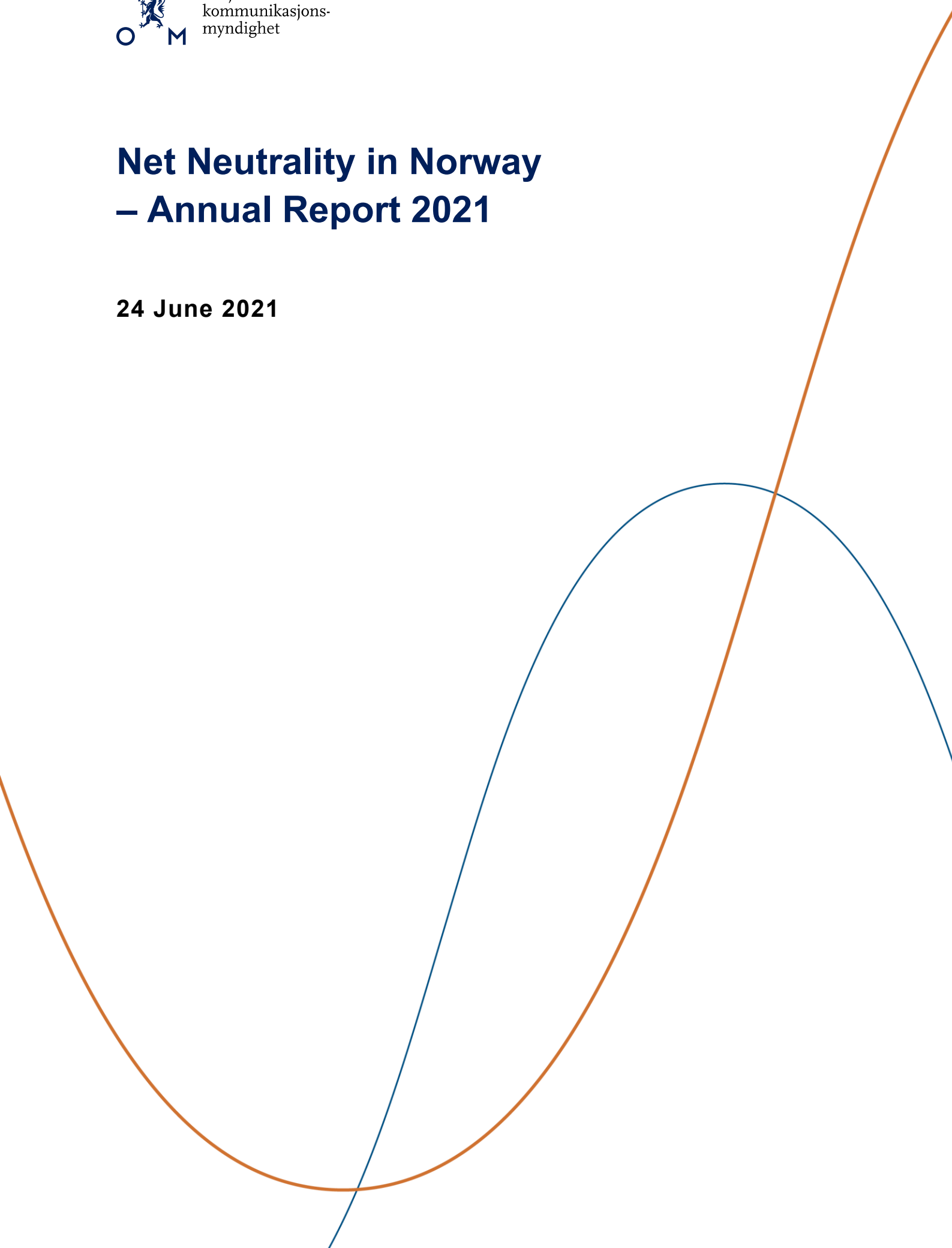
Nasjonal kommunikasjons-myndighet

Net Neutrality in Norway – Annual Report 2021

24 June 2021



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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 fifth consecutive report. Net neutrality is the principle that all internet communications must be treated equally, regardless of sender, recipient, equipment, application, service or content. The period covered by the report runs from 1 May 2020 to 30 April 2021.

Net neutrality was codified by 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 Open Internet guidelines, which have been adopted pursuant to Article 5(3) of the Regulation. In accordance with recital19 of Regulation, the national regulatory authorities must "take utmost account" of the BEREC guidelines in their application of the Regulation. BEREC published a revised version of the guidelines 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, and e.g. 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 communicate 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

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 concerning open internet access, and BEREC open internet guidelines.

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

2.2 Zero-rating in Norway

2.2.1 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-

[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

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.

The regulatory assessment of zero-rating is performed as an overall assessment based on the criteria set out in paragraph 46 of BEREC open internet guidelines. This assumes that the practice does not entail traffic management in contravention of the Regulation. The criteria are related to the providers' market position and the effect on content and application providers and other 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.

2.2.2 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 offers named "Music Freedom", which concern zero-rating of selected music streaming providers. 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 impact.

The national electronic communication statistics for 2020 show that the duopolistic situation is continuing, since Telenor and Telia together have around 81 per cent of the subscribers in the market for mobile services. In terms of revenue, together the companies have around 86 per cent of the private market and 92 per cent of the business market.

2.2.3 Impact on the content and application providers

Nkom generally considers 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 using other applications where content transfer consumes the data allowance.

ISP	Content and application provider
Telia	Spotify, Tidal, Beat, Apple Music, Deezer, Audiomack
Telenor	Spotify, Tidal, Beat, Apple Music, Deezer, Audiomack and SoundCloud

Table 1: Current music streaming providers

Most recently, SoundCloud has become one of Telenor's content and application providers for the zero-rated "Music Freedom" service. Today, this is the only difference between Telenor and Telia's offerings of music streaming services in the zero-rating offering. Nkom therefore maintains its assessment that the number of content and application providers that are actually included in the zero-rating programs is relatively limited, and that this mainly covers large, well-established providers.

Concerning the development of zero-rating of music streaming in Norway in recent years, the number of music streaming applications covered is relatively stable, and during the current reporting period Nkom has not received any enquiries about problems with inclusion in the zero-rating programs. Concerning the delineation of the "music streaming" content category,

[4] Nkom report of 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

no complaints have been received that applications from potentially related content categories are not included.

2.2.4 Impact on end-users

Nkom considers 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, compared to our neighbouring countries. 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.

