line with the Commission's recommendation, in which case the weighting will also have to be re-assessed."*
>
> "*It is also clear that PT's LRIC model for access has significant differences from the LRIC model recommended by the Commission. First of all, the Commission recommends a Bottom Up-LRIC +, while PT has a so-called hybrid model. Secondly, PT's model does not use adjusted acquisition cost for so-called "reusable legacy civil engineering assets". In PT's assessment, with the assumptions made by the Commission, a BU-LRIC+ would probably give a lower modelled LLU price for copper access in Norway than appears from PT's current LRIC model."*

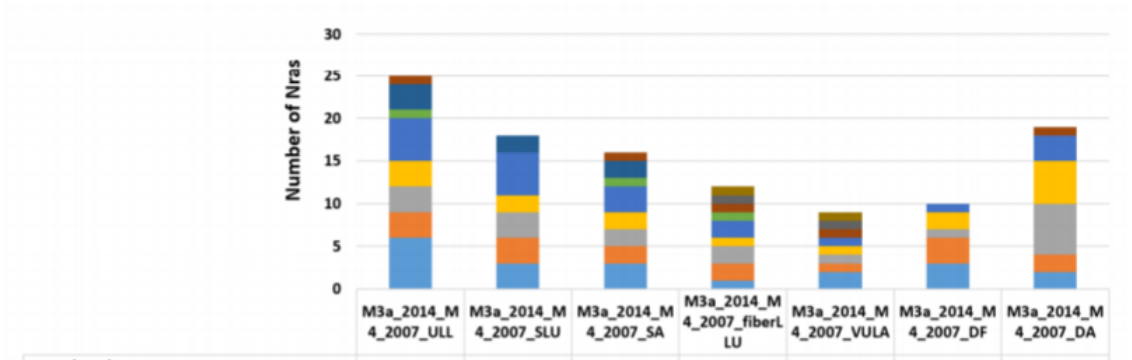
498. Since the 2014 decision, Nkom has further developed the LRIC model. This is discussed further in Section 7.3.2.3 below, where the cost basis and method of determining the price cap are discussed and described.

7.3.2.2.2 Assessment of whether the price-cap regulation should be continued

499. Price-cap regulation, whereby maximum prices to apply in a certain period are set in advance, yields predictable prices for both access buyers and the regulated wholesale provider during the period to which the regulation applies. Alternative forms of price regulation might be cost orientation, retail-minus regulation, or price regulation based on benchmarking, or a combination of two or more of these.

500. Figure 2 is taken from BEREC's report *Regulatory Accounting in Practice 2017* and shows that cost orientation and price capping, or a combination of these two forms of price regulation, have been most commonly used for price regulation of local, physical access to copper-based access networks (ref. the column for M3a_2014_M4_ULL in Figure 2 below) in European countries.

Figure 13 – Combination price control / costing methodologies (M3a)



	M3a_2014_M4_2007_ULL	M3a_2014_M4_2007_SLU	M3a_2014_M4_2007_SA	M3a_2014_M4_2007_fiberLLU	M3a_2014_M4_2007_VULA	M3a_2014_M4_2007_DF	M3a_2014_M4_2007_DA
ERT/FDC/HCA	0	0	0	1	1	0	0
ERT/LRIC-LRAIC (BU)/CCA	0	0	0	1	1	0	0
Price cap/FDC/HCA	1	0	1	1	1	0	1
Price cap/FDC/CCA	3	2	2	0	0	0	0
Price cap/LRIC-LRAIC (TD)/CCA	1	0	1	1	0	0	0
Price cap/LRIC-LRAIC (BU)/CCA	5	5	3	2	1	1	3
Cost orientation Alone/FDC/HCA	3	2	2	1	1	2	5
Cost orientation Alone/FDC/CCA	3	3	2	2	1	1	6
Cost orientation Alone/LRIC-LRAIC (TD)/CCA	3	3	2	2	1	3	2
Cost orientation Alone/LRIC-LRAIC (BU)/CCA	6	3	3	1	2	3	2

Source: BEREC 2017

Figure 2. Price regulation method in Marked 3a. Source: BEREC Report Regulatory Accounting in Practice 2017

501. In Norway, the price regulation of LLU access has been based on price cap since 2006, and Nkom cannot see that this price-cap regulation has had unintended negative effects. On the contrary, Nkom's opinion is that the price-cap regulation has proved to be an appropriate form of price regulation of copper-based LLU in the former Market 4. The price-cap regulation in Norway has provided a basis for competition in the retail market, based on access to Telenor's copper access networks, while not precluding significant investments in NGA networks. Figure 3 indicates that the rate of growth in fibre development in Norway has not been affected adversely by the decrease in the price cap for LLU during the period. The extent to which the price cap has had any positive effect on the investments in fibre is difficult to assess. It is important to emphasise that the growth in fibre is influenced by a number of factors, of which the wholesale price of LLU is only one among several factors.

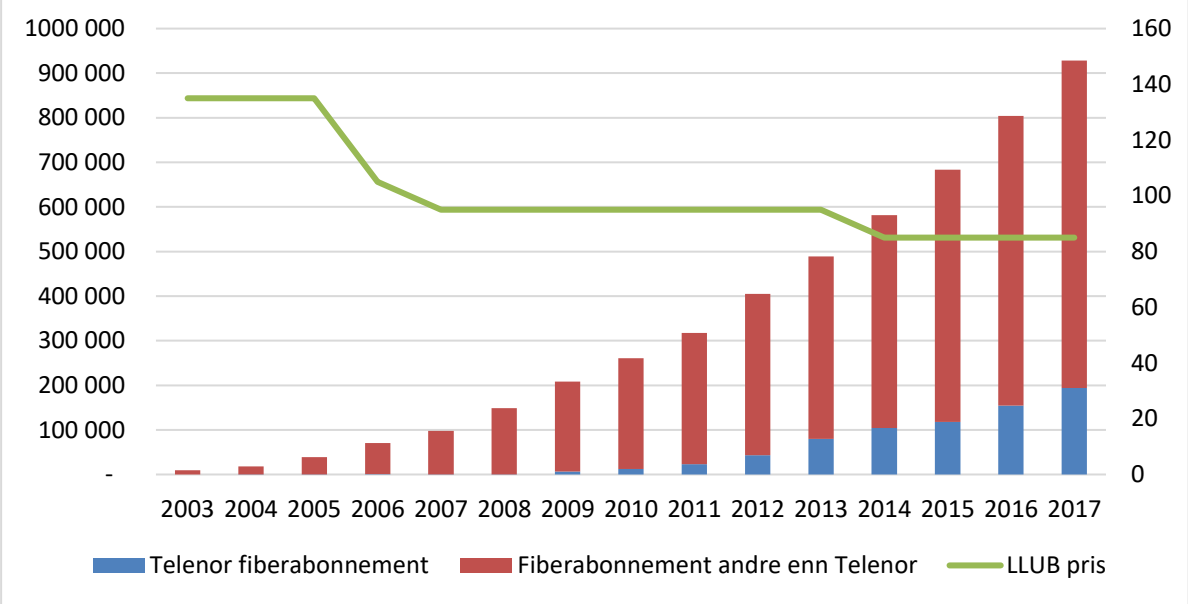


Figure 3. Development in the number of fibre subscriptions in Norway. Source: Nkom's electronic communication statistics.

502. Nkom believes that on this basis it is still appropriate that the price regulation of local, physical access to copper based access networks is based on price capping.

7.3.2.3 Further details of the cost basis and method of determining the price cap

503. Further details of the cost basis and method of determining the price cap When Nkom is to determine price caps for copper-based local access, the cost basis on which the price-cap regulation is to be based must be considered, as well as the method to be applied to determining the price cap.

504. On this basis, Nkom has made an assessment of whether the price-cap regulation of local, physical access to copper-based access networks must be based on historical costs or replacment costs, cf. Section 7.3.2.3.1 below. With regard to selecting the method of determining the price cap, this is described in Section 7.3.2.3.2.

7.3.2.3.1 Assessment of historical costs or re-procurement costs as the basis for price regulation

505. Figure 2 is taken from BEREC's report *Regulatory Accounting in Practice 2017* and shows that in most European countries, the cost basis for price regulation of local access in Market 3a is based on replacement costs.

506. In Norway, historical costs have formed the basis for the LLU price-cap regulation since 2006. This has ensured predictable and stable prices over time for local, physical access to the copper network. In the Commission's recommendation from 11 September 2013, weight is given, among other things, to stable and predictable wholesale prices for copper-based access (Recital 25):

"A costing methodology that leads to access prices replicating as much as possible those expected in an effectively competitive market is appropriate to meet the objectives of the Regulatory Framework. Such a costing methodology should be based on a modern efficient network, reflect the need for stable and predictable wholesale copper access prices over time, which avoid significant fluctuations and shocks, in order to provide a clear framework for investment and be capable of generating cost-oriented wholesale copper access prices serving as an anchor for NGA services, and deal appropriately and consistently with the impact of declining volumes caused by the transition from copper to NGA networks, i.e. avoiding an artificial increase in wholesale copper access prices which would otherwise be observed as a result of customers migrating to the NGA network of the SMP operator."

507. Against this background, Nkom believes that the consideration of predictable and stable prices over time is an element which advocates that historical costs should continue to form the basis for the price-cap regulation of local, physical access in the copper network.

508. Nkom furthermore believes that in this assessment weight should be given to how a change in the cost basis, from historical costs to replacement costs, may lead to over-compensation of Telenor's costs relating to local, physical access to the copper network in a present value perspective. This is further discussed and described in Chapter 2 of the Memorandum "*Note for Nkom on copper modelling"* from Analysys Mason of 15 December 2017 (Annex 5). The key aspect in this context is that the use of historical costs and replacement costs, respectively, as the cost basis would have given Telenor the same cost coverage in a present value perspective, but that, with the two cost bases, the cost recovery develops differently from year to year. This entails that if the cost basis changes during the given period for the lifetime of different assets in the cost model, this would entail wholesale prices that give over- or under-compensation for the regulated network owner in a present value perspective.

509. In Chapter 3 of the aforementioned memo from Analysys Mason, this is exemplified by Ofcom's "Valuing copper access statement" from 2005. As Nkom sees it, this assessment indicates that the cost basis for price caps for local, physical access to the copper network in Norway should still be based on historical costs:

"4.11 In terms of cost recovery, the total returns permitted will be equivalent (for any given asset), irrespective of whether an HCA or FCM CCA methodology is applied, provided that the methodology is applied consistently throughout the asset's life and that such returns are discounted at the operator's cost of capital. However, any change in methodology during the life of the asset could lead to an over- or under-recovery of cost. The analysis conducted by Ofcom has shown that the inconsistent application of CCA on some of BT's network assets has created the potential for a future over-recovery of costs against those assets.

4.12 Although the use of CCA and HCA are equivalent in terms of cost recovery if applied consistently over time, a switch between the two conventions could potentially give rise to over- or under-recovery of costs depending upon the future replacement cost and the point during the asset lifecycle at which the switch took place. This is because, while the extent of cost recovery is equivalent between the two approaches, the path of cost recovery is not."

510. Nkom has furthermore assessed whether the continued use of historical costs as the basis for the price-cap regulation of local, physical access to the copper network gives the right signals with regard to "build or buy" decisions among Telenor's competitors in the retail market for standardised broadband access.

511. In the 2013 recommendation, the Commission assumes that, in principle, replacement costs are more appropriate than historical costs in terms of how the price regulation of local, physical access to the copper network is to give the market operators the right "build or buy" signals. Furthermore, the aforementioned memo from Analysys Mason refers to how there may be a contradiction between the wish to avoid that the regulated wholesale price for copper access gives over-compensation to the network owner, and the wish for this price to give effective market signals in order to stimulate the development of NGA networks.

512. On the basis of the attached market analysis, Nkom believes that there is no need for the consideration of the correct "build or buy" signals to be given greater weight than before in the assessment of historical costs or replacment costs, as the cost basis for price cap for local, physical access to the copper network in Norway. Since 2006, the price cap for LLU has to a great extent been based on historical costs. At the same time, the development of fibre has shown steady growth for many years. Today, the fibre coverage in Norway is higher than in most other European countries, and there is still strong activity among a number of fibre developers throughout the country. The new Broadband Development Act can also make it both easier and cheaper for fibre developers to establish new fibre networks. This is assumed to further stimulate the fibre development.

513. Nkom furthermore point outs that the number of fibre customers has increased in step with the fibre coverage, and there are no signs in the market that the proportion of fibre customers is being reduced in areas with fibre coverage. On the contrary, the market development in the retail markets indicates increased demand for high-capacity Internet access in fibre networks. Nkom believes that this indicates that historical costs as the basis for the price cap for local, physical access to the copper network have not had any negative effects on the fibre development or on the development in the number of fibre customers over the past decade. Any transition to the use of re-procurement costs will have negative effects, as described earlier in this chapter. In Nkom's assessment, this entails that in the Norwegian broadband market it is not the case that a transition to re-procurement costs as the cost basis for local, physical access to the copper network is necessary in order to provide incentives for fibre development.

514. This implies that the aforementioned potential conflict between the wish to avoid that the regulated wholesale price for copper access gives over-compensation to the network owner, and the wish for this price to give effective market signals in order to stimulate the development of NGA networks, does not represent a real problem in the Norwegian broadband market. Nkom therefore believes that continued use of historical costs as the basis for the price-cap regulation of local, physical access to the copper network is suitable to prevent over-compensation of Telenor's costs in a present value perspective, and also to ensure competition in the retail market based on access to Telenor's copper network, without this affecting the fibre development in a negative direction.

515. Figure 4 shows a comparison of European LLU prices. The figure shows that Norway is in the upper part of the price layer. On any transition from historical costs to replacement costs as the basis for the price cap for local, physical access to copper-based access networks, the access price would have brought Norway closer to the top of this list.

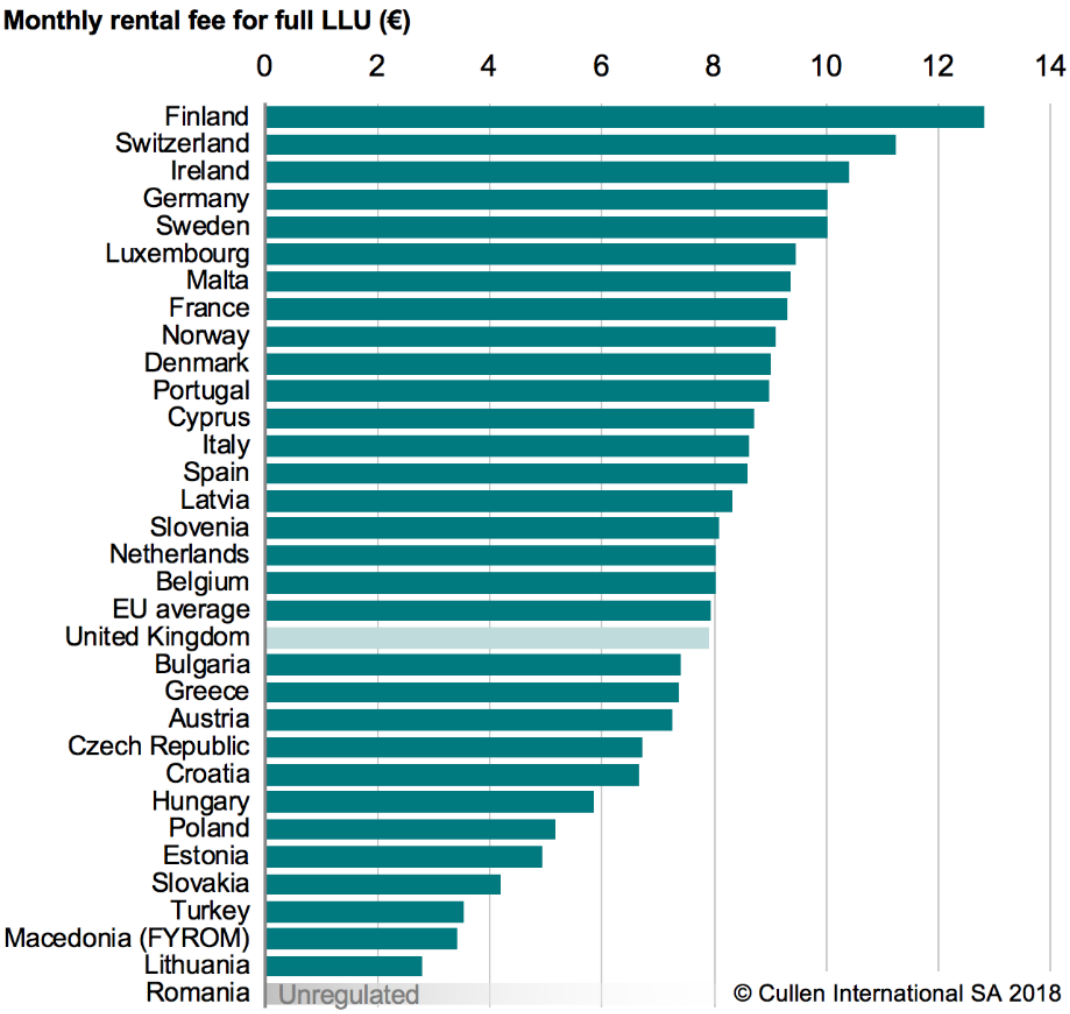


Figure 4. Monthly price for LLU. Source: Cullen, updated 1 July 2018.

516. In summary, Nkom believes that there are several factors which indicate that the price-cap regulation of local, physical access to the copper network should still be based on historical costs; both the consideration of stable and predictable wholesale prices over time and the wish to prevent over-compensation of Telenor's costs. Since it is also the case that historical costs as the basis for the price-cap regulation of local, physical access to the copper network cannot be said to have had unintended negative consequences for the fibre development in Norway, Nkom has concluded that the price cap for local, physical access to copper-based access networks in Market 3a should be based on historical costs in the coming regulation period.

7.3.2.3.2 Method of determining the price cap

517. In Nkom's decisions from 2006, 2009 and 2014, the price cap for copper-based LLU was determined on the basis of a comprehensive assessment, whereby Nkom's starting point was Telenor's cost account, which is based on fully-distributed, historical costs.

518. In the period from 2009 til 2011, Nkom developed an LRIC model for fixed access in Norway. As previously mentioned, this model not used directly in connection with the determination of the price cap in the decision of 20 January 2014, but was included as part of the overall assessment.

519. Since the previous decision, Nkom has further developed the LRIC model. Nkom believes that the further-developed model now provides a good basis for determining price caps for local, physical access to copper-based access networks in Market 3a. Against this background, Nkom has concluded that it is no longer necessary to undertake an assessment of several elements as the basis for determining price caps for local, physical access to copper networks. The level of the price cap for local, physical access to copper networks is therefore determined in this decision on the basis of modelled costs as in the latest version of Nkom's LRIC model.

520. For a more detailed description and discussion of key model assumptions in the further developed LRIC model, reference is made to the "Conceptual approach to upgrading Nkom's LRIC model of fixed access networks in Norway" (Annex 3), which Analysys Mason has prepared for Nkom, as well as the attached memo from Analysys Mason of 15 December 2017 (Annex 5).

7.3.2.4 Determination of price caps for local, physical access to copper-based access networks

521. With the assumptions and principles that Nkom has assumed, the latest version of the LRIC model provides a price per month of NOK 73 for full local, physical access to the copper network in 2019. This entails a decrease of around 14% compared to the existing price cap. Figure 5 shows modelled costs in the period from 2019 to 2021.

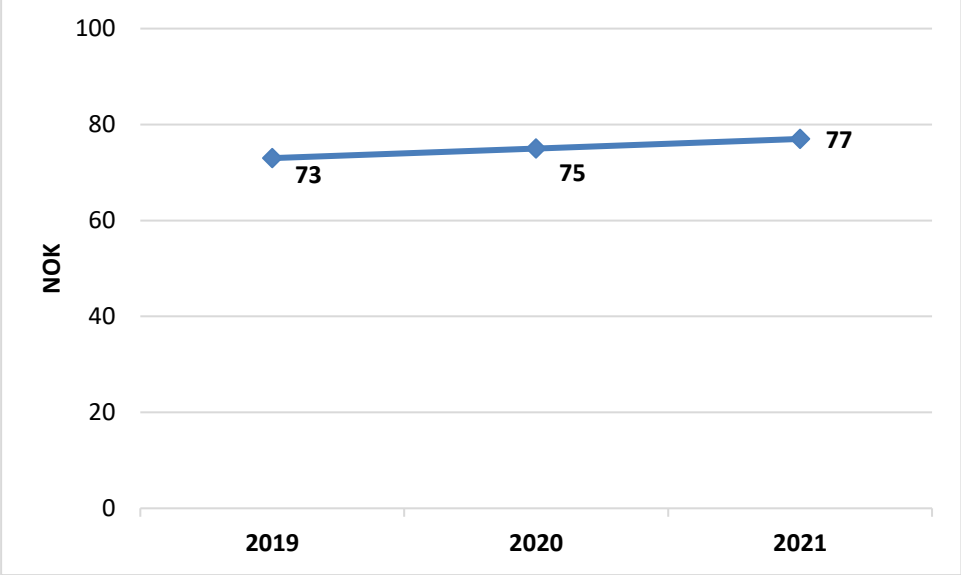


Figure 5. Modelled costs for local, physical access to copper-based access networks. Source: Nkom's LRIC model

522. Figure 5 shows that the modelled costs indicate increased prices for local, physical access to the copper network in the next few years.[33] On this basis, Nkom has assessed whether the price cap for local, physical access to copper-based access networks in Market 3a must be adjusted annually in the coming regulation period, or whether, as in the decisions for the former Market 4, a price cap must be determined for the entire regulation period, reflecting the average price level for the period in question.

523. Since in this decision, modelled costs are the basis for the determination of the price cap, and the modelled costs increase in the next few years, Nkom has concluded that it is most appropriate that the price cap for the coming regulation period reflects the annual, modelled cost increase. For practical reasons, the date of the first change in the price cap is set as 1 February 2019. This entails that maximum prices for local, physical access to the copper-based access network in Market 3a in the next few years are set at:

- From 1 Febri\uary 2019: NOK 73 per month
- From 1 January 2020: NOK 75 per month
- From 1 January 2021: NOK 77 per month

524. Prices for establishment, co-location, etc., as well as backhaul services, are not subject to this price-cap regulation, cf. Sections 7.3.7 and 7.3.8 below.

[33] The most important reasons for the increased modelled costs per access in the coming regulation period are increases in operational costs (OPEX) and a slight reduction in the total number of lines in the model. Capital costs (capex) are relatively stable. See also model documentation in Annex 4.

7.3.2.5 Rule for pricing of shared access

525. Rule for pricing of shared access On 11 April 2002, Nkom issued a decision on pricing of shared access. Its purpose was to clarify the principles for allocating the access line's costs between the telephony and broadband services in cases where both services use the same access line.

526. In the decision of 11 April 2002, Nkom concluded that a 50/50 split rule for the costs of the copper lines could be deemed appropriate. See the decision for further details of the grounds for this. Telenor was directed to use a formula according to which the price for shared access was to be calculated at half of the calculated price for full access (same product type), less special costs for establishing and operating full access, with the addition of special costs for establishing and operating shared access.

527. This rule was also the basis for the former Market 4 decisions of 20 February 2006, 3 April 2009 and 20 January 2014.

528. Nkom cannot see that anything in the justification for this pricing rule has changed since the previous decision, and considers the same principles to be appropriate going forward for the product variants that can be characterised as shared access. This entails that wholesale customers still pay a lower price for shared access than for full access. If the end user cancels the telephone service, on the other hand, the form of access will be converted to full access at an appurtenant higher price. This applies to both wholesale access to the copper access network and to Telenor's own use of this access network.

529. Based on the aforementioned, Nkom has concluded that the price of shared access must still be set at half of the calculated price for full access (same product type), less the special costs of establishing and operating full access, thereafter with the addition of special costs for establishing and operating shared access.

7.3.2.6 Setting price caps for sub-loops

530. In its comments on Nkom's notification of the latest draft decisions in the former Market 4 and Market 5, ESA referred to how Nkom does not require Telenor to have differentiated prices between LLU and sub-loops/SLU. ESA e.g. stated the following in this respect:

> "*Against this background, the Authority invites the NPT to monitor any emergent demand for SLU access over the period of this market review and, where there is a serious risk that alternative investments may be unduly hindered due to the lack of a commercially effective SLU option, to develop an efficient and transparent methodology for setting the terms and conditions of access to SLU without delay.*"

531. In the decision in the former Market 4 of 20 January 2014, Nkom pointed out that if Nkom further developed a cost model that made it applicable to model costs for the sub-access line, this would provide a basis for determining a specific price cap for this type of access.

