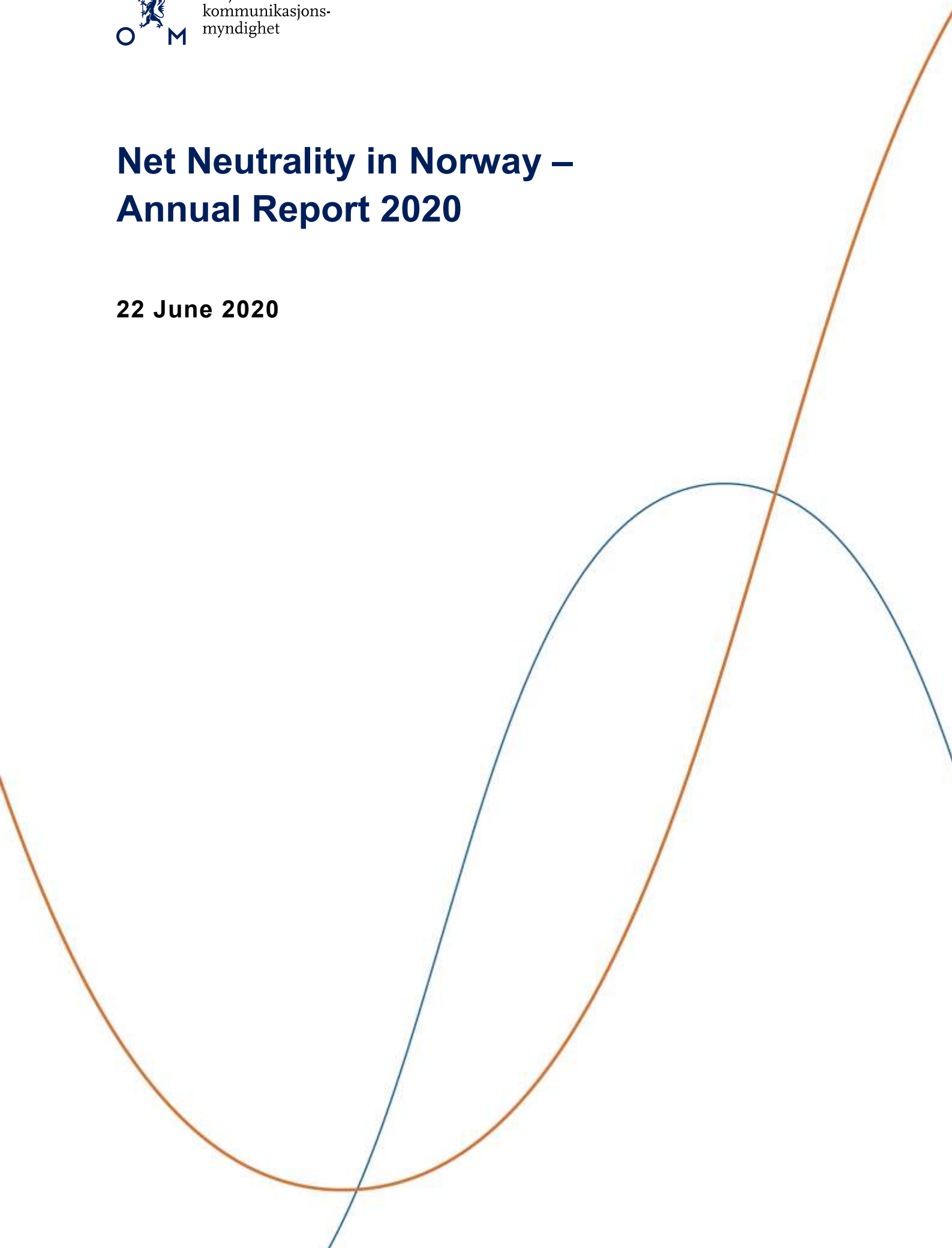
Nasjonal kommunikasjons-myndighet

Net Neutrality in Norway – Annual Report 2020

22 June 2020



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1 Introduction and background

Nkom publishes an annual report on the status of net neutrality in Norway, and this is the fourth consecutive report. Net neutrality is the principle that all internet traffic must be treated equally, regardless of sender, recipient, equipment, application, service or content. The period covered by the report runs from 1 May 2019 to 30 April 2020. During the period, Nkom held the Norwegian Net Neutrality Forum on 17 October 2019.

Net neutrality was codified in law in Norway with effect from March 2017 in connection with the introduction of European rules on net neutrality, in accordance with Regulation 2015/2120[1]. This Regulation aims "to establish common rules to safeguard equal and non-discriminatory treatment of traffic in the provision of internet access services and related end-users' rights. It aims to protect end-users and simultaneously to guarantee the continued functioning of the internet ecosystem as an engine of innovation."[2]

The monitoring of net neutrality is also based on BEREC's guidelines on net neutrality, which have been established pursuant to Article 5(3) of the Regulation. In accordance with section (19) of the preamble, the regulatory authorities must take utmost account of relevant guidelines from BEREC in their application of the Regulation.

On 30 April 2019, in its evaluation of the impact of the Regulation, the European Commission concluded that there was no need for this to be updated. On this basis, in the course of the reporting period, BEREC undertook a revision of the related guidelines. The draft revised guidelines were subject to public consultation from 10 October to 28 November 2019. The final version of the revised guidelines was published on 16 June 2020.

The report is organised according to the same structure as the provisions of the Regulation. Section 2 describes access to an open internet via Norwegian providers' internet access services, including reports on assessments of existing zero-rating offers. Section 3 describes issues related to traffic management in Norwegian providers' networks. Section 4 describes how Norwegian providers provide information about the internet access services they offer. Section 5 describes the quality achieved by Norwegian internet access services.

Finally, Section 6 provides an overall assessment of the status of net neutrality in Norway. This section also serves as an overall summary of the content of the annual report.

2 Access to an open internet

2.1 The right to an open internet access service

The right of Norwegian end-users to access an open internet is specified in the Norwegian Electronic Communications Act's net neutrality provision[3], the European Regulation on an Open Internet, and BEREC's net neutrality guidelines.

Article 3(1) of the Regulation describes how the end-users, via their Internet access service, are entitled to access and distribute information and content, use and provide applications and services, and use terminal equipment of their choice.

[1] Regulation (EU) 2015/2120 of the European Parliament and of the Council.

[2] First paragraph of the preamble to Regulation 2015/2120.

[3] Norwegian Act on Electronic Communications, Sections 2-16. Net neutrality

2.2 End-user terms and conditions

In 2018, Chilimobil AS (Chili) launched a subscription called “Free Data”. On its launch, the subscription had several restrictions to end-users’ opportunities to share data with themselves and others, and move SIM cards from their mobile phone to other devices. Nkom assessed the case according to the end-user’s right to determine what type of equipment to use for their internet access service.

Nkom made a decision on 20 December 2018 which required Chili to modify the subscription terms, with reference to the net neutrality regulations. The basis for the decision is described in further detail in the annual report for 2019. Chili appealed the decision to the Norwegian Ministry of Local Government and Modernisation (KMD). In the appeal decision dated 11 December 2019, KMD upheld Nkom's decision.

2.3 Zero-rating in Norway

2.3.1 Background

Zero-rating is a form of price discrimination of selected applications compared to other applications. A typical example is that music streaming can be used without using the end-user’s agreed data allowance. The internet service provider decides which applications are zero-rated.

Internet service providers offer zero-rating on the basis of Article 3(2) of the Regulation, which introduces the concept of “commercial practice”. This Article requires providers to refrain from providing internet access services on commercial terms which limit the end-user’s right to open internet access.

Nkom has obtained updated information from Telenor and Telia concerning the scale of their zero-rated offers. In addition, the Norwegian Media Businesses Association (MBL) and the Norwegian Consumer Council notified their view of the effect of today's zero-rated services at the Net Neutrality Forum and to BEREC’s consultation on revised net neutrality guidelines. Further description of zero-rating is based on this data collection.

The regulatory assessment of zero-rating is performed as an overall assessment based on the criteria set out in section 46 of BEREC’s net neutrality guidelines. This assumes that the practice does not entail technical traffic management in contravention of the Regulation. The criteria are related to the providers’ market position and the effect on content providers and end-users, as well as the scale of zero-rating. Below, an account is given of Nkom’s assessment of the aforementioned criteria, in addition to an overall assessment.

2.3.2 The market positions of the internet service providers

In its own reports, Nkom has previously assessed zero-rating offers from both Telenor[4] and Telia[5], both named “Music Freedom”. In these instances, Nkom has expressed concern that the offers might have adverse effects, due to the two internet service providers’ significant market position and potential influence.

The electronic communication statistics for 2019 show that the duopolistic situation is continuing, since Telenor and Telia together have around 84 per cent of the subscribers in the market for telephony-connected mobile services. In terms of revenue, together the companies have around 90 per cent of the market.

[4] Nkom report 29 June 2017, see: https://www.nkom.no/aktuelt/nyheter/_attachment/29334?_ts=15cf3f67b0a

[5] Nkom report of 18 December 2017, see: https://www.nkom.no/aktuelt/nyheter/_attachment/31360?_ts=1606da8f297

2.3.3 Impact on the content providers

Nkom generally believes that the zero-rating offers can influence the terms of competition in the content market since, due to the positive price discrimination, using selected music streaming applications can appear to be more advantageous for the users than other applications whereby content transfer consumes the data allowance.

