

Report:

Net neutrality report 2016/2017

Report to the European Commission and
BEREC according to regulation (EU)
2015/2120



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1 Background and Introduction

According to article 5.1, second paragraph of the Regulation (EU) 2015/2120 of the European Parliament and of the Council of 25 November 2015 laying down measures concerning open internet access and amending Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks and services and Regulation (EU) No 531/2012 on roaming on public mobile communications networks within the Union, hereinafter the Regulation, the national regulatory authorities shall publish reports on an annual basis regarding their monitoring and findings, and provide those reports to the Commission and to BEREC on the 30th of June. This first report covers the period from 30 April 2016 to 30 April 2017.

The first year of the Regulation has been characterized by media attention, inter alia on PTS supervision of the Regulation. Therefore, in addition to the supervision and monitoring of the open internet rules, PTS has also worked with targeted information efforts related to the Regulation, e.g. through the Authority's website.¹

This report describes the supervision and activities that PTS has carried out to monitor and ensure that Swedish end users have access to an open internet access service in accordance with the rules of the Regulation.

¹ PTS website: <http://www.pts.se/sv/Bransch/Internet/Oppenhet-till-internet/>

2 Description of the Swedish Market

2.1 The Internet Access Services Market

The Swedish market for internet access services is characterized by good accessibility for end users both in terms of fixed and mobile broadband. Furthermore, the end users' availability of the latest technologies and most futureproof access forms, fibre and 4G technology (LTE) is relatively good. Market players are investing in order to meet increasing demand for higher bandwidth and transmission speed.

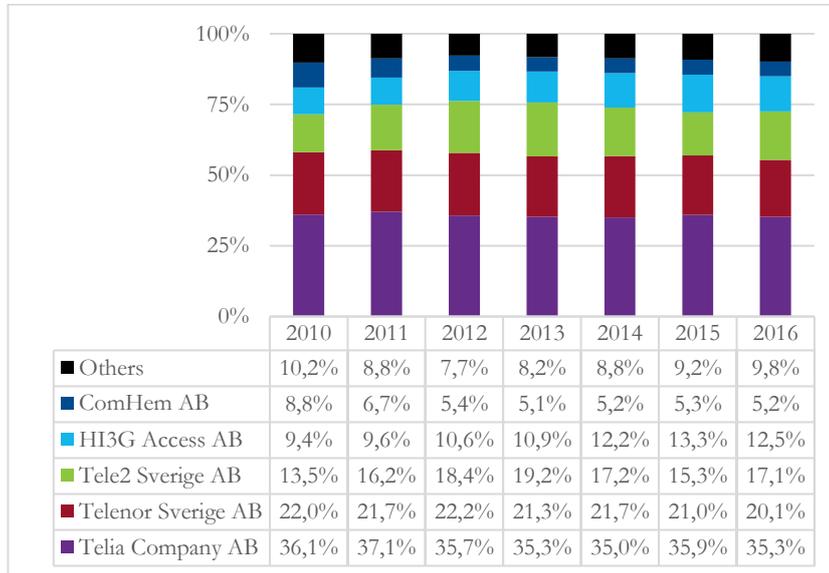
At national level, Sweden has five major players in the total market for internet access services (fixed and mobile) with varying market shares. The mobile broadband market is more concentrated compared to the fixed broadband market, which is more characterized by local and regional operators (municipal networks).

In summary, end users generally have the possibility to choose between a numbers of internet access providers, which positively impacts the end users' access to an open internet.

2.1.1 Market Shares

The level of market shares of the five major players on the Swedish broadband market have been relatively stable in recent years. Telia Company AB (Telia) and Telenor Sverige AB (Telenor) are to a greater extent active in both the fixed and mobile broadband markets, whilst Tele2 Sverige AB (Tele2) and Hi3G Access AB (Tre) are primarily active in the mobile broadband market. Com Hem Holding AB (Com Hem) is primarily active in the fixed broadband market.