According to the Nordic-Baltic statistics, Nkom observes that Norwegian mobile subscribers have had the lowest data consumption. In countries where inclusion of unlimited data is more widespread, zero-rating will be less problematic. In Figure 1 below, data consumption for mobile internet access services in Norway is compared to Sweden and Denmark:

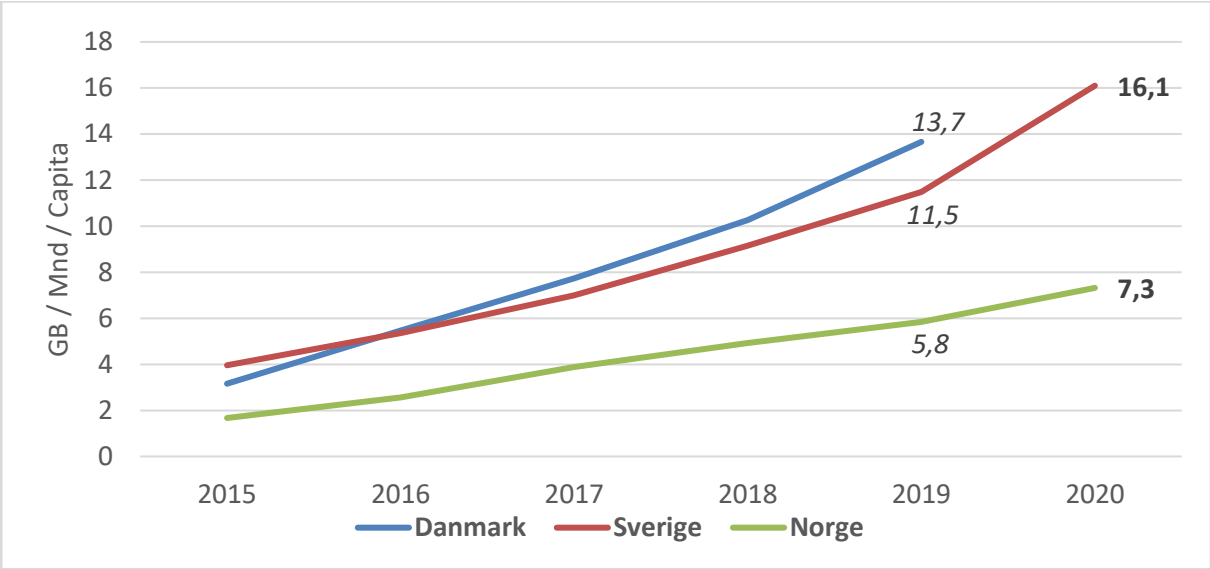

Figure 1: Data consumption in mobile networks per month per capita measured in Gbytes

Norway is among the countries with both relatively low data consumption in mobile networks, and relatively high prices for subscriptions with unlimited data allowances. This implies that zero-rating is also more problematic in Norway. When the data allowances are large enough, offers of zero-rating will only have a small impact on the choices made by users.

Mobile subscriptions with a higher data allowance included are more prevalent in several other countries than in Norway. At the end of 2018, 2019 and 2020, respectively, the breakdown of the total customer base (in the private market) by data allowance was as follows in Norway:

Allowance	2017	2018	2019	2020
No data included	23.1%	19.3%	16.5%	14.0%
From 0 to 1 included	7.2%	7.6%	6.0%	6.4%
From 1 to 5 included	45.6%	43.7%	45.2%	41.2%
From 5 to 10 included	16.2%	16.3%	16.6%	17.5%
From 10 to 20 included	6.5%	6.6%	7.5%	9.9%
Over 20 included	1.5%	6.4%	8.2%	-
From 20 to 100 included	-	-	-	5.3%
Over 100 included	-	-	-	5.7%

Table 2: 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 indicates, however, that the proportion of end-users with allowances greater than 10 GB per month is still increasing slightly. The greatest increase in 2020 was for subscriptions with allowances greater than 10 GB.

Over the past year, subscriptions with "free" data usage, i.e. allowances exceeding 100 GB, have not become particularly more prevalent among more providers. But most mobile providers in Norway today offer subscriptions with data allowances from 30GB onwards. The providers themselves see this as a form of "free" data use.

Nkom observes that the market trend shows that large data caps have become less expensive since last year's net neutrality report. Nkom views this as a possible consequence of the new regulation of the mobile market that came into force on 14 May 2020.

- Ice has the "Data Freedom"[6] offer, 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 main subscription ranging from 8 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 transfers traffic via another mobile network, the data consumption is deducted from the main subscription's data allowance.
- Chilimobil also has a subscription that facilitates almost unlimited data use ("Chili Free Data"). [7] If the customer uses more than 100 GB a month, the company states that the speed is limited to 3 Mbit/s. With "Chili Free Data", the amount of data is limited to 24 GB in EU/EEA countries outside Norway. In April 2020, Chilimobil[8] launched a subscription with free data consumption for its customers in Sweden.
- Happybytes is a new player that also offers a form of "free" data use. Happybytes uses Telenor's network and offers both 4G and 5G coverage. Their "free" subscription is a 90-GB data cap. Data consumption is limited by only allowing the customer to use 3 GB per day. If the customer uses up the 3 GB in one day, no further payment is required, but the speed is reduced to 40 kbit/s for the rest of the day. The subscription also has a 24 GB limit in the EU/EEA[9].
- At Telia, "Telia X" is a subscription that offers virtually unlimited data consumption at a fixed monthly price. After the customer has used 100 GB per month, the speed is reduced to 3 Mbit/s up to the start of the next month.[10]
- Telenor launched the "Next" products in June 2020. The Next subscriptions are offered with speed differentiation and are available in the following speed categories: "Normal" up to 10 Mbit/s, "Fast" up to 100 Mbit/s and "Maximum" up to 300 Mbit/s. Telenor has imposed a monthly limit of 100 GB, after which the speed will be reduced automatically to 3 Mbit/s. Otherwise, see further details of "Next" in Sections 3 and 4.
- The latest "free data" product launched comes from Talkmore. In May 2021, like Telenor, Talkmore launched unlimited data use with a given speed restriction. Talkmore's "unlimited" is identical to Telenor's "Next" products. They have the same speed classes of 10, 100 and 300 Mbit/s and throttling of speed to 3 Mbit/s when use exceeds 100 GB per month. The prices are naturally below those offered by Telenor[11].

