

Net Neutrality in Norway – Annual Report 2018

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Contents

- 1 Introduction and background..... 3
- 2 Access to an open internet..... 4
 - 2.1 The right to an open internet access..... 4
 - 2.2 Zero-rating in Norway 4
- 3 The collection of data on traffic management..... 6
 - 3.1 Traffic management of the internet access service 7
 - 3.2 Specialised services 7
- 4 Information about the internet access service 8
 - 4.1 Information about traffic management 8
 - 4.2 Information about normally available speed 9
 - 4.3 Information about the handling of complaints related to net neutrality 10
- 5 The quality of the internet access service 11
 - 5.1 The general quality of the internet access service..... 11
 - 5.2 Regulatory supervision..... 11
 - 5.3 Measurement results from Nettfart.no 12
- 6 Overall assessment..... 16

1 Introduction and background

This is the second year that the Norwegian Communications Authority (Nkom) has prepared an annual report on net neutrality in Norway. Net neutrality is the principle that all internet traffic should be treated equally, regardless of sender, recipient, equipment, application, service or content. The report describes the status of net neutrality in the Norwegian market.

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 2015/2120¹. These rules superseded national guidelines on net neutrality from 2009.

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

Nkom monitors the development of net neutrality in the Norwegian market pursuant to Article 5(1) of the Regulation, which describes how the regulatory authorities must closely monitor and ensure compliance with the provisions of the Regulation.

The Regulation further stipulates in Article 5(1) that the national regulatory authorities must publish an annual report on net neutrality in the national market. BEREC's guidelines for net neutrality³ specify that the period for the annual report should be 1 May until 30 April of the following year.

Information from internet service providers concerning the development of net neutrality is obtained under Article 5(2) of the Regulation. This describes how internet service providers shall, at the request of the regulatory authorities, provide information relevant to the requirements in the Regulation.

The monitoring of net neutrality is also based on BEREC's guidelines on net neutrality, which have been established in pursuance of Article 5(3) of the Regulation. In accordance with recital 19, the regulatory authorities should take utmost account of relevant guidelines from BEREC.

The report is organised in accordance with the provisions of the Regulation. Section 2 describes access to an open internet via Norwegian providers, and reports on existing zero-rating offers in the market. Section 3 describes issues related to technical traffic management in the networks of Norwegian providers. 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.

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

² First recital of Regulation 2015/2120

³ BEREC Guidelines on the Implementation by National Regulators of European Net Neutrality Rules, BoR (16) 127

2 Access to an open internet

2.1 The right to an open internet access

Open internet access in Norway is protected by the Norwegian authorities based on the provision concerning net neutrality in the Electronic Communications Act⁴, as well as the European Open Internet Access Regulation and BEREC's guidelines on net neutrality.

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

2.2 Zero-rating in Norway

Zero-rating is a form of positive price discrimination for selected traffic, that allows an end-user to use music streaming or other applications without this consuming the included data quota. It is the internet service provider that decides which applications can be used by the end user in this manner.

Internet service providers offer zero-rating on the basis of Article 3(2) of the Regulation, which introduces the concept of "commercial practice". The aforementioned Article requires providers to refrain from providing internet access services with commercial conditions that limit the end user's right to open internet access.

Nkom has in its own reports assessed zero-rating offers from Telenor⁵ and Telia⁶, both named "Music Freedom". The aforementioned two companies had by the end of the first half of 2017 a total of about 90 percent of all subscriptions in Norway, and this share was about the same at the end of 2017. In both cases, Nkom has expressed concerns that the offer may have negative effects, due to the significant market position of the two internet service providers and the potential impact. Furthermore, Nkom believes that zero-rating may affect the competitive conditions in the content markets and may have a direct effect on end-user behaviour.

However, it was found that the scale of this type of commercial practice was limited in the market, and based on an overall assessment, Nkom found that there was no basis for issuing an order to take corrective action at that time.

However, for both cases, Nkom has emphasised that if the zero-rating schemes in the market are not functioning as anticipated, especially if the scale increases significantly, Nkom is likely to have to reconsider the analysis of zero-rating in the market. Nkom has therefore conducted a separate follow up of the scale of zero-rated offers.

Nkom's assessment of zero-rating as a commercial practice (provided that this does not entail technical traffic management measures that are infringing the regulation) is performed as an overall assessment in accordance with paragraph 46 of BEREC's guidelines concerning net neutrality, with emphasis on the following aspects:

- Market positions of the internet service providers
- Market positions of the content providers
- Impact on the content providers
- Impact on the end users
- The scale of the commercial practice
- Any circumvention of the goal of the Regulation

⁴ Act on Electronic Communications, Sections 2-16. Net neutrality

⁵ Nkom report 29 June 2017, see: https://www.nkom.no/aktuelt/nyheter/_attachment/29334?_ts=15cf3f67b0a

⁶ Nkom report 18 December 2017, see: https://www.nkom.no/aktuelt/nyheter/_attachment/31360?_ts=1606da8f297

The status of zero-rating in the Norwegian market as of 30 April 2018 is still largely in accordance with the Telenor and Telia assessments from June and December 2017. But there has also been some development since these assessments were made, as described below.

The market positions of the internet service providers

When it comes to the market positions of the internet service providers, Nkom’s latest annual statistics show that Telenor and Telia have maintained their significant positions in the market, and they have almost 90 percent of all subscriptions.