532. Nkom's further developed LRIC model also gives the opportunity to calculate costs for the sub-loops (SLU). As stated, the model provides a good basis for setting the price cap for local, physical access to copper-based access networks in Market 3a. Nkom believes that it is appropriate to use the model results as the basis for price-cap regulation, also for sub-loops.

533. For 2019, the monthly costs for sub-loops are calculated at NOK 58. This is over 20% lower than the costs of full access (LLU). Figure 6 shows modelled costs for sub-loops in the period from 2019 to 2021.

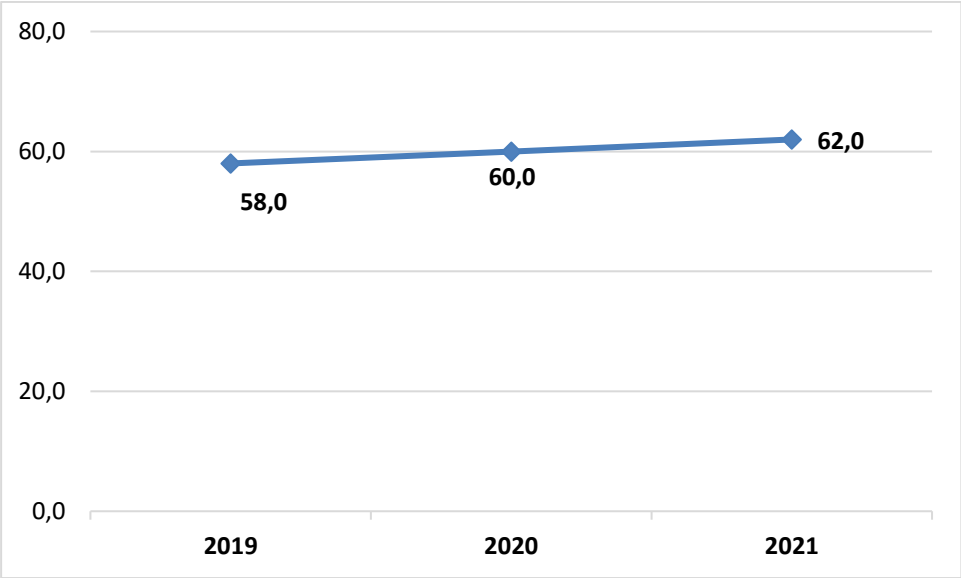


Figure 6. Modelled costs for the copper-based sub-loops. Source: Nkom's LRIC model

534. Figure 6 shows that the modelled costs also indicate increased prices for sub-loops/SLU during the next few years. On this basis, Nkom has assessed whether a price cap for access to sub-loops in Market 3a must be adjusted annually in the coming regulation period, in the same way as for LLU, or whether, as in the decisions for the former Market 4, a price cap must be determined for the entire regulation period, reflecting the average price level for the period in question.

535. Since, in this decision, modelled costs are the basis for determining the price cap for both LLU and sub-loops, and the modelled costs increase in the next few years, Nkom has concluded that it is most appropriate that the price cap for the coming regulation period reflects the annual, modelled cost increase. For practical reasons, the date of the first change in the price cap is set as 1 February 2019. This entails that maximum prices for sub-loops/SLU in Market 3a for the next few years are set as:

- From 1 February 2019: NOK 58 per month
- From 1 January 2020: NOK 60 per month
- From 1 January 2021: NOK 62 per month

536. Prices for establishment, co-location, etc., as well as backhaul services, are not subject to this price-cap regulation, cf. Sections 7.3.7 and 7.3.8 below.

7.3.2.7 ESA's comments

537. In its comments concerning Nkom's notification of a draft decision in Markets 3a and 3b, ESA refers to how Nkom uses historical costs as the basis in the LRIC model. With this background, ESA calls on Nkom to monitor how the selected price adjustment affects investments and infrastructure competition. ESA writes:

> *«…the Authority calls on Nkom to monitor the impact of the proposed wholesale copper access prices closely and to be prepared to review its price control remedy if investment incentives and infrastructure competition do not develop in the direction envisaged.»*

538. Nkom will monitor market developments closely and, among other things by obtaining half-yearly statistics and annual cover surveys, will have a good basis for assessing the development in investments and infrastructure competition. If the selected price regulation appears to affect development negatively, Nkom will reconsider the method of determining the price cap for local, physical access to copper-based access networks.

7.3.3 Local, virtual access to copper-based access networks in the form of VULA copper

7.3.3.1 Assessment of the need for price regulation

539. In Section 7.3.2, Nkom refers to how the pricing for local, physical access to copper-based access networks in the form of LLU is still of great importance to the competitiveness of the related retail market, and concludes that it is necessary to continue an obligation for Telenor concerning price regulation of such access in Market 3a.

540. In areas where the copper network is upgraded, providers using local, physical access to the copper network might be forced to purchase a substitute product, e.g. local, virtual access in the form of VULA copper. In such cases too, the pricing of the wholesale product will be of great importance to the competitiveness of the related retail market.

541. On the basis of the market analysis, cf. Annex 1, and the competition problems described in Chapter 5, including potential competition problems in the absence of regulation related to discriminatory and establishment-impeding behaviour which might lead to e.g. price squeezes and surcharges for Telenor's competitors in the downstream market, Nkom has concluded that it is necessary to introduce an obligation for Telenor concerning the price regulation of local, virtual access to copper-based access networks in the form of VULA copper in Market 3a.

542. Below, Nkom will assess which method must be used as the basis for the price regulation of VULA copper in Market 3a.

7.3.3.2 Choice of price regulation method

543. According to Section 7.2.5.3, as a minimum Telenor must offer VULA copper in the parts of the copper network that Telenor upgrades, and Telenor must offer traditional LLU in the remaining part of the copper network. An upgraded copper network requires significant investments, among other things as a consequence of fibre routing, and has the potential for considerably higher capacity. The starting point for the choice of price regulation method therefore differs for traditional LLU and VULA copper. In the light of a technology-neutral market definition, Nkom therefore deems it appropriate to consider the regulation of other types of NGA networks on determining the method of price regulation of VULA copper.

544. The use of remedies in this regulation is intended to maintain the competition for services and also to support the aim of infrastructure-based competition through commercial development of high-speed broadband. It is therefore necessary to assess how various different types of price regulation of VULA copper affect the developers' investment incentives and the access buyers' competitiveness.

545. Strict price regulation in the form of cost-oriented prices and price caps will ential that the access is priced at a level that corresponds to Telenor's long-term marginal costs and thereby supports the competition for services concerning the access. At the same time, any such price regulation might adversely affect Telenor's investment incentives and cause the extent of the upgrading of the copper networks to be reduced. This relationship has also been put forward by Telenor in the Broadband Forum. Nkom considers it appropriate to impose price obligations that are investment-neutral to the greatest possible extent. The choice of price regulation method for VUL copper therefore should not, in itself, affect Telenor's incentives in the choice between offering NGA in the form of an upgraded copper network, or via another infrastructure such as fibre. The goal of investment-neutral price regulation advocates that VULA copper follows the same principles as the regulation of Telenor's fibre network.

546. An opposite extreme, in the form of no or very moderate price regulation, would entail that insufficient consideration is made of the access buyers. Nkom therefore does not consider such regulation to be relevant.

547. The competition between different broadband access technologies in Norway is increasing. This entails that, in some cases, a customer that is offered an upgraded, copper-based broadband connection will also be able to choose to purchase a broadband connection via other access technologies. The retail prices for upgraded, copper-based broadband are to some extent assumed to be indirectly disciplined by the retail prices for broadband via alternative access technologies.

548. To some extent, any such disciplining effect will also be exercised from increased competition to offer content and related services via the Internet connection. The emergence of OTT operators represents a form of competition on the services side in the broadband

market, and entails that the access owners' offering of content and other services via the broadband connection is exposed to greater competition than before. In practice, this especially concerns the offer of TV services, but also broadband telephony. Use of the broadband connection for TV services requires that the broadband connection has relatively high capacity. There is therefore reason to assume that the threat from retail users' opportunity to move parts of their purchase of content and associated services to one or more OTT operators has a greater disciplining effect on the pricing of such services in an upgraded copper network.

549. Over-pricing in the retail market therefore appears to be a smaller potential competition problem for the part of the copper network that is being upgraded and where achievable speeds are so high that the OTT operators can deliver all types of services.

550. With regard to over-pricing as a competition problem in the wholesale market, Nkom refers to how Telenor has indicated in the Broadband Forum that the company in principle plans to only upgrade the copper network in areas where there is reason to assume that the development of alternative NGA networks will not take place. Furthermore, in connection with the notification of decisions in Markets 3a and 3b, Telenor has stated that the upgrading of the copper network will be significantly more limited than was originally planned. In isolated terms, the lack of potential for infrastructure-based competition indicates a strict form of price regulation. As referred to above, on the other hand, a strict form of price regulation could make it less attractive to implement the upgrade. Furthermore, it cannot be ruled out that Telenor is changing its ambitions related to the upgrading of copper network in the light of how the market is evolving differently to what Telenor expects at this time. Telenor might nonetheless find it appropriate to also upgrade the copper network in more central areas where the competition from alternative infrastructures is stronger.

551. The competition for services can be taken into account by ensuring that effective access buyers can profitably replicate services equivalent to those offered by Telenor through its own retail activity. Any such type of margin-based regulation might entail that the access prices are somewhat higher than when requirements of cost orientation and price caps are made, and thereby support the possibility of upgrading the copper network in several areas.

552. In its recommendation for consistent non-discrimination obligations and cost methodologies[34], the Commission has maintained that a requirement for cost-oriented prices for access to NGA networks under certain conditions is not necessary. The assumption is that the non-discrimination obligation is sufficiently effective, and entails that the access buyers must be ensured "Equivalence of Access".[35] According to the Commission, this can be achieved by setting requirements for both an economic replicability test and a technical replicability test. According to this recommendation, any such regulation is suitable to balance

[34] Cf. Section 7.1

[35] See http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:251:0013:0032:En:PDF, item 58.

the consideration of giving incentives for investments in high-capacity broadband with the consideration of ensuring competition for services, for the benefit of the retail users.

553. In Section 7.4, Nkom has concluded that an order with the tighter requirement concerning EoO, including the technical replicability test requirement, is sufficient for the access buyers to achieve “Equivalence of Access.” The requirement applies to all access forms covered by the regulation.

554. On this basis, Nkom concludes that it is not appropriate to impose strict price regulation in terms of price caps or cost-orientation for VULA copper in Market 3a. On the other hand, Nkom believes that an obligation for Telenor to offer access prices which entail that the access buyer is not subject to margin squeeze is appropriate. Any such requirement entails that Telenor may offer access to external providers at a price that enables buyers of access to replicate Telenor's products in the retail market and achieve positive margins. Nkom believes that price regulation in the form of a prohibition of margin squeeze for VULA copper is appropriate in order to take into account that price regulation of various types of NGA network must be investment-neutral, and to balance the consideration of investments against the consideration that access buyers must be able to compete effectively.

555. In order to ensure that the prohibition on offering access prices which make the access buyer subject to margin squeeze is observed, Nkom will undertake margin squeeze tests. As far as possible, Nkom will apply the same method and principles to the margin squeeze test for VULA copper in Market 3a as apply to the margin squeeze test for central access to Telenor's fibre-based access network in Market 3b (VUA fibre), cf. Section 7.3.4.3 in the Market 3b decision, and Annex 3 to the Market 3b decision. Nkom will make a separate decision on the concrete design of the margin squeeze test for VULA copper. Nkom has the objective that principles and the margin squeeze test for VULA copper must be completed before any launch of new wholesale products from Telenor.

556. If the margin squeeze test is not passed, i.e. does not give a positive result, Nkom will require rectification of Telenor’s access prices, cf. Section 4-9 of the Electronic Communications Act. In the rectification decision, Nkom will state by how much Telenor’s total wholesale costs must be reduced. Nkom believes that it is important that the access prices are reduced to the right level as quickly as possible, since excessively high access prices reduce the access buyers’ opportunity to compete in the retail market. On the other hand, Telenor must have some time to assess how the company will abide by the decision, including which wholesale prices the company will reduce. Nkom has assessed it to be reasonable that the wholesale prices must normally must be rectified within ten business days from the rectification decision being made.

557. If the margin squeeze test is not passed and the access buyers have thus paid an excessively high price in relation to the price obligation, access buyers may require repayment of the excessive price, cf. Section 10-12 of the Electronic Communications Act. On request, in

each individual case, Nkom will make a concrete assessment of whether individual decisions on repayment of the excessive price should be made. In order to calculate the size of the repayment amount, Nkom will have to consider for which period an excessive price has been charged, and how high the excessive price has been during this period.

7.3.4 Local, physical access to fibre-based access networks

7.3.4.1 Assessment of the need for price regulation

558. In the current decision in former Market 4, Nkom has not imposed price regulation under Section 4-9 of the Electronic Communications Act for fibre-based LLU access. Instead, Telenor was subject to an obligation of non-discrimination in terms of prices, supported by accounting separation. In the same way as for former Market 5, Nkom stated that a margin squeeze test for fibre-based LLU would be developed as an additional tool to follow up the non-discrimination requirement. In Nkom's view, such regulation would balance the considerations of supporting both service-based and infrastructure-based competition in an appropriate way.

559. In connection with the development of a margin squeeze test for fibre-based Broadband access in former Market 5, Nkom decided, however, that it would not be proportionate to develop a margin squeeze test for fibre-based LLU in former Market 4. The decision was based on the fact that the number of access lines available for physical access was very limited.

560. In the decision for Market 3b, Nkom has imposed price regulation in the form of margin squeeze test for access to Telenor's fibre-based access network (VUA fibre). Below, Nkom is assing whether there is now a basis for imposing Telenor price regulation for local, physical access to fibre networks, for example in the form of a reqirement to pass a margin squeeze test.

561. There have been no significant changes in Telenor's network regarding the number of fibre accesses available for local, physical access. In 2015 and 2016, there were just under 2000 fibre accesses available for physical access. As a result of Telenor's acquisition of the Nordix company, the number of available fibre accesses increased to around 5000 in 2017. Telenor has stated that the new fibre accesses will be converted to GPON during 2019-2020 and that they will no longer be available for physical access. The information from Telenor corresponds to Telenor's practice after previous acquisitions of point-to-point networks, and Nkom assumes that these fibre accesses will no longer be available for physical access within the period to which this decision applies. Furthermore, Nkom is not aware that Telenor has made new acquisitions of fibre accesses which give possibilities for physical access.

562. On the basis of the very limited number of fibre accesses available for physical access, and since there are no indications of any significant increase in the number of such accesses, Nkom, based on an overall evaluation, believes that obligations regarding transparency and

non-discrimination, with the associated follow-up in the form of accounting separation, are sufficient. Nkom refers to our assessment of non-discrimination, transparency and accounting separation requirements in Sections 7.4, 7.5 and 7.6. Based on this, Nkom concludes that it will not be proportional to impose price regulation for local, physical access to fibre-based access networks.

7.3.5 Local, virtual access to fibre-based access networks (VULA fibre)

7.3.5.1 Assessment of the need for price regulation

563. Nkom has assessed the necessity and proportionality of price regulation for local, physical access to fibre-based access networks in Market 3a in the light of the authority's approach to the regulation principle for Market 3a, cf. Section 6.1.

564. In the current decision in former Market 4, Nkom has not imposed an access obligation for local, virtual access to fibre-based access networks. The reason for adding any such access obligation in this decision in Market 3a is stated in Section 7.2.7.

565. On the basis of the market analysis, cf. Annex 1, and the competition problems described in Chapter 5, including potential competition problems in the absence of regulation related to discriminatory and establishment-impeding behaviour which might lead to e.g. price squeezes and surcharges for Telenor's competitors in the downstream market, Nkom has concluded that it is necessary to introduce an obligation for Telenor concerning the price regulation of local, virtual access to fibre-based access networks in the form of VULA fibre in Market 3a.

566. Below, Nkom will access which method must be used as the basis for the price regulation of VULA fibre in Market 3a.

7.3.5.2 Choice of price regulation method

567. While price regulation of local, physical access to copper-based access networks entails price regulation of access to a fully developed nationwide access network, price regulation of local, virtual access to fibre-based access networks will ential price regulation of access to an access network that is being developed. There are thus different starting points concerning the choice of price regulation method for local, physical access in the form of LLU, and local, virtual access in the form of VULA fibre, respectively. In the light of a technology-neutral market definition, Nkom therefore deems it appropriate to consider the regulation of other types of NGA networks on determining the method of price regulation of VULA fibre.

568. The use of remedies in this regulation is intended to maintain the competition for services and also to support the aim of infrastructure-based competition through commercial development of high-speed broadband. It is therefore necessary to assess how various different types of price regulation of VULA fibre affect the developers' investment incentives and access buyers' competitiveness.

569. A strict form of price regulation of VULA fibre, e.g. in the form of price caps or cost-orientation, might adversely affect fibre developers' investment incentives. Even though such a price regulation obligation will only be directed at Telenor, as the only provider with significant market power in this market, there is reason to assume that a strict form of price regulation of Telenor's wholesale fibre offering might also affect the future investment decisions of other fibre developers. Nkom does not wish to impose obligations in this market that affect the scope and speed of the fibre development to any significant degree.

570. An opposite extreme, in the form of no or very moderate price regulation, would entail that insufficient consideration is made of the access buyers. Nkom therefore does not consider such regulation to be relevant.

571. The competition between different broadband access technologies in Norway is increasing. This entails that, as a rule, an end user who is offered fibre-based broadband access can also choose between copper-based and mobile-based broadband access. In some cases, HFC-based access is also an alternative for end-users who are offered fibre-based broadband access. This competition among various technologies is assumed to have a disciplining effect on the retail prices for fibre broadband, even after the end user has selected access technology and connected to a fibre access provider.

572. To some extent, any such disciplining effect will also be exercised from increased competition to offer content and related services via the Internet connection. The emergence of OTT operators represents a form of competition on the services side in the broadband market, and entails that the access owners' offering of content and other services via the broadband connection is exposed to greater competition than before. In practice, this especially concerns the offer of TV services, but also broadband telephony. Use of the broadband connection for TV services requires that the broadband connection has relatively high capacity.

573. On this basis, over-pricing in the retail market appears to be a smaller potential competition problem for VULA fibre than for local, physical access to copper-based access networks in Market 3a.

574. With regard to over-pricing as a competition problem in the wholesale market, Nkom finds reason to emphasise that the terms of competition on the access side within fibre-based broadband is completely different than for copper-based broadband. For a potential wholesale consumer in Market 3a that wishes to offer fibre-based broadband in the retail market, there will generally be an option to invest in separate fibre accesses if the wholesale terms are perceived as not being very attractive. Broadnet, the Altibox partners and a number of local and regional fibre developers have already chosen such a strategy. This entails that the terms of competition for fibre-based broadband access in Norway are not directly comparable with the situation in many other European countries, which makes the dynamics of the Norwegian market for wholesale fibre access appear different from the market for wholesale copper

access, where it is not likely that Telenor's de facto monopoly position will be challenged in the years ahead.

575. The competition for services can be taken into account by ensuring that effective access buyers can profitably replicate services equivalent to those offered by Telenor through their own retail activity. Any such type of margin-based regulation might entail that the access prices are somewhat higher than when cost orientation and price caps are required, and thereby support opportunities to invest in NGA networks.

576. In its recommendation for consistent non-discrimination obligations and cost methodologies[36], the Commission has maintained that a requirement for cost-oriented prices for access to NGA networks under certain conditions is not necessary. The assumption is that the non-discrimination obligation is sufficiently effective, and entails that the access buyers must be ensured "Equivalence of Access".[37] According to the Commission, this can be achieved by setting requirements for both an economic replicability test and a technical replicability test. According to this recommendation, any such regulation is suitable to balance the consideration of giving incentives for investments in high-capacity broadband with the consideration of ensuring competition for services, for the benefit of the end-users.

577. In Section 7.4, Nkom has concluded that an order with the tighter requirement concerning EoO, including the technical replicability test requirement, is sufficient for the access buyers to achieve "Equivalence of Access." The requirement applies to all access forms covered by the regulation.

578. On this basis, Nkom concludes that it is not appropriate to impose strict price regulation in terms of price caps or cost-orientation of VULA fibre in Market 3a. On the other hand, Nkom believes that an obligation for Telenor to offer access prices which entail that the access buyer is not subject to margin squeeze is appropriate. Any such requirement entails that Telenor may offer access to external providers at a price that enables buyers of access to replicate Telenor's products in the retail market and achieve positive margins. A margin squeeze prohibition will in the given circumstances attend to investment incentives for Telenor and at the same time ensure that effective access buyers can compete in the retail market.

579. In order to ensure that the margin squeeze prohibition for local, virtual access to fibre-based access networks in Market 3a is complied with, Nkom will therefore undertake margin squeeze tests and gross margin tests. As far as possible, Nkom will apply the same method and principles to the margin squeeze test for VULA fibre in Market 3a as apply to the margin squeeze test for central access to Telenor's fibre-based access network in Market 3b (VUA fibre), cf. Section 7.3.4.3 in the Market 3b decision, and Annex 3 to the Market 3b decision. Nkom will also conduct gross margin tests according to the method described in Section

[36] Cf. Section 7.1

[37] See http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:251:0013:0032:En:PDF, item 58.

7.3.4.3 of the Market 3b decision. Nkom will make a separate decision on the concrete design of the margin squeeze test for VULA fibre.

580. In order for the margin squeeze regulation to effectively promote the purpose of the regulation, Nkom believes that it is important to achieve transparency and predictability for involved operators. It is therefore necessary that the regulation adequately clarifies in advance how a breach of the margin squeeze regulation will be enforced.

581. Section 2 of Annex 3 to the decision in Market 3b states that a margin squeeze test is passed if the end user income is greater or equal to the sum of wholesale costs and downstream costs. Whether a margin squeeze exists will thus depend on the relative relationship between revenue and costs in the margin squeeze model. It is thus necessary to determine which prices Telenor can adjust if the margin squeeze tests have failed. Specifically, the question is whether Telenor will be granted a right to increase retail prices as a remedy to an ascertained margin squeeze.

582. Nkom's choice of margin squeeze model as a pricing tool is based on an overall assessment of a number of factors, including that the margin squeeze regulation should promote the purposes of the regulation. The recommendation on consistent non-discrimination obligations and cost methodologies argues that price regulation in the form of an economic replicability test, on specific terms, is an alternative to cost orientation. Which scope of action Telenor should have in terms of remedying a reported breach of the margin squeeze regulation, is part of Nkom's assessment of whether margin squeeze regulation will function adequately effecient as a price regulation tool.

583. In the market analysis, Nkom has shown that Telenor has almost 100% market share in Market 3a, measured on sales of access to external buyers, see Section 3.3.2 of Annex 1. Telenor thus has no competitors in this part of the access market. If Telenor is allowed to increase end-user prices, this will in isolation help Telenor to pass the margin squeeze test. To allow such behavior, however, will not in Nkom's assessment address the underlying competition problem in the wholesale market. Nkom refers to that both vertical transfer of market power, including through pricing, and single market dominance, including exploitative behavior, have been identified as current competition issues in the wholesale market, cf. Sections 5.2 and 5.3. The need for the enforcement of a possible breach of the margin squeeze regulation to remedy the competition problems in the wholesale market, supports in Nkom's assessment that Telenor must be required to correct the margin squeeze by reducing wholesale prices.

584. In Annex 3 to the decision in Market 3b, Nkom has justified the choice of flagship products and the aggregation level that will be the basis for the margin squeeze tests. If the margin squeeze tests show that the requirements of the regulation are not met, it is important that this situation can be remedied effectively. If, in such a situation, Telenor is able to fulfill the requirement to pass the margin squeeze test by increasing the retail prices, it follows that such

rectification may only have effect by increasing the retail prices on one or more of the products covered by the margin squeeze test. Within the products covered by the test, there will be a proportion of end users who are in the binding period of the contract with an agreed price. Furthermore, the Electronic Communications Act, Section 2-4, requires that changes to or termination of an agreement on the purchase of electronic communications services shall not enter into force before one month after the notice has been sent to the end user. The provision also provides end users who do not accept the new terms of agreement, a right to cancel the agreement at no additional cost. Overall, Nkom believes that these conditions are in disfavour of allowing Telenor to correct the margin squeeze by increasing end-user prices, as such allowance will not provide sufficiently effective price controls.