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

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

[8] https://chilimobil.se/

[9] https://happybytes.no/tre-om-dagen/

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

[11] https://talkmore.no/mobilabonnement

The information in Section 2.2.4 on data allowances and speeds is from April 2021. Nkom observes that the market is subject to strong competition when it comes to large data caps. The terms are therefore subject to frequent change. Nkom considers this to be very positive for the market and the significance of zero-rating products.

2.2.5 Scale of zero-rating

The increasing scale of zero-rating increases the number of end-users who are encouraged to use certain selected content and application providers, which can thereby affect their 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".

- Telia's "Music Freedom" zero-rating offer as a supplementary service included for subscribers under the age of 29. "Music Freedom" is also a supplementary service for business subscribers requiring a larger data allowance for music streaming in addition to the allowance paid by their employer. This is paid for separately and is not part of the ordinary invoice to the customer. In addition, Telia includes "Music Freedom" for various subscriptions for 50 GB and above, and for "Telia X" customers.
- Telenor's zero-rating offer is also called "Music Freedom" and is offered to all customers with Yng or U18 products. The product can be purchased separately for NOK 49 per month by Next, original or U11 subscribers. The offer solely concerns music, but not podcasts or videos found on the various streaming services[12].

During the reporting period, the proportion of private subscriptions with "Music Freedom" increased from around 32 per cent to 39 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 makes a small contribution to the customer base that has "Music Freedom". Telia reports that the increase in subscriptions with "Music Freedom" is to a great extent due to an increase in Telia X subscriptions sold. Telia X is a "free data use" subscription, which therefore makes zero-rating less relevant.

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	April 2021
0 - 1 GB[13]	0%	1.1%	1.2%	1.4%
1-5 GB	16.3%	17.1%	20.2%	19.7%
5-10 GB	49.9%	33.3%	26.6%	19.6%
> 10 GB	33.6%	48.3%	52%	59.3%

Table 3: Share of private subscriptions with zero-rating per monthly data allowance

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 compensates 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

[12] https://www.telenor.no/privat/mobil/mobiltjenester/musicfreedom/

[13] On purchasing data allowances 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 allowances were purchased.

average data consumption of “Music Freedom”. This also contributes to compensating the negative effects of zero-rated services.

2.2.6 Overall assessment of zero-rating

In terms of the *effect on content and application providers*, zero-rating impacts terms of competition since it entails price discrimination between providers that are included and not included, respectively. There are no signs of a trend in the Norwegian market for the introduction of zero-rating for other application categories, such as social media, messaging applications or video streaming, as is the case in a few other European countries. This observation indicates that the effect of zero-rating on content and application providers is rather limited.

In terms of the *effect on end-users*, Nkom considers 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’ data use is increasing, however, and mobile providers are increasingly launching subscriptions that include a higher data allowance. Both the supply of and demand for larger data allowances might lead to greater competition in this market layer.

The *scale* of zero-rating has increased 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 a sufficient data allowance 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.

Based on an *overall assessment* of these development trends, Nkom considers that zero-rating in the Norwegian market currently does not have detrimental effects on competition or consumer welfare, despite a gradual increase in scale. However, Nkom will continue to monitor the development of zero-rating in the market.

3 Traffic management and specialised services

3.1 Information 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 open internet regulations. Nkom has obtained information of this nature as part of its collection of data for use in the annual national electronic communication statistics. The results for this year do not differ significantly from the results for last year.

According to information 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), as well as 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 open internet regulations.

Nkom has also obtained information about specialised services, i.e. other services offered in parallel with internet access services that fulfil specific criteria in the Regulation. The information shows that typical specialised services in fixed networks are voice over IP and IPTV, and in mobile networks it is relatively common to offer VoLTE. This is in line with the typical examples of specialised services in BEREC open internet guidelines.

Nkom also asked how the internet service providers safeguard 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 different 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 may initiate more detailed investigations of services offered in the Norwegian market.

3.2 Internet access services with differentiated speed

BEREC's revised guidelines from 2020 clarify how different quality classes may be offered for the internet access service, in line with the Regulation. This form of differentiation between different subscriptions has been customary in the fixed networks for many years, and has also ben occurred in the mobile networks in some European countries in recent years.

BEREC specifies that such internet access services must be "application-agnostic", which means that all applications are treated with the same traffic management. Furthermore, the guidelines emphasise that there must be full transparency concerning the traffic management of the subscriptions. Finally, BEREC notes that national regulators have the opportunity to impose minimum quality of service requirements on providers, in order to prevent any degradation of the general quality of the internet access service for end-users.

Speed-differentiated internet access services were observed in the Norwegian market for the first time in June this year, when Telenor launched "Next" as a mobile subscription with three different speed classes. The subscriptions offer the 10, 100 and 300 Mbit/s speed classes. According to Telenor, the data allowance is unlimited, and when consumption passes 100GB per month, the speed is reduced to 3 Mbit/s for the rest of the month. Subscribers can purchase additional data allowances if so required, however.

Nkom has obtained details from Telenor of how these internet access services are produced. On this basis, Nkom's general assessment of the "Next" subscription is that it is in line with the Regulation's requirements for traffic management of internet access services. See also Section 4 for an assessment of the transparency of the service provision.

Nkom sees it as a positive market development that providers differentiate according to the speed of internet access services, in contrast to differentiating according to content. Nkom considers differentiation based on data allowances and speed classes to be a shift away from the use of content differentiation in the form of zero-rating.

3.3 Traffic management and specialised services for 5G

The BEREC open internet guidelines are technology-neutral, but several of the clarifications that have been introduced on the revision of the guidelines clearly signal that various 5G services can be introduced in line with the open internet regulation.

Internet access services with high capacity and low latency are expected, as one of the first improvements to mobile technology provided by 5G. Here, BEREC guidelines specify that it is in line with the Regulation to offer internet access services with different levels of quality of service, and not just speeds, but also other parameters such as latency. This might facilitate the further provision of quality-differentiated internet access services.

The 5G networks are furthermore assumed to offer customised quality of service for specific services, in contrast to general internet access services. These services might belong to the "specialised services" category in accordance with BEREC's guidelines, i.e. these may be offered for services that it is not possible to guarantee via the internet access service. It is reasonable to assume that 5G network slicing might facilitate efficient development of specialised services.

This year, but also during the previous years, Nkom has held various dialogue meetings concerning the compatibility between the 5G technology and the open internet regulation, in order to facilitate the deployment of 5G in the Norwegian market. Nkom has emphasised the clarifications in BEREC guidelines as described above, with the aim of building an understanding of how 5G services could be offered in accordance with the Regulation.