Norwegian Net Neutrality Forum

At the Norwegian Net Neutrality Forum, several presentations problematised the availability of zero-rating in the Norwegian market. Pål Nedregotten, Executive Vice President for Innovation, Amedia, presented viewpoints on behalf of MBL. Nedregotten stated that the conditions for net neutrality had deteriorated significantly in Norway, and referred to Norwegian and European objectives that he did not believe were followed up adequately:

- Granavolden - the Norwegian governmental platform: “Enforce the principle of net neutrality, so that the internet provides equal opportunities for everyone and contributes to media diversity.”
- BEREC Guidelines: “The aim of the Regulation is to “safeguard equal and non-discriminatory treatment of traffic” (Article 1) and to “guarantee the continued functioning of the internet ecosystem as an engine of innovation” (Recital 1) as well as Recital 7, which directs intervention against agreements or commercial practices which, “by reason of their scale, lead to situations where end-users’ choice is materially reduced in practice”, or which would result in “the undermining of the essence of the end-users’ rights”.”

Finn Myrstad, director of digital services, the Norwegian Consumer Council, gave a presentation in which he presented viewpoints on behalf of the consumer side. Myrstad believed that zero-rating is a practice that is hostile to customers for the following reasons:

1. Controls the consumer’s free choices, and limits options
2. Distorts competition
    - Discrimination of content providers
    - Excludes smaller players from the market
    - Locks customers further
3. Harms diversity, distorts media habits
4. Challenges privacy
5. Telecom companies become gatekeepers on the internet
6. Weakens freedom of expression
7. Prevents the transition to larger mobile packages

Yiannis Yiakoumis, founder of the technology company Selfie Networks in San Francisco, also attended the forum. He is engaged in facilitating zero-rating in the interface between content providers and internet service providers. In his presentation, Yiakoumis expressed how the European approach to the regulation of zero-rating constitutes a kind of golden middle road on the scale between the extremes of total prohibition and full liberalisation.

Yiakoumis believed, however, that the regulation is not adhered to by various internet service providers that place obstacles in the way of some content providers, and that this could also occur in Norway. Based on his own experience, he listed several examples of how certain content providers were not included in the zero-rating programmes, or that such inclusion was delayed by the internet service providers.

Consultation input concerning the revision of BEREC’s guidelines

Nkom’s Net Neutrality Forum was held on the occasion of BEREC’s consultation concerning the draft revised net neutrality guidelines. In its consultation response, MBL also focused on the impact of zero-rating. MBL pointed out that zero-rating challenges and undermines the

very nature of net neutrality, and indicated that it is impossible to limit correctly zero-rated services, and that zero-rating has a detrimental impact on media diversity.

In the consultation response, MBL used Norway as an example of the impact of zero-rating in a national market. MBL argued that zero-rated music streaming from Telenor and Telia presents a threat in the Norwegian market, due to the small and expensive data allowances offered, compared to other Nordic countries. MBL furthermore argued that content priced at zero draws users away from other content that uses the limited data allowance.

The Norwegian Consumer Council responded to BEREC's consultation together with BEUC, the European Consumer Organisation. In BEUC's consultation response, it was argued, among other things, that in countries like Norway, zero-rating gives internet service providers with their own networks significant competitive advantages, since they can offer zero-rating programmes that is not possible for virtual operators to match. The Norwegian Consumer Council's report on zero-rating was furthermore cited as a source to illustrate the limitations in the regulation of zero-rating when this is assessed on a case-by-case basis.

2.3.4 Impact on the end-users

Nkom believes that the zero-rating offers can affect end-users' real freedom of choice, in particular because data allowances in Norway are relatively small and relatively highly priced. When the data allowance included that can be used freely becomes relatively small, zero-rating becomes more problematic than would have been the case with larger data allowances. The Nordic-Baltic statistics shows consumption of mobile data in Norway compared to other countries, cf. Figure 1:

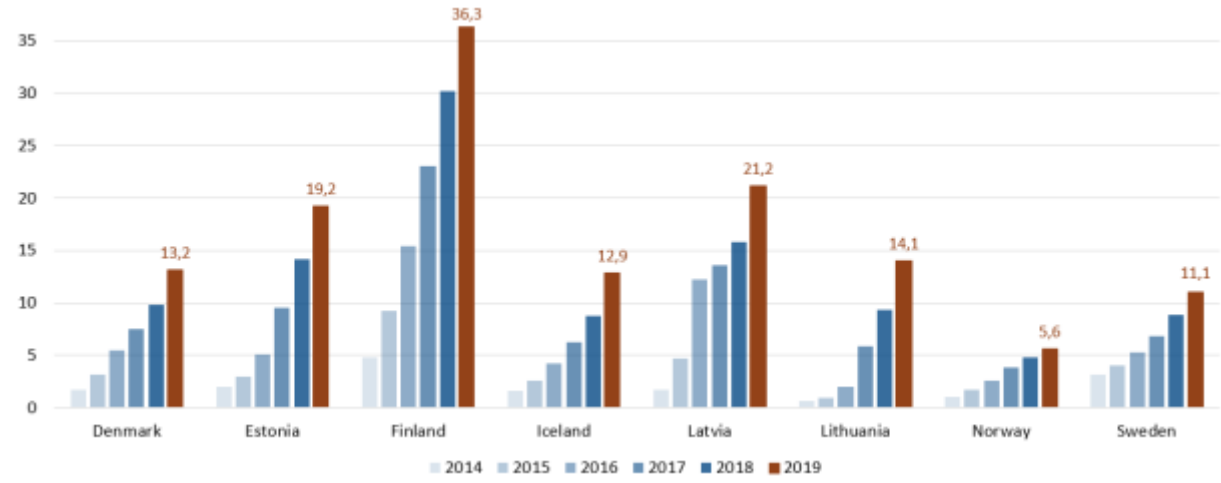

Figure 1: Data consumption in mobile networks per month per capita measured in Gbytes

In Figure 1, we note that Norway has the lowest data consumption included in the Nordic-Baltic statistics. In countries where the inclusion of unlimited data volumes is more prevalent, zero-rating will be less problematic. Figure 2 compares a selection of Nordic and Baltic mobile operators' mobile subscriptions with free data included. The comparison uses information from the mobile operators' own websites at the end of the first half of 2020, and the different currencies are converted into Norwegian kroner. Denmark, Estonia, Finland and Latvia all offer mobile phone subscriptions that include free use of data for less than NOK 300.

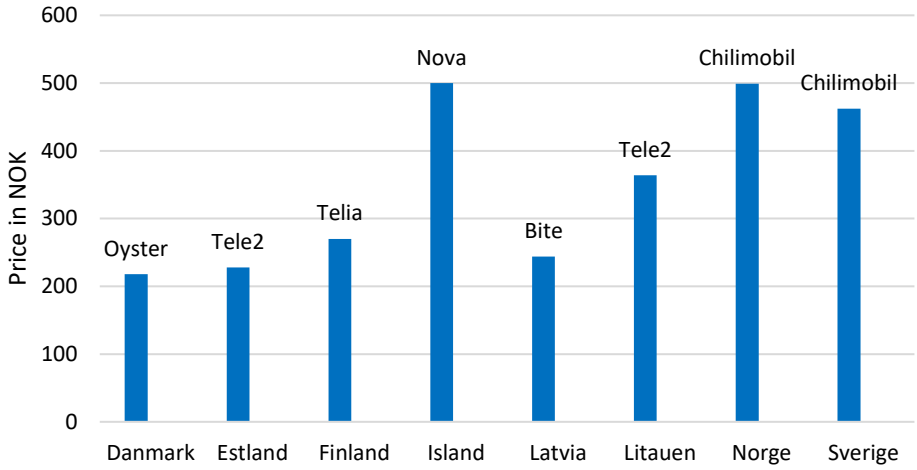

Figure 2: Selected subscriptions with free data included

Norway is among the countries that have both a relatively low consumption of mobile data, and relatively high prices for subscriptions with unlimited data allowances, as shown in the above figures. This implies that zero-rating is also more problematic in Norway, compared to Denmark and Estonia, among others. When the data allowances are large enough, offers of zero-rated services will only have a limited impact on the choices made by users.

Subscriptions with a higher data allowance included are more prevalent in several other countries than in Norway. At the end of 2017, 2018 and 2019, the distribution of the total number of customers (private) per data allowance in Norway was as follows:

Allowance	2017	2018	2019
No data included	23%	19%	17%
< 1 GB	7%	8%	6%
1-5 GB	46%	44%	45%
5-10 GB	16%	16%	17%
10-20 GB	6%	7%	7%
> 20 GB	1%	6%	8%

Table 1: Distribution of total number of customers (private) per monthly data allowance

The largest group of Norwegian end-users have subscriptions with a data allowance of between 1 GB and 5 GB included. The trend from 2017 indicates, however, that the proportion of end-users with allowances greater than 10 GB per month is still increasing slightly.

Since the last annual report, the number of providers that have launched mobile subscriptions with “free” data consumption has not increased, but several major subscriptions have been launched, including by Fjordkraft and Chilimobil, which during the reporting period launched a subscription with 40 GB of data.

Telia has launched “Music Freedom” in mobile broadband[6] for various subscriptions with 50GB and higher. For mobile telephony, Telia still has the “Telia X” subscription, which offers virtually unlimited data consumption at a fixed monthly price. After the customer has used 40 GB, the speed is reduced to 3 Mbit/s, however.[7]

[6] The term “mobile broadband” (MBB) concerns products that offer a dedicated data service using a separate SIM card. The user gains a clear data connection between the terminal and the mobile network, and, via this, access to the Internet.