585. The margin squeeze regulation on Telenor implies that Nkom periodically conducts margin squeeze tests. The test is carried out after each period and thus has a limited backward perspective. A more intrusive form of margin squeeze regulation is to require that a margin squeeze test shall be passed before end-user products can be offered in the market. If the regulator finds in connection with the test that the margin requirement in question is not met, there are no end users who will be directly affected if the regulated provider is allowed to increase the retail prices to remedy the margin squeeze situation. However, in the case of margin squeeze tests of products that end users have already signed a purchase agreement on, this does not apply. Nkom believes that, the interest of end-users indicates that Telenor should not be granted the right to increase retail prices to remedy an ascertained margin squeeze.

586. On the basis of the above, Nkom believes that allowing Telenor to increase its retail prices to remedy an ascertained margin squeeze would normally not be a sufficiently good option, compared to requiring Telenor to reduce its wholesale prices for local, virtual access in Telenor's fibre-based access network.

587. A requirement for an ascertained margin squeeze to be remedied by reducing wholesale prices implies a limitation of Telenor's freedom of action. However, in Nkom's view, such a restriction is necessary to ensure that the margin squeeze regulation is sufficiently effective to promote the purpose of the regulation and thus be a suitable form of price regulation. Nkom can not see that the purpose of the regulation can be achieved in a less intrusive manner. The alternative would be to impose another and more intrusive form of price regulation. In view of this, Nkom concludes that it is proportionate to impose requirements on Telenor to rectify breaches of the margin squeeze regulation by reducing wholesale prices.

588. If the margin squeeze tests and/or the gross margin tests are not passed, i.e. they do not give a result of at least zero, Nkom will normally impose on Telenor, pursuant to the Electronic Communications Act, Section 10-6, to correct the company's wholesale prices for access in this market to a level that Nkom based on the margin squeeze tests considers to provide economic replicability. Nkom will in the rectification decision state how much Telenor's wholesale costs need to be reduced.

589. The portfolio approach to the completion of margin squeeze tests implies that an imposed reduction of wholesale costs could be distributed among multiple access products. A question is then whether Telenor should be given the freedom to choose how the reduction is to be distributed between different access products included in the margin squeeze test. A key element behind the choice of a portfolio approach is that the margin squeeze regulation must ensure some flexibility for Telenor regarding pricing of various retail products. In the event of a finding of breach of the margin squeeze regulation, Nkom believes that this concern can not be weighted equally strongly. Nkom therefore refers to the assesment above where we express that Telenor will be required to reduce wholesale costs to a level deemed to provide economic replicability. Nkom nevertheless sees no reason to go as far as to demand that the reduction of wholesale costs be distributed proportionally to the access products included in the margin squeeze test.

590. On any actual breach of the margin squeeze regulation, Nkom considers it important that the wholesale prices are reduced to an appropriate level as quickly as possible, in order to restore the access buyers' opportunity to compete effectively in the retail market. On the other hand, it is reasonable to give Telenor some time to assess how the company will implement the ordered rectification. Experience from previous orders to rectify actual breaches of the margin squeeze regulation has also shown that in such cases there will be a need to consider any request for the rectification order to be subject to deferred execution. After a specific overall assessment, Nkom upholds that a rectification order as a consequence of actual breach of the margin squeeze regulation will normally enter into force 15 business days after the decision is taken.

591. For a requirement for rectification after failing to pass a margin squeeze and/or gross margin test to function effectively, Nkom finds it appropriate that Telenor submits a proposal to Nkom for how Telenor will execute the rectification. Any such proposal would be appropriate to streamline the implementation of the rectification decision in that any clarifications that might be required can be discovered and undertaken before the rectification order enters into force. Accordingly, Nkom concludes that on any requirement for rectification as a consequence of failing to pass a margin squeeze or gross margin test, Telenor must send Nkom a proposal for how Telenor will undertake the required rectification. The proposal must be sent within five business days after the rectification decision is communicated to Telenor.

592. In connection with a requirement to reduce wholesale prices, there may be questions as to whether Telenor shall be entitled to increase wholesale prices in the period up to the subsequent conduction of a margin squeeze test. In order for the margin squeeze regulation to be sufficiently effective to achieve the objective, Nkom emphasizes that the rectified wholesale prices will, as a clear starting point, act as a price cap until the next conduct of the margin squeeze test. If Telenor can demonstrate that there is a need to increase access prices during this period and that economic replicability will be safeguarded despite the rise in prices,

Telenor could still be allowed to increase wholesale prices before the next completion of the margin squeeze test, subject to approval by Nkom.

593. If the margin squeeze tests and/or gross margin tests are not passed and the access buyers have thus paid an excessively high price in relation to the price obligation, access buyers may require repayment of the excessive price, cf. Section 10-12 of the Electronic Communications Act. On request, in each individual case, Nkom will make a concrete assessment of whether individual decisions on repayment of the excessive price should be made. In order to calculate the size of the repayment amount, Nkom will have to consider for which period an excessive price has been charged, and how high the excessive price has been during this period. The data collected in connection with the conduction of a margin squeeze test will be somewhat older than the point in time for a possible order to rectify the margin squeeze. If these data have not been changed in the period up to the rectification decision, Nkom will take as a starting point that the margin squeeze has existed at the latest from the date the data were obtained.

594. The margin squeeze test pursuant to the decision in former Market 5 from 20 January 2014 is regulated by Section 4-7 of the Electronic Communications Act concerning non-discrimination. Over time, Telenor has maintained that the non-discrimination provision does not justify the current arrangement of the margin squeeze test in the 2014 regulation. Telenor has furthermore maintained that since the margin squeeze model is sanctioned in non-discrimination, Telenor is free to choose to exercise any claim for rectification, in full or in part, by increasing the retail prices. In its appeal decision of 25 October 2017, the Ministry of Transport and Communication has not upheld Telenor's position in this assessments, but has maintained Nkom's assessments of the issue of the legal basis and the rectification competence. Section 4-9 of the Electronic Communications Act provides a basis to impose "specific price regulation methods", including margin squeeze test requirements. Nkom maintains that the margin squeeze test in the 2014 regulation is sufficiently justified, but has, after an overall assessment, found it appropriate to require Telenor to offer access prices which ensure that the access buyer is not subject to margin squeeze, in accordance with Section 4-9 of the Electronic Communications Act.

7.3.6 Homes passed

595. In Section 7.2, Nkom has instructed Telenor to grant access to "homes passed". The issue that Nkom must consider here is whether there is a need for price regulation associated with such access, and in such case how the price regulation should be designed.

596. The connection of "homes passed" entails an extension of Telenor's fibre access network. On a par with the initial establishment of the relevant fibre access network, the expansion will entail costs for Telenor, including for trenching, laying ducts, blowing fibre cables and connecting the terminal equipment. The costs which this entails will typically be

covered by establishment fees and the sale of retail services or wholesale access. The period for the coverage of these costs will coincide with the fibre network's lifetime.

597. Nkom cannot see any basis to charge the access buyer a higher monthly access price for the purchase of access that has previously been "homes passed". The question is whether and, if so, to what extent, Telecom must be able to charge the access buyer a fee for the establishment of drop cables to "homes passed". Below, Nkom will assess various potential methods for the price regulation of drop cables to "homes passed".

598. Nkom first assesses whether cost orientation is a suitable method for the price regulation of the establishment of drop cables to "homes passed". By its nature, cost-oriented price regulation entails that the access price must cover costs. This price regulation method will therefore be appropriate to ensure the consideration of the covering of Telenor's costs.

599. The pricing of the establishment of fibre accesses in the retail market will be affected by the competition for the establishment of such infrastructure. The market price for establishment in the Norwegian market has been at a level which entails that the establishment price for end users is normally lower than the cost of establishing the individual fibre access. The establishment price has thus to a great extent been subsidised by the provider that establishes the access. For Telenor as the infrastructure owner, the cost of establishment could be covered by establishment revenue and monthly revenue from the sale of retail or wholesale services across the fibre's lifetime.

600. The market price for the establishment of infrastructure will also determine the price that an access buyer would be able to charge for the establishment of a drop cable to "homes passed". The access buyer would not be able to continue a cost-oriented establishment price for drop cables out to end users in full if it entailed an establishment price higher than the market price. A cost-oriented wholesale price for the establishment of drop cables might thereby entail that the access buyer must subsidise the establishment price.

601. The access buyer would be able to cover the wholesale costs of establishment from establishment revenue and sale of retail services. Since the retail revenue for the access buyer is based on services produced across an infrastructure subject to competition and the access buyer will not achieve wholesale revenue in cases where it does not achieve retail revenue, it is possible that the access buyer will not be able to recover the wholesale cost associated with the establishment of the drop cable. The access buyer will thus run a higher risk than is the case for Telenor, on such subsidisation, that the cost associated with the subsidisation may not be recovered. The higher the degree of subsidisation, the greater the risk must be deemed to be. In Nkom's assessment, the choice of cost orientation as the price regulation method for access to the establishment of "homes passed" thus entails a risk that the access obligation will not be effective.

602. On this basis, Nkom believes that price regulation of drop cables to “homes passed” in the form of cost orientation will not be appropriate and will not be suitable to achieve the purpose of the access obligation.

603. An alternative form of price regulation might be not to allow Telenor to charge a higher wholesale price for the establishment of “homes passed” than the establishment price which Telenor otherwise charges at wholesale level in cases where the end customer is already connected to Telenor’s fibre access network. Any such establishment fee does not apply to accesses that have already been established. The price can thus be considered to be set to at zero. Any such price regulation method will fulfil the access buyer’s need to be able to compete with Telenor on the establishment of drop cables to households that are subject to the access obligation for “homes passed”.

604. In the same way as the initial establishment of the current fibre access network, the connection of “homes passed” will entail costs for Telenor. When the access buyer uses the access obligation for the establishment of drop cables to “homes passed”, Telenor will not be able to forward this cost to the end user. If Telenor is furthermore not able to charge a higher price for the establishment of a drop cable to “homes passed” than the ordinary establishment price paid by the access buyer for an access that has already been established, these costs will have to be covered from sale of retail or wholesale services. In isolated terms, this may indicate a higher monthly price for wholesale access to drop cables established at the initiative of remote access buyers, than for other fibre accesses. Nkom cannot see that any such price structure would be appropriate and believes that the price regulation should make it possible for Telenor to cover part of the cost of the establishment of the drop cable to “homes passed” in the form of an establishment fee at wholesale level.

605. The price regulation of access to Telenor’s fibre access networks is designed on the basis of the principle of ensuring access buyers economic replicability, cf. Section 7.3.5.. The regulation is thus not cost-based, but oriented towards ensuring that the margin between Telenor’s retail prices and wholesale prices is sufficient to cover relevant downstream costs. The price regulation thereby requires increased price flexibility for Telenor.

606. In Nkom’s assessment, it will be appropriate to apply the same price regulation principle to the price regulation of the same infrastructure, irrespective of how the infrastructure was established. This indicates that the price regulation of the access obligation for the establishment of drop cables to “homes passed” should also be based on ensuring access buyers economic replicability. The consideration of non-discrimination between access buyers and Telenor's own retail activity indicates that the remuneration that the access buyer may have to pay for connection of “homes passed” households must not exceed the price for Telenor's own retail activity in the same circumstances. However, Telenor does not operate with any internal settlement price between its wholesale and retail activities, so that it is not possible to use a specific settlement price as the starting point.

607. Besides cost coverage for Telenor, Nkom believes that it is also necessary to design the price regulation so that it does not counteract the purpose of the “homes passed” access obligation. Drop cables that are established when connecting “homes passed” are the property of Telenor. Above, Nkom has referred to that Telenor will be able to earn revenue from establishment through the sale of retail services or wholesale services during the lifetime of the fibre accesses, while an access buyer that sells connection to “homes passed” will only earn revenue from the sale of retail services during the lifetime of the customer relationship. If the establishment fee is set high and the access buyer cannot transfer the high establishment fee to the end-user, this will increase the possibility that the access buyer will not be able to recover the costs associated with the establishment of the customer relationship and thus entail an increased risk for the access buyer.

608. Price regulation with a price cap that depends on Telenor’s retail price is, in Nkom’s view, comparable with price regulation in the form of margin squeeze tests and price-minus, which are also forms of price regulation whereby the wholesale price is directly related to the retail price for the regulated provider. On any reduction of the retail prices, a provider that is subject to such price regulation will also have to reduce the corresponding wholesale price. The need to consider the access buyer’s opportunity to compete with Telenor on the establishment of drop cables to households that are subject to the access obligation for “homes passed” will therefore be considered.

609. As referred to above, Telenor's pricing of the establishment of drop cables to “homes passed” will be influenced by the competition in the retail market for the establishment of relevant infrastructure. It is thus not certain that the price charged by Telenor for the establishment of access to “homes passed” will cover the cost of establishment. Nkom cannot see that price regulation of the establishment of drop cables to “homes passed” which entails equal treatment of Telenor’s own retail activity and remote access buyers would in itself entail disproportionate limitation of Telenor’s opportunity to achieve cover of costs on any such access.

610. Nkom has assessed how price-cap regulation of drop cables to “homes passed” linked to Telenor’s retail prices for access to establishment might affect pricing flexibility in the retail market. Any such price regulation will entail that Telenor’s wholesale price must reflect the price they charge themselves in the retail market. Nkom cannot see that this in itself restricts Telenor's scope for manoeuvre on determining prices in the retail market. Nkom furthermore cannot see that any such price regulation would have any such effect to a greater extent than other forms of price regulation whereby the wholesale price is linked to the retail price. Nkom furthermore cannot see that any such form of price regulation would actually limit the access buyer’s price flexibility in the retail market to a greater extent than other relevant price regulation methods, such as cost orientation. Here, Nkom also refers to how access buyers that achieve equal access to establish drop cables to “homes passed” will to a great extent be able to choose which retail price they set for such establishment. With regard to pricing

flexibility for broadband providers that do not offer broadband services via Telenor's infrastructure, Nkom cannot see that the current price regulation method would restrict these providers' price flexibility in the retail market, or the opportunity to compete with Telenor on the establishment of new infrastructure.

611. On this basis, Nkom concludes that the access to establish drop cables to "homes passed" must be based on a price cap on the price charged by Telenor for such establishment of their own retail activity.

612. On its websites, Telenor operates with a fixed establishment fee for fibre (hereinafter referred to as the listed price). The price is currently NOK 4,990 (including VAT). Nkom believes that Telenor's fixed establishment fee can be used as an estimate of Telenor's internal settlement price and considers it appropriate to use this price as the starting point when determining the price regulation for "homes passed". The fixed establishment fee (excluding VAT) will in principle be regarded as a price cap on the price that Telenor may charge the access buyer for the establishment of drop cables to "homes passed".

613. Even though Telenor as mentioned above operates with a fixed establishment fee offer on its websites, it cannot be ruled out that in some cases Telenor may be able to charge a higher establishment fee. For the access buyer, predictability concerning the costs associated with the establishment of drop cables to "homes passed" will be necessary in order for the access buyer to be able to decide whether to make use of the access. It is therefore necessary to have transparency concerning establishment fees.

614. In the access regulation, Telenor is required to maintain updated, transparent and readily available information about households included in Telenor's list of "homes passed". To ensure transparency and notoriety concerning current establishment fees, the lists of "homes passed" must be updated at all times with the current establishment fee that Telenor's own retail activity will charge on any densification sale.

615. In principle, the current establishment fee for the relevant connection will be Telenor's listed price for the connection of "homes passed", cf. above. If Telenor's retail activity for some potential customers can offer connection to "homes passed" at price below the listed price, this must be stated on the "homes passed" list. If any potential customers are to be charged a higher price than the listed price, this must also be stated on the aforementioned list. In such cases, Nkom will be able to ask Telenor to justify and document the higher establishment fee. Nkom will also be able to ask Telenor to justify and document any increases in the establishment fee for specific potential connections.

616. In order to contribute to increased clarity concerning the content of the price regulation of access to "homes passed", Nkom makes it clear that Telenor's own retail activity may not undertake densification sale with the offer of a lower establishment fee than shown by the "homes passed" list at the time when connection is offered to the end user. Such conduct will be deemed to be breach of this price regulation.

617. Telenor may have the incentive to undertake densification sale itself in areas where an access buyer is already undertaking densification sale. If Telenor is able to reduce the establishment fee during this phase, Telenor will not as such offer a lower establishment fee than shown by the "homes passed" list. Such conduct will, nonetheless, lead to unequal terms of competition for the access buyer and Telenor's retail activity. This potential competition problem could be resolved by setting the requirement that price changes must be notified with a certain time limit.

618. Telenor could furthermore have the incentive to reduce the prices in the "homes passed" list shortly before Telenor itself undertakes densification sale in the area affected by the price reduction. Systematic densification sale assumes that there is sufficient time to undertake the necessary preparations. In this way, Telenor will be able to effectively prevent the access buyer from undertaking densification sale on equal terms with Telenor's own retail activity. This potential competition problem could also be resolved by setting the requirement that price changes must be notified with a certain time limit.

619. In the light of the aforementioned points, Nkom believes that it is necessary to set requirements for notification of changes in the establishment fee for "homes passed", and refers to Section 7.5.5.4. below. In order to contribute to increased clarity concerning the content of the price regulation of access to "homes passed", Nkom makes it clear that Telenor's own retail activity is not able to undertake densification sale during the notice period, and with the offer of the notified lower establishment fee. Such conduct will be deemed to be breach of this price regulation.

620. In its comments on Nkom's notification of the draft decision in Markets 3a and 3b, ESA has invited Nkom to reconcidier the proposed price regulation for the establishment of drop cables to "homes passed". Among other things, ESA believes there is a risk that the proposed approach may limit price flexibility in the retail market. ESA states the following:

> *"The Authority invites Nkom to reconsider its proposal to set its proposed wholesale price cap for the establishment of the drop cable to homes passed based on Telenor's own retail charge for this component. The Authority has concerns that the proposed approach risks limiting retail pricing flexibility, as well as potentially reducing overall competitive uncertainty and tension on an important cost factor in the retail market. The Authority therefore asks Nkom to assess if alternative wholesale pricing mechanisms may be more appropriate and justified in that regard."*

621. On the basis of ESA's comment, above Nkom has made a renewed assessment of other possible forms of price regulation of drop cables to "homes passed". After the renewed assessment Nkom has maintained the conclusion that price-cap regulation of drop cables to "homes passed" based on Telenor's retail prices for establishment will best observe the need for cover of Telenor's costs and also contribute to the use of the access obligation for "homes passed" by the access buyer. As described above, Nkom cannot see that this price regulation

significantly affects other broadband providers' price flexibility in the retail market. Price regulation is thereby not suitable either to reduce the competitive pressure associated with the establishment price in the retail market. Nkom thus believes that the price regulation is appropriate, but does not go further than its purpose indicates. Nkom furthermore cannot see that the purpose sought to be achieved can be achieved with less intervention, and concludes that the price regulation is proportional.

7.3.7 Establishment and co-location, including civil engineering infrastructure, etc.

622. Even though Telenor's prices for the establishment of access to access lines, co-location etc., including access to information and support systems, do not normally represent the largest share of the total costs for buyers of wholesale products in Market 3a, these prices are still of great significance. In Nkom's view, these price elements can lead to potential competition problems, especially related to over-pricing. The prices may increase significantly, for example, thereby increasing the costs for providers requiring access.

623. In Nkom's view, on this basis it is necessary to regulate the prices for the establishment of agreements on local, physical access to copper-based access lines, the establishment of access lines, the management of the agreement on access to copper-based access lines, operator changes, access to information and support systems, and other relevant services related to local, physical access to the copper-based access network. Nkom believes that it is appropriate that the pricing of these services must be cost-oriented, based on fully-distributed, historical costs.

624. Since Nkom now requires Telenor to accommodate reasonable requests for local, virtual access to copper-based access networks (VULA copper), and local, virtual access to fibre-based access networks (VULA fibre), it is necessary to assess whether related services for VULA copper and VULA fibre, such as establishment, access to information and support systems etc., must be subject to specific price regulation.

625. VULA copper and VULA fibre will be subject to margin squeeze tests, cf. Sections 7.3.3 and 7.3.5, and it is natural that establishment fees and other relevant price elements will be included in these tests, in the same way as for VUA fibre in Market 3b. Nkom therefore believes that there is no need for further price regulation of establishment, access to support systems, etc.

626. In many cases, the purchase of wholesale products in Market 3a requires co-location in Telenor's network. Nkom believes that it is still necessary to have price regulation of co-location that is required in connection with the purchase of access products in Market 3a. Co-location will not be subject to the price-cap regulation for local, physical access, nor to the margin squeeze assessments for local, virtual access.

627. The pricing of co-location must continue to be based on the principle of cost orientation. Since co-location is a service that is used across various markets and that to a great extent is shared for both copper- and fibre-based access, Nkom believes that the requirement of cost

orientation for co-location must apply in relation to both copper- and fibre-based access networks. In its follow-up of the cost orientation requirement for co-location, Nkom will give emphasis to the cost accounts for co-location from Telenor. It may also be relevant to request additional reporting in connection with specific cases.

628. In the current decision in former Market 4 of 20 January 2014, it was emphasised that access to co-location also includes access to civil engineering infrastructure, cf. items 160–163 of the decision. This entails that current obligations related to price and accounting regulation for co-location also include civil engineering infrastructure.

629. In this decision, Nkom has found a need for a more detailed assessment of the access obligation for civil engineering infrastructure, cf. Section 7.2.12. Nkom has assessed that there is still a need for the pricing of services related to civil engineering infrastructure to be based on the principle of cost orientation.

7.3.8 Backhaul services

630. In previous decisions, Telenor has been required to offer dark fibre or other relevant solutions for backhaul. No requirements have been made pursuant to Section 4-9 of the Electronic Communications Act concerning the pricing of such access.

631. In some geographical areas, Telenor will be the sole provider of backhaul services, while in other areas there will be several possible providers of such access. Nkom assumes that the increased prevalence of fibre networks has resulted in rather fewer areas where Telenor is the only provider, compared to the previous market analysis. Increased competition to offer backhaul services might limit the possibility of over-pricing and reduce the need for strict price regulation of such access.

632. Backhaul services will be an integral part of the services that, under this decision, are subject to margin squeeze tests. This will apply to VULA fibre and VULA copper. This means that any need for price regulation of backhaul services will be limited to the purchase of LLU, SLU and local, physical access to the fibre access network. The purchase of LLU (access to HK) is expected to have rather less significance than before. There might also be a need for access to backhaul on buying SLU in connection with any upgrading of the copper network.

633. In areas where other providers than Telenor wish to upgrade the copper network, it will often be the case that these have their own access to backhaul, or that, with a relatively small investment, they will be able to establish their own solutions for backhaul. In other areas, providers that upgrade will be dependent on buying backhaul from Telenor in order to effectively upgrade the copper network. Nkom believes that if the starting point for upgrading for other providers at one point must be equivalent to Telenor’s starting point, there will be a need for price regulation, to ensure the purchase of backhaul services from Telenor at cost-oriented prices.

634. The purchase of local, physical access to fibre access networks (PtP) has, until now, been limited, and Nkom expects this to persist. The need for price regulation of backhaul for this type of services will therefore be limited.

635. The margin squeeze tests of VULA fibre and VULA copper ensure the economic replicability of Telenor's retail products, including the need for backhaul. Any such regulation is suitable to reduce the need for separate price regulation of backhaul services used for broadband services in Market 3a. In isolated terms, this indicates a reduced need for separate price regulation of backhaul services for such purposes. However, Nkom believes that it is natural to see access to backhaul as an overall service in the national market. This exerts influence in the opposite direction. The fact that backhaul services can be used to both support copper-based and fibre-based access also leads to regarding backhaul as an overall service. On this basis, Nkom believes that there is no reason to omit certain types of use of backhaul from separate price regulation requirements.

636. On this basis, Nkom believes that it is necessary to require Telenor to offer access to backhaul services at cost-oriented prices. This applies to backhaul services associated with the purchase of local, physical access, or local, virtual access in Telenor’s copper-based or fibre-based access network.