4 Information about the internet access service

4.1 Transparency requirements

Article 4 of the Open Internet Regulation sets requirements concerning the information that internet service providers must provide to their end-users. In Article 4(1) there is a requirement for 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 from end-users relating to the rights and obligations laid down in Articles 3 and 4(1).

Below, the report focuses on the same topics as in the 2020 annual report: transparency concerning traffic management measures and speed. As for the previous year, Nkom has reviewed the providers' websites to check for compliance with the transparency rules in the Regulation. Nkom has reviewed the websites of the following providers:

- Telenor
- Telia
- ICE
- GlobalConnect
- Eidsiva Bredbånd
- NextGenTel
- Viken Fiber (Altibox)
- Lyse Fiber (Altibox)
- Fjordkraft
- NTE Marked

In subsections 4.2 and 4.3, some comments are made concerning how, as at end-April, information about traffic management and speeds is described by the individual providers.

4.2 Transparency concerning traffic management

Providers of internet access services must disclose the traffic management measures that are used. See also 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 provided, it is also relevant to assess the actual content and quality of the information.

Examples of information concerning traffic management in the Norwegian market:

- Telia has a good solution for how traffic management information is disseminated to customers, on its website[14], in the subscription terms[15], and at the company's various market outlets[16]. 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[17] in the form of general information, as well as a description of specific ports 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, among other things, is provided. [18]
- Telenor describes traffic management in the contractual terms of the contract[19], which state that traffic management can be conducted on the basis of security requirements or legal requirements, or as a consequence of a contract with an end-user concerning limitations to data volume or use.

Nkom's assessment concludes that the providers' practice varies somewhat with regard to the degree of detail in their description of traffic management measures. Some providers have a dedicated net neutrality information 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, providers have a satisfactory presentation of traffic management measures, which are thereby in accordance with the Regulation.

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

4.3 Transparency concerning speed in the fixed network

To strengthen the rights of end users, Article 4(1)(d) of the Regulation sets the requirement that providers of internet access services must inform end-users of the speed that they are

[14] https://www.telia.no/hastighet/#trafikkstyring
[15] https://www.telia.no/globalassets/pdf/abonnementsvilkar_privat.pdf
[16] 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
[17] https://www.globalconnect.no/trafikkstyring
[18] https://www.nextgentel.no/priser/vilkar-1#nettnoytralitet
[19] https://www.telenor.no/privat/vilkar/vilkar-mobile-tjenester.html

realistically able to deliver. The Regulation requires providers of *fixed* internet access services to specify the following quality 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.

BEREC considers certain types of Fixed Wireless Access services to be fixed internet access services with regard to the requirements concerning 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 that apply to fixed internet access services.

In specific cases, Nkom may assess whether a service can be regarded as a fixed internet access service, on the basis of the specific implementation and the conditions for the service provision. As far as Nkom is aware, as at the end of April 2021 capacity reservation or dedicated frequency bands for fixed wireless access services are not used by Norwegian internet service providers.

Examples of information about *fixed* internet access service speeds:

- Telenor has a separate website which refers to the different access technologies, with information about speed classes in a dropdown menu for each service offered. For subscriptions for which Telenor delivers "hybrid fibre"[20], this is solely the maximum upload speed described on the website, and not the minimum speed, normally available speed or advertised speed.[21]
- Telia also offers fixed internet access services via fibre and "hybrid fibre", and emphasises on its website that the provider needs information about the address to be able to state what specific access can be offered.[22] For each product, the maximum, minimum and normally available speeds are specified.
- GlobalConnect and Eidsiva Bredbånd also make information about access types and speeds available on their websites.[23]
- NextGenTel has a separate net neutrality information page, where, among other things, information about the relevant speed classes is provided.
- Viken Fiber and Lyse – both under the Altibox brand – also have a separate website with information about upload and download speeds, but still without specifying what constitute maximum, minimum and normally available speeds.[24]

[20] "Hybrid fibre" = Hybrid Fibre-Coax (HFC)
[21] https://www.telenor.no/privat/internett/
https://www.get.no/produkter/internett
[22] https://www.telia.no/internett/bredband/
[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

For fixed internet access services, Nkom observes a clear improvement in information concerning speed compared to previous years, since to a great extent the providers state the various different speed parameters required under the Regulation, including the normally available speed.

4.4 Transparency concerning speed in the mobile network

In mobile networks, the normally speed available in a given cell is difficult to predict, due to the varying number of active users. For this reason, only fixed internet access 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 quality parameters concerning speed:

- Estimated maximum speed
- Advertised speed

Mobile internet access services include both ordinary mobile subscriptions and dedicated internet access service subscriptions, since both are service offers that provide access to the internet. Ordinary mobile subscriptions support both internet access service and telephony/text messages, while dedicated subscriptions only support internet access service. The former is often used via mobile phone, while the latter is often used via a router.

With regard to dedicated internet access service subscriptions in the mobile network, a distinction is often made between "*fixed* wireless access"[25] offered at a fixed geographical location, often with an outdoor antenna, and "dedicated *mobile* internet access"[26] that can be used freely at different geographical locations within the coverage area. These differences can lead to varying conditions for the internet access service speed achieved for the different subscriptions.

Nkom has examined details of the speed of various examples of *internet access service via an ordinary mobile subscription*. Most of these subscriptions are differentiated by the size of the data allowance, but also on the basis of subscriber age. Some of the subscriptions are also differentiated by content, in the form of zero-rating, as described above in Section 2.2.

- Telenor offers mobile subscriptions tailored to different age groups ("For all", "Yng 18-28", "Under 18" and "Under 11"). Regarding "Yng 18-28", "Under 18" and "Under 11", there are no explicit details of the estimated maximum speed and advertised speed. According to the website, one achieves "maximum speed", without being informed of what this speed is. Reference is also made to the terms and conditions for mobile subscriptions, where in clause 6 the reservation is made that mobile network speeds are affected by external conditions. The same applies to the "For all" age group, with the exception of the "Next" product.
- The Telenor "Next" subscription entails virtually unlimited data use, whereby the end-user can choose between maximum speeds of up to 10 Mbit/s, 100 Mbit/s or 300 Mbit/s[27]. The speed differentiation assumes normal conditions in the mobile network. In the event of network congestion, the various categories of "Next" customers will be treated equally. Nkom has been in dialogue with Telenor during the reporting period with the request to Telenor to improve the information concerning how the speed differentiation does not apply during congestion.

[25] Referred to as "wireless broadband" by many internet service providers

[26] Referred to as "mobile broadband" by many internet service providers

[27] Up to 1,000 Mbit/s on 5G.