Figure 1 Market Shares – Total Broadband Subscriptions

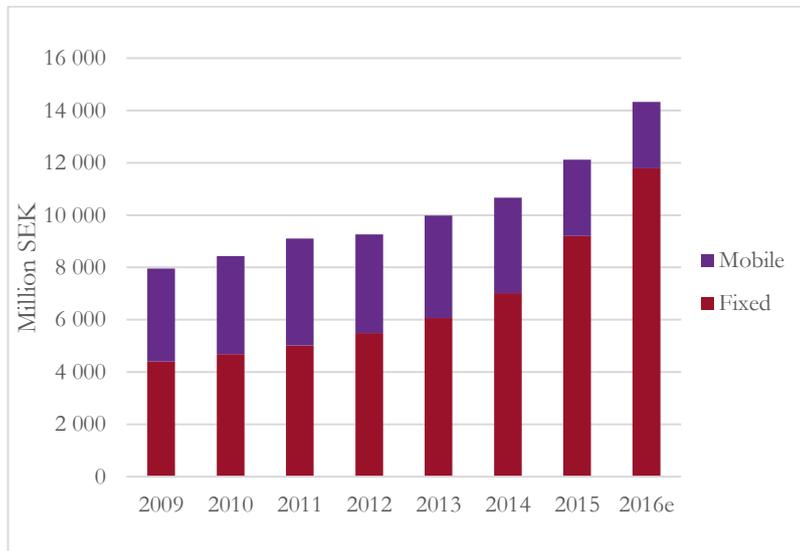


Source: Svensk Telekommarknad, PTS-ER-2017:10, figure 23

2.1.2 Investments

To meet the end users' demand for increased bandwidth, many market players make major investments in the roll-out of infrastructure. The chart below shows that in recent years, investments in fixed broadband infrastructure have increased, mainly as a result of the ongoing roll-out of fibre. Investments in mobile infrastructure have declined slightly over the years, partly due to the fact that the roll-out of 4G (LTE) has reached good geographic coverage and, in principle, a complete population coverage.

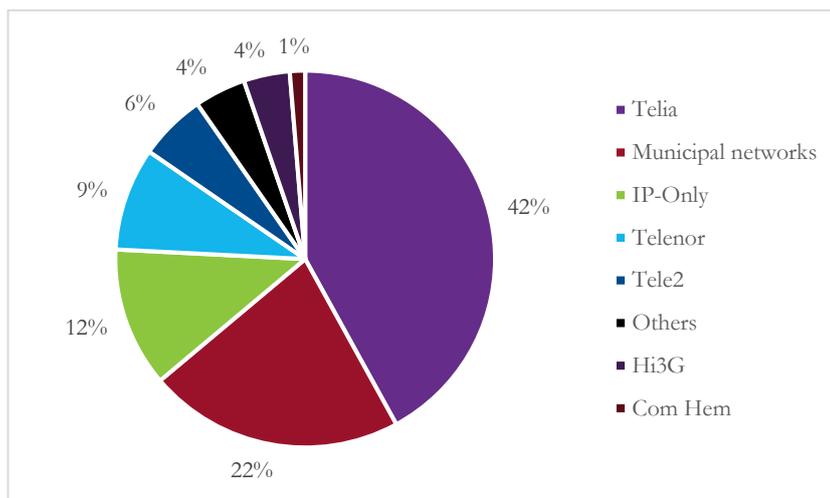
Figure 2 Investments in Fixed and Mobile Infrastructure



Source: PTS and annual reports from Internet Access Providers

In terms of total infrastructure investments per network owner, Telia is the operator that has made the largest investments. From the diagram below however, it is clear that several operators invest considerable amounts. Here the regional and local urban networks are prominent.