7.3.9 Cost accounting

637. Pursuant to Section 4-9 of the Electronic Communications Act, Nkom may require providers with significant market power to use specific systems for cost accounting. The provision specifies the following obligations in connection with cost accounting:

> *“A description of the systems required for cost accounting, including an overview of the main cost categories and the cost allocation rules that are used, shall be made public. Confirmation that the cost accounts are in accordance with the system laid down for compiling the cost accounts shall be prepared by an external auditor and published annually.”*

638. Annex 1 of the NGA Recommendation states:

> *“In order to enforce cost-orientation obligations, NRAs should impose accounting separation pursuant to Article 11 of Directive 2002/19/EC. Separated accounts for the NGA infrastructure and/or service elements to which access is mandated should be set up in such a manner that the NRA can (i) identify the cost of all relevant assets for the determination of access prices (including depreciation and valuation changes) and (ii) monitor effectively whether the SMP operator grants access under the same conditions and prices to other market participants as to its own downstream arm. Such monitoring should include the performance of margin-squeeze tests. Costs should be allocated on the basis of objective criteria amongst the various wholesale and retail products which rely on such inputs, to avoid double counting.”*

639. For several years, Nkom has assumed that the main purpose of accounting separation is to monitor compliance with an obligation of non-discrimination. Nkom has also assumed that the main purpose of cost accounting will usually be monitoring compliance with an obligation of cost-oriented prices. There are a number of similarities between accounting separation and cost accounting, but also some differences, which are discussed in Nkom's remedy document.

640. With this decision, the price cap for local, physical access to the copper-based access network is based on modelled costs from Nkom's LRIC model. Previously, the price cap was based partly on information from the cost accounts from Telenor. Even though the method of determining the price cap has now been changed, the information that cost accounting provides will be important for Nkom when, in a few years' time, an updated market analysis is to be performed, with any associated assessment of separate obligations in this relevant market.

641. Other price elements than the monthly prices for local, physical, access to the copper network are subject to the cost-orientation requirement. Costs related to the establishment of local, physical access are not included in the modelled costs from Nkom's LRIC model. Therefore, Nkom considers it necessary for Telenor to prepare cost accounts for local, physical access to copper-based access networks, including access to sub-loops. Furthermore, Nkom considers it necessary that Telenor provides a supplementary report to the cost accounts, with a split between subscription and establishment/other products/services for local, physical access to copper-based access networks.

642. Concerning local, physical access to Telenor's fibre-based access network, Nkom has concluded that it is neither necessary nor proportional to impose price regulation. There will thus be no need either for Telenor to prepare cost accounts for such access.

643. For VULA copper and VULA fibre, Nkom has concluded that price regulation in the form of margin squeeze tests is necessary. Costs related to subscription and establishment will be included in these margin squeeze tests. Nkom therefore believes that there will be no need to require Telenor to prepare cost accounts for VULA copper or VULA fibre.

644. Nkom believes that it is necessary for Telenor to continue to prepare cost accounts for co-location in fixed networks, including cable routes, in line with current practice. Co-location related to local, physical access to copper- and fibre-based access networks, VULA copper and VULA fibre will be included in the overall cost accounts for co-location in fixed networks.

645. Furthermore, Nkom considers it necessary for Telenor to prepare cost accounts for backhaul services. Backhaul services associated with the purchase of local, physical access or local, virtual access in Telenor's copper-based or fibre-based access networks must be included in the overall cost accounts for such access.

646. In connection with the reporting of cost accounting, Telenor shall account for any significant changes in reported figures compared to the previous reported cost accounting.

7.3.10 Proportionality

647. Nkom believes that in this case there is no entirely satisfactory alternative to price regulation of local access, both physical and virtual, to the copper-based access network, in order to resolve any problems associated with over-pricing in this market.

648. In principle, price regulation is considered to be a burdensome obligation. In practice, Nkom has faced a choice between the use of cost orientation or price-cap regulation for local, physical access to copper-based access networks. Determining a price cap can be resource-intensive. When the price cap has been determined, however, price-cap regulation as a method will generally not be very resource-intensive for the regulated provider to comply with and not very resource-intensive for the authority to oversee. In this respect, the price-cap regulation will seem less onerous, both for the regulated provider and for the supervisory authority, than a cost-orientation requirement.

649. Nkom has concluded that Telenor must offer the establishment of drop cables to "homes passed" households subject to the access obligation in this decision. The fee for such establishment will be determined according to the principles stated in Section 7.3.6. Nkom believes that this obligation is necessary and proportional to ensure that access buyers also have access to densification sales in established fibre access networks.

650. In the same way, Nkom believes that the cost orientation of the establishment of local, physical access to copper-based access networks is proportional. Furthermore, Nkom believes that cost-orientation of co-location, cable routes, etc., is necessary and proportional. This is a continuation of the regulation in the former Market 4.

651. Nkom has concluded that Telenor must offer backhaul services at cost-oriented prices and also keep cost accounts of these services. Nkom believes that the obligation is necessary and proportional.

652. Nkom has concluded that it is necessary to impose an obligation on Telenor to pass a margin squeeze test for local, virtual access to the copper-based access network. Nkom believes that such a requirement is proportional, since the test to a sufficient degree ensures Telenor's incentives to invest in an upgraded copper network, while also protecting the access buyer by preventing margin squeeze. Nkom believes that, in overall terms, the benefits exceed the drawbacks which this obligation imposes on Telenor. The same applies to local, virtual access to fibre-based access networks.

653. The cost accounting obligation is mainly a continuation of the existing obligation in the former Market 4, and Telenor has already developed a cost accounting system. The obligation is therefore less onerous than if Telenor had to develop such a system from scratch.

654. On this basis, Nkom believes that the proposed price regulation and cost accounting obligations for Telenor are proportional. In this respect, reference is also made to the assessment in Section 7.7.

7.3.11 Special obligations related to prices and accounts

655. Nkom refers to the aforementioned assessments concerning which special obligations associated with prices and accounts must be imposed on Telenor in Market 3a. The special obligations imposed on Telenor ASA (in the remainder of the chapter referred to as Telenor) are stated in this chapter.

656. Pursuant to Section 4-9 of the Electronic Communications Act, Nkom requires Telenor to set prices for full local, physical access to the copper-based access network, in line with the price caps stated in Section 7.3.2.4. The price caps for local, physical access to the copper-based access network in Market 3a during the next few years are set at:

- From 1 February 2019: NOK 73 per month
- From 1 January 2020: NOK 75 per month
- From 1 January 2021: NOK 77 per month

657. Pursuant to Section 4-9 of the Electronic Communications Act, Nkom requires Telenor to set the price for shared access at half of the calculated price for full access (same product type), less special costs for establishing and operating full access, with an addition for special costs for establishing and operating shared access, cf. Section 7.3.2.5..

658. Pursuant to Section 4-9 of the Electronic Communications Act, Nkom requires Telenor to set prices for access to sub-access lines/SLU in line with the price caps stated in Section 7.3.2.6. The price caps for access to sub-loops/SLU in Market 3a for the next few years are set as:

- From 1 February 2019: NOK 58 per month
- From 1 January 2020: NOK 60 per month
- From 1 January 2021: NOK 62 per month

659. If Nkom does not take a new decision in this market before 31 December 2021, the price caps set for 2021 for local, physical access and access to sub-loops/SLU will apply until further notice.

660. Pursuant to Section 4-9 of the Electronic Communications Act, Nkom requires Telenor to offer access to VULA copper at prices which ential that the access buyer is not subject to margin squeeze, in line with Section 7.3.3. Telenor must pass a margin squeeze test for VULA copper. Nkom will, as far as possible, apply the same principles as apply to the margin squeeze test for VUA fibre in the Market 3b-decision Annex 3, but will make a separate decision on the specific design of the margin squeeze test at a later date.

661. Pursuant to Section 4-9 of the Electronic Communications Act, Nkom requires Telenor to offer access to VULA fibre at prices which entail that the access buyer is not subject to margin squeeze, in line with Section 7.3.5. Telenor must pass a portfolio-based margin

squeeze test of fibre-based retail products, and a gross margin test of individual, fibre-based, retail products. As far as possible, Nkom will apply the same method and principles to the margin squeeze test for VULA fibre in Market 3a as apply to the margin squeeze test for central access to Telenor's fibre-based access network in Market 3b (VUA fibre), cf. Section 7.3.4.3 in the Market 3b decision, and Annex 3 to the Market 3b decision. Nkom will conduct gross margin tests according to the method described in Section 7.3.4.3 of the Market 3b decision. Nkom will make a separate decision on the concrete design of the margin squeeze test for VULA fibre.

662. Pursuant to Section 4-9 of the Electronic Communications Act, Nkom imposes price caps on Telenor for access to establish drop cables to “homes passed” based on the price that Telenor can be deemed to charge its own retail activity for any such establishment, cf. Section 7.3.6. The price cap applies to access level and the prices must be kept updated at all times. An equivalent transparency requirement is stated in Section 7.5.4.1.

663. Pursuant to Section 4-9 of the Electronic Communications Act, Nkom requires Telenor to offer the establishment of agreements on access to copper-based access lines, the establishment of access lines, the management of the agreement on access to copper-based access lines, operator change, access to information and support systems and other relevant services, cf. Section 7.3.7, related to local, physical access to the copper-based access network, at cost-oriented prices. The cost-orientation must be based on fully-distributed historical costs.

664. Pursuant to Section 4-9 of the Electronic Communications Act, Nkom requires Telenor to offer co-location (including access to civil engineering infrastructure) in connection with both copper- and fibre-based access networks at cost-oriented prices, cf. Section 7.3.7. The cost-orientation must be based on fully-distributed historical costs. The cost-orientation requirement must apply in relation to both copper- and fibre-based access networks. The follow-up on the cost-orientation requirement will emphasise cost accounting, and any special reporting.

665. Pursuant to Section 4-9 of the Electronic Communications Act, Nkom requires Telenor to offer access to backhaul services relating to the purchase of local, physical access or local, virtual access in Telenor's copper- or fibre-based networks at cost-oriented prices, cf. Section 7.3.8. This applies to backhaul services associated with the purchase of local, physical access, or local, virtual access in Telenor’s copper-based or fibre-based access network.

666. Pursuant to Section 4-9 of the Electronic Communications Act, Nkom requires Telenor to keep cost accounts for local, physical access to copper-based networks based on fully-distributed historical costs, cf. Section 7.3.9. Telenor will prepare an additional report to the cost accounts showing the cost accounts for subscription and establishment/other products/services individually.

667. Pursuant to Section 4-9 of the Electronic Communications Act, Nkom requires Telenor to keep cost accounts for co-location based on fully distributed historical costs, cf. Section

7.3.9. The total cost accounts for co-location in fixed networks must include both copper- and fibre-based access networks.

668. Pursuant to Section 4-9 of the Electronic Communications Act, Nkom requires Telenor to keep cost accounts for backhaul services based on fully distributed historical costs, cf. Section 7.3.9.

669. Telenor's obligation to keep cost accounts based on fully distributed costs thereby includes co-location, backhaul services and local, physical access to copper-based access networks. In this decision, Nkom applies the same principles as were assumed in the decision of 21 December 2006 on elaboration and clarification of principles for cost accounting.

670. Pursuant to Section 4-9 of the Electronic Communications Act, Nkom requires Telenor to keep cost accounts according to the following principles:

- Operating revenue, operating expenses (including depreciation), imputed interest payments and capital employed for full and shared access to the copper-based access network in Market 3a must be separated from other activities and appear as a separate profit unit.
- Costs/capital employed that are not directly attributable shall be allocated to the profit unit on the basis of an analysis of the causal relationship to the extent this is possible. Remaining costs/capital employed shall be distributed proportionally on the basis of previously attributed costs/capital employed.
- The cost accounts will be based on the financial accounts, with the exception of the financial items to be replaced by an imputed interest rate on the book capital employed. Imputed interest payments shall consist of a weighted average of interest on debt and a reasonable return on equity multiplied by book capital employed. A reasonable rate of return on capital is in principle equal to the level expected from equivalent investments. Telenor will use the prevailing interest rate set by Nkom for the fixed network markets. Book capital employed is the same as the book value of assets less non-interest-bearing liabilities. The cost accounts are to be reconciled with the financial accounts, and any discrepancies must be explained.
- The cost accounts are to be reviewed by an auditor in accordance with the standard for a limited review. Among other things, the auditor shall prepare a confirmation of whether or not the cost accounts comply with the stipulated system of cost accounting, including verification of the reconciliation with the audited financial accounts. In addition, a verification shall be conducted of whether selected distribution keys meet the requirements for activity based costing. The auditor shall be given access to all relevant documentation in order to express an opinion about the cost accounts.

671. It is stipulated in Section 4-9, third paragraph, of the Electronic Communications Act that Telenor must publish a description of the systems imposed for running cost accounts, including an overview of the main categories of costs and which distribution keys are used.

672. Pursuant to Section 10-3 of the Electronic Communications Act, Nkom requires Telenor to report the above mentioned cost accounts to Nkom before 1 July of the following year. The first reporting according this decision must be for the 2019 financial year and must be sent to Nkom before 1 July 2020. In connection with the reporting of cost accounting, Telenor shall account for any significant changes in reported figures compared to the previous reported cost accounting.

673. Nkom may issue supplementary provisions in a separate decision regarding the obligation of cost accounting, cf. also Nkom's decision of 21 December 2006 on elaboration and specification of principles for cost accounting.

7.4 Non-discrimination

7.4.1 Regulatory basis

674. Chapter 5 identified the fact that Telenor can discriminate between different providers with regard to price or other conditions as a potential competition problem.

675. Non-discrimination requirements are also discussed in the NGA Recommendation. In respect of non-discrimination based on price, it is stated in Annex I:

> *"Under the principle of non-discrimination, the price charged to the SMP operator's downstream arm should be the same as the price charged to third parties."*

676. In the recitals, the Recommendation also mentions non-discrimination more generally:

> *"(17.) […] non-discrimination obligations are required to ensure the effectiveness of access to the terminating segment."*

677. Section 4-7 of the Electronic Communications Act authorises Nkom to impose an obligation of non-discrimination. The first paragraph of the provision authorises the imposition of an obligation on a provider with significant market power to treat external users equally. The second paragraph of this provision authorises imposition on a provider with significant market power of an obligation to offer the same or equivalent quality and terms to competing providers as to its own or associated operations.

678. Non-discrimination does not necessarily imply that all businesses are to be given identical terms, but that any differences in terms that are imposed are based on objective criteria. The main point of non-discrimination is that providers with significant market power must treat similar situations in a similar manner with regard to price, information and other terms and conditions, regardless of the operations they pertain to.

7.4.2 Assessment of the need for an obligation of non-discrimination

679. To a certain degree, discriminatory behaviour can be redressed through price controls and/or transparency obligations. For example, an obligation of cost-oriented prices could make it difficult to discriminate on price. A transparency obligation can make it more difficult to maintain discriminatory practices, partly because it makes this kind of behaviour more visible. Nevertheless, Nkom finds that price controls and transparency obligations alone would not be sufficient to prevent price discrimination and other discriminatory behaviour between in-house and external providers.

680. An obligation of non-discrimination could prevent the leveraging of market power from the wholesale to the retail market, as the scope to engage in exclusionary behaviour is reduced. In this context, exclusionary behaviour means attempts to deny access to and shut out competitors from markets by operating with prices, quality differences or access terms that favour the provider's own operations.

681. In the decision of 20 January 2014 in former Market 4, Telenor was imposed an obligation of non-discrimination for access to both copper and fibre-based access networks, as well as for set-up, co-location and other associated services (cf. Section 4-7 of the Electronic Communications Act).

682. Chapter 5 identifies the possibilities for various forms of differentiation of prices and/or price structures between different categories of customer and between internal and external access buyers. Other discrimination between an SMP provider's own retail operations and external provision, for example related to delaying tactics, undue requirements and quality discrimination, could result in the leveraging of market power from the wholesale to the retail market (see Chapter 5).

683. Furthermore Telenor may have an incentive to discriminate against external operations with regard to price and other terms. For example, it is conceivable that Telenor could grant less favourable terms to providers that pose the greatest competitive threat to Telenor in related retail markets.

684. Nkom therefore finds that an obligation on non-discrimination regarding access should be imposed on Telenor in Market 3a. The obligation of non-discrimination applies between internal use and external provision, as well as between different external buyers of access. On the basis of the discussion of competition problems for various access forms in Chapter 5 and the design of the access and price controls above, the obligation shall apply to wholesale products based on both copper and fibre in Telenor's access networks. Furthermore, Nkom finds that Telenor should continue to be subject to an obligation of non-discrimination for co-location, backhaul, etc., in connection with wholesale products based on both copper and fibre in Telenor's access networks.

7.4.3 Assessment of whether obligations of non-discrimination should be based on EoI or EoO

685. Obligations of non-discrimination can be designed in a variety of ways. In previous decisions in the wholesale markets for broadband access, obligations of non-discrimination have not usually contained specific requirements regarding Telenor's use of systems and supply chains for the company's internal retail operations and external access buyers respectively, based on an assessment of an Equivalence of Inputs (EoI) or an Equivalence of Output (EoO) approach. However, on the basis of the Commission's Recommendation on consistent non-discrimination obligations and costing methodologies from 2013, it is natural to assess whether obligations of non-discrimination should be based on an EoI or an EoO regime.

686. In the Commission's Recommendation on consistent non-discrimination obligations and costing methodologies from 2013 (the 2013 Recommendation), EoI and EoO are defined as follows:

> *"Equivalence of Inputs (EoI) means the provision of services and information to internal and third-party access seekers on the same terms and conditions, including price and quality of service levels, within the same time scales using the same systems and processes, and with the same degree of reliability and performance. EoI as defined here may apply to the access products and associated and ancillary services necessary for providing the 'wholesale inputs' to internal and third-party access seekers.*
>
> *Equivalence of Output (EoO) means the provision to access seekers of wholesale inputs comparable, in terms of functionality and price, to those the SMP operator provides internally to its own downstream businesses albeit using potentially different systems and processes."*

687. In other words, EoI means that the products, prices, systems and processes used for the regulated provider's internal retail operations are also offered to external buyers of access, while EoO means that the wholesale offering to external buyers of access is comparable with the provision to the regulated provider's internal retail operations in respect of functionality and pricing, even though different systems and processes may be used.

688. The aim of the Commission's 2013 Recommendation is to promote increased competition, strengthen the internal market for electronic communications networks and services, and promote investments in NGA networks. The Commission considers it important that obligations of non-discrimination are designed to ensure equal terms of competition, and in the 2013 Recommendation stated that the following elements should be taken into account in the formulation of obligations of non-discrimination:

- Ensure equivalent access through requirements of EoI or EoO

- Secure technical replicability for access buyers when the regulated provider launches new retail products
- Ensure that the regulated provider complies with obligations of non-discrimination by monitoring and following up KPIs with related service level agreements (SLA) and compensation arrangements in the form of service level guarantees (SLG)

689. As a point of departure, the Commission finds that EoI is the most effective approach to ensure non-discrimination. At the same time, the Commission points out that, based on national circumstances, it may be disproportionate to impose an EoI obligation. If EoI is not considered proportionate from a cost–benefit point of view, the regulatory authority should ensure that the regulated provider offers access products based on an EoO approach. In this case, the regulator must ensure that the obligation of non-discrimination entails that access buyers can use systems and processes with the same level of reliability and quality or performance as the systems and processes used by the regulated provider's internal retail operations.

690. The Commission points out that if an EoO basis is chosen, it is especially important to ensure equal terms of competition for access buyers through technical replicability and associated tests. In order to create increased transparency and confidence in the wholesale market, and to ensure that the SMP provider complies with the obligations of non-discrimination in an EoO regime, the Commission states further that monitoring and follow-up of KPIs, with associated SLAs and SLGs, should be included as part of the obligation of non-discrimination.

691. Against this backdrop, Nkom has assessed whether to impose on Telenor an obligation of non-discrimination based on EoI in Market 3a. According to the 2013 Recommendation, an assessment of the proportionality of an EoI obligation should be based on a cost–benefit assessment where the regulated provider's costs associated with compliance with an EoI obligation, including costs associated with system and process changes to existing IT systems and supply chains, are weighed up against the benefits for competition afforded by EoI. The assessment must at the same time take into account the objective defined in the 2013 Recommendation that regulation should promote investments in NGA networks.

692. The attached market analysis refers to complaints and appeals Nkom has processed in recent years relating to the obligation of non-discrimination in former Markets 4 and 5. Experience from these complaints and appeals suggests that there may be a need to impose EoI in order to prevent discrimination between Telenor's internal retail operations and external buyers of access in Market 3a in the years ahead. EoI will restrict Telenor's ability to exercise discriminatory behaviour and thereby contribute to increased trust among the access buyers in this market.

693. At the same time, an EoI obligation may entail significant development and/or change costs for Telenor. These kinds of costs must be weighed up against potential positive effects

for innovation and competition in the retail market as a result of an obligation of EoI. In this context, Nkom believes that it must also be assessed whether the positive competition effects of an EoI regime can also be achieved by clarifying and sharpening the non-discrimination requirements in an EoO regime.

694. In the 2013 Recommendation, the Commission assumes that obligations of non-discrimination in Market 3a based on EoI will have significant positive effects for NGA competition and innovation linked to NGA services. Nkom also holds that requirements that effectively ensure non-discrimination in Market 3a are important for NGA competition in Norway, but at the same time finds that the relatively high degree of infrastructure competition in the Norwegian broadband market suggests that an obligation of EoI is not as important for innovation associated with NGA services in Norway as in countries with weaker infrastructure competition. The degree of infrastructure competition is also referred to by the Commission as a factor that should be taken into account when assessing the benefits and usefulness of EoI.

695. Information that Nkom has obtained from Telenor about systems and supply chains for internal and external sales channels indicates that there is already a high degree of use of the same systems and supply chains and that planned system improvements apply to both internal and external systems. This implies that there are already elements of EoI in Telenor's wholesale offering, as was also pointed out in the decision in former Market 4 from 2014. This argues in favour of the view that it will not be proportionate to impose EoI.

696. In light of this, Nkom has concluded that, from a cost–benefit perspective, it is neither necessary nor proportionate to impose an obligation of non-discrimination based on EoI in Market 3a. However, based on the experiences from the aforementioned complaints and appeals relating to the obligation of non-discrimination in former Markets 4 and 5, Nkom finds it is necessary to clarify and partially sharpen the requirements regarding documentation of non-discrimination in an EoO regime in Market 3a. This kind of clarification and the sharpening of the documentation requirements will make it easier for both Nkom and external buyers of access to assess whether Telenor is complying with the obligation of non-discrimination in this market.

7.4.4 Non-discrimination based on EoO

697. Non-discrimination based on EoO means that Telenor's wholesale operations can continue to use different systems and processes for provision to its internal retail operations and sales to external buyers of access. According to the Commission's 2013 Recommendation, however, obligations of non-discrimination in an EoO regime should be designed to ensure that the systems and processes used for the external access buyers have the same level of reliability, functionality and quality or performance as the systems and processes used for the regulated provider's internal retail operations.

698. In its comments on Nkom's notification of the draft decision in former Markets 4 and 5, prior to the current decision of 20 January 2014, ESA highlighted the importance of access

buyers being ensured input factors equivalent to those available to Telenor's own retail operations. ESA stated:

> "*Against this background, the Authority invites the NPT to ensure that access seekers can use the wholesale access systems and processes relevant to markets and with the same degree of reliability and performance as Telenor's own downstream retail arm. This includes ensuring effective access to the same technical and commercial wholesale information, as well as to ordering, delivery and repair inputs necessary for an efficient operator to develop or adapt its own systems and processes, in sufficient time to compete with the corresponding retail offers of the SMP operator.*"

699. Using this as a starting point, Nkom has undertaken a comprehensive assessment of which obligations should be included in an obligation of non-discrimination based on EoO in Market 3a. Since Nkom has concluded that EoI is neither necessary nor proportionate in this market, Nkom finds that the sum of the obligations in an EoO regime must ensure equal terms of competition and non-discrimination between external buyers of access and Telenor's internal retail operations.

700. A key element of an obligation of non-discrimination is that access buyers should be able to offer similar products as Telenor in the retail market and launch new products at the same time as Telenor. To ensure that this is possible, Nkom concludes below that it is necessary to impose on Telenor an obligation to perform technical replicability tests as a part of the non-discrimination obligation in Market 3a.

701. In addition, Nkom regards the preparation and publication of KPIs related to key activities in the supply chain as an important means to detect any potential discriminatory behaviour. KPIs are intended to measure different parameters that have been determined beforehand in a service level agreement (SLA) between the regulated provider and the access buyers. Nkom finds that it is also necessary for an effective EoO regime to impose on Telenor SLA requirements that can form the basis for monitoring and follow-up of published KPIs. In addition, Nkom holds it is necessary that the SLAs include service level guarantees (SLG) in the event of non-compliance with agreed quality levels in order to ensure non-discrimination based on EoO in Market 3a.

702. The obligation to perform technical replicability tests is part of the obligation of non-discrimination and is justified and described in more detail below. The requirement to prepare and publish KPIs related to key activities in the supply chain and the requirements for SLAs and SLGs relating to the same quality parameters as the KPIs were part of obligation of transparency and reference offers in the current decision in former Market 4. In this decision, the requirements regarding SLAs and SLGs are described in Section 7.2.15, while the requirements regarding KPIs are described in Section 7.5.4.