The market positions of content providers and effect on the content providers

The Telenor and Telia zero-rating schemes have evolved following their introduction, and the number of included content providers has increased. Nkom observes, however, that there are still several other streaming music providers, but in reality these are not covered by the Telenor and Telia zero-rating schemes.

The market delimitation of the content market, as discussed in Nkom’s assessments of the Norwegian zero-rating cases, may also include other content than purely music content. Over the past year, Nkom has received enquiries regarding both podcasts and radio⁷, something which reinforces the impression that the delimitation that Telenor and Telia have chosen for their schemes are being questioned. Also, announcements that Spotify will offer news and that YouTube will offer music streaming, show that the content categories of music, radio, podcasting and audiovisual music content are merging more and more together.

The content offer for "Music Freedom" from both Telenor and Telia, show that the two providers follow each other, except that only Telenor includes Google Music.

| | April 2017 | June 2017 | February 2018 |
|---------|---|---|--|
| Telenor | Spotify, Tidal, Apple Music, and Google Music | Spotify, Tidal, Apple Music, and Google Music | Spotify, Tidal, Apple Music, Deezer, Beat and Google Music |
| Telia | | Spotify, Tidal and Beat | Spotify, Tidal, Beat, Apple Music and Deezer |

Table 1: Content providers in "Music Freedom", development the last year.

As regards the impact on content providers, both Telenor and Telia say that their zero-rating schemes are open to more music streaming providers. The number has increased somewhat over the last year, but it is still dominated by large, well-established providers. If we compare this with what is on offer in the Netherlands, which has carried out a similar assessment of zero-rating to that done by Norway, T-Mobile Netherlands has as many as 28 content providers, as well as several on a waiting list.⁸

⁷ Statement concerning Nkom’s assessment of Telenor Yng Music Freedom, the Norwegian Media Businesses' Association, 6 November 2017; Zero-rating in the Norwegian mobile market, 9 November 2017, zero-rating and net neutrality, December 2017, the Norwegian Consumer Council; Free music streaming challenges net neutrality, opinion piece by Håkon Viktil, Dagens Næringsliv, 4 April 2018; Net neutrality, the zero-rating of music streaming and consequences for radio use, Digitalradio Norge, 30 April 2018; Impact of net neutrality, zero-rating and music streaming, Norsk Radiolytter-Forening (Association of Norwegian Radio Listeners), 7 May 2018.

⁸ <https://community.t-mobile.nl/nieuws-345/update-toevoegen-diensten-datavrije-muziek-272243>

Impact on the end users

With regard to the effect on end users, the amount of data transmitted from the zero-rated content providers, compared with the size of the included data allowance that can be freely used, is an important parameter.

There is no clear trend in the growth of the average consumption of zero-rated traffic, and the period of zero-rated offers has been short. Based on the data available, usage seems to have a slightly downward trend. This could possibly be due to the fact that the initial subscribers to the service were large-scale consumers, and that those who have subscribed later use less.

However, Telenor and Telia customers have different profiles; a larger proportion of Telenor customers with a low data allowance use zero-rated content. For both companies, however, the majority of the users of "Music Freedom" have data allowances of between 5 and 10 GB per month.

By comparing the data consumption with the population in our neighbouring countries⁹, it is evident that Norwegian subscribers have the lowest consumption of mobile data in the Nordic countries. In addition, Nkom has compared some of the prices of the Nordic offers, and the findings show that for comparable data allowances, prices for mobile data are considerably higher in Norway than in Denmark, Sweden and Finland.

This shows that Norwegian end users are currently provided with smaller and more expensive data allowances than other comparable countries. This makes zero-rating extra problematic in the Norwegian market, since the included allowance that can be freely used is relatively small compared with the data allowances in a number of other countries.

However, after the reporting period for this report expired on 30 April 2018, came the announcement of the launch of Norway's first subscription with (in practice) a free data allowance. Chili Mobil offers a subscription¹⁰ with a data quota of 1,000 gigabytes per month. Large data allowances reduce incentives for zero-rating, and if large data allowances are offered on a wider basis in the Norwegian market in the future, it may limit the propagation and use of zero-rating. So far, no other mobile providers has launched similar offers to Chili Mobil.

Scale of zero-rating

Regarding the scale of zero-rating offers, Telenor and Telia have both reported that in the period up to March 2018, they registered an increase in the number of subscribers using the offers. Telenor has limited the scheme to be included in the Yng products, while Telia offers "Music Freedom" along with a number of its subscriptions. This distinction implies that the proportion of the companies' customers who have utilised zero-rating is different. The proportion of Telenor's and Telia's private customers using "Music Freedom" has increased during the last year.

3 The collection of data on traffic management

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 rules. Nkom has obtained data of this nature as part of its collection of data for use in the annual statistics of electronic communications in Norway.

⁹ 3 sources: 1) <http://dfmonitor.eu/prices/country/> 2) https://www.pfs.is/library/Skrar/Tolfraedi/Norraen-tolfraedi/Telecommunication_markets_in_the_Nordic_and_Baltic_countries_2016.pdf 3) <https://nrkbeta.no/2018/02/09/i-finland-far-du-ubegrenset-med-mobildata-til-under-250-kroner-i-maneden/>

¹⁰ Nkom has not yet assessed the terms and conditions of use for this offer.