Figure 3 Investments in Fixed and Mobile Infrastructure per Network Owner 2016

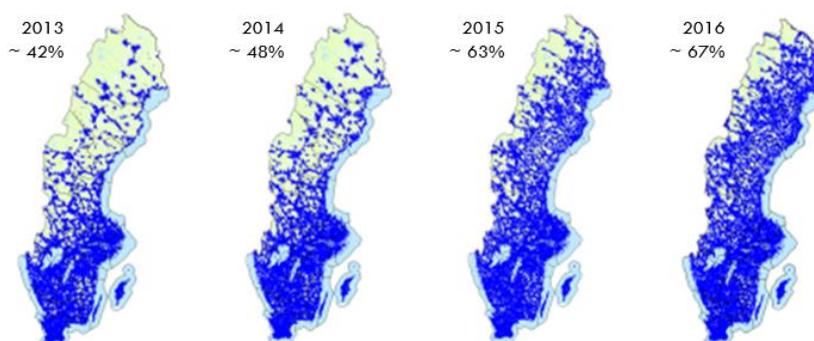


Source: PTS and the companies' annual reports. Investments in joint network companies are distributed according to ownership interests of the respective companies.

2.1.3 Technology

The roll-out of the latest technologies for both fixed and mobile broadband infrastructure (4G and fibre) is far advanced in Sweden. By 2016, Sweden had a 67 percent geographical coverage of 4G networks, allowing a 10 Mbit/s surf speed and, in principle, a full population coverage.

Figure 4 Geographic Coverage with 4G Network Allowing 10 Mbit/s



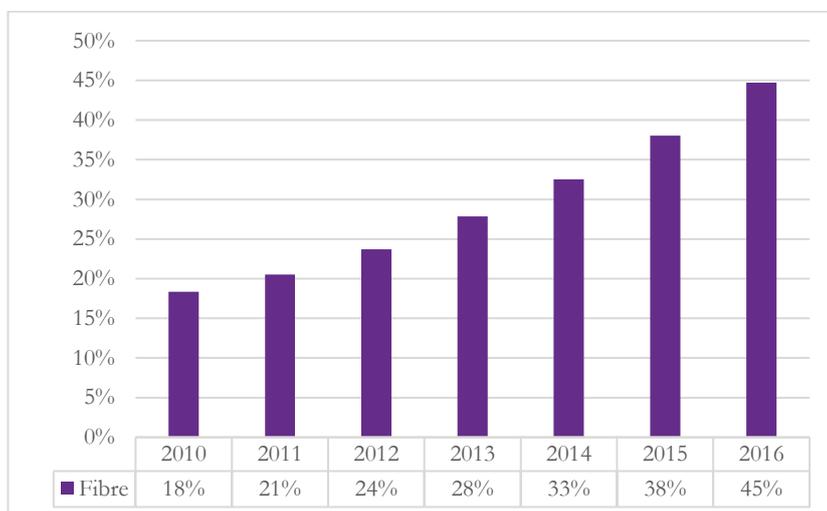
Source: Data from PTS mobile coverage- and broadband survey 2016, PTS-ER-2017:7

The number of fibre subscriptions has increased in recent years and today, 45 percent of all households in Sweden have broadband subscriptions via fibre.

About 70 percent of households in multi dwelling units have the possibility to obtain broadband via fibre. In multi dwelling units that have access to fibre, 50 per cent also have access to cable TV. In the multi dwelling units that do not have access to fibre, about 45 percent have access to broadband via cable TV networks. In other words, fibre and cable TV networks are both built in parallel in many of the multi dwelling units.

The demand for fibre to single dwelling units is high in Sweden and a large number of the households are willing to pay for getting fibre access in their houses. More than 30 percent of the single dwelling units have broadband subscriptions via fibre.