7.4.5 Content of the obligation of non-discrimination

703. The obligation of non-discrimination shall apply to all the wholesale products covered by the obligation of access in Market 3a (cf. Section 7.2 above).

704. The obligation of non-discrimination applies both to Telenor's offerings to various external buyers of access and between external access buyers and Telenor's internal retail operations.

705. Non-discrimination between different external buyers of access means that Telenor will offer the same terms, functionality and pricing to all external access buyers that request wholesale products in Market 3a, unless the difference can be justified by objective criteria. Examples of aspects where there must not be differential treatment between external buyers of access include system availability, delivery, fault correction and migration.

706. In the appeal decision of 9 March 2018 concerning Nkom's decision on the designation of providers with significant market power and the imposition of special obligations in the market for access to and call origination in public mobile communications networks (formerly Market 15), the Ministry of Transport and Communications has, among other things, further explained the content of the requirement of non-discrimination between remote access buyers, and how this will be followed up. In Section 6.4.6, the Ministry writes the following:

> *"In order to control whether the requirement of non-discrimination between remote access buyers is complied with, Nkom will undertake a comparison of the various agreements. If the agreements cannot be compared directly, Nkom can make assumptions that make it possible to compare the agreements. It cannot be specified in advance which assumptions will be made in the individual case, because this will depend on the structure and design of the agreements. The conditions must be realistic for the access buyers that are compared, and suitable for the purpose. If there is any doubt about how the obligation is to be complied with, Telenor will be able to contact Nkom for further guidance.*
>
> *The Ministry refers to how volume discount, volume commitment and binding time, for example, may be objective reasons for different prices. Whether such conditions constitute an objective reason must be determined in the individual case. Reference is made to section 237 and Nkom's elaboration of how, when a competing provider achieves better terms, equivalent terms must be offered to other competing providers. This entails that it must be possible for the terms to result in a lower price for all access buyers, for this to be considered to be an objective reason for different prices.*
>
> *The fact that terms have a value for Telenor will not necessarily mean that this is an objective reason for different prices. It is actual cost savings that are central to the assessment of what is considered to be an objective reason. The cost savings must be documented and, to a certain degree, quantified in order to constitute a objective reason for different prices. This is in line with the Electronic Communications Act's*

preparatory work, which sets the requirement that the terms must be clear and verifiable, so that it is possible to control compliance."

707. Nkom believes that the Ministry of Transport and Communications' assessment is also relevant in this context and applies the assessments to the content of the non-discrimination requirement in this decision.

708. Non-discrimination between external buyers of access and Telenor's internal retail operations means that Telenor must offer wholesale products to external access buyers with the prices and conditions, and with the same functionaliy, as apply to Telenor's internal retail operations. Examples of aspects where there must not be differential treatment between Telenor and external buyers of access include system access, delivery, fault correction and migration.

709. In its comments on Nkom's notification of the draft decision in Markets 3a and 3b ESA has acknowledged Nkom's assessment that it is not proportionate to impose non-discrimination based on EoI. ESA also emphasises the importance of Nkom ensuring that the non-discrimination obligation functions effectively, and e.g. writes:

"The Authority acknowledge NKOM's view that the imposition of EoI in the Norwegian context would be disproportionate. At the same time, NKOM's reply to the Authority's first RFI demonstrates that, even in the presence of existing non-discrimination and KPI reporting obligations, the assessment of Telenor's systems and routines in 2017 indicated that its channels/interfaces still had more fult-handeling functionality and were more automated than those available to access buyers. In this regard, the Authority invites Nkom to make sure that the apporiate safeguards and monitoring processes are in place to confirm an effective operation of the non-discrimination obligation (and that Nkom acts swiftly in the event of any disputes) such that technical replicability of Telenor's offers is ensured for the forthcoming regulatory period."

710. To ensure that the non-discrimination obligation functions effectively, Nkom has made several clarifications and changes compared with the market decisions from 2014. Nkom refers to how, among other things, it is stated above that Telenor is to offer wholesale products to remote access buyers at such prices and terms, and with the same functionality, as applies to Telenor's internal retail activity. Nkom furthermore refers to how Telenor must prepare more detailed service level agreements (SLAs) with related compensation schemes (SLGs) and key performance indicators (KPIs), cf. Sections 7.2.15 and 7.5.4.2. Nkom has also required Telenor to conduct a technical replicability test before the company launches new or modified retail products, cf. Section 7.4.5.1 below. This will contribute to effective monitoring of the non-discrimination obligation in order to ensure the technical replicability of Telenor's retail offer.

711. If, despite these specifications and changes, the non-discrimination obligation nonetheless proves not to function sufficiently effectively, this will provide a basis for a new assessment of whether it is proportionate to impose non-discrimination based on EoI.

712. The requirement that access buyers must have access to the same functionality as Telenor's internal retail activity entails that adjustments must be made in several of Telenor's systems. Before the end of Q1 2019, Nkom therefore requires Telenor to send Nkom an overview showing the areas/systems in which Telenor's internal retail activity and remote access buyers have the same functionality, and in which areas/systems the functionality is different. For each of the areas/systems for which the functionality is different, Nkom also requires a detailed description of what is needed for the functionality to be the same, as well as an estimated time schedule for this work.

713. Nkom believes that it is appropriate for remote access buyers to have the opportunity to comment on any such overview. To the extent that Telenor's description of the overview concerns trade secrets, Nkom therefore requests that Telenor also submits a public version of the overview and ensures that the public version is suitable for the purpose, as far as this is possible.

714. Within an EoO regime, it is not decisive to the non-discrimination obligation how Telenor defines, structures and organises the relationship between its own retail and wholesale activities, including which systems and processes are used between the retail and wholesale activities. However, the systems and processes used by remote access buyers must have the same degree of reliability, functionality, and quality/performance as the systems and processes used by Telenor's internal retail activity. Since future changes in Telenor's IT systems and supply chains might be of significance to the non-discrimination obligation based on EoO, in Section 7.5.5 Telenor is required to notify Nkom as soon as possible about major changes in IT systems and supply chains.

715. The obligation of non-discrimination between external buyers of access and Telenor's internal retail operations also implies that all the wholesale products covered by the obligation of access in Market 3a must be made available to the access buyers within a reasonable period of time and in a way that allows the access buyers to offer retail products that correspond to Telenor's retail products (technical replicability).

716. Telenor must furthermore make all wholesale products subject to the access obligation available to the access buyer within a reasonable period of time. The requirement entails, among other things, that Telenor must ensure that the access buyers are given sufficient time to develop and adapt their IT systems and processes in order to be able to launch equivalent retail products at the same time as Telenor's own retail activity, irrespective of whether the retail products are based on new or modified wholesale products. Telenor therefore cannot make new or changed wholesale products available to remote access buyers at a later time than when they are made available to the company's internal retail activity.

717. The technical replicability requirement relates to new and modified retail products that Telenor launches. This requirement implies an obligation for Telenor to provide a reasonable amount of time for external buyers of access to use the same technical and commercial

information pertaining to relevant wholesale products and processes as Telenor's internal retail operations have access to. This means, among other things, that Telenor must offer the same SLAs to external buyers of access as it does to its in-house retail arm regarding, for example, system access, deliveries, fault management and correction times, and migration, and the same terms and conditions for access to relevant wholesale products.

718. The obligation to offer wholesale products with the conditions, and with the same functionaliy, as Telenor uses internally also implies that the systems that Telenor makes available to external buyers of access must be applicable and sufficient to ensure non-discrimination linked to orders and order handling processes, etc. This means, for example, that in the event of system changes or updates in Telenor's internal ordering systems to improve or streamline the order flow, corresponding system changes and updates must also be implemented in Telenor's ordering systems for external buyers of access.

719. Access agreements often contain provisions on volume discounts. The volume discounts are often split up into increments whereby the discount increases as the volume increases. Operations with high volumes will thus have an advantage over providers with smaller volumes. In order to ensure that the volume discounts are non-discriminatory, the increments in the discount scale must be objectively justified.

720. Clauses in standard access agreements that entitle Telenor to unconditional and one-sided permission to make changes, creates unpredictability for an access buyer that does not similarly apply for Telenor's internal retail business. Nkom is therefore of the view that such a right for Telenor to make changes involves the favouring of Telenor's own retail business and is therefore liable to create different opportunities to compete for access buyers and Telenor's own operations. The non-discrimination obligation entails that requirements for unconditional and one-sided permission to make changes cannot be included in agreements relating to regulated access. Reference is made to Section 7.5.3.2 regarding the prohibiting of unconditional and one-sided permission to make changes in reference offers.

7.4.5.1 Technical replicability test

721. The obligation of non-discrimination in Market 3a entails, among other things, that the regulated access products must provide access buyers with the same opportunity as Telenor's own retail operations to offer new and modified retail products. Telenor may have an incentive and the opportunity to favour its own retail operations through the technical design of the access products. It is therefore necessary to consider obligations that ensure that this aspect of the non-discrimination obligation becomes effective.

722. In Nkom's opinion, requiring that Telenor itself verifies that the access products provide equivalent opportunities for external access buyers to develop and offer corresponding retail products as the company's own retail operations will promote compliance with the obligation of non-discrimination. This kind of verification is also called a technical replicability test. In order

for an obligatory technical replicability test to be effective, Nkom finds it will be necessary to set a supplementary requirement to document that the test has been performed and passed.

723. Nkom concludes that it is necessary to impose on Telenor an obligation to perform a technical replicability test in order to promote compliance with the obligation of non-discrimination. Nkom cannot see that there are less invasive ways of ensuring that the obligation of non-discrimination is sufficiently effective. The more detailed requirements regarding the content etc. of the technical replicability test are described in Section 7.4.5.1.1, while the requirements regarding deadlines for submission etc. are specified in Section 7.4.5.1.2.

7.4.5.1.1 Test content and documentation requirements

724. Before Telenor launches new or modified retail products that are wholly or partly based on wholesale products covered by the access obligations in Market 3a, Telenor must conduct a test in accordance with the requirements laid down in this section. This requirement means that Telenor must not launch these kinds of retail products until the time limits defined in Section 7.4.5.1.2 have expired, unless Nkom, before expiry of these time limits, states in writing that the technical replicability test has been passed.

725. The purpose of the test is to promote compliance with the obligation of non-discrimination by ensuring that the access products Telenor offers enable external buyers of access to technically replicate the retail products Telenor itself offers in the retail market. To support this purpose, Telenor must communicate with access buyers in product development processes that trigger a requirement for technical replicability tests. The contents of this dialogue must be documented as part of the test that must be submitted to Nkom.

726. In order to assess whether the requirement for technical replicability is met, the technical replicability test must also as a minimum include the following information:

a) Description of the retail product(s) for which the replicability test has been carried out. This description must contain the same information as will be included in Telenor's sales and marketing materials in connection with the launch of the new or modified retail product. In addition, the description must include any other information relevant to the issue of technical replicability. The description must also include the planned release date for the retail product.
b) Specification of which wholesale products in Market 3a, including sub-elements of relevant wholesale products, are necessary to develop and offer a retail product corresponding to the retail product that Telenor is planning to launch.
c) Documentation showing that if any of the wholesale products specified in b) are either a new product or a product that has been modified within the last six months before the deadline for submission of the replicability test (cf. Section 7.4.5.1.2), notification has been provided of the changes, and new or modified wholesale products have been made available to external access buyers within a reasonable time and with adequate

information about technical and commercial aspects to ensure that the access buyer is able to replicate the retail product in question.

d) Documentation showing that access has been established to the ordering systems for the new or modified wholesale products that enables replicability of the relevant retail product and that the access complies with the non-discrimination requirement between Telenor's own retail operations and external access buyers. In addition, it must be documented that access buyers have had the opportunity to test these ordering systems.

7.4.5.1.2 Time limit for submission and assessment of documentation related to technical replicability

727. In order for the technical replicability test to fulfil its purpose, Nkom finds it necessary to set a time limit for submission of the test to Nkom. The time limit should strike a balance between Nkom's needs to assess whether the technical replicability requirement has been met before new or modified retail products are launched and Telenor's potential need to make changes and adaptations to the products involved in the test. Nkom concludes that 20 working days is an appropriate balance between these considerations. Telenor must thus submit the technical replicability test to Nkom 20 days before the date on which Telenor plans to launch a retail product that triggers a requirement to conduct a technical replicability test (cf. Section 10-3 of the Electronic Communications Act).

728. Nkom will assess the technical replicability of the retail product based on the documentation that Telenor has submitted. If Nkom concludes that the submitted documentation does not provide sufficient basis to assess whether the obligation of technical replicability has been met, Nkom will inform Telenor about this without undue delay. The time limit of 20 working days will be extended accordingly by the number of working days from Nkom informing Telenor that the documentation is inadequate until Nkom has received adequate documentation.

729. Telenor must not launch any new or modified retail products that are wholly or partially based on wholesale products that are covered by the access obligations in Market 3a before the time limits ensuing from this section have expired, unless Nkom, before expiry of these time limits, states in writing that the technical replicability test has been passed.

730. If Nkom concludes that the replicability test has not been passed, Nkom may impose on Telenor an obligation to rectify the matter by offering a wholesale product that complies with the non-discrimination obligation and providing the access buyer with the information that is necessary and sufficient to replicate Telenor's retail product. The situation may also be rectified by Telenor postponing or refraining from offering the retail product in question. In addition, it will be appropriate to sanction non-compliance with the obligation of non-discrimination through infringement fees pursuant to Section 10-13 of the Electronic Communications Act.

7.4.6 Proportionality

731. Nkom finds that imposition of an obligation of non-discrimination on Telenor in Market 3a is proportionate. Nkom finds that non-discrimination is a relatively unburdensome obligation. The obligation of non-discrimination is essentially a continuation of the regulation of former Market 4, except that Nkom is now imposing a new obligation to conduct technical replicability tests (cf. Section 7.4.5.1). This kind of test is important to ensure that access buyers are able to offer retail products that are equivalent to Telenor's retail products and that the products can be offered from the same time. Nkom finds that it is not particularly burdensome for Telenor to perform the test and that the documentation requirements are manageable.

732. Nkom finds that the advantages for competition of an obligation of non-discrimination clearly outweigh the burdens for Telenor. Moreover, Nkom cannot see that there are other suitable remedies that will adequately redress the competition problems that Nkom has identified related to price and non-price discrimination.

733. Nkom therefore concludes that the above-mentioned obligations of non-discrimination are proportionate.

7.4.7 Special obligations related to non-discrimination

734. Nkom refers to the aforementioned assessments concerning which special obligations associated with non-discrimination are to be imposed on Telenor in Market 3a. The special obligations imposed on Telenor ASA (in the remainder of the chapter referred to as Telenor) are stated in this chapter.

735. Pursuant to Section 4-7 of the Electronic Communications Act, Nkom requires Telenor to give access as specified in Section 7.2, on non-discriminatory terms, in line with Section 7.4.2. The non-discrimination requirement applies between internal use and external provision, as well as between different external buyers of access. The obligation applies to wholesale products based on both copper and fibre in Telenor's access network.

736. Pursuant to Section 4-7 of the Electronic Communications Act, Nkom imposes a non-discrimination obligation on Telenor concerning co-location, backhaul and other similar services intended to facilitate access, in connection with wholesale products based on both copper and fibre in Telenor's access networks, in line with Section 7.4.2.

737. Pursuant to Section 4-7 of the Electronic Communications Act, Nkom requires that Telenor's non-discrimination obligation must be based on "Equivalence of Output", in line with Sections 7.4.3, 7.4.4 and 7.4.5.

738. Pursuant to Section 10-3 of the Electronic Communications Act, before the end of Q1 2019, Nkom therefore requires Telenor to send Nkom an overview showing the areas/systems for which Telenor's internal retail activity and remote access buyers have the same functionality, and for which areas/systems the functionality is different. For each of the

areas/systems for which the functionality is different, Telenor must also provide a detailed description of what is needed for the functionality to be the same, and an estimated time schedule for this work. The overview must be sent to Nkom at avtaler@nkom.no and firmapost@nkom.no.

739. Pursuant to Section 4-7 of the Electronic Communications Act, Nkom requires that Telenor shall conduct a technical replicability test prior to the launch of new or modified retail products, and send Nkom documentation that the product is technically replicable for remote access buyers, in line with Section 7.4.5.1.

7.5 Publication and reference offers

7.5.1 Regulatory basis

740. Pursuant to Section 4-6, first paragraph, of the Electronic Communications Act, Nkom may impose an obligation on a provider with significant market power to publish specified information or prepare and publish reference offers for electronic communications networks and services.

741. It furthermore follows from Section 4-6, first paragraph, that the obligation to publish specific information may, among other things, include accounting information, technical specifications, network characteristics and other terms and conditions for delivery and use.

742. Pursuant to Section 4-6, second paragraph, of the Electronic Communications Act Nkom may require that offers pursuant to the first paragraph are sufficiently unbundled into individual elements with associated terms based on market needs so that the user is not bound to accept services, functions or outputs that have not been requested.

743. Pursuant to Section 4-6, third paragraph, of the Electronic Communications Act, a provider with significant market power in the market for the products full and shared access to fixed network shall prepare a reference offer for access to the fixed network. It follows from the provision that the reference offer must be sufficiently unbundled so that the requester does not pay for services, functions or outputs that have not been requested. Section 2-5 of the Electronic Communications Regulation specifies the minimum requirements for the contents of this kind of reference offer. The term “fixed access network” is technology neutral, and the obligation is therefore not limited to the fixed copper access network.

744. Pursuant to Section 2-6 of the Electronic Communications Regulation, a provider with significant market power in the markets for full and shared access to fixed networks shall also publish more detailed specified information related to the offer of co-location.

745. Nkom may, pursuant to Section 4-6, fourth paragraph, of the Electronic Communications Act, determine where, how and on what conditions the specified information and the reference offer shall be made publicly available. Pursuant to the same provision,

Nkom may order that changes be made to the offer and, pursuant to Section 4-6, first paragraph, of the Electronic Communications Act (cf. fourth paragraph) may set requirements in advance regarding the content of the reference offers.

746. Obligations related to the publication of specified information and reference offers are also discussed in the Commission's NGA Recommendation and the Recommendation on consistent non-discrimination obligations and costing methodologies. The latter specifies that key performance indicators (KPIs) will enhance transparency with respect to the quality and delivery of the regulated provider's wholesale products. It also states that KPIs are the most appropriate tools to detect discriminatory behaviour and that publication of KPIs is considered necessary to ensure a level playing field.

747. In the following, obligations for a provider with significant market power to publish specified information and reference offers are referred to as transparency obligations.

748. Pursuant to Section 10-3 of the Electronic Communications Act, Nkom may require information that is necessary for, among other things, the implementation of the Electronic Communications Act and decisions made pursuant to the Act. At the request of the Authority, service providers must submit information, including classified information concerning electronic communications networks and services, and related facilities, and concerning infrastructure connected to the operating and control systems. This also concerns information on future changes in electronic communications networks and services that may be of significance for services offered to competitors.

7.5.2 Transparency obligations

749. Although transparency obligations on their own are rarely sufficient to remedy competition problems, they play a key role in streamlining and ensuring compliance with other obligations, such as the obligation of access and the obligation of non-discrimination. For example, as regards access issues, it will help to simplify and speed up negotiations if the key terms and conditions for access follow a reference offer that is publicly available. Ensuring that access buyers have access to relevant and necessary information through the requirements regarding reference offers and access to specified information will also help redress the power asymmetry between Telenor and the access seeker. Furthermore, requirements for transparency will make it easier for other providers and Nkom to monitor compliance with obligations of access and non-discrimination. Transparency obligations also increase confidence that access is being offered on non-discriminatory terms.

750. In the above, Nkom has imposed on Telenor an obligation to grant access and set requirements regarding non-discrimination. It is thus appropriate to impose proportionate transparency obligations to support compliance with these obligations.

7.5.3 Reference offers

7.5.3.1 Requirements regarding the preparation and publication of reference offers with appurtenant standard agreements

751. Nkom finds it necessary to require that Telenor must prepare and publish reference offers and accompanying standard agreements for the wholesale products covered by the obligation of access pursuant to this decision. Nkom is of the view that reference offers that are available for all access buyers that submit a reasonable request are important to streamline the obligation of access and the obligation of non-discrimination in Market 3a.

752. Nkom considers the burden for Telenor of having to prepare and update reference offers to be relatively limited. In addition, Nkom is of the view that the competition benefits of requiring that Telenor prepares and publishes reference offers will outweigh the disadvantages such requirements may have for Telenor. Nkom thus finds it proportionate to impose on Telenor an obligation to prepare and publish reference offers for products covered by the obligation of access in this wholesale market.

753. Telenor's reference offers shall provide access to wholesale products in Market 3a on non-discriminatory terms. This entails, among other things, that Telenor's reference offers must be in line with the obligation of non-discrimination between external access buyers and Telenor's own retail operations (cf. Section 7.4).

754. Pursuant to Section 2-5, first paragraph, of the Electronic Communications Regulation, a provider with significant market power in the market for full and shared access to the fixed access network must publish a reference offer. The provision also sets more detailed requirements regarding the content of the reference offer:

1. information on the infrastructure and associated facilities to which it is relevant to offer access
2. information on location of where access pursuant to no. 1 can be offered
3. technical conditions for access to and use of the fixed access network
4. procedures for orders and delivery
5. information on restrictions of use
6. Terms of supply for full and shared access to fixed access networks, including:
    a) delivery date
    b) compensation for failure to meet agreed delivery times
    c) service level
    d) fault handling procedures
    e) quality parameters

f) standard contractual terms

g) rates for each service, function, infrastructure or other item covered by the offer.

755. In addition, pursuant to Section 2-5, second paragraph, of the Electronic Communications Regulation, a provider with significant market power in this wholesale market must publish information on the terms and conditions for access to information and support systems pursuant to Section 2-4 of the Electronic Communications Regulation.

756. In respect of the obligation to grant access to co-location in this wholesale market, Section 2-6 of the Electronic Communications Regulation dictates that the following information must be published:

1. where co-location can be offered, and if practically possible, the free capacity
2. which form of co-location can be offered, including:
   a) physical co-location
   b) co-location in close-lying structures
   c) virtual co-location
3. any restrictions on equipment which can be co-located
4. security procedures
5. access control procedures for representatives from competing providers
6. security standards
7. guidelines for the allocation of space if space is limited
8. conditions for the contracting party's right to visit the premises, if co-location is requested.

757. Publication of reference offers with appurtenant standard agreements on Telenor's website is considered a satisfactory form of publication. In order to simplify negotiation processes and prevent delaying tactics in connection with negotiation processes, Telenor's reference offers must to the greatest extent possible constitute a complete agreement.

758. Within three months of this decision entering into force, Telenor must publish on the company's website updated reference offers that comply with the requirements of this decision. At the same time, Telenor must send the updated reference offers to Nkom at avtaler@nkom.no and firmapost@nkom.no.

7.5.3.2 Requirements regarding the content of reference offers

759. In order to ensure that the transparency obligation adequately helps improve streamline and ensure compliance with other imposed obligations, such as the obligations of access and non-discrimination, Nkom finds that in some areas there is a need to specify the requirements regarding content of the reference offers in greater detail than is provided by the above-

mentioned provisions in the Act and Regulation. Nkom holds that this may help improve efficiency in negotiations for access in this wholesale market.