[7] https://www.telia.no/mobilabonnement/mobilabonnement-for-alle/telia-x

Ice has the “Data Freedom”[8] service, which gives up to 1,000 GB per month at a speed of 10 Mbit/s in the company’s own mobile network. The offer is an “additional service” in combination with the company’s own main subscription ranging from 6 to 30 GB per month. The customer can thereby in practice make use of free data consumption for as long as the customer stays in Ice’s mobile network. When the customer streams data from another mobile network, the data consumption is deducted from the main subscription's data allowance.

As the only provider without its own mobile network[9], Chilimobil also has a subscription that facilitates almost unlimited data consumption (“Chili Free Data”). [10] With Chili Free Data, the data volume is limited to 19 GB in EU/EEA countries outside Norway. If the customer uses more than 5 GB per 24-hour day, the company states that the speed is limited to 3 Mbit/s until midnight of the relevant day. In April 2020, Chilimobil[11] launched a subscription with free data consumption for its customers in Sweden.

Shortly after the end of the reporting period, Telenor launched the “Next” subscription series, with data allowance 100 GB per month, after which the speed is reduced to 3 Mbit/s. The subscriptions are available with the speed classes: “Normal” up to 10 Mbit/s, “Fast” up to 100 Mbit/s and “Maximum” up to 300 Mbit/s. This is the first subscription type in Norway to differentiate by speed instead of data volume.

2.3.5 The scale of zero-rating

The increasing scale of zero-rating increases the number of end-users who are encouraged to use certain selected content providers, which can thereby affect the freedom of choice. In last year’s annual report, the scale of zero-rating was assessed to be limited. This was the main reason that Nkom, according to an overall assessment, found that there was no basis to give a mandatory order to rectify the zero-rating offers in the market at that time. It is still the case that zero-rated services include Telenor and Telia’s offer of “Music Freedom”. However, Ice has introduced free data use for 10 websites for a period[12], as a consequence of the coronavirus pandemic.

During the reporting period, the proportion of private subscriptions with “Music Freedom” increased from around 28 per cent to 32 per cent. Even though both Telenor and Telia offer the opportunity to buy “Music Freedom” separately for NOK 49 for certain other subscriptions, this only contributes to a small extent to the customer base that has “Music Freedom”.

Overall for Telenor and Telia’s customer base, the proportion of private subscriptions with zero-rating per monthly data allowance has developed as shown in the following table:

Allowance	April 2018	April 2019	April 2020
0 - 1 GB[13]	0%	1.1%	1.2%
1-5 GB	16.3%	17.1%	20.2%
5-10 GB	49.9%	33.3%	26.6%
> 10 GB	33.6%	48.3%	52%

Table 2: Share of private subscriptions with zero-rating per monthly data allowance

[8] https://www.ice.no/produkt/data-frihet/

[9] Chili buys access to Telia’s mobile network.

[10] https://www.chilimobil.no/bestill/chili-fri/

[11] https://chilimobil.se/

[12] https://www.ice.no/ice-magasinet/fri-databruk-med-ice/

[13] On purchasing data packets of 10, 15 or 20 GB, subscriptions with no data allowance included, such as prepaid cards, will be included in the figures for the calendar month in which the data packages were purchased.

Mobile subscriptions with data allowances below 10 GB, with “Music Freedom” included, entail age restrictions. On the other hand, mobile subscriptions with data allowances from and including 10 GB, with “Music Freedom” included, are available to everyone.

As the above figure shows, the increase in the number of private subscriptions with “Music Freedom” is greatest among end-users with over 10 GB per month. To some extent, this trend offsets the negative effects of zero-rated services. Among the subscriptions with “Music Freedom” included, there has been a clear downward trend from 2017 for allowances in the 5-10 GB range.

According to information from Telenor and Telia concerning the average consumption of zero-rated content, end-users with data allowances greater than 10 GB per month have the highest average data consumption of “Music Freedom”. This also contributes to offsetting the negative effects of zero-rated services.

2.3.6 Overall assessment of zero-rating

In terms of the ***effect on content providers***, zero-rating affects terms of competition by entailing price discrimination between providers that are included and providers that are not included. On their websites, both Telenor and Telia describe how providers of music streaming services can become included in “Music Freedom”. The conditions for content providers have not changed during the past year, however, with the exception that Audiomack is now part of “Music Freedom” at both Telenor and Telia. Nkom therefore maintains its assessment that the number of content providers that are actually included in the zero-rating schemes is relatively limited, and that this solely concerns large, well-established providers.

In terms of the ***effect on end-users***, Nkom believes that zero-rating can restrict end-users’ freedom of choice, particularly in view of the relatively small, highly-priced data allowances compared to other countries. Nkom maintains our assessment for this criterion without any changes from the previous annual report. End-users are using more mobile data, however, and more mobile operators are launching subscriptions with larger data allowances included. Both the supply of and demand for larger data allowances might lead to greater competition in this market layer. Nkom will follow the market, on the other hand, and the assessment might be different if additional zero-rated content categories were to be launched in the market.

The ***scale of zero-rating*** has increased somewhat since the previous reporting period. The zero-rated offer is concurrently increasingly being taken up by users with relatively large data allowances. These users are deemed to have sufficient mobile data to have relatively great freedom to choose which applications they wish to use. These users will thereby be less motivated to use zero-rated applications. In addition, there has been a decline among those with medium-sized data allowances, who are likely to choose to switch to subscriptions with a larger data allowance. As a consequence of this development, Nkom is less concerned that last year's increased scale of “Music Freedom” has detrimental effects on competition or consumer welfare. Nkom assesses that the scale continues to be limited.

Based on an ***overall assessment*** of these criteria, Nkom therefore does not see any basis to issue mandatory orders for rectification of the zero-rating schemes, despite a continued increase in their scale. However, Nkom will continue to monitor the development of zero-rating in the market.

3 Traffic management and specialised services

3.1 Data collection from Norwegian providers

BEREC recommends data collection from internet service providers as a method that national regulatory authorities can use to monitor the providers' compliance with the net neutrality regulations. Nkom has obtained data of this nature as part of its collection of data for use in the annual statistics.

Traffic management of the internet access service is particularly relevant when assessing net neutrality. The internet access service is defined as a "public electronic communications service offering access to the internet." Traffic management methods that the internet service providers use for the internet access service are regulated by Article 3(3) of the Regulation.

According to data obtained by Nkom concerning the traffic management used by Norwegian providers in the production of internet access services, typical traffic management measures include the blocking of domain names in DNS pursuant to a judicial order, the Kripos Child Abuse Filter, and blocking of TCP/UDP ports in connection with specific security measures (for example, to prevent DDoS (Distributed Denial of Service) attacks and other types of cyber-attacks) and anti-spam measures (based on Norwegian industry norms).

For mobile networks, there have also been reports of general bandwidth throttling, pursuant to the subscription terms and conditions, when the data allowance has been used up, but not throttling of specific applications. Bandwidth throttling that treats all applications equally is, in principle, in compliance with the applicable net neutrality rules.

Specialised services are defined as services other than internet access services which are optimised for specific content, applications or services, or a combination thereof, where the optimisation is necessary in order to meet requirements of the content, applications or services for a specific level of quality. In Article 3(5) of the Regulation, the net neutrality regulations require internet service providers to ensure sufficient network capacity to be able to offer these services in addition to internet access services.

According to data obtained by Nkom from Norwegian providers, typical specialised services in the fixed network are Voice over IP and IPTV, and on mobile networks it is relatively common to offer VoLTE in parallel with the internet access service. This is in line with the typical examples of specialised services in BEREC’s net neutrality guidelines.

Nkom also asked how the providers ensure that the capacity in their network is sufficient to ensure that the specialised services are not to the detriment of the general quality of the internet access service for end-users. The general response to this is that the traffic at the links in the network is monitored continuously, and that capacity is expanded as needed.

Nkom has not conducted a detailed review of the reported traffic management measures and specialised services, but considers that these are provided in accordance with the Regulation. In the future, Nkom will be able to initiate more detailed investigations of the services offered.

3.2 Facilitation of 5G

Norwegian Net Neutrality Forum

The Norwegian Net Neutrality Forum was held on the occasion of BEREC’s publication of the draft revised European net neutrality guidelines. Compatibility between the guidelines and 5G was the main topic of the forum. At the forum, internet service providers, content providers and

the consumer side were also invited to submit their considerations concerning the revised guidelines.

Henrik Larsen, attorney, Legal & Regulatory, Telia Norway, gave a presentation entitled “The concept of specialised services as a basis for providing customised connectivity”. Larsen pointed to how the regulation allows for varying, agreed service quality on the internet access side, and that specialised services can be offered if a service would not function satisfactorily in practice on the “best effort internet”.

Larsen also pointed out the problem that any service on a base station in the mobile network will affect other services in the same area, at one level or another. He asked the timely question of how this would affect the criterion that the specialised service must not impair the quality of the internet access service? This assumes a relatively complicated assessment to which there is no simple answer.

Consultation input concerning the revision of BEREC’s guidelines

After the Net Neutrality Forum, several Norwegian operators contributed consultation responses to BEREC's consultation concerning draft revised net neutrality guidelines. In its consultation response, Telia focused on the significance of the net neutrality regulation for the 5G technology. In this respect, Telia expressed support for BEREC's clarification that different quality levels for various different internet access services would be in line with the Regulation.

Telia also had critical comments concerning the level of detail at which regulators can assess the requirements that the Regulation makes of the operators’ implementation of services in general, which is also of significance to 5G services in particular. Finally, Telia emphasised regulators’ and operators’ shared interest in stimulating investment in 5G expansion.