3.1 Traffic management of the internet access service

Traffic management of the internet access service is especially 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 services are regulated by Article 3(3) of the Regulation. As part of the monitoring of net neutrality in the Norwegian market, Nkom has asked providers for information about the traffic management methods they use in the production of their internet access services.

Examples of such traffic management methods 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.

Nkom has not conducted a detailed assessment of the reported traffic management measures, but considers that these are provided in accordance with the Regulation. In the future, Nkom may undertake more thorough investigations of the providers' traffic management measures.

3.2 Specialised services

Specialised services are defined as services other than internet access services optimised for specific content or specific applications, or a combination of these, where optimisation is necessary to meet the requirements of the content or applications for specific level of quality.

The net neutrality rules require that internet service providers must ensure sufficient network capacity to be able to provide these services in addition to the internet access services provided. As part of the supervision of specialised services in the Norwegian market, Nkom has asked providers for information about the specialised services they offer.

Frequently reported specialised services in the fixed network are VoIP and IPTV, and on mobile networks it is relatively common to offer VoLTE (Voice over LTE) parallel to the internet access service. This is in line with the typical examples of specialised services in BEREC's net neutrality guidelines.

When the providers were asked how they ensure that the capacity of their network is sufficient whereby the specialised services are not provided to the detriment of the general quality of the internet access service for end-users, the response is that they continuously monitor traffic at all the connections on the network and that capacity is increased as needed.

Nkom has not conducted a detailed assessment of the reported specialised services, but considers that these are provided in accordance with the Regulation. In the future, Nkom may undertake more thorough investigations of the specialised services provided.

4 Information about the internet access service

Article 4 of the Regulation gives requirements for information that providers of internet access services must make available to their end users. In Article 4(1) there is a requirement for transparency in the contracts of internet service providers, and providers must publish such information, whereas in article 4(2) providers are required to have transparent, simple and effective procedures for the processing of complaints from end users related to the rights and obligations in Articles 3 and 4(1).

As part of the follow-up, Nkom has asked providers of fixed and mobile internet access services to report the information they provide to their end users about the internet access service.

In general, the feedback shows that the providers have information available, but that the clarity and extent of this varies. Some of the providers largely refer to the terms and conditions of a subscription, while others have their own web pages with information about net neutrality and the quality of the internet access services. In this report, we focus on three topics; information about traffic management measures, information about the normally available speed, and finally, information about the handling of complaints related to net neutrality. Providers of mobile and fixed internet access services are treated collectively where the questions are relevant to both types of providers.

4.1 Information about traffic management

Internet service providers must disclose the traffic management measures that are being used. We refer to section 3 for more information on actual traffic management measures.

The starting point is that the providers make information available in the general terms and conditions, including about any traffic management measures. Although the providers can demonstrate that this information is given in the terms and conditions or similar places, this says little about the actual quality and content of the information.

An example of information that has been made available is Telia, which refers to the information both in their terms and conditions and on their own web pages. These pages present information about the traffic management measures that are in use and the background/justification for them. In addition, the end user can find information about speed and factors that can affect the speed. Broadnet also has information on its own website where information about traffic management measures is provided, including what applications are blocked by Broadnet, for example, due to security measures. In general, Nkom is in favour of information about the internet access services being presented in a way that is easily accessible to end users and that summarises relevant information.

In its terms and conditions, Telenor indicates that traffic management measures may be implemented on the basis of security as well as regulatory or statutory obligations etc. While this is not at the same level of detail as Telia, it provides general information about the measures Telenor has implemented. Some of the providers also show that they follow the industry norms by blocking, for example, SMTP. Viken Fiber said that they have taken such measures, but this is not stated in the company's current terms and conditions.

There are consequently a variety of practices among the providers regarding the extent to which information about traffic management measures is made available to end users, and how the information is made available. Although the majority provide information about this, it is not necessarily easily accessible for end users. Nkom recommends that providers that have not yet done so, create their own web pages with information about net neutrality in order to improve transparency towards the end users.

4.2 Information about normally available speed

In order to strengthen the rights of end users, it is a requirement of Article 4(1)(d) of the Regulation that providers of internet access services inform end users of the speed that they are able realistically 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

By “normally available speed” it is meant the speed that an end user would expect to receive 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 Table 2 below, Nkom reproduces examples of how providers inform private customers in contracts and on web pages about the speed of a fixed internet access services.