- Telia offers family subscriptions matched to the number of family members, and also single subscriptions adapted for children and adults. As for other mobile internet access services, reference is made to a general information concerning the maximum speed one can expect to achieve using the various mobile technologies (2G-5G). The "Telia X" subscription, which, like Telenor "Next", offers virtually unlimited data use, specifies that the speed is "unlimited [...] up to 100 GB". The speed is then reduced to 3 Mbit/s.
- Ice offers a mobile subscription "For all" and for the "Under 29".[28] As for other mobile internet access services, reference is made to general information about the maximum speed one can expect to achieve with various mobile technologies (2G-4G). In the same way, there is further information in the subscription terms and conditions about factors that affect speed.

Nkom has examined the information available concerning the speed of various examples of *dedicated internet access service subscriptions in the mobile network*. For the "*fixed* wireless access" category, differentiation is typically based on speed, and for the "dedicated *mobile* internet access" category, differentiation is typically based on the size of the data allowance.

- Telenor offers the subscriptions "wireless broadband" and "mobile broadband". In the "wireless broadband" portfolio, speed classes up to 10, 30, 60 or 100 Mbit/s are offered, while for all "mobile broadband" subscriptions, a "theoretical speed" of up to 300 Mbit/s and an "expected" speed of up to 100 Mbit/s are offered. For "mobile broadband", the data allowances vary from 8 to 200 GB per month. "Mobile broadband" can also be used in combination with a mobile subscription with virtually unlimited data (the "Next" product portfolio described above), more specifically by the subscriber sharing data allowance using a router and Data SIM.
- Telia also offers "wireless broadband" and "mobile broadband", with estimated and varying maximum speeds for each of the subscriptions, in addition to various data allowances. The "wireless broadband" portfolio also distinguishes between the "home" and "holiday cabin" categories. [29] The former category markets maximum speeds for the various subscriptions from 25 to 300 Mbit/s, and for the latter category from 25 to 50 Mbit/s. For "mobile broadband", the data allowances range from 10 to 500 GB per month. For the two smallest data allowances (10 and 25 GB), no explicit information about speed is provided, but reference is made to a general information about the maximum speed one can expect to achieve with the mobile technologies (2G-5G).[30]
- Ice offers "mobile broadband" with data allowances from 7 to 300 GB.[31] There is information about general conditions that may affect speed, but no explicit information is provided about the estimated maximum speed or advertised speed of the various products. Like Telia, Ice refers to a general information concerning the maximum speeds that can be expected to be achieved using the various mobile technologies (2G-4G).[32] The subscription terms also describe factors that may affect speed.[33]

Concerning mobile internet access services, Nkom observes that for some providers it is intuitive and easy to understand which speed is offered for the individual product. For other providers, the customer must look for relevant information on the website and/or in the subscription terms and conditions. Nkom also notes that several providers use mobile technology as the basis for the speeds that the customer can expect to achieve. Nkom

[28] https://www.ice.no/mobilabonnement/
[29] https://www.telia.no/internett/tradlost-bredband/
[30] https://www.telia.no/hastighet/
[31] https://www.ice.no/mobilt-bredband/
[32] https://www.ice.no/dekning/
[33] https://www.ice.no/vilkaar/vilkar-privatkunder/

supports this approach, but also believes that it should be considered whether advertised speed and maximum speed can be linked more directly to each individual product, whereby the end-user obtains clearer information about the speed that is delivered.

Nkom's assessment is that some providers could make information about speed available to customers to a greater extent. For some providers, it is necessary to either know precisely what one is looking for, or to contact the provider for further details of where relevant information is available. For mobile internet access services with speed differentiation between different subscriptions, such as for Telenor "Next", Nkom considers it relevant for the provider to specify whether end-users are also differentiated during congestion.

5 Quality of the internet access service

5.1 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.

Recital 17 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 services via mobile networks, some of the requirements are eased due to the particular circumstances associated with varying numbers of active users per cell, as well as non-homogeneous coverage. 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 monitoring of quality of service

A method to follow up on Article 5(1) of the Regulation is to monitor the development in the quality of their internet access service measured by end-users. In this report, Nkom has assessed the results from Nkom's speed measurement service, Nettfart, which consists of tools for measurement via web browser (nettfart.no) and mobile apps adapted to iOS and Android (Nettfart Mobile).

As for all types of crowd sourcing, the representativeness of the measurement result database may be limited, since use of the measurement tool is voluntary, and depends on the individual end-user taking the initiative to perform such measurement. The measurement results do nonetheless provide an indication of the quality of the internet access service experienced by the end-users. Review of the underlying data set also shows that, over time, information is collected from a very large proportion of the providers.

5.3 Speed measurement results

5.3.1 Measurement results from nettfart.no

This subsection presents results measured by nettfart.no via web browser. For fixed internet access services, the development in average access speed across different subscriptions is presented below.