In its consultation response, Telenor commented that the revision of BEREC's guidelines came at the right time to address the introduction of the 5G technology. Telenor points out that even though 5G will improve the performance of internet access services, 5G will first of all provide customised service quality for specialised services using network slicing.

Concerning specialised services, Telenor emphasised the importance of avoiding regulatory uncertainty that might impede the full utilisation of the opportunities inherent in the 5G technology. Telenor also advocated giving operators great freedom to offer specialised services by ensuring that market demand should also be a relevant criterion.

BEREC’s revised guidelines

BEREC published the final version of the revised guidelines on 16 June 2020. BEREC’s guidelines are technology-neutral, but several of the clarifications that have been introduced clearly signal that various 5G services can be introduced in line with the net neutrality regulation.

Internet access services with high capacity and low time delay are expected, as one of the first improvements to mobile technology provided by 5G. In this respect, BEREC’s guidelines state that it is in line with the Regulation to offer internet access subscriptions with various different quality of service levels, such as speed and/or latency. The same applies to internet access subscriptions containing several different levels of quality of service, where the end-user’s applications can request different quality levels, such as choosing between standard and low latency. This is a form of “application agnostic” quality of service.

The 5G networks are furthermore assumed to offer customised quality of service for specific services, in contrast to general internet access services. These services will lie within the “specialised services” category in accordance with BEREC’s guidelines, and these may be offered for services that it is not possible to guarantee via the internet access service. The revised guidelines specify how the evaluation of the criteria for specialised services can be undertaken, as requested by the internet service providers during the consultation. However,

the ultimate method of such assessment will probably have to wait for BEREC's newly developed measurement tool to become generally available.

There are also high expectations of new machine-to-machine (M2M) services, also referred to as the Internet of Things, in the 5G networks. Two specifications in particular in BEREC's revised guidelines are relevant in this regard. The guidelines indicate that some M2M networks will be offered as private networks, and these are exempted from the Regulation, which only applies to publicly available electronic communications. The guidelines furthermore specify that for M2M devices that are subject to resource constraints, specialised services might be in line with the Regulation if such issues as energy restrictions and security could not be secured by internet access services.

3.3 Internet traffic and net neutrality during the coronavirus outbreak

In connection with the coronavirus outbreak in Norway and in Europe in general, internet service providers and the national regulatory authorities closely monitored traffic development on the internet infrastructure. It was also important to clarify the application of the pan-European net neutrality regulation, and to initiate preventive measures. In general terms, it can be concluded that the internet service providers in Norway and other European countries have handled the traffic load on a sound basis.

As a consequence of the coronavirus situation, Norwegian employees and school pupils were sent home from workplaces and schools on 12 March 2020. This led to a significant increase in people's use of home offices and home schooling, and communication via the internet suddenly became even more important for the functioning of Norwegian society. This brought an increase in internet traffic in Norwegian providers' networks and at the Norwegian internet exchange[14].

On 18 March, the European Commission initiated dialogue with various video streaming providers, such as Netflix, to explore the possibility that they could contribute to reducing traffic congestion by offering standard-resolution, rather than high-resolution, content. Furthermore, online game providers announced that they would contribute by uploading their software updates overnight, so as not to impose an unnecessary load on the infrastructure during daytime hours, when traffic was greatest.

Measures like this are related to the application layer and have an impact together with inherent protocol mechanisms such as congestion control and content distribution networks (CDN). Endpoint-based congestion control in protocols such as TCP and QUIC[15] is significant to limiting network traffic, and the same applies to the adaptive video encoding offered by content providers. CDN networks contribute by making content available closer to the recipients, thereby reducing traffic congestion, for example at points of interconnection.

On 19 March, BEREC and the European Commission published a joint statement in order to clarify the regulatory conditions during the pandemic. The institutions pledged to continue to maintain an open internet for Europeans, and specified that, also during the coronavirus situation, the Regulation prevents operators from blocking or throttling internet traffic from specific applications.

The statement furthermore described how operators may implement *reasonable* traffic management measures as usual (Article 3(2) of the Regulation). Furthermore, in view of the coronavirus situation, operators would also be able to use *exceptional* traffic management measures (Article 3(3)) if this is necessary in order to handle extraordinary network congestion,

[14] NIX (Norwegian Internet eXchange) is a Norwegian hub for interconnection between Internet service providers. NIX comprises several separate points of interconnection spread across different geographical locations.
[15] TCP = Transmission Control Protocol, QUIC = Quick UDP Internet Connections.

but it was specified that this can only be used for as long as necessary, as described in the provision in the Regulation.

On 30 March, BEREC then announced that it would report regularly on the status of internet capacity in the light of the coronavirus outbreak. Norwegian data were reported by Nkom to BEREC's European status overview. In general terms, BEREC's observations showed an increase in traffic, but no serious congestion situations were reported, and BEREC concluded that the operators were tackling the situation well.

The overall situation for Norwegian providers shows that during March and April 2020, there were no problems with congestion in the networks in general. There was a significant increase in traffic as a consequence of the coronavirus outbreak, while existing network resources managed to handle the increase in traffic.

A traffic increase of around 30 per cent was reported for mobile networks, and the traffic distribution across 24 hours showed a particular increase during daytime hours compared to the evening/night. Mobile providers notified, however, that users in some rural areas might experience short-term problems with high traffic load at individual base stations.

A traffic increase of around 40 per cent was reported for fixed internet access services, and in this case too, the greatest impact was during daytime hours. Fixed network providers notified that ADSL connection users might experience short-term problems with high traffic load in some areas, but also notified measures to enhance the network capacity.

At the Norwegian internet exchange, a traffic increase of around 30 per cent was reported. In this case, too, traffic distribution with higher daytime traffic increases compared to normal was observed. Preventive measures were initiated by several providers, by increasing the capacity for interconnection between the various providers' networks.

Nkom monitored the situation closely and received regular reports from the various providers. With regard to specific net neutrality and traffic management issues, no incidents were reported, nor were there any reports of cases of the implementation of exceptional traffic management measures, as provided for in BEREC's statement.

The situation was watched closely by the press in Norway and the world in general, and in retrospect there were allegations that the European measures during the coronavirus situation were necessary due to "problems" with the European internet, and even that there were "tremendous problems"[16]. Yet there are no observations to support such a conclusion.

On the contrary, the resilience of internet technology and the efforts of internet service providers and content providers revealed an overall situation in which the Norwegian and European internet tackled the situation on a sound basis. This also confirmed that the European net neutrality regulation is designed to handle such exceptional situations as we witnessed in March-April 2020 (i.e. the part of the coronavirus crisis that occurred during the reporting period for the annual report).

4 Information about the internet access service

4.1 Information requirements

Article 4 of the Regulation sets requirements concerning the information that internet service providers must make available to their end-users. In Article 4(1) there is a requirement for

[16] "The internet is surviving the pandemic — let the feuding begin", Politico, 4 April 2020, https://www.politico.com/news/2020/04/11/internet-surviving-pandemic-feuding-begin-179611

openness and transparency in providers' contracts concerning internet access services, and that providers must disclose such information, while in Article 4(2) providers are required to have transparent, simple and efficient procedures to address complaints of end-users relating to the rights and obligations laid down in Articles 3 and 4(1).

Below, we focus on the same topics as in the 2019 annual report: information concerning traffic management measures and information concerning speed. With regard to information concerning the right to complain, Nkom still believes that joint processing of complaints by the providers is acceptable for as long as it is evident that complaints concerning net neutrality can also be made to the providers.

As described in the 2019 annual report, Nkom issued an information letter to internet service providers, based on a survey which showed that providers could become better at providing their end-users with the required information. A common aspect of the ongoing follow-up was that the providers – in dialogue with Nkom – implemented measures on their websites and in their contractual terms to ensure that the relevant information is made available to end-users in a format and form that are in closer compliance with the requirements under the Regulation.

In sections 4.2 and 4.3, some comments are also made concerning how, as of today, information about traffic management and speeds is described by the individual providers.

4.2 Information concerning traffic management

Providers of internet access services must disclose the traffic management measures that are being used. We refer to Section 3 of the report for more information about the actual traffic management measures.

The Regulation requires the internet service providers to include information about traffic management measures in the contractual terms and to publish this information (typically on their websites). Even if the providers can document that the information is given, it is also relevant to assess the actual content and quality of the information.

- Telia has a good solution for how traffic management information is disseminated to customers, on its website[17], in the contractual terms[18], and at the company's various market outlets[19]. The website gives a detailed description of how traffic is handled in the company's network, and customers can also find information about how to make complaints.
- GlobalConnect has a detailed description of traffic management measures on its website[20], in the form of general information as well as a description of specific applications that are blocked for security reasons. The company also provides information on how complaints concerning traffic management or other net neutrality issues can be made.
- NextGenTel has a separate net neutrality information page, where traffic management information, inter alia, is provided. [21]

[17] https://www.telia.no/hastighet/#trafikkstyring

[18] https://www.telia.no/globalassets/pdf/abonnementsvilkar_privat.pdf

[19] https://onecall.no/kundeservice/4G-hastighet-mobildata
https://mycall.no/kundeservice/hastighet-mobildata
https://www.phonero.no/info/trafikkstyring-hos-phonero
https://www.phonero.no/info/hastighet-hos-phonero

[20] https://www.globalconnect.no/trafikkstyring

[21] https://www.nextgentel.no/priser/vilkar-1#nettnoytralitet

- Telenor describes traffic management in the contractual terms of the agreement, which state that traffic management can be conducted on the basis of security, court orders, or as a consequence of contract with end-users concerning limitations to data volume.