760. On this basis, Nkom has found it necessary to make the following clarifications of the requirements regarding the content of reference offers in this decision:

1. The starting point for imposition of specific obligations is that Telenor has significant market power in the relevant market and can thus behave independently of competitors, customers and consumers to an appreciable extent. For regulation to function as intended, Nkom holds it is vital that it remedies the asymmetrical relative strength between Telenor and the external buyers of access by facilitating that the access agreements are of the type that could be expected to be found if the market was characterised by competition. This means that the reference offers should to a reasonable extent balance the respective interests of Telenor and buyers of access. Based on this, Nkom finds there is a need to specify that reference offers should not include terms and conditions that are unreasonable, cf. Section 7.2.14 where Nkom concluded that Telenor shall be prohibited to set unreasonable requirements or use unreasonable terms in contract in connection with acommondating a reasonable request for access. Therefore, Nkom imposes on Telenor a general obligation not to set unreasonable terms in its reference offers.
2. An unconditional right for Telenor to unilaterally implement changes to the company's reference offers will, in Nkom's opinion, be liable to create clear unpredictability for an access buyer in comparison with Telenor's internal retail business. In Nkom's view, such commercial uncertainty is to be deemed an expense the buyer of access will have to take into consideration when it will price its services in competition with Telenor. Since corresponding unpredictability does not apply for Telenor, Nkom finds that such a provision is liable to restrict the access buyer's opportunity to compete with Telenor on equal terms and thereby favours Telenor's own retail business. Nkom is therefore of the opinion that provisions that grant Telenor unconditional and one-sided permission to make changes are unreasonable and discriminating contract terms. Nkom refers to the discussion in Section 7.4.5.
3. Reference offers shall include detailed, clear descriptions of all the wholesale products that Telenor is required to provide access to in accordance with this decision, with the corresponding price list for all the access products in this wholesale market.
4. As regards the technical conditions for access to and use of wholesale products in this market, the reference offer must contain, among other things, technical specifications for possible interconnection points in the network. In addition, Telenor, as part of the reference offer in Market 3a, must provide access buyers with information about equipment that can be used in the network, including end-user equipment in connection with the upcoming modernisation of the copper network. Through its

ownership of the copper network, Telenor will have better insight than access buyers into which end-user equipment is compatible with Telenor's network equipment. This could provide Telenor with an advantage by the company being in a better position to plan procurement of end-user equipment compatible with vectoring and/or G.fast in Telenor's copper network than access buyers that do not have this knowledge. In order to ensure that Telenor and access buyers can compete in the retail market on an equal footing, Nkom therefore finds it necessary to impose on Telenor an obligation to prepare and publish a list ("vectoring whitelist") of end-user equipment that is compatible with vectoring and/or G.fast in Telenor's copper network. The list must, at a minimum, include all relevant equipment that Telenor uses, plans to use, or that Telenor in some other way knows is compatible with Telenor's own network equipment, linked to the upgrading of the copper network. The list must be up-to-date at all times and take into account relevant technological developments.

5. Information on special terms and conditions for access to co-location must be stated in the reference offer, including information about options for co-location at different locations, which equipment can be co-located, the rules for allocation of space if there is limited co-location space, access rules, and safety and security requirements, etc.
6. Ordering procedures for all wholesale products included in the obligation of access in accordance with this decision must be included in reference offers, as must payment terms, including invoicing procedures.
7. Reference offers must also include terms and conditions and procedures for:
    - Deliveries, with appurtenant service level agreements (SLA)
    - Fault correction, with appurtenant service level agreements (SLA)
    - Migration, with appurtenant service level agreements (SLA)
    - Compensation arrangements in the form of service level guarantees (SLGs) for failure to provide the agreed service levels. Nkom specifies that Telenor must provide reasonable compensation in the event of failure to provide the level of service quality agreed in SLAs (and not only in connection with failure to meet agreed delivery times, as provided directly by Section 2-5 of the Electronic Communications Regulation).

    See Section 7.2.15 for a more detailed description of the requirements regarding SLAs and SLGs in this decision.
8. In addition, reference offers must include provisions on:
    - Agreement period, renegotiation and termination
    - Price negotiations during the agreement period
    - Consequences of any breach of agreement

- Dispute resolution arrangements

9. Any requirements in Telenor's reference offers regarding provision of security should be proportionate. Nkom would specify that this entails that Telenor cannot set requirements regarding provision of security beyond the commercial risk the company is subjected to by providing the specific access. In Nkom's view, terms requiring a company requesting co-location to both pay in advance for leasing and provide bank guarantees will not normally be a proportionate requirement.
10. Reference offers must include the guidelines and terms and conditions for coexistence in the network that ensure that, for example, the agreed quality level is maintained.
11. Reference offers must contain dates showing when the offer was last modified and dates for any other changes within the current decision period.

761. Telenor's fault correction policy in the copper access network must be included in the standard agreements. This is reviewed separately in Section 7.5.5.3.

7.5.3.3 Process in connection with preparation of and major changes to reference offers

762. Agreements on access in this relevant market will largely conform to Telenor's reference offers. Reference offers thus play a central role in that in practice they almost exhaustively define the terms and conditions of the access agreements. For this reason, it is especially important that, in the event of preparation of new reference offers and in connection with major changes to Telenor's existing reference offers, transparent processes are employed whereby access buyers are involved and their needs are taken into account before major changes of this kind are implemented. In this context, major changes are changes that might substantially affect the access buyers' investments and/or choice of business model, which the access buyers have made based on Telenor's current reference offers for access in this wholesale market. Changes to the reference offers that reduce access buyers' right to get faults in the network repaired by Telenor on Telenor's account, cf. Section 7.5.5.3, will also be considered a major change that means that Telenor must involve access buyers.

763. Nkom finds it appropriate that, in connection with any major changes to the reference offers, Telenor obtains feedback from the access buyers and involves the access buyers in the change process. In this context, Nkom finds that the Norwegian Broadband Forum, established in 2016, is a suitable forum for obtaining feedback. Nkom therefore holds that any major changes made to Telenor's reference offers should be discussed with the access buyers in the Broadband Forum a reasonable amount of time before any such major changes are implemented.

7.5.4 Access to specified information

764. In addition to the obligation to prepare and publish reference offers, Nkom holds it is necessary and proportionate to impose on Telenor an obligation to provide access to specified information as part of the transparency obligation in this decision.

765. As a starting point, the obligation to grant access to specified information applies to any information that is relevant and necessary in connection with access in this wholesale market and that is not readily available by other means. The information must be transparent and provided in a manner that is appropriate for the purpose of the exchange of information. Telenor may not refuse to grant access to this kind of information on the grounds that the information in question has not been systematised in a way that can be forwarded to the access buyers.

766. Nkom would clarify that it is not a prerequisite for the obligation to grant access to specified information that Telenor's internal retail operations use the information provided, if the information can be regarded as necessary in order for access buyers to be able to take advantage of Telenor's obligation of access in the relevant wholesale market in an appropriate manner.

767. In the following Nkom has found it appropriate to define in more detail the obligation to provide specified information relating to two areas: namely information about Telenor's infrastructure covered by the obligation of access, and key performance indicators (KPIs).

7.5.4.1 Access to information about Telenor's infrastructure covered by the obligation of access

768. Telenor shall provide access buyers with the following information about the company's infrastructure covered by the obligation of access in this decision:

1. The geographical coverage of the current infrastructure, including information about where the infrastructure is located, based on location data.
2. Interconnection points where an access buyer can connect its equipment to Telenor's network.
3. Potential customer base for various locations in Telenor's access network, including homes passed in Telenor's fibre access network that are potential retail customers for access buyers based on access covered by the obligation of access in this decision (cf. Section 7.3.6).

769. Telenor may require the access buyer to enter into a security agreement with Nkom as a condition for the access buyer to be granted access to this kind of information about the company's infrastructure, if access to this type of information requires security clearance pursuant to the Security Act and the provider requesting the relevant information is not subject to the Security Act, cf. Section 7.2.4.3.3.

7.5.4.2 Publication of key performance indicators (KPIs)

770. In the current decision in former Market 4 of 20 January 2014, Telenor was required to prepare and publish KPIs. This obligation was based on recommendations from BEREC, which, in addition to specifying which indicators should be included in the KPI requirements, also stressed the importance of preparing and publishing KPIs for both the wholesale provider's internal retail operations and external buyers of access. This was considered important to make it possible for the external wholesale customers to assess whether there is any discrimination between different external access buyers, as well as between external access buyers and the wholesale provider's own retail operations.

771. With reference to the discussion above regarding KPIs as part of a holistic EoO regime for non-discrimination in Market 3a (cf. Section 7.4), Nkom finds there is also a need to impose on Telenor an obligation to prepare and publish KPIs as part of the obligation of transparency in Market 3a. Nkom considers it necessary that the obligation to publish KPIs is formulated so that it is possible to compare quality and service levels for Telenor's own retail operations and external buyers of access in this wholesale market. Nkom believes this is important in order to detect any discrimination between external and internal providers in the associated retail market and will therefore impose on Telenor an obligation to prepare two sets of KPIs in Market 3a.

772. Section 7.2.15 describes the correlation between requirements regarding SLAs and KPIs. It is clear from this description that the purpose of KPIs is to measure the quality level of the same key activities for which SLAs have been prepared in the reference offers for wholesale products covered by the obligation of access in Market 3a.

773. The Commission's Recommendation from 2013 states that KPIs are information that can enhance transparency with respect to deliveries and quality in the relevant markets. The Commission also points out in the Recommendation that KPIs should be related to key activities in the supply chain and cover the entire chain, including the ordering process, the delivery or provision of the service, quality parameters linked to fault management and fault repair times, and migration between different access products. This is also taken into account in the formulation of the obligation of SLAs (cf. Section 7.2.15).

774. In light of this, Nkom finds it necessary to impose on Telenor an obligation to prepare and publish KPIs for the following key activities:

- System access (uptime and response time)
- Deliveries
- Fault management and fault correction times
- Migration between different access products

775. KPIs for each of these key activities must be designed so that they are suitable to measure the degree of fulfilment of SLA goals for the same key activities set out in Telenor's reference offers for wholesale products in Market 3a.

776. To ensure that KPIs for the external wholesale provision and Telenor's internal use of the equivalent input factors are comparable, the bases for calculation must be comparable. It is therefore necessary that Telenor discloses which methods it uses to calculate the KPIs. If Telenor's own retail operations do not use the same products, systems, and/or processes as the external buyers of access, the differences in the basis or method of calculation must be highlighted as part of the publication of KPIs. Nkom considers this necessary in order to detect any discrimination between external buyers of access and Telenor's own retail operations. If there are differences in the calculation basis and/or methods, it must be demonstrated that the calculation basis for the external and internal KPIs as a minimum relates to:

- The same calculation interval (that is, the number of days, weeks, or months)
- The same calculation period (i.e. week x or month y)
- Measurement of the corresponding level in the delivery process

777. In the current decision in former Market 4 of 20 January 2014, Telenor was required to publish KPIs on a monthly basis. Based on experience with monthly publication in recent years, Nkom finds it appropriate to change the publication frequency to quarterly for the coming decision period in Market 3a. This frequency will make the obligation less burdensome for Telenor and in Nkom's opinion will be sufficient to serve the purpose. A slightly lower publication frequency will also enable a more thorough analysis of the published data.

778. Telenor must publish the quarterly KPIs at the latest within 15 days of the end of the quarter. Telenor must notify Nkom each time it publishes the quarterly KPIs in Market 3a and at the same time send Nkom a brief account of Telenor's assessment of the relationship between the published KPIs and compliance with the obligation of non-discrimination in Market 3a. This notification and the description should be sent to avtaler@nkom.no and firmapost@nkom.no.

7.5.5 Obligation to give notice

7.5.5.1 Assessment of the need for an obligation to give notice

779. Discrimination based on factors other than price between Telenor's own retail operations and external buyers of access is a potential competition problem in the relevant market and may have major negative consequences for access buyers' ability to compete. The fact that Telenor's retail operations receive information about changes to existing infrastructure and establishment of new infrastructure earlier than external buyers of access is a potential source of this kind of discrimination. The same is true if Telenor's own retail operations receive more detailed information or information of better quality than access buyers. Both could give Telenor a clear advantage in that the company will be better and earlier able to make

necessary adjustments to business models and strategies in the broadband market. It is therefore necessary to assess proportionate obligations to give notice in order to redress this competition problem.

780. Failure to provide sufficient advance notice of changes in prices or other terms and conditions is also a potential competition problem and could give Telenor an advantage in the competition in the retail market. It is therefore necessary to assess proportionate remedies to redress this competition problem.

781. The need to require notification of changes to the establishment price for “homes passed” is assessed above in Section 7.3.6.

782. Future technology and/or structural changes in Telenor’s access network might be of significance to access and other conditions governed by this decision. Nkom therefore believes that there is a need to require that Telenor notify such changes to Nkom.

7.5.5.2 Requirements regarding the notice period for changes to existing infrastructure

783. In the decision of 20 January 2014 in former Market 4, Telenor was required to give affected providers notice of planned, significant changes to the access network and decommissioning of copper access lines and/or main distribution frames. Pursuant to the decision, notice must be given with respective minimum periods of six months and three years. The notice periods were determined on the basis of consensus between Telenor and access buyers before the relevant market decision. In the regulation period, Nkom has had to specify the precise details of the content of Telenor’s obligation to provide notice extensively, and the content of the obligation to give notice has been discussed at length in the Broadband Forum. Nkom has further imposed on Telenor an obligation to provide three years’ notice of decommissioning of copper access lines that the company initially notified with six months’ notice (cf. Nkom’s decision dated 8 July 2016). Telenor appealed the decision, but Nkom’s decision was upheld in the Ministry of Transport and Communications’ appeal decision of 19 December 2017.

784. Experience from the current regulation period supports the view that failure to provide sufficient advance notice of changes to the copper access network is still a competition problem. If Telenor’s competitors do not obtain access to information on planned changes to the copper network at the same time as Telenor, this will also clearly constitute a breach of the obligation of non-discrimination. In Nkom’s opinion, experience from the current regulation period also suggests that it is appropriate to establish more detailed rules regarding notice in order to rationalise the obligation of non-discrimination.

785. The fact that access buyers do not receive information about changes in sufficient time or at the same time and with the same quality as Telenor’s own retail operations is a potential competition problem also in relation to fibre access networks. In the current regulation period, Nkom has been made aware that Telenor has made changes to its GPON-based fibre access network. The changes have been of such a nature that they might affect the profitability of

access buyers that buy fibre-based broadband access. Nkom has not received any formal complaints about the changes, but regards this as a reason to assess the need to further specify the obligation to provide notice in connection with changes to Telenor's fibre-based access network.

786. Who is to be notified and with which deadline will have to be decided on the basis of affected interests. The central interests in this assessment are, in Nkom's opinion, Telenor's interest in having control over its own access network, including predictability regarding its own freedom of action in this regard, the access buyer's interest in predictability of investments made in connection with Telenor's access network, including predictability of the framework conditions for the provision of broadband in the retail market and the objective of achieving sustainable competition. In some areas, the interest of sustainable competition will overlap with the interests mentioned above.

787. As stated, predictability for investments is of key importance to the access buyers. Providers will therefore have a need to be notified of changes to the access network that affect investments already made in Telenor's access network. The same will apply if an access buyer has initiated a process to invest in Telenor's access network. Nkom believes that, in such cases too, access buyers are in need of predictability, given the notoriety that access buyers will actually request access. If Telenor makes changes to parts of the network where no access buyers have used the access opportunity, the situation will be different, however. Nkom believes that these conditions should affect who is to receive notice in accordance with this decision. Providers that have actually applied access lines that are withdrawn due to changes in the access network will therefore have the right to more comprehensive notification than providers that have not made use of the access. This can be seen from the notification deadlines below.

788. The need for a notice period in connection with discontinuation of access is discussed in the Commission's NGA Recommendation:

> *"39. […] NRAs should ensure that alternative operators are informed no less than 5 years, where appropriate taking into account national circumstances, before any decommissioning of points of interconnection such as the local loop exchange. This period may be less than 5 years if fully equivalent access is provided at the point of interconnection."*

It follows from the quoted passage that the Commission acknowledges that the notice period may be made shorter on the basis of national circumstances and if access is offered that is fully equivalent to the decommissioned access.

789. The main reason for the current three-year notice period for the decommissioning of copper access lines or main connections is that access buyers that wish to invest in Telenor's copper access network need predictability to know that their investments will have a certain duration. At the same time, a longer notice period might preclude further development of the

service offerings in the copper access network. The notice period pursuant to the current regulation is shorter than the five-year period recommended by the Commission in the NGA recommendation, as a result of two factors. One is that the notice period should not unnecessarily restrict Telenor's ability to further develop the copper access network, and the other is, as mentioned above, that the deadline was set in consultation with both Telenor and access buyers.

790. The issue of potential disadvantages for the further development of the service offering entailed by longer notice periods has come to the fore through new possibilities for upgrading copper-based access networks afforded by technologies such as vectoring and G.fast. Efficient use of these technologies requires that only one provider can control the upgraded copper accesses and provides grounds to consider imposing on the provider that has such control an obligation to offer access to external access seekers. In this connection, Nkom refers to Section 7.2.3 of this decision.

791. In the event of a possible upgrade of the copper access network, participants in the Broadband Forum agreed that it is necessary to be able to perform the upgrade relatively quickly after the decision to upgrade is taken. This is necessary in order for it to be realistic to complete the upgrade. A long notice period in connection with upgrading the copper access network, for example 3 years, would be problematic. Although Nkom has not maintained the conclusion that there should be equal opportunities for Telenor and the access buyers to use exclusionary technology in the copper network, Nkom believes that the need for short notice is still applicable in the event of a possible upgrade of the copper network under the responsibility of Telenor.

792. In the current regulation period, Telenor has expressed that the company would like to invest in an extensive upgrading of the copper access network and, more recently, that the company sees it as more appropriate to largely limit this upgrade to more rural areas. Telenor would prefer to invest in increasing its establishment of other infrastructure for high-capacity broadband, primarily fibre-based access networks. Nkom also understands that Telenor wants to avoid having parallel fixed access networks as far as is possible.

793. In the aftermath of the national consultation, Nkom has asked Telenor about the plans the company now has to upgrade the copper network. In its response, Telenor made reference to what the company has communicated in the market about mobile and fibre being its priority investment areas. However, Telenor could neither confirm nor deny the existence of concrete plans to upgrade the copper network. Accordingly, Nkom believes that changes to and decommissioning of copper access networks, with the potential loss of existing access, will be a relevant issue in the lifecycle of this market decision.

794. Based on the above, Nkom finds it necessary to impose on Telenor an obligation to provide three years' notice of changes to its copper access network in cases where the company is going to make changes that result in the loss of accesses. Nkom would specify

that the obligation to provide three years' notice only applies if Telenor makes changes that result in a loss of access that an access buyer is actually using, or where it can be demonstrated that an external access buyer has provided Telenor with information through Telenor's ordering systems that it is going to start using the access.

795. It seems less likely that Telenor will make changes to the fibre access network that will have the effect of discontinuation of access to the fibre accesses to which access has been given. In the event that this should nevertheless happen, the considerations that indicate that a three-year notice period is required (cf. the previous paragraph) will apply in full. Telenor must therefore, in the same way as for the copper access network, notify the access buyers of any changes to the fibre access network that will result in the access buyer no longer being able to use accesses currently in use by the access buyer.

796. Upgrades or other changes to the access network that result in loss of a granted access, but where the access is replaced by another kind of access, may also entail disadvantages for access buyers because the change will reduce predictability for the access buyer. This implies that in these kinds of cases too, access buyers should be entitled to receive reasonable advance notice of changes. However, the disadvantage for the access buyer is limited if a relevant replacement product is offered, and the replacement product is offered in sufficient time not to adversely affect the existing service production. In this case, the disadvantage for the access buyer will be limited to perhaps not being able to make use of the investments in Telenor's infrastructure for as long as originally thought.

797. A balance must be struck between predictability for the access buyer in this area and Telenor's ability to exploit the access network to offer competitive broadband services in the retail market. It is also relevant to take into account the fact that the access buyer will also benefit from changes to the access network, as the changes will enable the access buyer to offer higher capacity to its end users, as long as Telenor provides the opportunity to offer broadband services in the upgraded network using a relevant replacement product.

798. The latter consideration does not come into play to the same extent in cases where the access buyers upgrade points in the copper access network. Access buyers who use SLU access to offer high-capacity broadband, for example in the form of VDSL2 and Vplus, should be ensured predictability for the investment which the upgrade entails. In this case, Telenor should not be able to make changes to the upstream copper access network that will cause the access buyers to lose access to the relevant sub-loop access lines after a short period of time. Nkom therefore finds that three years' notice must be given of these kinds of changes.

799. In Section 7.2.5 Nkom has imposed on Telenor an obligation to meet all reasonable requests for local, virtual access to copper-based networks and expressed that this kind of access should be offered in those parts of Telenor's copper access network that are upgraded. In Nkom's opinion, the access product should be regarded as a relevant substitute product for the loss of physical access to Telenor's copper-based access network. An access buyer that

uses access that lapses as a result of Telenor upgrading the copper access network will therefore be ensured an access product that meets the need for continuity in service production. In addition, Nkom refers to the fact that there was consensus among the participants in the Broadband Forum who expressed an interest in upgrading the copper access network that this kind of upgrade ought to be able to happen reasonably quickly once a development decision had been made.

800. In light of the assessments above, Nkom finds that a notice period of six months is sufficient in connection with Telenor upgrading and making other changes to the copper access network that cause access to be lost, as long as the access buyer is offered a relevant replacement product. In Nkom's opinion, a notice period of this duration will also be sufficient in connection with changes to fibre-based access networks that have the same impact on access. In cases where Telenor makes changes to access networks covered by access obligations that entail that access may be lost, Telenor may therefore give six months' notice, provided the access buyer is offered a relevant replacement product.

801. To be considered to be a relevant substitute product, it is necessary that this can be considered to belong to the same wholesale market as the product it is to replace. This entails, among other things, that the substitute product must provide the same opportunity to control different characteristics of the retail service as the product which lapses. The substitute product must thereby make it possible to continue existing retail services that use the product which lapses as an input factor. Nkom refers to the assessments in Section 2.4.3 of the market analysis concerning key characteristics of products in Market 3a. The requirements of a relevant substitute product include, for example, that broadband access or VUA fibre (products in Market 3b) will not be relevant substitute products for the lapse of LLUB access to copper- or fibre-based networks, respectively, (products in Market 3a). Telenor can nonetheless offer such products in addition to a relevant substitute product in Market 3a.

802. Telenor will occasionally need to make systematic changes to its access networks. If these changes do not affect access products that are in use, it is reasonable that changes may be made with a shorter notice period. However, the fact that the changes do not affect access does not mean that the changes are of no significance at all to access buyers. In addition, the fact that the changes have been planned supports the view that it will not be burdensome for Telenor to give access buyers slightly longer notice. On this basis, Nkom concludes that Telenor must provide notice of planned changes that do not affect the access granted with a three-month period of notice.

803. In some cases, there may be a need to make adjustments and adapt the access networks so quickly that a three-month notice period is disproportionate, even though this might have negative short-term effects on the access granted. These kinds of changes may be necessary for technical, maintenance or operational reasons and may be due to faults. These kinds of changes may be carried out with a shorter period of notice than three months. Nkom stresses that in these kinds of cases Telenor is not exempt from notifying access buyers about

the change and that Telenor must notify with as long a notice period as possible based on the nature and impact of the relevant work. Furthermore, Telenor must be able to document on request that the work performed cannot be regarded as normal maintenance, but was necessary and justified in concrete events.

804. If Telenor makes changes to parts of the network covered by the obligation of access, but where there is no access buyer taking advantage of this access, Nkom finds there are grounds to conclude that no provider is significantly affected by the change. In line with Nkom's views expressed above, Nkom regards an access as in use if it can be demonstrated that an external access buyer has provided Telenor with information through Telenor's ordering systems that it is going to start using an access that will be affected by the change. The fact that at the time in question no-one is using the access that will be affected by a given change does not imply that the change is of no significance at all for the access buyers. For example, these kinds of changes could be of significance to the access buyer's planning for the future use of access. Nkom also holds that it is essential to ensure widespread knowledge of these kinds of changes to the access network that affect the scope of accesses covered by access requirements. Moreover, Nkom finds it difficult to see that Telenor might have a legitimate reason for making changes that affect the access covered by the obligation of access without providing some kind of notice to access buyers.

805. Nkom therefore concludes that Telenor must provide notice of changes to the access networks that will entail that the access buyer will no longer be able to make use of the obligation of access, even in cases where no access buyer is taking advantage of Telenor's obligation to grant access. One month's notice shall be given and can be given on Telenor's website, as long as the notice is easy to access. Telenor must also notify Nkom that notice has been given by sending an email to avtaler@nkom.no and firmapost@nkom.no.

806. For the record, Nkom would clarify that Telenor will be able to make changes with a shorter notice period than follows from this regulation, if Telenor has consent from providers that are entitled to receive notice pursuant to this decision. In this case, Telenor must be able to document that consent has been given.

807. It will be possible, in some cases, that Telenor must make changes to the access network due to circumstances beyond Telenor's control. Such changes might, for example, be mandatory orders from public authorities or landowners, and would make it difficult or impossible for Telenor to comply with the notification deadlines that are otherwise laid down in this decision. On the other hand, any circumstances beyond Telenor's control, will not reduce the access buyer's need for predictability. In such cases, too, there will thus be a need for the notification rules to, as far as possible, take account of the need for predictability for the access buyer.

808. On this basis, Nkom finds it necessary to grant Telenor an exemption from the notification rules in cases where changes in the access network are necessary due to

conditions beyond Telenor's control. In such cases, Telenor will therefore be able to notify changes in the access networks entailing that access buyers will no longer be able to use the access obligation, with shorter notice than is otherwise provided by this decision. In such cases, the notification deadline must not be reduced by more than is justified by the conditions lying beyond Telenor's control.