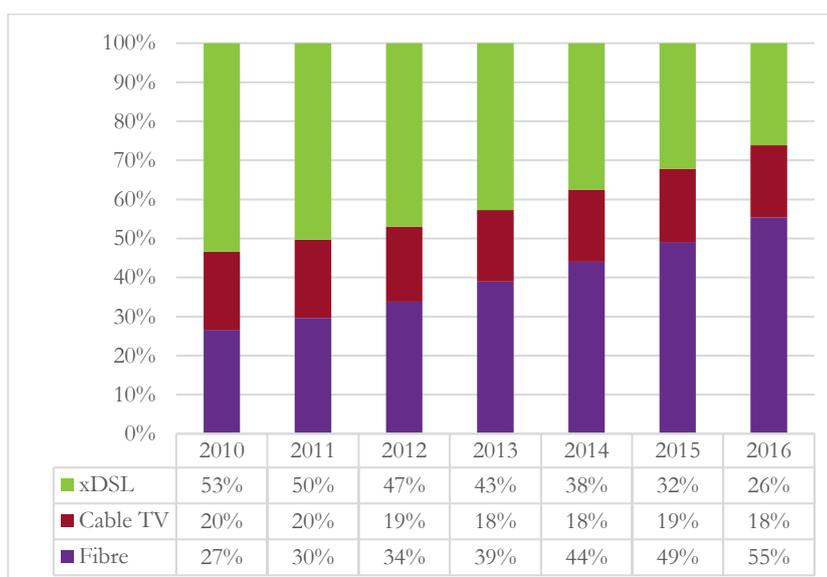
Figure 5 Households with Broadband Subscription via Fibre



Source: Data from Svensk Telekommarknad, PTS-ER-2017:10

Fibre connections accounted for 55 percent of the total fixed broadband subscriptions in 2016, thus dominating the fixed broadband market. The trend is still that the share of fibre connections is growing, mainly at the expense of a reduced number of subscriptions via xDSL. The number of subscriptions via cable TV has been relatively constant in recent years.

Figure 6 Share of Fixed Broadband Subscriptions per Technology



Source: Data from Svensk Telekommarknad, PTS-ER-2017:10

2.2 Offers in the Swedish Market

In the Swedish market for fixed broadband services, the operators provide various bandwidth offers. Subscriptions on fixed broadband is often bundled with other services. Bundling means that the subscription contains multiple services included in the same offer or with a common price list², e.g. double-, triple- or quadruple play.

The most common bundle for double play is fixed telephony and fixed broadband, which accounts for 36 percent of the total number of bundled subscriptions. Bundling of TV and fixed broadband is the third most common bundle. The second most common bundle is triple play with fixed telephony, fixed broadband and TV.³ It is common for operators to offer mobile broadband services including SMS, MMS and voice calls as well as the cost of terminal equipment. End users can often choose between various volume packages, with corresponding price for combinations of the bundled services.

Data usage is increasing in the market. To meet the increased demand for bandwidth, some of the operators in the Swedish market for mobile broadband subscriptions have chosen to increase the amount of data volume included in the subscription. Telenor and Tele2 have chosen to offer unlimited mobile data⁴ while Telia and Tre, offer mobile subscriptions where specific data traffic for selected services and applications is not counted against the data volume included in the agreement, so-called zero-rating.⁵ Zero-rating and Telia's and Tre's offers are described in more detail below in chapter 3.

² Svensk telekommarknad 2016, PTS-ER-2017:10, dnr 16-11655, s 61.

³ Svensk telekommarknad 2016, PTS-ER-2017:10, dnr 16-11655, s. 62.

⁴ Example Telenor website:

http://www.telenor.se/abonnemang/?gclid=CL_gr9quptQCFVGMGQodai4Avw&gclsrc=aw.ds

And Tele2's website:

<https://www.tele2.se/handla/mobilabonnemang?gclid=COfl4uvptQCFdqCsgod3m4Diw>

⁵ Telia's website: <https://www.telia.se/privat/telefoni/tjanster/produkt/fri-surf-social>

<https://www.telia.se/privat/telefoni/tjanster/produkt/fri-surf-lyssna>

and Tre's website: <https://www.tre.se/privat/kundservice/abonnemang-och-tjanster/musikstreaming/>

3 Supervision and Activities During the Reporting Period

3.1 Supervision According to Article 3

At present, Telia and Tre are the operators with zero-rating offers in the Swedish mobile market. Zero-rating is a contractual model, which means that the data usage of certain applications or services (selected by the operator) are not counted against the monthly contracted data volume included in the subscription for the internet access service. Business models with zero-rating offers are currently not provided for fixed internet access services. PTS has not found any reason to review any specific offer on the fixed broadband market during the reporting period.