| Provider | Information online | Information in the contract |
|---------------------|---|--|
| Telenor | End users can choose between a number of standard broadband subscriptions. Telenor also offers a broadband check for xDSL that checks the download and upload speeds the customer can expect for a given address. | Terms and conditions for DSL broadband: <i>“Download and upload speeds may vary within the specified speed range of the products, depending on conditions on the copper line...”</i> Terms and conditions for fibre broadband: <i>“Technical aspects of the network may mean that it is not possible to deliver the maximum speed the service can provide. Telenor therefore reserves the right to vary the actual speed, in order to ensure that the customer receives a stable and reliable service...”</i> |
| NextGenTel | End users can choose between a number of standard broadband subscriptions. NextGenTel informs customers of expected download and upload speeds within a given range (e.g. 10-20 Mbit/s) | NextGenTel private subscription terms and conditions: <i>“NextGenTel provides the customer with broadband access via a line with an agreed capacity and a broadband router. The broadband is delivered at a defined kilobit per second rate and the line speed will be up to the ordered speed class, but during periods of heavy load on the network, the customer may experience poorer capacity and speed than stated in the price list... ”</i> |
| GET | End users can choose between a number of standard broadband subscriptions. | GET’s subscription terms and conditions for private customers: <i>“The transmission speed may drop or decrease as a result of technical control mechanisms built into protocols or other components. Moreover, the speed may be lower than what is specified, during periods of heavy load on the network...”</i> |
| Viken Fiber/Altibox | End users can contact Viken Fiber directly and get feedback about possible delivery to a given address. | No speed information in the general terms and conditions. |
| Broadnet/HomeNet | End users can choose between a number of standard broadband subscriptions. HomeNet states that the actual speed will often be higher than the expected speed. | General subscription terms and conditions: <i>“HomeNet is not responsible for the speed limitations caused by circumstances or conditions beyond HomeNet’s control and reserves the right that circumstances of a technical nature in the network may mean that it is not always possible to deliver the maximum speed specified for the selected service...”</i> |

| | | |
|------------------|--|--|
| Eidsiva Bredbånd | End users can choose between products based on their measured speed. | General subscription terms and conditions: "Actual speed in the network could be somewhat lower than stated in the contract, especially during periods of high load. If, there are repeated problems with achieving the specified speed in specific coverage areas, EB will consider making necessary upgrades to rectify these issues..." |
|------------------|--|--|

Table 2: Information about fixed internet access speeds

In mobile networks, the normally available speed in a given radio cell is more difficult to predict due to the varying number of active end 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 measurement parameters for download and upload speeds respectively:

- estimated maximum speed
- advertised speed

Nkom has not conducted any investigation of specific contracts between providers and their customers, but observes that in general, in subscription terms and conditions or on the websites of providers, information is rarely given, for example, about the normally available speed for a fixed internet access services. Also for mobile internet access services, information given in accordance with the requirements of the Regulation is inadequate.

Nkom believes this is not a satisfactory result over a year after the introduction of the Common European Net Neutrality Rules, and expects the providers to in future comply with the requirements in the Regulation about providing information about the internet access services they offer.

4.3 Information about the handling of complaints related to net neutrality

All providers, both of fixed and mobile internet access services, refer to their call centres and general complaints procedures for the processing of complaints related to net neutrality. It seems that at present, none of the providers currently have specific procedures associated with net neutrality.

The Regulation does not require that the procedure for handling complaints regarding net neutrality be separate from the general complaints procedure. There are good grounds for assuming that the requirements in the Regulation do not differ significantly from the requirements for complaints procedures included in other regulations in the field.

Nkom believes that this form of procedure for dealing with complaints related to net neutrality is sufficient for the time being, but does not rule out that clarifications may be applicable at a later date if it proves necessary.

5 The 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 a monitoring and reporting obligation to ensure that providers of internet access services, fulfil their obligations regarding open internet access. Article 5(1) stipulates that national regulatory authorities must follow up on the compliance by providers with the provisions of Articles 3 and 4.

Recital 17 of the Regulation highlights the importance of specialised services and their use should not lead to a reduced general quality of customer access to the internet. For access to the internet via mobile networks, some of the requirements are relaxed due to the particular conditions associated with having varying number of active users per radio cell. But it is also expected that the general quality of the internet access service will be maintained over time.

In the same recital, instructions are given for how national regulatory authorities can monitor the compliance of internet service providers with these principles. Measurements of technical parameters that affect what the end user can use their internet access service for and what quality of service is received, are pointed out. In addition to the parameters for quality of service, the recital also mentions other methods of monitoring the deliveries of providers. One example is comparing advertised speed with measured speed, or assessing the level of traffic congestion in the network.

5.2 Regulatory supervision

A method for following-up on Article 5(1) of the Regulation has been the monitoring of the measured quality of the internet access services of end users. This can be achieved in different ways. In this report we have looked at the results of Nkom's measurement service Nettfart.no, especially with regard to fixed internet access services, as well as the annual report from Simula on the quality of Norwegian mobile networks.

Nkom has investigated the results that users of the measurement service Nettfart.no have obtained when testing their internet subscriptions. As with all types of crowd sourcing, the representativeness of the samples may be limited, as the use of the measurement service is voluntary, and depends on the individual end user taking the initiative to conduct a measurement. However, the measurement results provide an indication of the quality of the internet access service experienced by end users. A review of the underlying data shows that over time, information is collected from a large proportion of the providers and that all access technologies are represented.

The Centre for resilient networks and Applications (CRNA) at Simula¹¹, prepares an annual report¹² that addresses the state of the Norwegian mobile network. Through their measurement system, which consists of over 150 active measurement probes spread over large areas of the country, CRNA can accurately monitor the development in capacity, stability, and degree of packet loss for each internet access. The final version of their report shows that Norwegian mobile networks experienced fewer outages, higher average speed and lower packet loss in 2017 than any other year. In conjunction with Nkom's own data sources and investigations, these reports help shed light on the quality of mobile based internet access for Norwegian end users.