As last year, Nkom finds that the providers' practice varies somewhat with regard to the degree of detail in their descriptions of traffic management measures. Some providers have a dedicated net neutrality page, which includes traffic management as an element of further information, while others have a more limited description in the contractual terms. The review undertaken by Nkom in connection with this annual report also shows that as a minimum all providers have a satisfactory presentation of traffic management measures, which thereby are in accordance with the Regulation.

Nkom will undertake continuous supervision of how the providers inform their customers of traffic management measures.

4.3 Information concerning speed

In order to strengthen the rights of end-users, it is a requirement under Article 4(1)(d) of the Regulation that providers of internet access services inform end-users of the speed that they are realistically able to deliver. The Regulation requires providers of *fixed* internet access services to specify the following parameters for download and upload speeds, respectively:

- Minimum speed
- Normally available speed
- Maximum speed
- Advertised speed

"Normally available speed" is the speed that an end-user can expect to achieve for the majority of the time that they use the service. This parameter is probably the one that provides the most relevant information to end-users about the performance of the internet access service.

In mobile networks, the speed normally available in a given cell is more difficult to predict, due to the varying number of active users. For this reason, only fixed internet service providers are required to provide information about this speed parameter. However, the Regulation requires providers of *mobile* internet access services to specify the following parameters for speed:

- Estimated maximum speed
- Advertised speed

BEREC considers certain types of Fixed Wireless Access (FWA) to be fixed internet access services with regard to the requirements concerning openness and transparency in the Regulation. This is, for example, the case where wireless technology (including mobile) is used for internet access at a fixed location with dedicated equipment, and uses either capacity reservation or dedicated frequency bands. In such cases, requirements concerning the availability of information in contracts and on the provider's website should be in accordance with the requirements concerning openness and transparency that apply to fixed internet access. In specific cases, Nkom will be able to assess whether a service can be regarded as fixed internet access on the basis of the specific implementation and the conditions for the specific service provision.

- Telenor and Telia/Get have separate webpages which refer to the various access technologies, with information about speed classes in a dropdown menu for each service offered. [22]

[22] https://www.telenor.no/privat/internett/
https://www.get.no/produkter/internett

- GlobalConnect and Eidsiva Bredbånd also make information about access types and speed classes available on their websites.[23]
- NextGenTel has a separate net neutrality information page, where, inter alia, information about the relevant speed classes is provided.
- Viken Fiber and Lyse – both under the Altibox brand – also have a separate webpage with information about upload and download speeds, but without specifying what constitute maximum, minimum and normally available speeds.[24]

During the work on the annual report, the review of the providers' websites showed that, to a greater extent than before, information is provided concerning the relevant speed parameters, including the speed normally available for fixed internet access. Several of the providers have actively implemented measures to fulfil the requirements under the Regulation. It is also Nkom's experience that some providers could make this information even clearer to customers. For some providers, it is necessary to either know exactly what one is looking for, or to contact the provider for further details of where information is available.

Nkom will undertake ongoing supervision of how providers keep their customers informed about speeds and, after the publication of this annual report, will continue the dialogue with providers concerning which information must be published and how information can be made available to customers in the best possible way.

5 Quality of the internet access service

5.1 The general quality of the internet access service

Article 5 of the Regulation states that national regulatory authorities have monitoring and reporting obligations to ensure that providers of internet access services fulfil their obligations regarding open internet access. Article 5(1) stipulates that national regulatory authorities have a duty to follow up on providers' compliance with Articles 3 and 4.

Section (17) of the preamble highlights the importance of the fact that specialised services and the use of such services should not reduce the general quality of the customer's access to the internet. Concerning internet access via mobile networks, some of the requirements are eased due to the particular conditions associated with varying numbers of active users per cell, as well as non-homogeneous cover. Yet over time, in this case too, it is expected that the general quality of the internet access service will be maintained.

5.2 Regulatory follow-up

A measure to follow up on Article 5(1) of the Regulation is to monitor end-users' measured quality of their internet access. In this report, we have considered the results from Nkom's measurement service, *Nettfart*, which consists of measurement tools for measurement via web browser (nettfart.no) and mobile applications adapted to iOS and Android (Nettfart Mobil).

As for all types of crowd sourcing, the representative value of the statistical basis may be limited, since use of the measuring service is voluntary, and depends on the individual end-user taking the initiative to conduct measurement. However, the measurement results provide

[23] https://www.globalconnect.no/wp-content/uploads/2019/06/Tjenestebeskrivelse-Internett-GC-200109-v-3.3.pdf
https://eidsiva.net/siteassets/vilkar/vilkar-privat/2019-12-04-nettnoytralitet_oppd.pdf
[24] https://altifiber.no/privat/priser/
https://www.lyse.no/internett

an indication of the quality of the internet access service experienced by the end-users. Review of the underlying data also shows that, over time, information is collected from a very large proportion of the providers and that all access technologies are represented.

5.3 Measurement results from Nettfart

5.3.1 Measurement results for fixed internet access services

For fixed internet access services, the report presents the development in average speed measured by nettfart.no across the end-users' different subscriptions, as well as the development in average speed per technology (fibre, cable TV and xDSL). Finally, measured speed compared to the advertised speed of the end-users' subscriptions is presented.

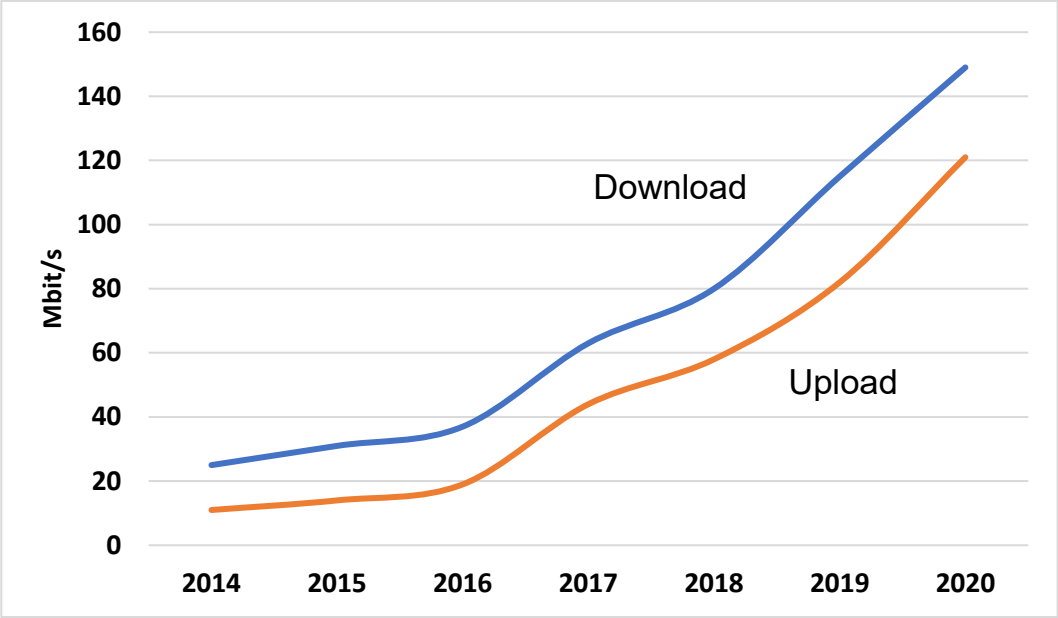

Figure 3: Average speed for fixed internet access services (source: nettfart.no)

Figure 3 shows that, so far in 2020, the average speed measured across the end-users' different subscriptions is twice as high as in 2017. This applies to both download and upload speeds. The growth from the previous reporting period appears to be continuing. Compared to the results up to 2016, in recent years there has been a significant increase in speed. This increase in speed will enable customers, with a good margin, to use all types of applications via their internet access service.

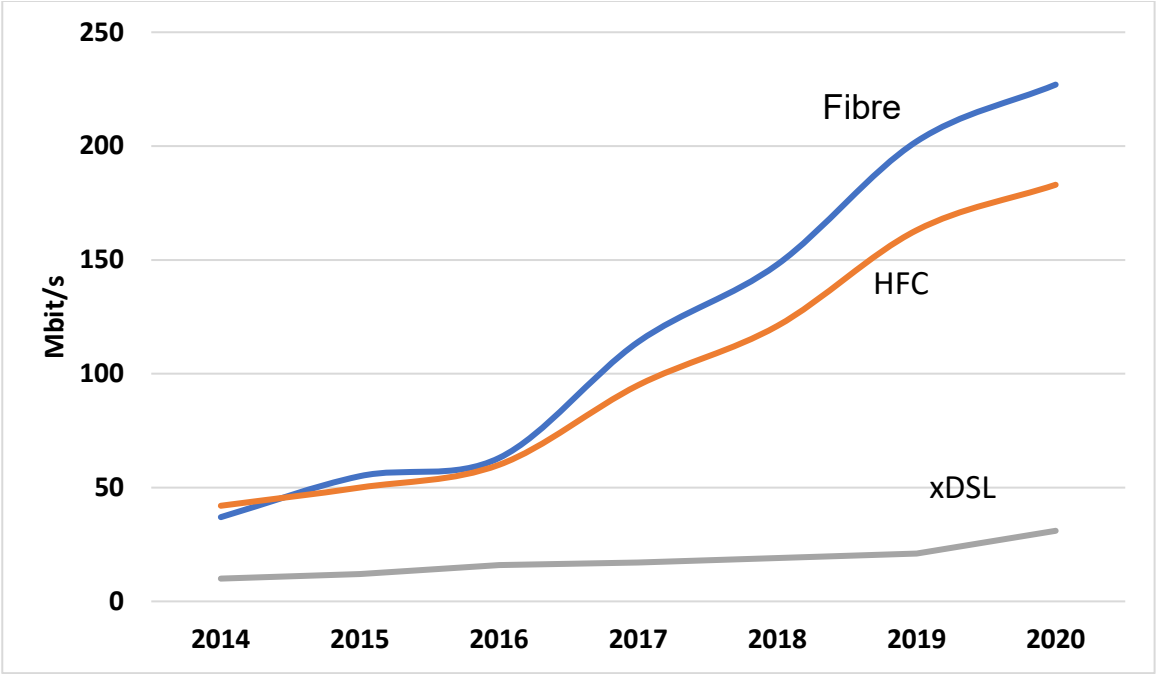

Figure 4: Average download speed by technology (source: nettfart.no)

The breakdown by access technology shows Figure 4 that there are variations in the speeds achieved by users via fibre, cable TV (HFC) and xDSL. The fibre and cable TV technologies offer significantly higher download capacity than internet access based on xDSL. The various different characteristics of the transmission media are the main explanation for this. Fibre accesses and HFC have considerably greater available bandwidth compared to accesses based on copper cable. This must also be viewed in the light of Telenor's decision and work to discontinue the copper network by the end of 2022.