PTS initiated the supervision of Telia's and Tre's zero-rating offers in May 2016. In August 2016, BEREC's net neutrality guidelines were adopted⁶. Although the guidelines are not legally binding they provide guidance for the regulatory authority's supervision in relation to the Regulation. PTS focused its supervision on the fact that Telia and Tre in their offers are allowing the continued use of specific data traffic even though the end user has consumed the agreed data volume.

3.1.1 Supervision According to Article 3.3 – Telia Company AB (Telia)

Telia launched two mobile offers on April 18, 2016, "Free surf on social media" (Social) and "Free surf listening" (Listen).

The subscribers of Social get "free surf" on a number of social media apps/services (Facebook, Instagram, Messenger, Whatsapp, Twitter and Kik). The subscriber may use the specified social media services without the data usage affecting the volume of data included in the subscriptions. Hence, the social media services included in Social are always available, even if the end user has consumed the amount of data included in the subscription. The offer was later supplemented with the apps/services Pinterest, Viber, LINE and Welcome App.⁷

With Listen the subscribers are able to stream selected services and applications for music, radio and audio books free of extra charge. Listen is an add-on service to two of Telia's mobile subscriptions offered. For 59 SEK per

⁶ BEREC Guidelines on the Implementation by National Regulators of European Net Neutrality Rules http://berec.europa.eu/eng/document_register/subject_matter/berec/regulatory_best_practices/guidelines/6160-berec-guidelines-on-the-implementation-by-national-regulators-of-european-net-neutrality-rules

⁷ Telia's website: <https://www.telia.se/privat/telefoni/frisurfsocial>

month the subscriber is free to stream up to 100 GB of music, radio or audio books included in Listen, without affecting the volume of data included in the subscription. The services included in Listen are always available, even though the subscriber has consumed the whole amount of data included in the subscription. The applications included in Listen are Spotify, Storytel, Sveriges Radio and Radio Play.⁸

In summary, PTS has concluded that Telia in connection with the two offers (Social and Listen) conducts traffic management measures in breach of article 3.3 of the Regulation. Telia was instructed by PTS to discontinue the traffic management in due course when the end user is still able to use the specified services and applications included in each of the offers, whilst other data usage is blocked.⁹

Telia appealed PTS' decision to the administrative court and called for the decision to be upheld, i.e. that the decision temporarily should not apply pending the ruling of the court. Telia was granted this request in the administrative court of appeal in March 2017. The administrative court has not settled the case yet. In this supervision case, PTS has not investigated any zero-rating aspects of the business models, nor if and to what extent they are consistent with article 3.2 of the Regulation.

3.1.2 Supervision According to Article 3.3 – Hi3G Access AB (Tre)

Tre launched a mobile offer on August 31, 2015, “Free surf music streaming”. In Free surf on music streaming the subscribers, regardless of subscription type (pre-paid excluded), can stream selected music applications up to 70 GB per month without it affecting the data volume according to the subscription. Since February 2017, the offer includes Tre's existing customers, consumers and business users, regardless whether the subscriber has a bundled offer or a standalone mobile broadband subscription. Currently, Spotify, Deezer, Tidal, Google Music, SoundCloud and Apple Music are the services included in the offer.¹⁰