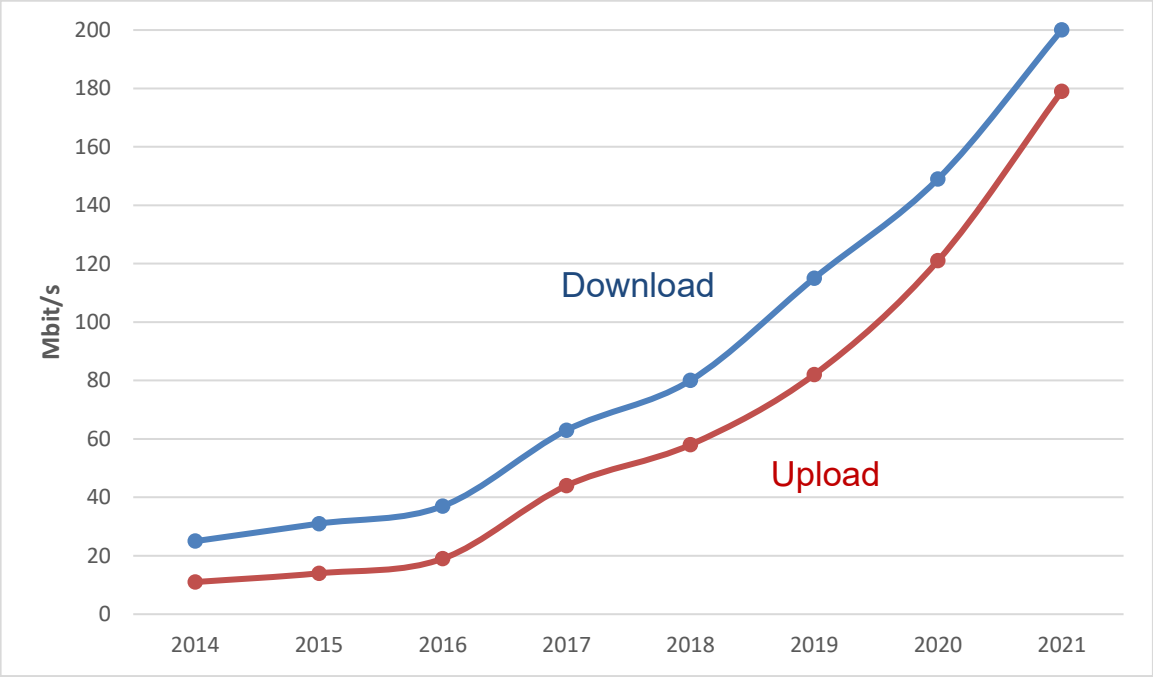

Figure 2: Average speed for fixed internet access (source: nettfart.no)

Figure 2 shows that, so far in 2021, the average speed measured across the various subscriptions is three time as high as in 2018. This applies to both download and upload speeds. The increase observed in the previous reporting period appears to be continuing. Compared to the measurement results up to 2016, in recent years there has been a significant increase in speed.

For the measurement of mobile internet access services using nettfart.no via web browser, the development in average speed across the different subscriptions is presented below.

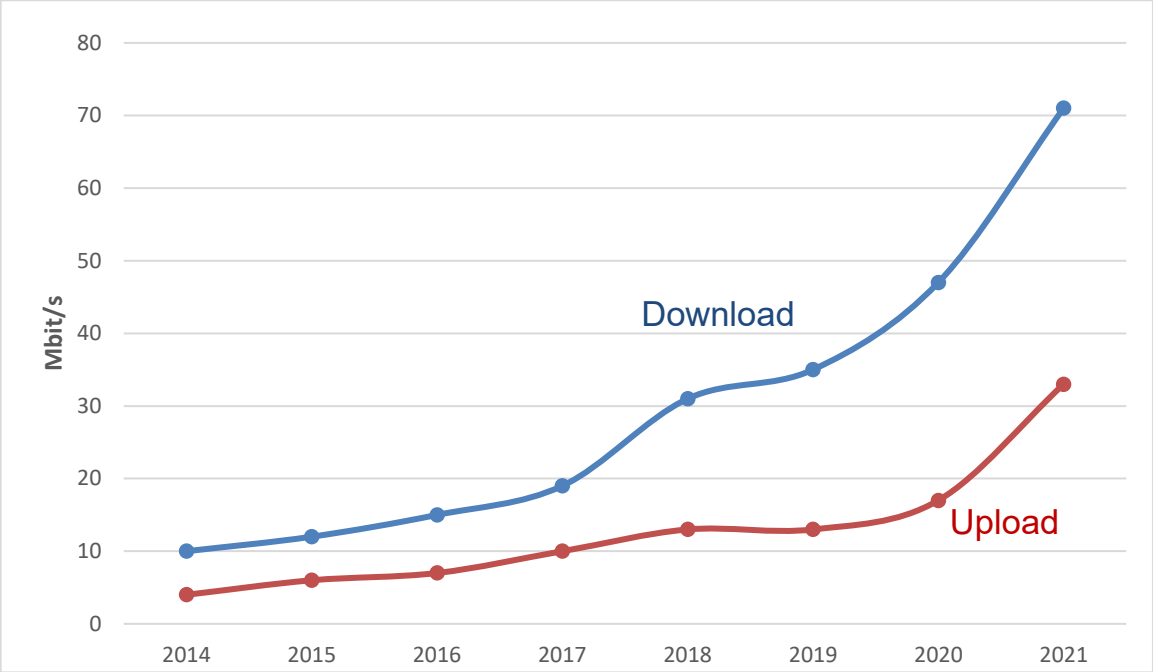

Figure 3: Average speed for mobile internet access (source: nettfart.no)

Figure 33 shows that there is also a positive trend for internet access services via mobile networks with regard to the development in the measured average download and upload speeds. The figure show that download and upload speeds as of June 2021 are more than twice as high as in 2019. Nkom can observe that Norwegian subscribers have the lowest data consumption for mobile internet access services in the Nordic region (cf. section 2.2.4). This entails lower traffic load 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.

5.3.2 Measurement results from Nettfart Mobile

This subsection presents results measured using the measurement app Nettfart Mobile. First, the average speed per technology (3G, 4G and WLAN) is presented, and then the variation in the speed over 24 hours.

Note that Figure 3 shows the average speed for all access technologies, based on nettfart.no. These measurement results may therefore deviate somewhat from the figures presented in Figures 4 and 5 below, where the measurement results are distributed across the various technologies, based on Nettfart Mobile.

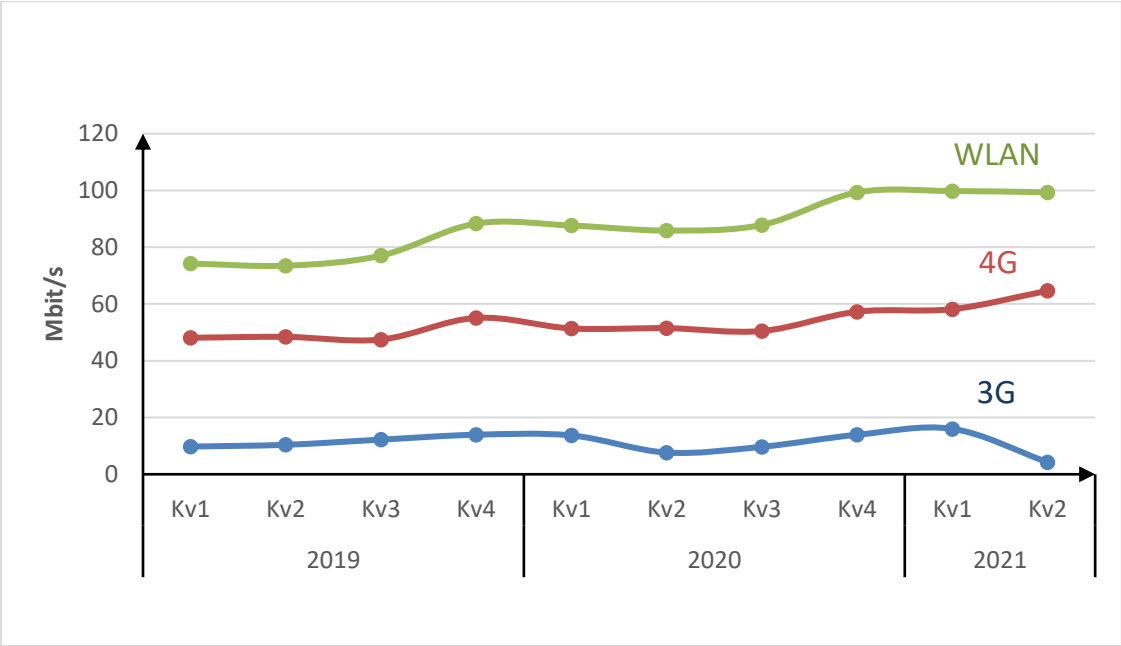

Figure 4: Average download speed per technology (source: Nettfart Mobil)