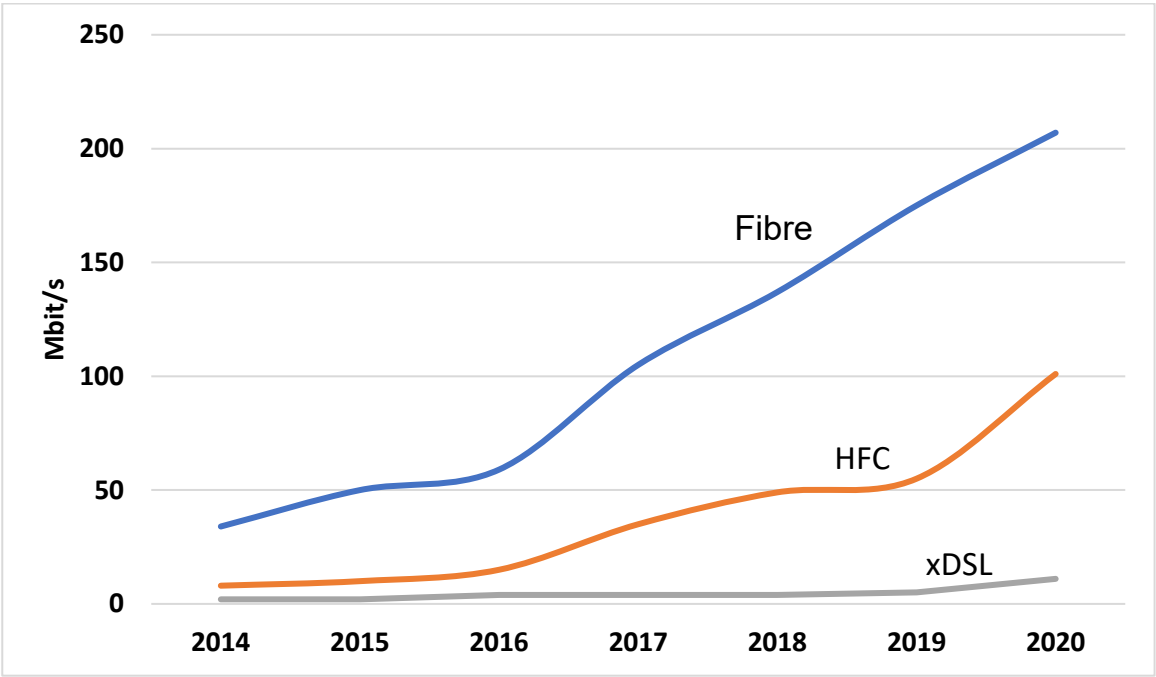

Figure 5: Average upload speed by technology (source: nettfart.no)

There are also greater variations between fibre and cable TV (HFC) when it comes to the average measured upload speed, see Figure 5. The results show a significant increase in HFC upload speeds, which may be related to statistical variation due to few measurements for this access technology. As from 2016 onwards, fibre accesses in particular experience a great increase in average upload speed. This is probably due to the introduction of several fibre subscriptions offering symmetrical speeds for the customer, i.e. the same capacity for traffic both from and to the internet. Subscriptions based on xDSL show marginal development when it comes to average upload speed.

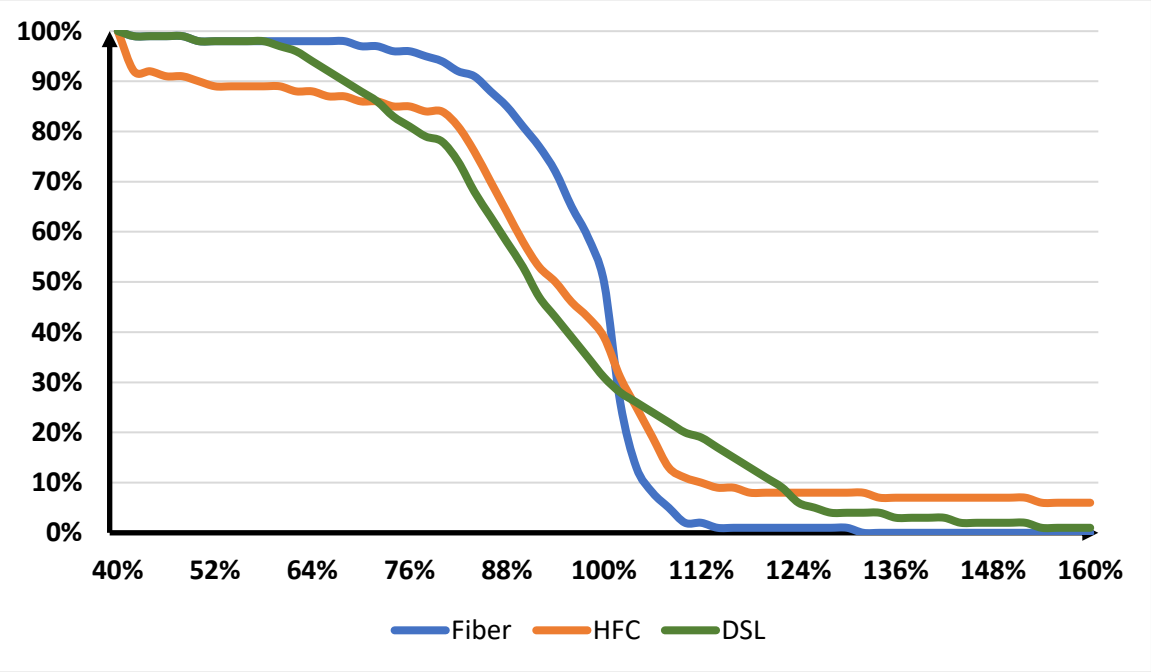

Figure 6: Measured speed compared to advertised speed (source: nettfart.no)

Figure 6 shows the relationship between measured speed and advertised speed for fixed internet accesses (fibre, cable TV and DSL) from 1 May 2019 until 30 April 2020. The figure shows the proportion of the measured accesses (vertical axis) that, as a minimum, achieve the corresponding proportion of the advertised speed (horizontal axis). In line with the Regulation, it is important that the providers offer a speed that matches the speed that is advertised in contracts and on the provider's website. The results for fibre and cable TV are relatively good, while the results for DSL vary. A possible source of error in this respect is that product lists are updated manually, which may entail that some customers register their measurements against the wrong product, as well as a relatively low number of measurements being compared to advertised speed, which applies to HFC in particular.

5.3.2 Measurement results for mobile internet access services

For mobile internet access services, the report presents the development in average speed measured by nettfart.no. Average speed per technology (3G, 4G and WLAN) is also presented, as measured with Nettfart Mobil. Finally the variation in speed over 24 hours is presented.

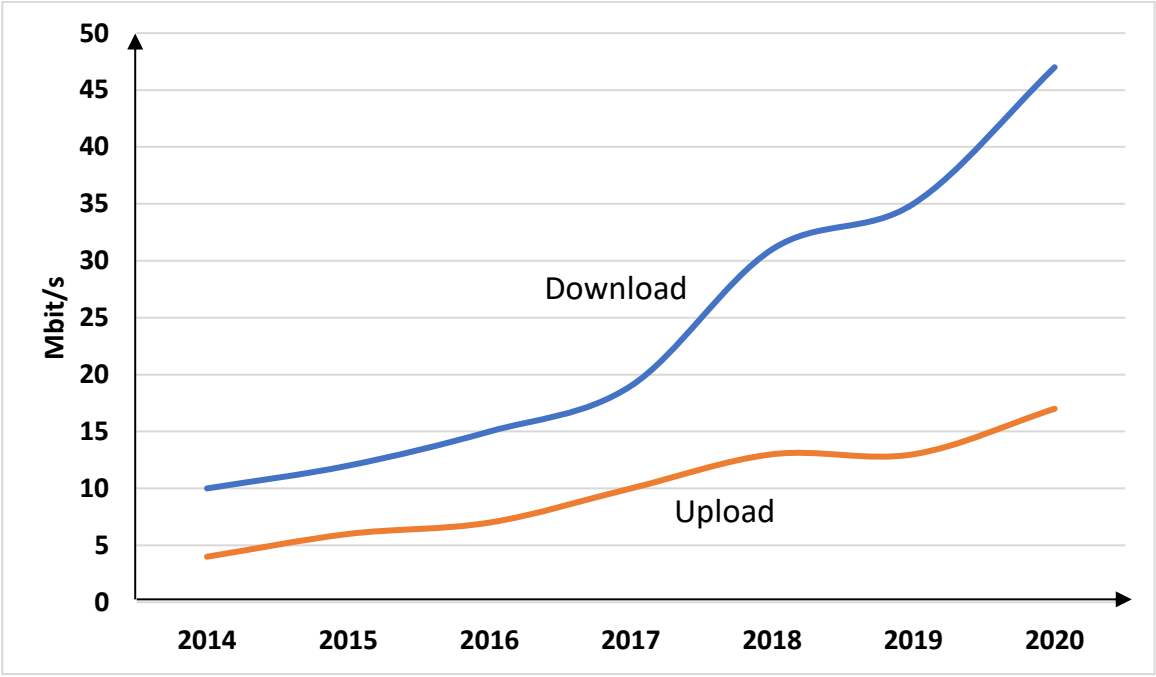

Figure 7: Average speed for mobile internet access services (source: nettfart.no)