¹¹ Simula Research Laboratory, www.simula.no

¹² <https://www.simula.no/sites/default/files/crna-2017.pdf>

5.3 Measurement results from Nettfart.no

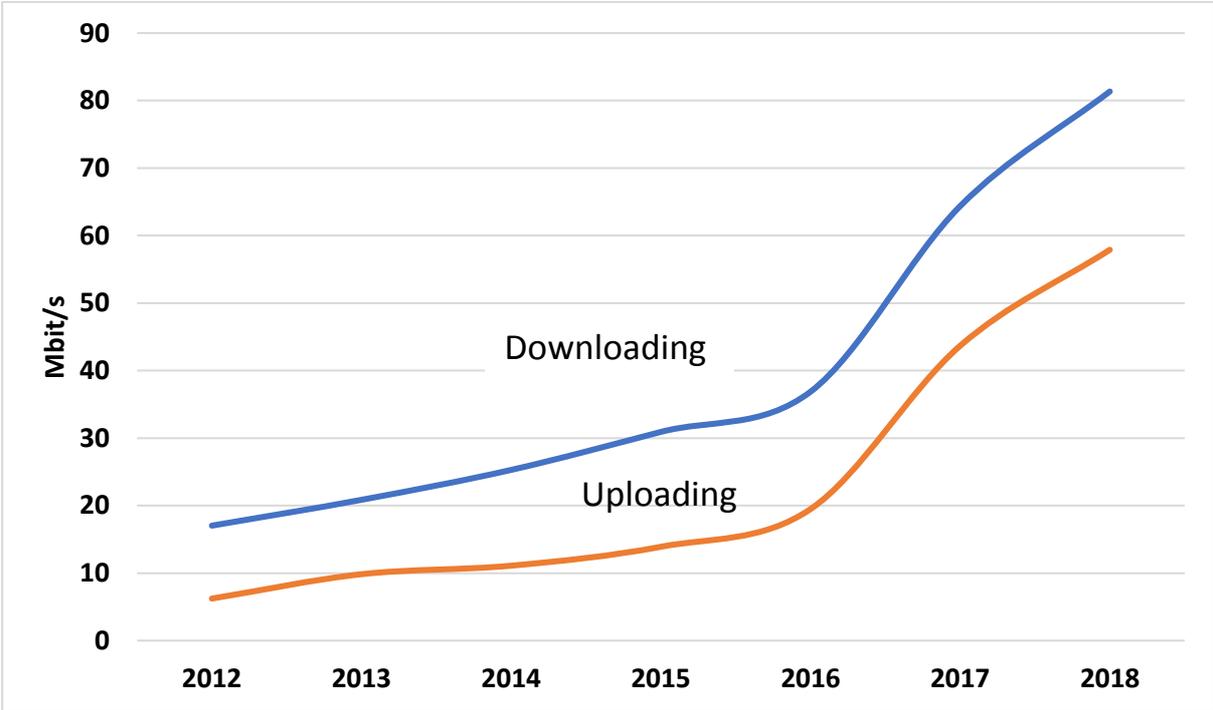


Figure 1 Average fixed internet access speed 2012 - 2018

Figure 1 shows that there has been a pronounced increase in the measured average speed of fixed internet access services from 2016 up until now. This also includes the reporting period for this annual report. Such an increase in speed enables internet users to basically use all types of applications over their internet access services. However, it is also important that the providers maintain capacity and accessibility for interconnection with regional, national and global partners. This relationship is not covered by the measurements of Nettfart.no.