Tre has informed PTS that the company intends to adjust its offer to comply with PTS's interpretation of the Regulation. Therefore, PTS has not notified a decision regarding Tre's traffic management measures within the offer “Free surf music streaming”. Tre has presented PTS with a timetable, outlining when

⁸ Telia's website: <https://www.telia.se/privat/telefoni/tjanster/produkt/fri-surf-lyssna>

⁹ PTS decision with ref.no. 16-5475 and 16-5476

¹⁰ Three's website: <https://www.tre.se/privat/kundservice/abonnemang-och-tjanster/musikstreaming/>

their adjustments will be completed, and PTS is continuously monitoring the process.¹¹

3.2 Supervision According to Article 4

In February 2017, PTS concluded a major supervision¹² regarding transparency and content in agreements between operators and consumers. The review comprised seven operators, both large and small, which together cover more than 90 percent of the market. The purpose of the supervision was to ensure operators' compliance with the regulation of PTS (PTSFS 2013:3) regarding content in agreements, based on chapter 5, section 15 in the Swedish Electronic Communications Act.

In the review the Authority examined, inter alia, that agreements between operators and consumers are designed to enable them to be saved and restored in their entirety and that the consumers were able to receive the agreements in legible form. Furthermore, it was verified that the agreements had an easy-to-read summary of the most important content of the agreement. In addition, it was verified that operators inform about any use of contractual terms that restrict the consumer's access to or the consumer's use of applications and services. Finally, a control was made on how the operators informed the consumers about any other restrictions that may apply.

The result of the supervision was overall satisfactory. Operators under review did not generally use contractual terms that restrict consumers' access to or use of applications and services. Consumers are generally informed by the operators about any restrictions in the terms of the agreement. However, the result was not as satisfactory regarding the existence of an easy-to-read summary of the main points of the agreement.

When the review was initiated, PTS based it on chapter 5 section 15 of the Swedish Electronic Communications Act with related regulations (PTSFS 2013:3) This regulation partially covers the same areas as article 4.1 of the Regulation. PTS therefore considers that the Authority has in fact reviewed certain areas included in article 4.1 of the Regulation.

During the autumn of 2016, PTS initiated an additional supervisory effort regarding information in agreements and information on prices, tariffs and general terms and conditions. This was based on complaints filed to the Authority. Nine operators were included in this supervision.

¹¹ PTS ref.no. 16-5477

¹² PTS ref.no.: 14-11855, 14-11856, 14-11857, 14-11858, 14-11859, 14-11860 and 14-11861

According to the Swedish Electronic Communications Act, an agreement between a consumer and the provider of a public communications network or publicly available electronic communications services shall contain clear, comprehensive and accessible information about the service provider, the services as well as the terms of the agreement. This means, inter alia, that the following information should be included in the agreement

1. Name and address of the operator
2. How the agreed service(s) are described in the agreement
3. Access to emergency calls and provision of location data
4. The lowest quality level offered
5. Normal transfer speed for sending and receiving data
6. Delivery time
7. Measures taken to measure and manage traffic in order to avoid traffic overload in the network and how the measures may affect the quality of service
8. Maintenance- and customer support services offered
9. Limitations on the use of terminal equipment that affect the consumer's use of the services and the possibilities and costs of changing such limitations
10. Subscriber's options in terms of entering their personal data in a subscriber list
11. Prices and tariffs as well as the basis for calculation that affects the total cost of the service(s) included in an agreement and how these are presented in a context that is equally clear
12. How payment can be made and the price difference between different methods of payment and how information about current rates and maintenance fees can be obtained
13. Term of the agreement
14. Conditions for renewal and termination of service
15. Conditions for renewal and termination of the agreement
16. What measures may be taken in case of security shortcomings
17. Terms of compensation if services are not provided according to the agreement
18. How a dispute settlement procedure for consumers out of court is initiated

Furthermore, it shall, according to chapter 5, section 17 of the Swedish Electronic Communications Act, be clear what type of information that is available related to current prices and tariffs and on the general terms and conditions for and use of the network or service.