Figure Figure 44 shows differences in the average measured download speed by radio technology. The figure shows that users of Nettfart Mobil[34] achieve rather higher speeds when the phone or tablet is connected to wireless LANs (WLAN), compared to measurements via mobile networks (3G and 4G).[35] 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 WLAN measurements, it is uncertain which transmission medium is used to and from the home for the individual measurements. During the past year, the number of fibre-based internet access[36] subscriptions has increased, which probably has had a significant impact on average WLAN speeds.

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

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

[36] During 2020, the number of private subscriptions for fibre-based internet access increased by 168 000. By the end of 2020, there were more than 79,000 private subscriptions for fixed wireless broadband (source: the Ekom statistics portal).

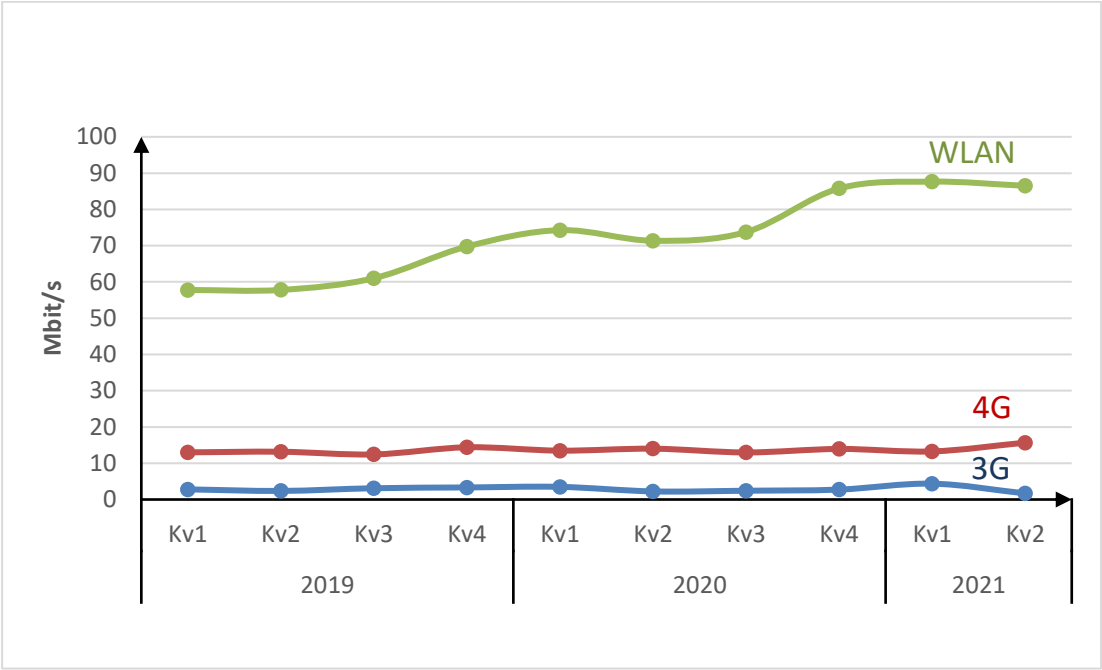

Figure 5: Average upload speed by technology (source: Nettfart Mobil)

Figuree 5 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 cellular communication are at a significantly lower level than download speeds (as shown in Figure Figure 44). 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 communication between the internet and the individual customer.

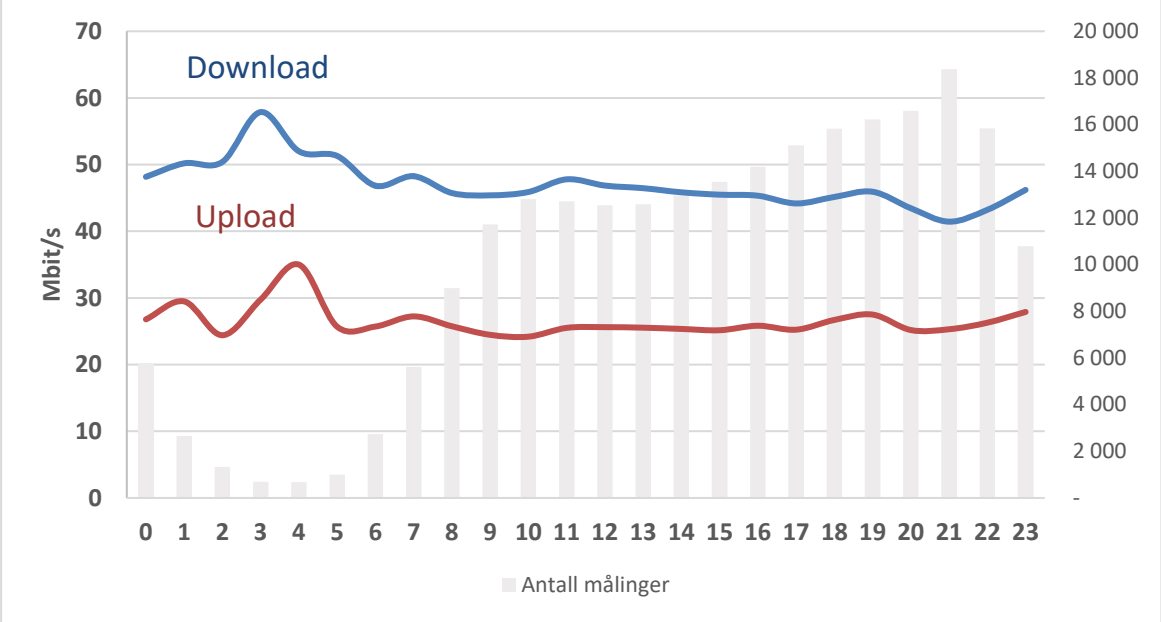

Figure 6: The median of download and upload speeds per hour (source: Nettfart Mobil)

*Figure*6 shows the median value of download and upload speeds distributed per hour throughout 24 hours, measured for the period from 1 May 2020 to 30 April 2021. 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 capacity.