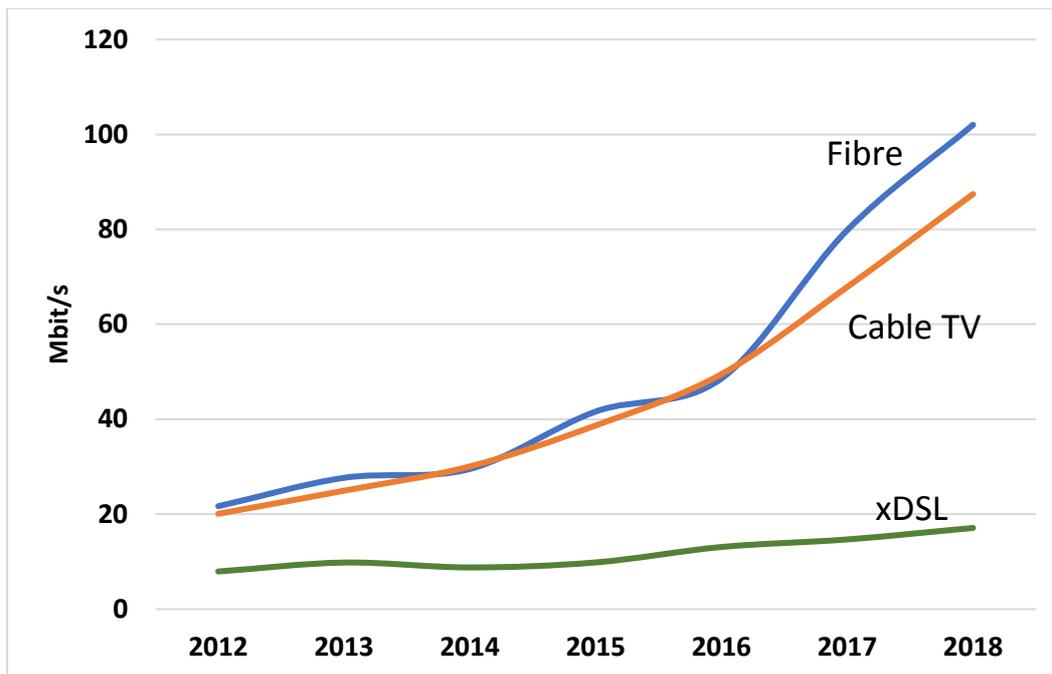


Figure 2 Average download speed, broken down by technology 2012 - 2018

Figure 2 provides a more nuanced picture of the download speed achieved by users, depending on the access technology that connects them to the internet. Up until 2016, the development in speed has been quite similar for fibre and cable TV networks. The measurement results over the past two years show a trend where pure fibre-based internet accesses provide somewhat faster speeds than is the case for cable TV networks.

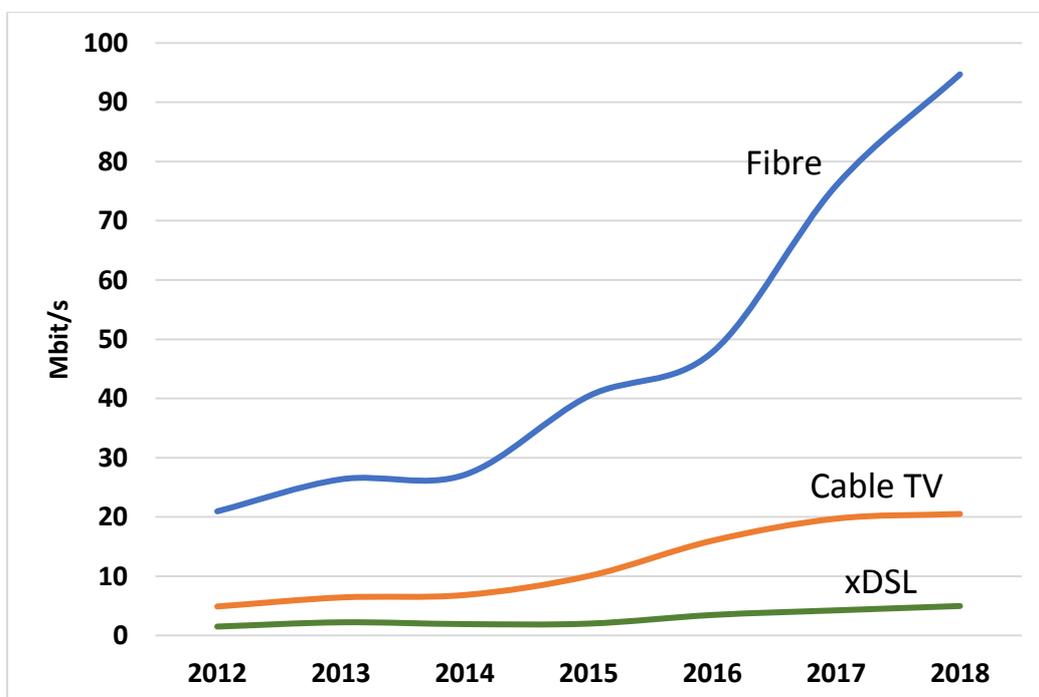


Figure 3 Average upload speed, broken down by technology 2012 - 2018

Figure 3 shows measured average upload speed for fibre, cable TV and xDSL. There are clear differences in speed for the three access technologies. The differences are likely to depend on both constraints in the actual access technology as well as how the providers choose to distribute the available capacity for uploading and downloading that the technology has for the services provided.