The ongoing supervision of the nine operators concerns all of the above points and is therefore extensive. PTS expects to finalise the supervision during 2017. Since the USO directive (chapter 5 section 15 of the Swedish electronic communications Act) and the Regulation are both applicable and appear to apply in parallel, PTS found it relevant to describe this supervisory effort in this context.

3.3 Information Activities

In order to inform about the open internet Regulation, PTS has continuously updated its website with relevant information and published posts on the Authority's blog. PTS has also produced a pamphlet¹³ (How does the EU open internet rules concern you as an ISP?), which is primarily aimed at the smaller providers of internet access services who may not know that the Regulation exists and concerns them.

Furthermore, PTS representatives have had speaking engagements on the new Regulation at external seminars, including the Authority's market day gathering industry stakeholders.

Media attention on net neutrality, and specifically PTS' supervision, has been high and PTS has upheld a high availability to accommodate information requests.

3.4 Survey – Svensk Telekommarknad

In the last two years, PTS has in the survey Svensk Telekommarknad¹⁴ included questions on traffic management. Three questions were included on traffic management measures and specialised services in fixed and mobile networks. The questions were asked to the ten biggest operators covering around 90 percent of the market. For fixed networks the selection was based on the number of internet subscriptions and on traffic volume for services in mobile networks. The questions and the answers received are explained below.

Question 62: Have you applied traffic management measures during the period April 30 to December 31, 2016? Answer the question with yes or no in fixed and mobile broadband networks respectively.

¹³ http://pts.se/upload/Faktablad/SE/2017/Faktablad-oppet-internet-pts-f-2017_7.pdf

¹⁴ Svensk Telekommarknad is PTS' statistical report based on a survey conducted twice a year covering all notified operators.

	Fixed network (answered yes)	Mobile network (answered yes)	Comment
We take actions that can block certain content	4 of 10	3 of 10	Child porn filter
We take actions that can block certain users	1 of 10	1 of 10	Breach of contract
We take actions that can block certain services	2 of 10	2 of 10	Traffic class
We take actions that can slow down traffic related to certain content	1 of 10	1 of 10	Traffic class
We take actions that can slow down traffic related to certain services	1 of 10	1 of 10	Traffic class
We take actions that can slow down traffic related to certain users	1 of 10	1 of 10	Traffic class
We take actions that prioritize certain content	1 of 10	1 of 10	Traffic class
We take actions that prioritize certain users	1 of 10	1 of 10	
We take actions that prioritize certain services	4 of 10	0 of 10	
We take actions that prioritize certain services of which Specialized services	5 of 10	1 of 10	IPTV
We take actions that prioritize certain services of which other services	4 of 10	1 of 10	VOIP
We take no traffic management actions	1 of 10	0 of 10	

Generally, none of the responses gave a direct rise to suspicion of infringement of the Regulation regarding article 3.3 (traffic management) and article 3.5 (services optimised for certain quality, specialised services). Several operators state that they voluntarily use the National Police Board’s barring list, also known as the child pornography filter to block such content. One operator indicates that they apply certain traffic management measures with respect to different traffic classes. About half of the operators respond that they offer services optimised for specific content such as IPTV and in some cases IP telephony. The prerequisites for providing services that are not internet access services but which are optimised for specific content are governed by article 3.5 of the Regulation.

Question 63: What are the traffic management measures aimed at? (Multiple choices possible). Answer the question with yes or no in fixed and mobile broadband networks respectively. I “Yes” please elaborate.