5.3.3 Assessment of the measurement results

The internet access services have really been put to the test during the pandemic, when various measures due to the coronavirus outbreak were implemented, such as extensive use of home offices and home schooling. The digitalisation of society has accelerated at record speed, and new users and application areas are now contributing to an overall increased traffic load in the networks.

It is positive to note that the development in the speed of fixed internet access services is nonetheless continuing the favourable trend from the previous reporting period. The average download and upload speeds for fixed internet access services have increased by 35 and 50 per cent, respectively, since the last reporting period.

There is also positive development in the speed of mobile internet access services. Mobile providers appear to be able to meet the demand by expanding coverage and implementing radio technologies that effectively leverage the available range. For 4G, the average download speed has increased by 25 per cent since the last reporting period, while the average upload speed has only increased marginally. For 3G, there is a marginal decrease in speeds, which may be due to mobile providers gradually turning off this technology in favour of frequency resources for 4G and 5G.

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 price structure for subscriptions and technical availability (coverage) that influence how prevalent this form of internet access services can become, as an alternative to fixed 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, in particular the criteria of effect on content and application providers, effect on other end-users and the scale of zero-rating in the market.

In terms of the *effect on content and application providers*, zero-rating affects terms of competition since it entails price discrimination between providers that are included and not included, respectively. In the Norwegian market, we have had zero-rating of music streaming for many years, but there are no signs of a trend for the introduction of zero-rating for new application categories, such as social media, messaging applications or video streaming, as in some other European countries.

In terms of the *effect on end-users*, Nkom considers 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' data use is increasing, however, and mobile providers are increasingly launching subscriptions that include a higher data allowance. Both the supply of and demand for larger data allowances might lead to greater competition in the market.

The scale of zero-rating continues to increase somewhat each year. Concurrently, zero-rated music is increasingly streamed by users with large data allowances. These users are therefore deemed to have sufficient allowances to give them relatively great freedom to choose content.

Based on an overall assessment of these development trends, Nkom considers that the zero-rating in the Norwegian market currently does not have detrimental effects on competition or consumer welfare, despite a gradual increase in scale. However, Nkom will continue to monitor the development of zero-rating in the market.

Traffic management and specialised services

Nkom's information collection from internet service providers shows no significant changes compared to last year in terms of traffic management of the internet access service, as well as the provision of specialised services in the market. Providers typically report on traffic management of internet access service based on statutory 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 performed any detailed scrutiny of the reported traffic management measures or specialised services, but assumes that these are offered in accordance with the Regulation. In the future, Nkom may initiate more detailed investigations of the measures.

In June 2020, speed-differentiated internet access services were observed in the Norwegian market for the first time, when Telenor launched "Next" mobile internet access services with three different speed classes. Based on information obtained from Telenor, Nkom's general assessment is that the traffic management for "Next" is in line with the Regulation.

Nkom considers it to be a positive market trend that providers differentiate according to the speed of internet access services, in contrast to differentiating on the basis of content. Nkom considers differentiation based on data allowances and speed classes to be a shift away from the use of content differentiation in the form of zero-rating.

This year, but also during the previous year, Nkom has held dialogue meetings concerning the compatibility between the 5G technology and the open internet regulation, in order to facilitate the use of 5G in the Norwegian market. Nkom has given weight to the clarifications in BEREC open internet guidelines, with the aim of building an understanding of how 5G services could be offered in accordance with the Regulation.

Information about the internet access service

Nkom's assessment is that the providers' practice varies with regard to the level of detail in their description of traffic management measures. Some providers have a dedicated net neutrality information page, which includes traffic management as an element of a comprehensive overview, while others have a more limited description in the contracts. The review undertaken by Nkom shows that providers generally have a satisfactory presentation of traffic management measures, which are thereby in accordance with the Regulation.

Concerning *fixed internet access services*, Nkom can observe a clear improvement in the information concerning internet access speed compared to previous years, since to a great extent providers disclose the various different speed parameters required under the Regulation, including the normally available speed.

Concerning *mobile internet access services*, Nkom observes that for some providers it is intuitive and easy to understand which speed is offered for the individual product. Nkom also notes that several providers use mobile technology as the basis for information concerning speed. Nkom supports this approach, but also believes that it should be considered whether advertised speed and maximum speed can be linked more directly to each individual product, whereby the end-user obtains clearer information about the speed that can be expected.

Concerning mobile internet access services with speed differentiation between different subscriptions, such as Telenor "Next", Nkom considers it relevant for the provider to specify whether end-users are also differentiated during congestion in the provider's mobile network.

Quality of the internet access service

The internet access services have really been put to the test during the pandemic when various measures due to the coronavirus outbreak were implemented. Society's digitalisation has accelerated at record speed, and new users and application areas are contributing to an overall increased load in the networks. On a monthly basis, Nkom has reported the status of the Norwegian internet to BEREC since March 2020. Throughout the period covered by the annual report (May 2020-April 2021), Nkom has reported "green" status, which means that the internet access service has functioned well, and the pandemic has not led to problems with the availability or general quality of the internet access service.[37]

It is positive to note that the development in the speed of fixed internet access services is nonetheless continuing the favourable trend from the previous reporting period. The average download and upload speeds for fixed internet access services have increased by 35 and 50 per cent, respectively, since the last reporting period.

There is also positive development in the speed of *mobile internet access services*. Mobile providers appear to be able to meet the demand by expanding coverage and implementing radio technologies that effectively leverage the available range. For 4G, the average download speed has increased by 25 per cent since the last reporting period, while the average upload speed has only increased marginally.

Main conclusion

Nkom considers 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 in particular follow up on whether the offer of large, unlimited data allowances has a dampening effect on the scale of zero-rating in Norway during the next year. Furthermore, the increasing use of 5G in the mobile networks will be relevant to monitor in the future, in particular with regard to interaction between the internet access service and specialised services.

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[37] https://berec.europa.eu/eng/news_and_publications/whats_new/8224-berec-publishes-the-first-summary-report-in-2021-on-the-status-of-internet-network-capacity-regulatory-and-other-measures-in-light-of-the-covid-19-crisis