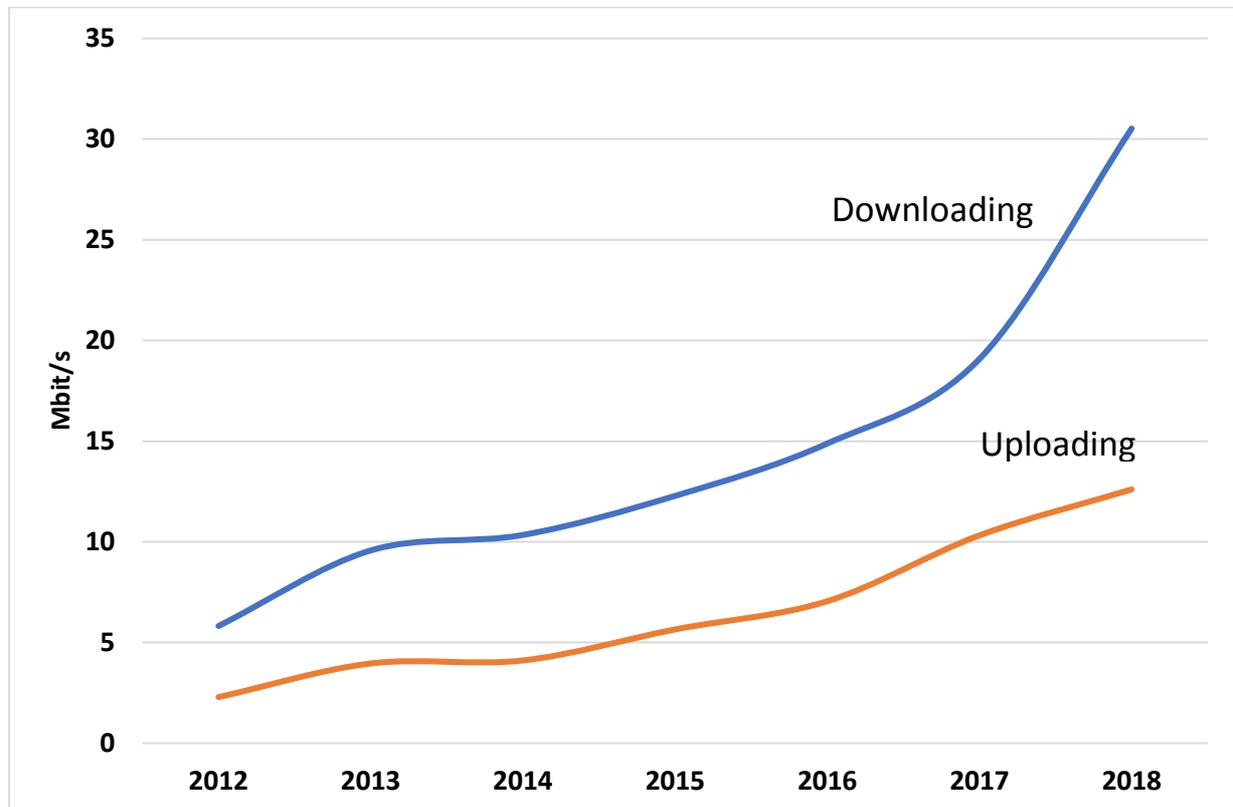


Figure 4 Average mobile internet access speed 2012 - 2018

Figure 4 shows that there is also a positive trend in terms of the average speed of internet access via mobile networks. However, Nkom observes that Norwegian internet users have the lowest consumption of mobile data in the Nordic countries (cf. section 2.2), which results in lower traffic loads than would have been the case if Norwegians used mobile data to the same extent as in our neighbouring countries.

It is interesting to see that mobile based accesses now offer speeds that technically make these viable alternatives to fixed solutions. In the case of 5G, the further development of mobile internet access services is one of the most important focus areas. Therefore it is the pricing structure for subscriptions and technical availability (coverage) that influences how widely this form of internet access services can evolve to be an alternative to a fixed internet access services.

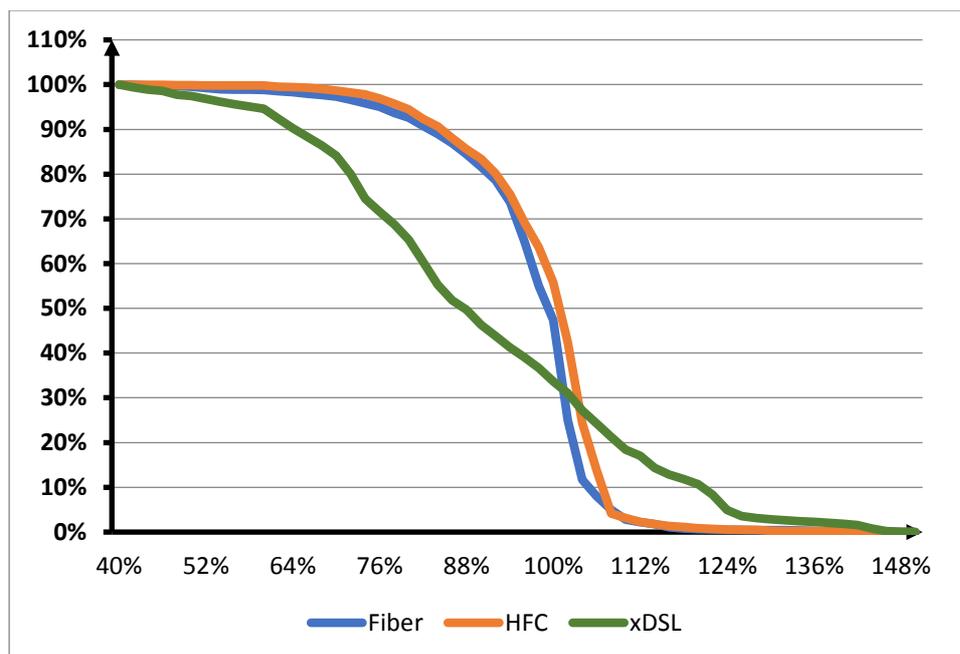


Figure 5 Measured speed compared with advertised speed

Figure 5 shows the relationship between measured speed and advertised speed on fixed internet access (fibre, cable TV and xDSL) from 1 May 2017 until 30 April 2018. The figure shows how large a proportion of the measured accesses (vertical axis) 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 web site.

Assessment of measurement results from Nettfart.no

Overall, the figures show that the positive trend of an increase in internet access speed for Norwegian end users seems to be continuing. This applies to traffic in both directions over the users' access, and it is apparent for all access technologies – xDSL, cable TV, fibre and mobile internet access. It is likely to be cable TV and fibre access in particular that bring the average values up.

Internet accesses based on xDSL also has a positive development, but it has a much flatter curve. There are probably several factors that can explain this. Technically speaking, it is difficult to achieve very high speeds over a copper based access, because for this technology there are numerous aspects that will set limitations.