Figure 7 shows that for internet access services via mobile networks there is also a positive trend in terms of the development in the measured average download speed. For upload speed, there appears to be a small increase. Nkom observes that Norwegian internet users have the lowest consumption of mobile data in the Nordic countries (cf. Section 2.3.4). This entails lower traffic loads in the mobile networks than would have been the case if Norway's mobile data consumption had been equivalent to that in our neighbouring countries.

It should also be noted that Figure 7 shows the average speed for 2G, 3G and 4G overall, based on nettfart.no. These measurement results may therefore deviate somewhat from the figures presented in Figures 8 and 9 below, where the measurement results are distributed across the various technologies, based on Nettfart Mobil.

In the case of 5G, the further development of mobile internet access services is one of the most important focus areas. It is thus the pricing structure for subscriptions and technical availability (coverage) that influences how widely this form of internet access service can develop as an alternative to fixed internet access services.

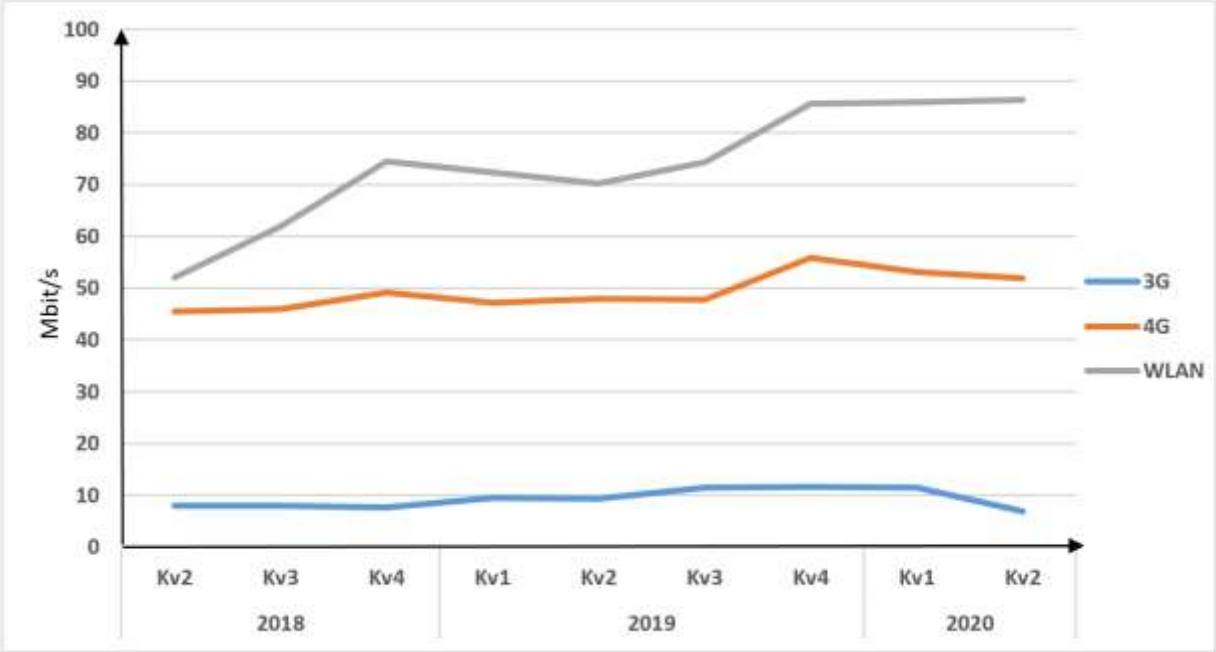

Figure 8: Average download speed per technology (source: Nettfart Mobil)

Figure 8 shows differences in the average measured download speed by radio technology. The figure shows that users of Nettfart Mobil[25] achieve rather higher speeds when the phone or tablet is connected to wireless LANs (WLAN), compared to measurements via mobile networks (3G or 4G).[26] This may indicate that capacity development in the mobile networks does not follow the same trend as WLAN access in home networks that communicate with the internet via wired accesses. Concerning access measurements, we know little about the transmission medium used to and from the home for the individual measurement. During the past year, the number of subscriptions for fibre-based internet access[27] has increased, which has probably had a great impact on average WLAN speeds.

[25] Nettfart Mobil is Nkom's mobile applications available for Android and IOS.

[26] Measurement results from all users of Nettfart Mobil, irrespective of which provider they have a contract with.

[27] During 2019, the number of subscriptions for fibre-based Internet access increased by 154,000.

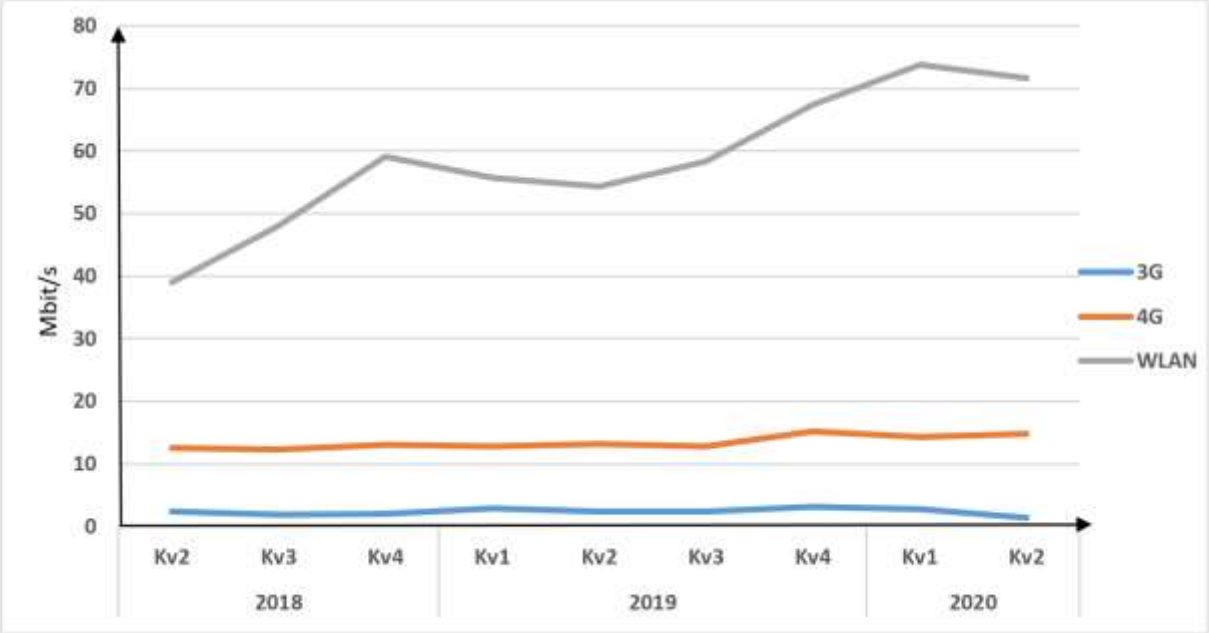

Figure 9: Average upload speed by technology (source: Nettfart Mobil)

Figure 9 shows that the differences between measurements via the mobile networks compared with measurements via WLAN are even more pronounced when it comes to upload speed. The increase in the number of fibre subscriptions is probably one of the reasons that WLAN download and upload speeds are virtually symmetrical. Upload speeds for mobile communication lie far lower than download speeds (as shown in Figure 8). The explanation may be that the mobile networks reserve a larger proportion of the available frequency range for download, since it can be assumed that this is the dominant direction of data flows between the internet and the individual customer.