809. In order for access buyers to receive notification as early as possible, Nkom believes that there is a need to make the requirement of Telenor that notification with a shorter notification time must be given without undue delay from when the conditions justifying the shorter notification time arise.

810. At the same time as access buyers are notified in accordance with the exemption concerning a shorter notification time, Telenor must document and justify to Nkom that the conditions for the exemption are fulfilled, including that notification with a shorter deadline is necessary, and that the notification time is not reduced by more than necessary in the specific case. The documentation must include information about the time when Telenor received information about the conditions justifying the exemption.

7.5.5.3 Telenor's fault correction policy

811. Telenor is required to provide access to the company's copper-based access network. Changes in the access network leading to a loss of the access which the access buyer has actually taken into use, or where it can be verified that an external access buyer has given Telenor information through Telenor's ordering systems that it is going to start using the access, must be notified in accordance with the notice periods stated in Section 7.5.5.2. Key considerations behind the notification obligation are the access buyers' need for predictable access and predictability for the investments in Telenor's network.

812. Telenor has a "fault correction policy" for the copper-based access network. Telenor's standard agreements include a provision that allows Telenor to demand that the access buyer terminate the access agreement with own end customers with immediate effect on "failure of the telecom network that it is not technically or financially justifiable to rectify".[38] Furthermore, Telenor will be able to terminate the access agreement with the access buyer with one month's notice when "... it is not commercially reasonable to correct the error".[39] These rights for Telenor are elaborated on in the fault correction policy, inter alia by setting upper cost limits for repairs. The content of the policy will therefore have a major impact on the extent of cases that can be terminated with short notice. By comparison, in accordance with Section 7.5.5.2 of this resolution, Telenor shall notify changes in the access network that lead to the loss of access which the access buyer has actually taken into use, 6 months and 3 years respectively. Accordingly, Nkom believes that the fault correction policy can intervene in the rights and obligations of this decision.

[38] Cf. item 16.5 in the Operator Access Agreement
[39] Cf. item 16.6.3 in the Operator Access Agreement

813. The policy states that if the fault correction has an estimated cost that exceeds the fixed cost limits for repairs “Telenor will seek to find alternative solutions”, and furthermore that “if it is not possible to do this, Telenor will terminate the accesses concerned on the basis of applicable agreements”. In cases where Telenor chooses to terminate an access in accordance with the fault correction policy, the policy provides for the access buyers and end-customers to be able to cover all costs of the fault correction. Nkom is not aware that access buyers who use this opportunity to maintain access achieve any timely warranty against the fact that the access once again can be notified terminated due to subsequent errors.

814. In more recent years Telenor has gradually reduced the cost limits for fault correction of single accesses. In 2015, for example, the cost limits for private customers was NOK 20,000 (for both telephony and broadband). This limit is now NOK 3,300[40] for telephony and NOK 8,500 for broadband. One consequence of the lower cost limits will be that relatively minor faults on the access lines could lead to termination of the accesses concerned.

815. The reduced cost limits for fault correction means that the fault correction policy can potentially have a significant practical impact on access. In this context, Nkom points out that the cost limits for fault correction could be further reduced and that there appears to be limited transparency related to Telenor's assessment of whether the cost limits are exceeded. Nkom therefore believes that there is a risk that the considerations, on which the notification rules are based on, will not be adequately addressed.

816. Nkom can see, however, that there may be good reasons to accept that Telenor has a fault correction policy for separate individual customer accesses. The copper access network is old and is gradually being replaced by new technology. It would therefore be unreasonable for Telenor to have to correct faults on individual accesses in the copper access network without taking the costs into consideration. Nkom therefore believes that it can be accepted that Telenor has a fault correction policy, provided if some requirements for the policy are set, cf. below. Nkom makes the proviso, however, that this standpoint can be reconsidered if the fault correction policy and the exercising of the policy become too extensive in practice.

817. Nkom believes that it is unfortunate that the fault correction policy is determined outside the framework of the standard agreements. In order to ensure transparency and that the access buyers can be involved in changes to the policy, cf. Section 7.5.3.3, the policy must be included in the standard agreements for access in this wholesale market.

818. The policy must specify upper cost limits for fault correction of a single access line. To ensure non-discrimination, the cost framework must be the same for copper access lines where external access buyers have existing end-customer agreements as for copper access lines in which Telenor's own end-user activity has the customer relationship. The cost limits must not be set at an unreasonably low level. This implies that the cost must not be set at a

[40] With effect from 1 December 2018, see https://www.telenorwholesale.no/2018/09/endret-feilrettingspolicy-01-12-18/

level that could undermine the purpose of the notification obligations in Section 7.5.5.2. It further implies that the cost limits are to be set so that the amounts are high enough to cover the cost of rectifying faults that can be considered common or predictable.

819. The policy shall facilitate that the access buyers can request Telenor to document the basis for termination of the access line. This applies both to the cost calculation which is the basis for determining that the fault correction will exceed the cost limits and the assessment determining that it will not be possible to implement “alternative solutions”. Replies to requests for such documentation must be given without undue delay.

820. The policy must include provisions regarding the access buyers’ right to require reasonable compensation on the termination of the access line. If Telenor's end-user activity offers compensation to end-customers who lose the opportunity for copper-based broadband access because it is not deemed prudent to correct faults in order to maintain the current access line, Telenor will be obliged to offer access buyers compensation which gives the same opportunity as Telenor's own end-user activity to offer compensation to the end-user concerned.

821. In cases where Telenor offers its own end customers access to alternative infrastructure instead of the discontinued copper access line, such as the fibre network, Telenor must give the access buyers information on how any access buyers’ customers can get access to alternative infrastructure, such as by purchasing an access product or through agreement-based access.

822. In cases where Telenor chooses to terminate the access concerned due to repair costs exceeding the limit, the policy must enable the access buyers to cover the costs that exceed the cost limit. The policy must furthermore include procedures for the access buyers themselves to be able to cover some of the costs of the fault correction. In such cases, the access buyer must have the right to have access to the relevant access line for a period that is at least in line with the access buyer’s right after the notification obligations in Section 7.5.5.2.

823. In Section 7.5.3.3, Nkom has set requirements concerning the process in connection with preparation of, and major changes to, standard agreements. Since Nkom now requires the fault correction policy to be part of the standard agreement, the aforementioned requirements must also be applied in connection with future changes in the said policy.

7.5.5.4 Notification of changes in the establishment price for “homes passed”

824. In Section 7.3.6, Nkom concluded that it is necessary to set requirements for the notification of changes in the establishment price for “homes passed”.

825. Nkom believes that it may be appropriate to have the same notification deadline for changes in the establishment price as for changes in prices in general, cf. the deadline of two months set out in Section 4-6, first paragraph no. 5, of the Electronic Communications Act. Nkom believes that a deadline of two months will give the access buyers sufficient

predictability with regard to the costs which must be expected for the establishment of drop cables to “homes passed”.

7.5.5.5 Requirements regarding the content of and other common requirements regarding notice of changes to existing infrastructure

826. In Section 7.4, Nkom has imposed on Telenor an obligation of non-discrimination. Telenor might have an incentive and the opportunity to notify the access buyer of a change using information that is of lower quality than the information Telenor gives to its own retail operations. In order to reduce the possibility of this kind of discrimination, Nkom finds there is a need to specify in greater detail the requirements regarding the content of the notice Telenor has an obligation to provide in accordance with this decision. This kind of specification will further help streamline the obligation to provide notice and, in Nkom’s opinion, may also help reduce potential conflicts between Telenor and access buyers linked to providing notice.

827. The obligation of non-discrimination entails that buyers of access should receive notification of any changes to Telenor’s copper access with the same quality and at the same time as Telenor notifies its own retail operations. In terms of the quality of the notice, this implies that the notice must as a minimum include information about:

1. Which existing accesses and, as applicable, other parts of Telenor’s network will be affected by the change.
2. All information related to the affected accesses and any other parts of Telenor’s network that is relevant and necessary for the access buyer to receive in order to be able to safeguard its interests on equal terms with Telenor’s retail operations. This includes information that is relevant and necessary both for the purchase of wholesale access and to operate existing end-user service offerings. The fact that Telenor’s retail operations will not be directly affected in a specific case does not curtail the requirements regarding Telenor’s notification pursuant to this section.
3. When the change will be started and when it will be completed. Telenor must also notify any significant deviation from the notified date of completion.

828. With a view to ensuring clarity regarding the content of the obligation to give notice, Nkom finds it appropriate to specify more precisely the requirements regarding advance notice of changes that will result in a loss of access that is in use. In these kinds of cases, Telenor must as a minimum provide information about:

1. An offer of access to relevant replacement products.
2. A plan for any forced migration to the new replacement product.
3. Information about what types of equipment will be used at the point being upgraded and reference to compatible end-user equipment (see Section 7.5.3 on Telenor’s reference offers).

829. For the record, Nkom would point out that the minimum requirements above do not imply any curtailment in Telenor's obligation to notify access buyers with the same quality as Telenor's own retail operations.

830. As regards the requirement that access buyers must receive notification at the same time as Telenor's own retail operations, Nkom will consider that the internal service provider has been notified of a given change at the latest at the time when the internal service provider, including parties representing this, has gained knowledge that a decision has been made to make a given change. Nkom will further deem that the access buyer has received notification on the day a notice that meets the requirements of this decision has been sent to the correct person at an access buyer that is entitled to receive notice pursuant to this decision, or has been communicated in some other way as prescribed in this decision. The access buyer is responsible for ensuring that Telenor is provided with correct and up-to-date information about whom the notice should be addressed to.

831. For the sake of clarity, Nkom would point out that provision of notice that does not meet the requirements in this decision or is not sent to the correct person will not be regarded as sent, with the effect that the notice period does not start running. It will nevertheless still be possible for Nkom to conclude, after a concrete assessment, that the notice is sufficient if the defect is regarded as minor and non-recurring. Nkom would further point out that the assessment of whether notice is regarded as having been sent applies in relation to the individual provider that is entitled to receive notice.

7.5.5.6 Changes in the matter notified

832. Telenor may have legitimate reasons for making changes compared with what has been notified before the period of notice expires. In principle, these kinds of changes may be to the access buyer's advantage or disadvantage. It may also be that the change benefits some access buyers, but creates problems for others. Changes in a notified matter may also create uncertainty regarding what is actually going to happen. This kind of uncertainty may weaken the access buyer's ability to make rational adaptations to the matter that has been notified and could thus weaken the access buyer's ability to compete.

833. To promote clarity regarding the access buyer's framework conditions, Nkom therefore finds it necessary to impose on Telenor an obligation to provide new notice, with the same deadline as the original notice, if Telenor changes a matter it has already notified it is going to change. Since it is not necessarily clear whether a change is to the advantage or disadvantage of all the affected access buyers and because it is not necessarily clear whether a change to a notified change will be an advantage or disadvantage, Nkom finds that the obligation to provide new notice must in principle apply in all cases of change in a notified change. The new notice should be given in the same format as the original notice. To ensure that this kind of obligation is not disproportionate compared with its purpose, Nkom finds that the obligation to provide new notice should nevertheless not apply to insignificant changes. To avoid any

uncertainty, Nkom specifies that this is a narrow exception and that the clear main rule is still an obligation to provide new notice.

7.5.5.7 Relationship to Telenor's reference offers

834. The notification rules for changes to Telenor's copper access network differ somewhat from those in Nkom's decision from 2014 and are formulated slightly differently than in the aforementioned decision. In order to avoid confusion regarding the content of Telenor's obligation to give notice, Telenor must ensure that the reference offers draw the access buyers' attention in an appropriate manner to the requirements the company is subject to in respect of providing notice.

7.5.5.8 Extended notice period in connection with changes that entail a disadvantage

835. Failure to provide sufficient notice of changes in prices or other terms and conditions may also be a potential competition problem. One transparency obligation that might remedy this competition problem is to require that Telenor gives notice of these kinds of changes with sufficient time for affected access buyers to be able to reflect the change in their end-user agreements. Pursuant to Section 4-6, first paragraph, of the Electronic Communications Act (cf. fourth paragraph), Nkom may stipulate an extended notice period, if this is necessary.

836. Pursuant to Section 2-4, third paragraph, of the Electronic Communications Act, the notice period for changes in retail agreements is one month:

> *"Providers of public electronic communications services must notify end-users of changes to or termination of the agreement. Changes to or termination of the agreement may only enter into force a minimum of one month after the notification is sent to the end-user."*

837. In order for providers that purchase access products from Telenor that are covered by this decision to have enough time to adapt their own terms and conditions to reflect changes to Telenor's products or terms and conditions, Nkom finds it necessary to expand the general obligation to give notice pursuant to Section 2-4, third paragraph, of the Electronic Communications Act. On the basis of this and pursuant to Section 4-6, first paragraph, of the Electronic Communications Act (cf. fourth paragraph), Nkom will impose an obligation on Telenor to notify buyers of regulated access of any changes in existing services that are to the disadvantage of the other party to the agreement and/or its end users no later than two months before the change is implemented. Without an expanded obligation to give notice of this nature, buyers of regulated access would not have sufficient time to take account of the changes in their own retail agreements and at the same time discharge the general obligation to give notice to their own end users. Nkom finds that an expanded obligation to give notice is not disproportionately burdensome for Telenor.

838. An obligation is therefore imposed on Telenor to notify other providers of any changes to existing offers, including prices, delivery times, fault correction times and routines,

functionality, quality, etc. that are to the disadvantage of other providers, and thereby also their end users, no later than two months prior to implementation of the change. In order for the obligation to be sufficiently effective, Nkom finds it is sufficient that the change is to the disadvantage of *some* of the access buyers or their end users for the change to be regarded as triggering an extended notice period. By changes that entail a disadvantage, Nkom means changes that would normally be perceived as a burden for the wholesale customer and/or their end users, such as price increases, longer delivery times, lower quality, restrictions in the service, etc.

839. To avoid any misunderstanding, Nkom would clarify that price reductions and other changes that are to the advantage of the access buyer and/or its end users are not subject to the extended notice period requirement. These kinds of changes may therefore take effect immediately.

7.5.5.9 Notification of technology changes and changes in IT systems and supply chains to Nkom

840. Telenor's choice of technology and network structure could be of very great importance for the type of access that can be offered to remote access applicants and for the development necessary to offer the relevant access. The choice of technology and network structure might thus affect the opportunity for remote access buyers that use Telenor's infrastructure to compete effectively in the end-user market.

841. The costs related to offering a certain type of access will furthermore be included in Nkom's assessment of the proportionality of imposing a given type of access. Major costs associated with offering a certain type of access will, in isolated terms, indicate that it is not proportional to impose the relevant access. On assessing the proportionality of imposing access, it will also be relevant to consider which alternatives Telenor has to choose solutions that limit the costs associated with offering remote access. To the extent that Telenor chooses solutions which entail that the relative costs of offering access are high, it could still be proportional to impose access.

842. On this basis, Nkom believes that there is a need for Telenor to notify Nkom of technology changes that might affect the opportunity to offer access to remote access buyers, cf. Section 7.5.5.1. One example of such a technology change is to upgrade the copper access network with excluding technology.

843. In Section 7.4.3, based on a cost/benefit analysis, Nkom has concluded that it is not proportionate to impose non-discrimination based on EoI in Market 3a. This entails that Telenor can continue to use different systems and processes for deliveries to internal retail activities and sales to remote access buyers (EoO), respectively. However, the systems and processes used by remote access buyers must have the same degree of reliability, functionality, and quality/performance as the systems and processes used by Telenor's internal retail activity.

844. Nkom also acknowledges the Commission's point of departure that EoI is the most effective approach to ensuring non-discrimination. Telenor's choice of IT systems and supply chains might have great significance for whether the access buyers can compete on non-discriminatory terms compared to Telenor's own retail activity, and for the possibility of ensuring non-discrimination through EoI.

845. On this basis, Nkom believes that there is a need for Telenor to notify Nkom of major changes in IT systems and supply chains. Any such notification obligation will give Nkom a basis to asses the effect of new or changed system solutions on non-discrimination requirements and, in Nkom's assessment, will be appropriate to support development towards systems common to Telenor and remote access buyers, and thereby EoI in more areas. In the same way as expressed by Nkom above in relation to technology changes, the development of changed IT systems and supply chains could be of significance to Nkom's assessment of the proportionality of setting non-discrimination requirements in the form of EoI.

846. In light of the fact that the two conditions named above could be of great significance to obligations and rights under this decision, it is of central importance that Nkom receives early notification of technology changes and major changes in IT systems and supply chains. With early notification, Nkom aims at a time which precedes Telenor's key choices that are of significance to the access that Telenor can offer remote access buyers, including with which functionality and in which systems access can be offered. The nature of any such changes would vary, and it is therefore difficult to set an absolute deadline for such notice. Nkom therefore requires Telenor to notify Nkom of technology changes and major changes in IT systems and supply chains as early as possible. In view of the fact that Telenor's assessments of wholesale customers' needs in the event of technology changes and changes in IT systems and supply chains might affect Nkom's proportionality assessments, Telenor itself also has an interest in such changes being notified at an early stage.

847. In Nkom's assessment, an obligation for Telenor to notify technology changes and changes in IT systems and supply chains cannot be deemed to be particularly onerous.

7.5.6 Proportionality

848. Nkom finds it is necessary to impose on Telenor obligations of transparency related to the obligation to prepare and publish reference offers, access to specified information and notice requirements in order to rationalise the obligation of access and the obligation of non-discrimination in Market 3a. Nkom finds that the above-mentioned transparency obligations are suitable to remedy potential competition problems in this wholesale market and considers that the benefits of these transparency commitments far exceed the inconvenience the obligations entail for Telenor.

849. In the formulation of the transparency obligations, Nkom has attached importance to striking a balance between the access buyers' needs for information and predictability in order to be able to compete on equal terms with Telenor's own retail operations in the downstream

market, on the one hand, and the principle of minimum regulation, such that the obligations are not more invasive than the purpose requires, on the other. Nkom holds that the obligations entailed by the obligation to prepare and publish reference offers, the obligation to grant access to specified information and obligation to give notice are designed such that they preserve this balance.

850. Nkom has found it appropriate to specify the transparency obligations in Market 3a in greater detail than in the current decision in former Market 4. Nkom holds that these clarifications are necessary to ensure compliance with the imposed obligations of access and non-discrimination. In Nkom's opinion, the competition-promoting effect of these specifications cannot be achieved in a less invasive manner.

851. Regarding the obligation to publish reference offers, Nkom believes that it is important that the imposed obligation includes requirements relating to the preparation and publication of reference offers, requirements regarding the content of reference offers, and requirements on transparent processes in connection with the preparation of and major changes to reference offers. This could help simplify and expedite negotiations in connection with the conclusion and amendment of access agreements, and make it easier to monitor compliance with the obligations of accessibility and non-discrimination.

852. The obligation to prepare and publish KPIs is part of a holistic EoO regime for non-discrimination in Market 3a (cf. Section 7.4). Nkom finds it proportionate to set requirements that ensure that the obligation to publish KPIs provides a basis for comparing quality and service levels provided to Telenor's own retail operations and external buyers of access respectively. This is important in order to detect any discrimination between external and internal providers in the associated retail market.

853. In respect of access to specified information about Telenor's infrastructure covered by the obligation of access, Nkom finds that the content of the obligation is necessary to ensure that external access buyers can compete on equal terms with Telenor's own retail operations in the downstream market. At the same time, Nkom finds that this obligation takes into account Telenor's security needs in that access buyers may be required to enter into a security agreement as a condition for the access buyer to be granted access to this kind of information about the company's infrastructure, to the extent that access to this type of information requires security clearance pursuant to the Security Act and the provider requesting the relevant information is not subject to the Security Act.

854. The transparency obligation's requirements regarding provision of notice are deemed necessary to prevent discrimination between Telenor's own retail operations and external buyers of access. Nkom holds it is important to ensure that Telenor's own retail operations do not receive information about changes to existing infrastructure and establishment of new infrastructure earlier than external buyers of access. It is also important to ensure that Telenor's own retail operations do not receive more detailed information or information of

better quality than access buyers. In addition, Nkom finds that the requirements regarding notification are necessary to ensure access buyers have the same opportunities as Telenor's own retail operations to make adjustments to their business models and strategies in the broadband market.

855. In light of this, Nkom concludes that the above-mentioned transparency obligations are proportionate.

7.5.7 Special obligations relating to publication and reference offers

856. Nkom refers to the aforementioned assessments concerning which special obligations associated with publication and reference offers must be imposed on Telenor in Market 3a. The special obligations imposed on Telenor ASA (in the remainder of the chapter referred to as Telenor) are stated in this chapter.

857. As a consequence of Telenor being designated as a provider with significant market power in this market, Telenor will also have individual obligations associated with publication and reference offers as a direct consequence of the Electronic Communications Act and the Electronic Communications Regulation. In these cases, Nkom also has the opportunity to impose and define such obligations in further detail pursuant to Section 4-6, first paragraph, of the Electronic Communications Act.

858. It follows directly from Section 4-6 of the Electronic Communications Act and Section 2-5 of the Electronic Communications Regulation that Telenor shall prepare and publish a reference offer for access to the fixed access network. Nkom finds reason to clarify this access obligation, and pursuant to Section 4-6, first paragraph, of the Electronic Communications Act requires Telenor to prepare and publish reference offers with the specifications stated in Section 7.5.3.

859. It follows directly from Section 4-6, third paragraph, of the Electronic Communications Act that Telenor will divide the reference offer sufficiently so that the access requester does not pay for services, functions or benefits that are not requested.

860. It follows directly from Section 2-5 of the Electronic Communications Regulation that Telenor will publish reference offers with more detailed information. Nkom finds reason to clarify this access obligation, and pursuant to Section 4-6, first paragraph and Section 4-7 of the Electronic Communications Act requires Telenor to prepare reference offers with the specifications stated in Sections 7.5.3.2 and 7.5.3.3.

861. It follows directly from Section 2-6 of the Electronic Communications Regulation that for offers of co-location Telenor will publish further co-location information. Nkom finds reason to clarify this access obligation, and pursuant to Section 4-6, first paragraph, of the Electronic Communications Act requires the publication of co-location information with the with the specifications stated in Sections 7.5.3 and 7.5.4.

862. Pursuant to Sections 4-6 and 4-7 of the Electronic Communications Act, Nkom requires Telenor to conduct transparent processes involving access buyers and taking account of the access buyers' needs in the preparation of new standard agreements, as well as on major changes in standard agreements, in line with Section 7.5.3.3.

863. Pursuant to Section 4-6 of the Electronic Communications Act, Nkom requires Telenor to publish on the company's website updated reference agreements that comply with the requirements of this decision, and within 3 months of the entry into force of this decision.

864. Pursuant to Section 10-3 of the Electronic Communications Act, at the same time as publication Nkom requires Telenor to send the updated reference agreements to Nkom at avtaler@nkom.no and firmapost@nkom.no.

865. Pursuant to Section 4-4, eighth paragraph, of the Electronic Communications Act, Nkom requires Telenor to provide access to information on Telenor's infrastructure that is subject to the access obligation, in line with Section 7.5.4.1. Among other things, access must be granted to geographical coverage information for the relevant infrastructure, connection points and potential customer base for various locations in Telenor's network. Telenor may require the access buyer to enter into a security agreement with Nkom as a condition for the access buyer to be granted access to this kind of information about the company's infrastructure, if access to this type of information requires security clearance pursuant to the Security Act and the provider requesting the relevant information is not subject to the Security Act.

866. Pursuant to Section 4-6, first paragraph, of the Electronic Communications Act, Nkom requires Telenor to make the information in accordance with Section 7.5.4.1 available to the access seeker. The information must be updated at all times. With regard to information concerning the potential customer base for densification sales, these must include the same establishment price as Telenor's own retail activity may face at any time. Other terms and conditions relating to this establishment price are stated in Section 7.3.6.

867. Pursuant to Section 4-6, first paragraph no. 5, of the Electronic Communications Act, Nkom requires Telenor to publish key performance indicators (KPIs) for the key activities of system access, deliveries, error handling, and error correction times, and migration between various different access products, cf. Section 7.5.4.2. Telenor will ensure comparable KPIs for external and internal activities, among other things by publishing the calculation basis/methods applied by Telenor to the KPIs, in line with Section 7.5.4.2. The KPIs must be published quarterly, as from and including January 2019. The KPIs must be published no later than within 15 days of the end of the quarter.