The measured speed for both downloading and uploading over fixed internet accesses for the period May 2017 until April 2018 shows that end users are enjoying speeds that are more in line with advertised speeds, compared to just a few years back.

The increased availability of internet connectivity - either as a result of technological development, commercial initiatives by providers or a willingness from customers to spend money on high-speed subscriptions - makes it possible for end users to utilise a wide range of internet-based applications without needing to compete with each other for the necessary share of the total capacity. In line with such developments, the need to implement traffic management measures for the internet access services should also be limited.

6 Overall assessment

The Electronic Communications Act, which codifies the Regulation on Net Neutrality in Norwegian law, directs Nkom to closely monitor and ensure compliance with the provisions of the Regulation. This annual report on Norwegian net neutrality covers the period from 1 May 2017 until April 30 2018, and it has been prepared in accordance with article 5(1) of the Regulation.

In general, the state of net neutrality in the Norwegian market seems to be relatively good, but Nkom also has critical comments regarding a few conditions. Nkom bases this overall assessment on general data collection from the internet service providers, quality measurement of the internet access services, and specific follow up of the zero-rating schemes.

The rules for net neutrality give internet users the right to an open internet and state that commercial practices such as zero-rating should not limit this right, in accordance with Articles 3(1) and 3(2) of the Regulation. Nkom assesses zero-rating based on an overall assessment that takes into account several criteria in accordance with BEREC's guidelines.

Telenor and Telia offer zero-rating schemes in the mobile internet access market, and these providers have a combined 90 percent market share. The number of content providers included in the schemes has increased slightly over the past year, but is still dominated by larger, well-known music streaming providers. The data allowances offered to Norwegian end users are still smaller and more expensive than in comparable countries. After the end of the reporting period, Chili Mobil has been seen to buck the trend by offering a monthly allowance of 1,000 gigabytes. So far, no other mobile providers have launched a similar offer.

In the assessments of the Telenor and Telia zero-rating schemes of June 2017 and December 2017 respectively, the scale of zero-rating was the last criterion in the overall assessment. The limited scale lead to the conclusion that there was no basis for issuing an order at that time. The scale of zero-rating has continued increasing after these assessments were concluded.

Nkom's data collection from internet service providers shows no significant changes compared to last year regarding traffic management of the internet access services, as well as the provision of specialised services in the market, which are regulated by Articles 3(3) and 3(5) respectively, of the Regulation. Providers typically report the traffic management of the internet access services based on legal orders and security measures.

Frequently reported specialised services in the fixed network are VoIP and IPTV, and on mobile networks it is relatively common to offer VoLTE in parallel to the internet access service. The providers also report that the capacity of their networks is sufficient to ensure that the specialised services are not to the detriment of the general quality of the internet access service. This is typically achieved by continuously monitoring traffic at all the connections of the network and then increasing capacity as needed.

Nkom has not conducted a detailed assessment of the reported traffic management measures or the specialised services, but considers that these are provided in accordance with the Regulation. In the future, Nkom may carry out more detailed investigations of the measures taken by the providers.

Nkom has also reviewed the information provided by internet service providers to end users about the internet access service, such as traffic management and internet access speed, as

well as procedures for end user complaints in connection with net neutrality, based on the provisions of the Regulation in, Articles 4(1) and 4(2) respectively.

The results show that the providers provide information, but that the clarity and extent of this information varies. Some providers state that they inform end users in the contracts, and some providers provide information via their own web pages. In some cases, these web pages provide relatively detailed information about traffic management measures and the quality that can be achieved for the internet access service.

For fixed internet accesses, there is also a requirement in the Regulation that providers should provide information about the *normally available* upload and download speeds. The results of Nkom's investigation show that the providers rarely satisfy this requirement. There is not the same speed indication requirement for mobile internet accesses. However, the regulation states that all internet service providers must provide information about the speed that they are able realistically to deliver.

All providers, both of fixed and mobile internet access services, refer to their call centres and general complaints procedures, for the processing of complaints related to net neutrality.

Article 5(1) and associated recital 19 of the Regulation, describes that regulators should monitor the *general quality of internet access services*, in order to ensure that this is not negatively impacted by any specialised services offered. Among other things, Nkom has used the measurement results from Nettfart.no to make an overall assessment of this.

For fixed internet access services, the measurement results from Nettfart.no for the past year, show that the average speeds for both downloading and uploading are increasing, as well as demonstrating a good correlation between advertised speed and measured speed.

A positive development in speed has also been noticed for mobile internet access services. However, Nkom observes that Norwegian internet users have the lowest consumption of mobile data in the Nordic countries, which results in lower traffic loads than would have been the case if Norwegians used mobile data to the same extent as in our neighbouring countries.

Nkom's regulatory follow up of net neutrality is based on the Norwegian Electronic Communications Act and the Open Internet Regulation. On this basis, Nkom, in accordance with the policy signals in the bill from the Government for the implementation of the Regulation in Norwegian law, is working to maintain Norwegian net neutrality policy in the future.

In general, the state of net neutrality in the Norwegian market seems to be relatively good. However, Nkom sees two prominent challenges for the coming year; the ever-increasing scale of zero-rating, as well as the inadequate specification of the speeds of the internet access services offered. Nkom will in particular follow these developments further.