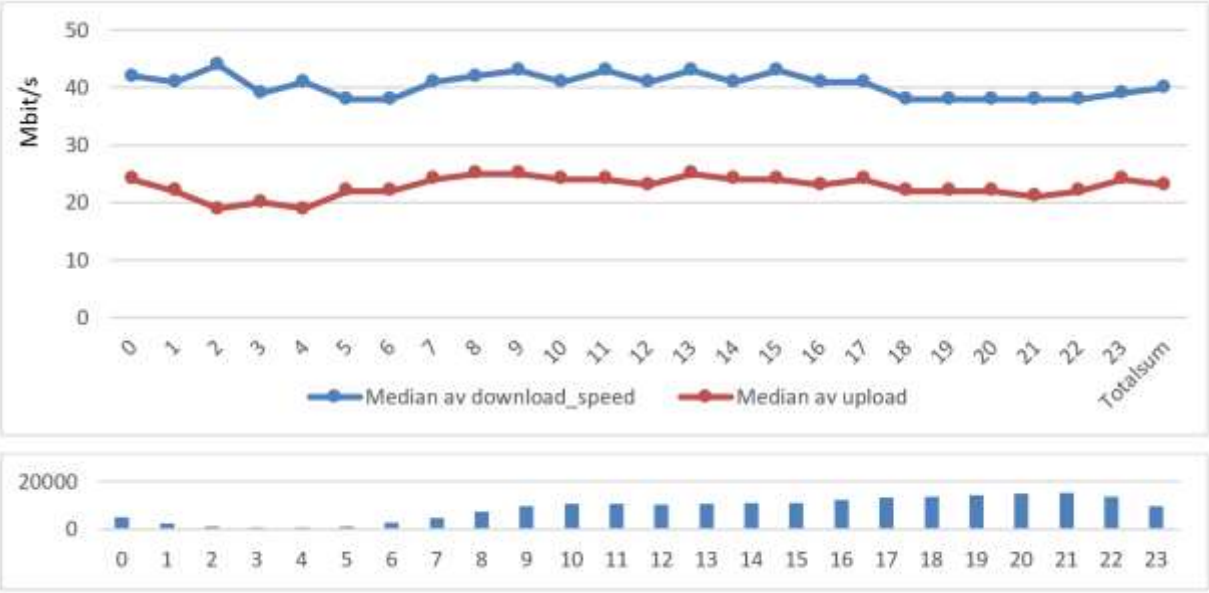

Figure 10: The median of download and upload speeds per hour (source: Nettfart Mobil)

Figure 10 shows the median value of download and upload speeds distributed per hour throughout the 24-hour day, measured for the period from 1 May 2019 to 30 April 2020. All radio technologies are assessed together and the graph clearly shows that the variation in download speed over 24 hours is relatively small. For upload, the fluctuations are even

smaller. This indicates that the internet access providers adapt the available capacity to customer demand and that the networks thereby continue to meet the need for more and more capacity.

5.3.3 Assessment of measurement results from Nettfart

Internet access services have really been put to the test since March/April this year, when measures to contain the coronavirus outbreak were fully implemented. Society's digitalisation has taken place at record speed, and new users and application areas are now contributing to an overall increased load in the networks.

It is positive to note that the development in the speed of fixed internet access is nonetheless continuing the favourable trend from the previous reporting period. This also applies to the first and second quarters of 2020. This is particularly evident for internet access based on fibre and cable TV (HFC). For the copper network (xDSL), there is only a marginal increase in speeds, which must be viewed in the context of Telenor's decision and work to discontinue the copper network by the end of 2022.

There is also positive development in the speed of mobile internet access. Mobile operators appear to be able to meet the demand by expanding coverage and implementing radio technologies that effectively leverage the available range. For 3G, there is a marginal decrease in speeds, which may be due to mobile operators gradually turning off this technology in favour of frequency resources for 4G and 5G.

Nkom can also observe that fixed internet access is provided with the help of fixed wireless technologies in the commercial mobile networks[28]. This was adopted by close to 50,000 customers during the first half of 2020. So far, solutions like this have speed limitations, but nonetheless contribute to an overall traffic load in the mobile networks, and may possibly explain why the development in the speed of 4G flattened out in the first and second quarters of 2020.

Technological development, commercial campaigns by providers and customers' willingness to spend money on subscriptions are all factors contributing to good network quality. The "Nordics - State Of Mobile Networks" report from Tutela[29] points out that speeds are just one of several crucial factors, together with latency, variation in latency (jitter) and packet loss, which are decisive to ensuring good internet access for the user. In the ultimate analysis, good internet access must enable users to do what they want to do online. In practice, smartphone users do not run speed tests all day, but they surf the web, use apps and communicate with their friends, or stream music and video. This is also an important consideration on assessing the quality of internet access services.

6 Overall assessment

Zero-rating in the Norwegian market

Regulatory assessment of zero-rating is undertaken as an overall assessment based on several different criteria, and in particular based on the criteria of effect on content providers, effect on end-users and the scale of zero-rating in the market.

In terms of the *effect on content providers*, zero-rating affects terms of competition since it entails price discrimination between providers that are included and not included, respectively.

[28] Fixed wireless Internet access uses the mobile network to give customers a subscription under which the customer cannot take assigned equipment with them if they move, but where "stable" speeds and high data allowances are offered.

[29] https://www.tutela.com/blog/nordics-state-of-mobile-networks-2020

One new content provider is included this year, but Nkom maintains its assessment that the number of content providers included in the zero-rating schemes is relatively limited, and solely concerns relatively large, well-established providers.

In terms of the *effect on end-users*, Nkom believes that zero-rating can restrict end-users' freedom of choice, particularly in view of the relatively small, highly-priced data allowances compared to other countries. End users use more mobile data, and additional mobile operators have launched subscriptions which include larger data allowances. At Nkom we maintain our assessment for this criterion without any changes from the previous annual report.

The scale of zero-rating has increased somewhat since 2019. At the same time, zero-rated music is increasingly streamed by users with relatively large data allowances. These users are in principle considered to have sufficient allowances to give them relatively great freedom to choose content. This means that Nkom is less concerned that last year's greater scale of zero-rating has detrimental effects on competition or consumer welfare. Nkom assesses that this scale continues to be limited.

Based on an overall assessment of these criteria, Nkom therefore does not see any basis to impose any mandatory orders for rectification of the zero-rating schemes, despite a continued increase in their scale. However, Nkom will continue to monitor the development of zero-rating in the market.

Traffic management and specialised services

Nkom's data collection from internet service providers shows no significant changes compared to last year in terms of traffic management of the internet access services, as well as the provision of specialised services in the market. Providers typically report on the management of the internet access service traffic based on court orders and security measures. Frequently reported specialised services in the fixed network are Voice over IP and IPTV, and on mobile networks it is relatively common to offer VoLTE as a specialised service.

Nkom has not undertaken any detailed scrutiny of the traffic management measures or specialised services reported, but assumes that these are provided in accordance with the Regulation. In the future, Nkom will be able to initiate more detailed investigations of the measures.

In recent years, increasing attention has been paid to the relationship between net neutrality and 5G. During the reporting period, the Norwegian Net Neutrality Forum was held, with main focus on compatibility between BEREC's net neutrality guidelines and 5G. At the forum, there was relatively broad agreement concerning the significance of specialised services, concurrently with internet access as the key to the introduction of 5G technology.

There was input from several Norwegian operators in response to BEREC's consultation concerning draft revised guidelines that was conducted after the forum. Final net neutrality guidelines were published on 16 June 2020. Several of the clarifications that have been added clearly signal that various 5G services can be introduced in line with the net neutrality regulation.

Internet access services with high capacity and low latency are expected, as one of the first improvements to mobile technology provided by 5G. BEREC specifies in its guidelines that offering internet access services with different quality of service levels will be in line with the Regulation. The revised guidelines also include clarifications of the assessment methodology for specialised services.

Information about the internet access service

As last year, Nkom finds that the providers' practice varies somewhat with regard to the degree of detail in the *information concerning traffic management measures*. Some providers

have a dedicated net neutrality web page, which includes traffic management as an element of further information, while others have a more limited description in the contractual terms. The review undertaken by Nkom in connection with this annual report does show, however, that the providers have a satisfactory description of traffic management measures, which are thereby in accordance with the Regulation.

In the autumn of 2019, Nkom sent an enquiry to fixed internet access providers, based on a survey which showed that the providers did not publish sufficient *information concerning speed* to their end-users. A common aspect of the ongoing follow-up of the survey was that the providers, in dialogue with Nkom, have updated the information on their websites and in their contractual terms, in order to ensure that this information is made available to end-users in a format and form that are in closer compliance with the requirements under the Regulation.

During the work on the annual report, the review of the providers' websites showed that, to a greater extent than before, information is provided concerning the relevant speed parameters, including the normally available speed for fixed internet access. Several of the providers have actively implemented measures to fulfil the requirements under the Regulation. It is also Nkom's experience that some providers could make this information even clearer to customers. For some providers, it is necessary to either know exactly what one is looking for, or to contact the provider for further details of where information is available.

Nkom will undertake ongoing supervision of how providers keep their customers informed about speeds and, after the publication of this annual report, will continue the dialogue with the providers concerning which information must be published and how information can be made available to customers in the best possible way.

Quality of the internet access service

The Regulation describes how regulators must inspect the general quality of internet access services, in order to ensure that this is not negatively affected by any specialised services that are offered. Among other things, Nkom has used the measurement results from tool "Nettfart" to perform an overall assessment of this.

Internet access services were really put to the test during March/April this year, when measures to contain the coronavirus outbreak were fully implemented. Society's digitalisation has taken place at record speed, and new users and application areas are contributing to an overall increased load in the networks.

It is positive to note that the development in the speed of *fixed internet access* is nonetheless continuing the favourable trend from the previous reporting period. This is particularly evident for internet access based on fibre and cable TV (HFC). For the copper network (xDSL), there is only a marginal increase in speeds, which must be viewed in the context of Telenor's decision and work to discontinue the copper network by the end of 2022.

There is also positive development in the speed of *mobile internet access*. Mobile operators appear to be able to meet the demand by expanding coverage and implementing radio technologies that effectively leverage the available range. For 3G, there is a marginal decrease in speeds, which may be due to mobile operators gradually turning off this technology in favour of frequency resources for 4G and 5G.

Main conclusion

Nkom believes that the status of net neutrality in Norway is satisfactory. Nkom will, however, continue to monitor the development of zero-rating in the market, and will in particular follow up on whether the offer of large, unlimited data allowances has a dampening effect on zero-rating in Norway the coming year.