868. Pursuant to Section 10-3 of the Electronic Communications Act, Nkom requires Telenor to notify Nkom each time it publishes the quarterly KPIs and at the same time to send Nkom a brief account of Telenor's assessment of the relationship between the published KPIs and compliance with the non-discrimination obligation in Market 3a, cf. Section 7.5.4.2.

869. Pursuant to Section 4-6, first paragraph no. 5, and Section 4-7 of the Electronic Communications Act, Nkom requires Telenor to give 3 years' notice of changes in its access network in cases where the company is making changes that result in the loss of accesses, cf. Section 7.5.5.2. If Telenor in such cases offers the access buyer a relevant replacement product, 6 months' notice will be sufficient.

870. Pursuant to Section 4-6, first paragraph no. 5, and Section 4-7 of the Electronic Communications Act, Nkom requires Telenor to give 3 months' notice of changes in the access network that do not affect the access provided, cf. Section 7.5.5.2. This applies with the exception of changes that it is necessary to implement more quickly, due to technical, maintenance-related or operational conditions. In such cases, Telenor will notify access buyers with as long a deadline as possible, based on the nature and effect of the relevant work. Furthermore, on request Telenor must be able to document that the work performed cannot be regarded as planned maintenance, but was necessary on objective and concrete grounds.

871. Pursuant to Section 4-6, first paragraph no. 5, and Section 4-7 of the Electronic Communications Act, Nkom requires Telenor to give one month's notice of changes if Telenor makes changes to the access network subject to the access obligation, but where no access buyer makes use of the access opportunity. This notice can be given on Telenor's website, provided that the notice is easily accessible. Telenor must also notify Nkom at avtaler@nkom.no and firmapost@nkom.no that such notice has been made available.

872. Telenor will be able to make changes with a shorter notice period than the aforementioned, if Telenor has consent from providers that are entitled to receive notice pursuant to this decision. In this case, Telenor must be able to document that consent has been given.

873. Telenor may make changes with shorter notification deadlines than are provided for above, on the basis of circumstances beyond Telenor's control. At the same time as access buyers are notified in accordance with the exemption concerning a shorter notification time for conditions beyond Telenor's control, Telenor must document and justify to Nkom that the conditions for the exemption are fulfilled, in line with Section 7.5.5.2. Telenor must send the documentation and justification to Nkom at avtaler@nkom.no and firmapost@nkom.no.

874. Pursuant to Section 4-6, first paragraph no. 5, and Section 4-7 of the Electronic Communications Act, Nkom requires Telenor to draw up notifications of changes to existing infrastructure in accordance with the minimum requirement in Section 7.5.5.5.

875. Pursuant to Section 4-6, first paragraph no. 5, and Section 4-7 of the Electronic Communications Act, Nkom requires Telenor to notify changes in the notice given, in line with Section 7.5.5.6.

876. Pursuant to Section 4-6, first paragraph no. 5, of the Electronic Communications Act, Nkom requires Telenor to ensure that the reference agreements draw the access buyers'

attention in an appropriate manner to the requirements the company is subject to in respect of providing notice, in line with Section 7.5.5.7.

877. Pursuant to Section 4-6, first paragraph no. 5, of the Electronic Communications Act, Nkom requires Telenor to give notice of any changes in prices or other terms to the disadvantage of the access buyers, including for their end users, no later than two months before the change is made, in line with Section 7.5.5.8.

878. Pursuant to Section 4-6, first paragraph no. 5, of the Electronic Communications Act, Nkom requires Telenor to notify changes in the establishment price for "homes passed" no later than two months before the change is made, in line with Section 7.5.5.4.

879. Pursuant to Section 10-3 of the Electronic Communications Act, Nkom requires Telenor to notify technology changes and major changes in IT systems and supply chains to Nkom as early as possible, in line with Section 7.5.5.9.

7.6 Accounting separation

7.6.1 Regulatory basis

880. Section 4-8 of the Electronic Communications Act has provisions regarding accounting separation. The first paragraph reads:

> *"The Authority may order a provider with significant market power to put in place accounting separation between different business areas or between specified activities connected to interconnection and access."*

881. In addition, Section 4-8, fifth paragraph, of the Electronic Communications Act further indicates that the Authority may impose obligations on the accounting methods and principles to be applied, while the sixth paragraph stipulates that providers must make accounting information available upon request.

882. Annex 1 of the NGA Recommendation states:

> *"In order to enforce cost-orientation obligations, NRAs should impose accounting separation pursuant to Article 11 of Directive 2002/19/EC. Separated accounts for the NGA infrastructure and/or service elements to which access is mandated should be set up in such a manner that the NRA can (i) identify the cost of all relevant assets for the determination of access prices (including depreciation and valuation changes) and (ii) monitor effectively whether the SMP operator grants access under the same conditions and prices to other market participants as to its own downstream arm. Such monitoring should include the performance of margin-squeeze tests. Costs should be allocated on the basis of objective criteria amongst the various wholesale and retail products which rely on such inputs, to avoid double counting."*

883. For several years, Nkom has assumed that the main purpose of accounting separation is to monitor compliance with an obligation of non-discrimination. Nkom has also assumed that the main purpose of cost accounting will usually be monitoring compliance with an obligation of cost-oriented prices. There are a number of similarities between accounting separation and cost accounting, but also some differences, which are discussed in Nkom's remedies document.

7.6.2 Assessment of the need to impose an obligation of accounting separation for local, physical access to copper-based access networks

884. Accounting separation can help identify and highlight any discrimination between Telenor's external wholesale customers and Telenor's internal operations. However, this is an issue that can also normally be remedied through various forms of price controls, possibly in combination with cost accounting. Nkom has concluded that it will be necessary and proportionate to impose an obligation concerning price controls and cost-oriented prices for local, physical access in Telenor's copper-based access network, including subloop unbundling, and cost accounting.

885. Since local, physical access to copper networks is subject to price regulation, an obligation of non-discrimination for this kind of access will not be the only remedy aimed at Telenor's prices. Nkom is aware that price controls do not guarantee that Telenor will not still be able to discriminate on price. However, as mentioned, in Nkom's view the price obligation will have a dampening effect on Telenor's incentives to discriminate on price. In addition, the obligation of transparency is being maintained, which will help promote compliance with the obligation of non-discrimination. The imposed price obligation in the form of a price cap and cost-oriented prices is also a strict form of price regulation, rendering an obligation of accounting separation unnecessary.

886. In light of this, Nkom has concluded that there is no need to impose an obligation of accounting separation for local, physical access to copper-based access networks.

7.6.3 Assessment of the need to impose an obligation of accounting separation for local, virtual access to copper-based access networks (VULA copper)

887. As mentioned above, accounting separation can help identify and highlight any discrimination between Telenor's external wholesale customers and Telenor's internal operations. However, this is an issue that can also normally be remedied through various forms of price controls, possibly in combination with cost accounting. Nkom has concluded that Telenor is to have price controls imposed in the form of a margin squeeze test on a portfolio of all the retail products, in areas where Telenor offers VULA copper.

888. Since VULA copper is going to be subject to price controls in the form of a margin squeeze test where all Telenor's retail products are included, an obligation of non-discrimination for this kind of access will not be the only remedy targeting Telenor's prices. Nkom is aware that price controls do not guarantee that Telenor will not still be able to

discriminate on price. However, as mentioned, in Nkom's view the price obligation will have a dampening effect on Telenor's incentives to discriminate on price.

889. On this basis, Nkom has concluded that it is neither necessary nor proportionate to impose an obligation of accounting separation for VULA copper.

7.6.4 Assessment of the need to impose an obligation of accounting separation for local, physical access to fibre-based access networks (fibre-based LLU)

890. As already mentioned, accounting separation can help identify and highlight any discrimination between Telenor's external wholesale customers and Telenor's internal operations. In respect of local, physical access to the fibre-based access network, Nkom concluded that it is neither necessary nor proportionate to impose price controls or an obligation of cost accounting. Therefore, any price discrimination will not be remedied through price control obligations. An obligation of non-discrimination for fibre-based LLU will therefore be the only remedy aimed at Telenor's prices.

891. Against this backdrop, Nkom finds that there is still a need to impose on Telenor an obligation of accounting separation for local, physical access to fibre-based access networks in order to monitor compliance with the obligation of non-discrimination. The purpose is to clarify whether buyers of this type of access can operate in the retail market for fibre-based broadband with a positive result based on the current access prices, given that they are equally efficient in their operations as Telenor.

7.6.5 Accounting separation for local, physical access to fibre-based access networks (fibre-based LLU) in more detail

892. In Nkom's opinion, it will be most appropriate to impose accounting separation for local, physical access to fibre-based access networks by dividing Telenor's value chain linked to local, physical access to fibre networks up into wholesale operations and retail operations. Accounting separation shall show Telenor's income and expenses in its fibre-based retail operations if the retail operations had to purchase local, physical access to the fibre-based access network from Telenor at the same rates as external wholesale customers. Accounting separation must be based on fully allocated historical costs. In general, the individual items in the accounts ought to include the elements specified in Section 7.6.9 below.

893. This kind of accounting separation will make it easier to monitor compliance with the obligation of non-discrimination regarding prices between Telenor's own fibre-based operations and buyers of local, physical access to fibre-based access networks.

894. The system and principles for accounting separation must be sufficiently documented for testing. The documentation must include an overview of what cost categories have been allocated to the fibre-based retail operations, as well as the prices and volumes related to the purchase of local, physical access to fibre-based access networks.

7.6.6 Assessment of the need to impose an obligation of accounting separation for local, virtual access to Telenor's fibre network (VULA fibre)

895. As already mentioned, accounting separation can help identify and highlight any discrimination between Telenor's external wholesale customers and Telenor's internal operations. However, this is an issue that can also normally be remedied through price controls. Nkom has concluded that Telenor is to have price controls imposed for VULA fibre in the form of a margin squeeze test for the commercially most attractive products in the retail market (flagship products). However, as some of Telenor's products in the retail market are not necessarily included in the margin squeeze test, Nkom nevertheless finds it necessary to impose an obligation of accounting separation for VULA fibre, in order to monitor compliance with the obligation of non-discrimination. This kind of accounting separation will apply to Telenor's fibre-based products in the retail market.

896. The purpose of accounting separation is to clarify whether access buyers can operate in the retail market for fibre-based broadband with a positive result based on the current access prices, given that they are equally efficient in their operations as Telenor.

7.6.7 Accounting separation for local, virtual access in Telenor's fibre network (VULA fibre)

897. In Nkom's opinion, it will be most appropriate to impose accounting separation for VULA fibre by dividing Telenor's value chain linked to VULA fibre up into wholesale operations and retail operations. Accounting separation shall show Telenor's income and expenses in its fibre-based retail operations if the retail operations had to purchase VULA fibre from Telenor at the same rates as external wholesale customers. Accounting separation must be based on fully allocated historical costs. In general, the individual items in the accounts ought to include the elements specified in Section 7.6.9 below.

898. This kind of accounting separation will make it easier to monitor compliance with the obligation of non-discrimination regarding prices between Telenor's own fibre operations and buyers of VULA fibre.

899. The system and principles for accounting separation must be sufficiently documented to allow verification. The documentation must include an overview of what cost categories have been allocated to the fibre-based retail operations, as well as the prices and volumes related to the purchase of local, physical access to Telenor's fibre network.

900. The accounting distinction will be a supplement to the margin squeeze test imposed for VULA fibre (cf. Section 7.3).

7.6.8 Proportionality

901. In Nkom's opinion, it will not be particularly burdensome to establish accounting separation for fibre-based LLU and VULA fibre in accordance with the principles outlined in Section 7.6.9; furthermore the obligation is appropriate in that it meets Nkom's needs to be

able to monitor compliance with the obligation of non-discrimination and enables rapid, effective intervention as and when necessary.

902. Through Nkom's decision in former Market 4, Telenor had an obligation imposed to establish accounting separation for fibre-based LLU and has therefore already established a system for this.

903. Although a system for accounting separation has already been established, there will be some resource usage related to the preparation of each report, and Nkom has therefore assessed the need for such reporting thoroughly for each individual wholesale product. Nkom finds that Telenor's resource input required to prepare reports based on accounting separation for fibre-based LLU and VULA fibre will be fairly small, relative to the benefits it will yield.

904. Against this backdrop, Nkom believes that an obligation for Telenor to report accounting separation in line with the description in this decision is proportionate.

7.6.9 Special obligations related to accounting separation

905. Nkom refers to the aforementioned assessments concerning which special obligations associated with accounting separation must be imposed on Telenor in Market 3a. The special obligations imposed on Telenor ASA (in the remainder of the chapter referred to as Telenor) are stated in this chapter.

906. Pursuant to Section 4-8, first paragraph, of the Electronic Communications Act, Nkom requires Telenor to prepare accounting separation for local, physical access to fibre-based access networks (fibre-based LLU) and accounting separation for local, virtual access to fibre-based access networks (VULA fibre), in line with Sections 7.6.5 and 7.6.7. The accounting separation will provide a basis for verifying that the prohibition of price discrimination towards external buyers of local, physical access and local, virtual access, respectively, to Telenor's fibre network is complied with, cf. Section 4-7, second paragraph, of the Electronic Communications Act.

907. Pursuant to Section 4-8, fifth paragraph, of the Electronic Communications Act, Nkom requires Telenor to divide the value chain into wholesale activities and retail activities, and to show Telenor's income and expenses in its fibre-based retail activities if Telenor's retail activities had to purchase fibre-based LLU and VULA fibre, respectively, from Telenor's wholesale activity at the same prices as external wholesale customers.

908. Pursuant to Section 4-8, fifth paragraph, of the Electronic Communications Act, Nkom requires Telenor to base the accounting separation for fibre-based LLU and VULA fibre on fully distributed historical costs, on the basis of Telenor's financial accounts. All the items must be distributed between the residential segment and the business segment based on relevant statistics on the delivered technology. Below are the principles for the preparation of the financial statement for Telenor's retail operations and the auditing principles:

- **Revenue** shall include all relevant revenues from services invoiced to Telenor's retail customers delivered via fibre-based broadband. In general, revenue figures should be taken directly from the financial statement, but may under special circumstances be collated with data from, for example, invoicing systems. The revenues must be reconcilable against the financial statements. The revenues from the retail market must be allocated to the relevant wholesale products.
- **The costs of the wholesale operations** shall include the costs that Telenor's retail operations would have paid to Telenor's wholesale operations if there was a reference offer between them for fibre-based LLU and VULA fibre. The wholesale operations' costs should be calculated by summing up the set-up and subscription volumes for the relevant wholesale products (i.e. fibre-based LLU and VULA fibre) and the associated trunk products required to produce the retail products, multiplied by the standard list prices. If standard list prices have been changed during the current period, a weighted average price shall be used. It must be shown how the wholesale operations' costs have been calculated, including a specification of which wholesale products have been included and the relevant prices, volumes and discount rates[41].
- **External cost of sales** shall include costs related to inputs that are bought from others and that are included in the production of the services linked to the relevant retail revenues specified above. This item must be specified.
- **The retail operations' internal costs** shall encompass all costs incurred by the retail operations in order to enable the sale and provision of the service linked to the relevant retail revenues specified above. Typical activities and processes will include sales, marketing, customer services, invoicing, operation of service platforms, operation of IT systems and relevant support systems, financial management, administration, etc. Internal costs are to be allocated according to the activity-based costing (ABC) method. Remaining costs shall be split proportionately based on costs already recorded.

  The principles for allocating costs between the wholesale and the retail operations must be described and explained in the first report. Any changes in the principles for allocating costs between the wholesale and the retail operations must be described and explained in the report for the period in question. It follows from the principle of fully allocated costs that the internal costs should include a reasonable share of the common costs, including corporate overheads. The retail operations' internal costs should be specified for all major cost categories.
- **Imputed interest rate** shall be included in the accounting statement in order to factor in a reasonable return on the investments included in the retail operations. Capital

[41] The discount rates must not exceed the highest volume discount offered to an access buyer, in line with paragraph (19) of the Commission's Recommendation on consistent non-discrimination obligations and costing methodologies of 11 September 2013.

employed related to equipment used by both the wholesale and the retail operations must be allocated according to the activity-based costing (ABC) method. Remaining capital employed is to be allocated as already allocated capital employed.

Telenor shall use the imputed interest rate defined in Nkom's current decision for imputed interest rate for the fixed network markets.

909. Pursuant to Section 4-8 of the Electronic Communications Act, Nkom requires Telenor to publish a description of the system for accounting separation, including an overview of cost categories and the distribution keys used.

910. Pursuant to Section 4-8, cf. Section 10-3, of the Electronic Communications Act, Nkom requires Telenor to submit accounting separation reports for fibre-based LLU and VULA fibre, respectively, to Nkom for each year before 1 July of the following year. The first report will be for the 2019 financial year and must be sent to Nkom before 1 July 2020.

7.7 Assessment of the overall impact of the remedies

911. Above, Nkom has made an individual assessment of the proportionality of each of the obligations imposed. Hereafter, Nkom will assess the proportionality of the use of the remedies on an overall basis.

912. On the basis of the market analysis and the competition problems identified in the relevant market, Nkom has assessed which obligations will be best suited to rectify actual and potential competition problems. Nkom believes that the obligations imposed are suitable for the purpose, which is to facilitate sustainable competition.

913. In Nkom's assessment, a relatively comprehensive and detailed regulation of Telenor in Market 3a is necessary in several areas. In Nkom's assessment, the obligations are necessary in order to promote adequate competition intensity in downstream markets which use products in this market as an input factor. Nkom furthermore believes that the remedies do not go further than necessary, and therefore that the current competition problems can not be remedied with less intrusive remedies. Nkom refers to the proportionality assessment of the individual remedies ordered.

914. The remedies in this decision ential both clarifications and changes to the obligations imposed on Telenor pursuant to Nkom's decision of 20 January 2014. In Nkom's assessment, the clarifications and changes are suitable and necessary to achieve the purpose of the regulation.

915. With regard to the access obligation, the decision entails that existing obligations are generally continued. In some areas, the decision entails new or changed obligations for Telenor. With regard to Telenor's fibre access network, the decision entails that Telenor must offer VULA access. The VULA access entails the further development of the VULA product that Telenor already offers pursuant to today's Market 5 regulation. The order must be viewed

in the light that there are very limited opportunities to achieve physical access in Telenor's fibre access network, and in Nkom's assessment this will be the least intrusive obligation to ensure the necessary access to Telenor's fibre network in Market 3a. In the light of new information, Nkom has concluded that the extensive copper updating regime that was notified is not necessary. Some aspects of the regime have been retained, however, and among other things an obligation is being introduced for Telenor to offer replacement products if Telenor upgrades the copper network with the effect that access which is in use is withdrawn. In Nkom's assessment, the obligation balances Telenor's interest in being able to upgrade the copper network and utilise the technological opportunities available to be able to offer higher capacity to the end users, and safeguards the need of remote access buyers for predictability and the opportunity to compete with Telenor on equal terms.

916. With regard to price and accounting regulation, the decision entails that existing obligations are generally continued. In some areas, the decision entails new or changed obligations for Telenor. This includes price regulation in the form of margin squeeze tests for the new VULA product in Telenor's fibre access network. If Telenor upgrades the copper network with the effect that access which is in use will lapse, Telenor must also offer a replacement product that will be price-regulated in the form of a margin squeeze test. Nkom has also introduced a cost-orientation obligation with related cost accounting for backhaul services. In Nkom's assessment, the aforementioned access obligations would not function sufficiently effectively with less intrusive pricing requirements.

917. With regard to the non-discrimination obligation, the decision entails a new obligation to perform technical replicability tests. Nkom cannot see that there are any less intrusive alternatives to ensure that the non-discrimination obligation is sufficiently effective. Nkom furthermore believes that the obligation is in proportion to the purpose which it is intended to achieve. In Nkom's assessment, the test and the documentation requirement cannot be considered to be particularly onerous for Telenor.

918. The transparency requirements are specified to a greater extent than in the current decision in the former Market 4. In Nkom's assessment this is necessary in order to contribute to increased predictability for all parties and for the requirements to function as intended. In this respect, Nkom refers to how further specification is necessary to ensure compliance with the obligations concerning access and non-discrimination that are imposed. In Nkom's assessment, the competition-promoting effect of the transparency obligations cannot be achieved less intrusively.

919. With regard to accounting separation, the decision entails that existing obligations are generally continued. In some areas, the decision entails new or changed obligations for Telenor. Among other things, this concerns a duty of accounting separation for the new VULA product in Telenor's fibre network. In Nkom's assessment, the purpose of the accounting separation could not be achieved with a less intrusive remedy.

920. Nkom believes that the obligations imposed will effectively remedy the competition problems identified. The decision entails that the combined regulatory burden will be somewhat greater for Telenor than under the current regulation. Nkom believes, however, that the obligations are also proportional in overall terms, viewed in the light of experience from the current regulation period, the expected competition benefits, and the goal of achieving sustainable competition. The fact that the overall effect may be burdensome for Telenor cannot be assigned decisive importance for as long as no less burdensome forms of regulation exist that are equally suitable to achieve the regulatory objective. Nkom has not been able to identify any such alternatives.

7.8 Relationship with ordinary competition legislation

921. In the decision of 20 January 2014 in the former Market 4, Nkom concluded that ordinary competition law will not provide an adequate degree of protection against the competition problems that have been identified in this market. Nkom believes that this conclusion still applies to Market 3a.

922. In Nkom's assessment, the provisions of the Competition Act will not be sufficiently effective to safeguard the considerations behind the special obligations in the relevant market. A key reason for this is that the ban in the Competition Act against undue exploitation of a dominant position is a general ban. This entails, among other things, that it would normally take a significantly longer time for the Norwegian Competition Authority to determine whether a specific instance of e.g. access denial or price discrimination can be regarded as misuse under Section 11 of the Competition Act, than the time necessary to determine whether conduct is in conflict with a specific access obligation that is imposed through sector-specific competition regulation under the Electronic Communications Act. Since the time factor is of central importance to achieving the objectives of the sector-specific regulation, ordinary competition law will be less appropriate than the sector-specific regulation to promote sustainable competition.

923. The sector-specific regulation gives the opportunity to impose detailed obligations in advance. Imposing sector-specific obligations could thereby ential increased clarity and predictability concerning the nature of the various obligations. In Nkom's assessment, this predictability will facilitate investments and thereby support development towards sustainable competition. Increased clarity concerning the nature of the obligation would furthermore facilitate faster intervention, ensuring effective regulation.

924. Nkom hereafter concludes that ordinary competition legislation will not adequately meet the need for predictability, for detailed regulations and for rapid intervention when needed. Nkom furthermore concludes that supplementary sector-specific advance regulation of Market 3a is necessary, in order to achieve the purpose of the sector-specific regulation.

8 Relationship with current decisions

925. Unless otherwise determined below, on the entry into force of this decision, Nkom's decision of 20 January 2014 concerning special obligations in the wholesale market for full and shared access to fixed access networks (formerly Market 4) is withdrawn.

926. Under the decision of 20 January 2014, Telenor must report cost accounts for copper-based LLUB access for up to and including the 2018 financial year. The report must be sent to Nkom before 1 July 2019.

927. Under the decision of 20 January 2014, Telenor must report cost accounts for co-location access for up to and including the 2018 financial year. The report must be sent to Nkom before 1 July 2019.

928. Telenor must report accounting separation for fibre-based LLUB for up to and including the 2018 financial year. The report must be sent to Nkom before 1 July 2019.

929. Under the decision of 20 January 2014, Telenor must publish key performance indicators (KPIs) for up to and including December 2018.

9 Entry into force and appeals

930. This decision and the associated obligations in the wholesale market for local access to fixed access networks will enter into force on 1 January 2019. Nkom draws attention to the fact that certain obligations in the decision are subject to specific deadlines for when the obligations must be fulfilled. These deadlines are stated in the sections concerning special obligations.

931. The decision may be appealed, cf. Section 11-6 of the Electronic Communications Act, and Section 28 of the Public Administration Act. The deadline for appealing decisions is normally three weeks, cf. Section 29, first paragraph, of the Public Administration Act. Due to the coming Christmas period and public holidays, Nkom believes that there are grounds for an extended appeal deadline, cf. Section 29, fourth paragraph, of the Public Administration Act. The deadline for appeal is therefore set at five weeks from the decision date.

932. Appeals must be addressed to the Ministry of Transport and Communications, but should be sent to the Norwegian Communications Authority. Only the Ministry of Transport and Communications may make a decision on deferred implementation of the decision, cf. Section 11-6, forth paragraph, of the Electronic Communications Act and Section 42 of the Public Administration Act. If, during any appeal process, the implementation of the decision is deferred, the withdrawal of existing obligations will be deferred until a final decision has been made concerning the appeal.