	Fixed network (answered yes)	Mobile network (answered yes)	Comment
Specific services (e.g. Skype, Netflix, Spotify)	0 of 10	1 of 10	Zero rating
Specific content (e.g. web sites with certain content)	3 of 10	3 of 10	Child porn filter
Specific protocols (e.g. SMTP, HTTP, P2P)	2 of 10	2 of 10	
Specific users or receivers (e.g. business)	0 of 10	0 of 10	
Prioritizing voice over e.g. data	5 of 10	1 of 10	IPTV and VOIP

The operators' responses to question 63 show that the majority of them prioritise voice services over general data traffic in fixed networks. Several operators also indicate that they target traffic management measures against illegal content and specific protocols such as Simple Mail Transfer Protocol (SMTP) and Domain Name System (DNS). None of the operators indicate that they give priority to corporate customers over private consumers in their networks.

Question 64: What are the purposes of your traffic management? Answer the options below with yes or no in fixed and mobile broadband networks respectively. If "Yes" please elaborate.

	Fixed network (answered yes)	Mobile network (answered yes)	Comment
Security reasons	3 of 10	1 of 10	DDOS
Integrity reasons	1 of 10	1 of 10	
Enhanced quality of experience	5 of 10	1 of 10	IPTV and VOIP
Commercial reasons	0 of 10	0 of 10	
Other, please comment	1 of 10	2 of 10	Child porn filter

Operators' responses to question 64 indicate that improved customer experience is the most common reason to apply traffic management measures. Furthermore, there are security reasons such as protection against attacks, Distributed Denial of Service attack (DDOS) as well as integrity reasons. None of the operators indicate commercial purposes being the reason for the applied traffic management measures. Generally, there are no responses that give direct reason to suspect infringements of the Regulation related to article 3.3 (traffic management) and article 3.5 (specialised services).

3.5 Measurements – Internet Access Services

At present, PTS does not conduct any measurements of the performance of internet access services but the Authority uses measurements¹⁵ made by consumers via a third party service called Bredbandskollen¹⁶. Bredbandskollen is a tool, free of charge that helps customers to evaluate the speed of their broadband connection. Bredbandskollen measures the speed at which the user's phone (app in iPhone or Android) or computer (web browser) can send and receive data. The measurement is made to the geographically closest national focal point (IXP) run by Netnod. Bredbandskollen also measures latency

Measurements via Bredbandskollen have been available for several years, which means that relatively many consumers in Sweden are aware of the possibility to measure the speed of their internet access service. Bredbandskollen's web tool for fixed networks was launched in October 2007 and for the mobile networks an iPhone app was launched at the end of 2008 and for Android in February 2011.

In February 2017, some 193 million measurements had been made in the fixed network since the launch of the tool and approximately 16 million measurements are made annually. In 2015 more than 3.3 million measurements were made via the mobile network. Today three out of four measurements with Bredbandskollen's app on the mobile network are made via 4G networks.

3.5.1 Development of the Average Up- and Download Speed

The average download speed across all technologies (fibre, cable TV, 3G/4G and xDSL) in Sweden was 59 Mbit/s in 2016 and the corresponding average upload speed was 35 Mbit/s. The average up- and download speed over fixed broadband has increased in all counties in Sweden since 2013. The tables below show the average speed per technology (Mbit/s) of the measurements made with Bredbandskollen.

¹⁵ All measurements in this paragraph refer to measurements made with Bredbandskollen. The values represents measurements made by consumers and the results are therefore based on their individual connection which subscription they hold. The measurements are therefore not representative for the population of Sweden as a whole.

¹⁶ Bredbandskollen is a tool free of charge helping internet users to evaluate their internet access service either via a mobile phone or a computer.

Table 1 Average Upload Speed (Mbit/s) per Technology

Technology	2008	2009	2010	2011	2012	2013	2014	2015	2016
Mobile	1	1	1	1	3	5	7	10	9
xDSL	1	1	1	1	2	2	2	3	3
Cable TV	2	4	4	6	7	9	14	16	16
Fiber	17	21	22	23	24	30	39	44	56
Total	5	6	6	6	9	14	22	29	35

Source: Bredbandskollen, Surf hastighet i Sverige 2008-2016, diagram O3-3

Table 2 Average Download Speed (Mbit/s) per Technology

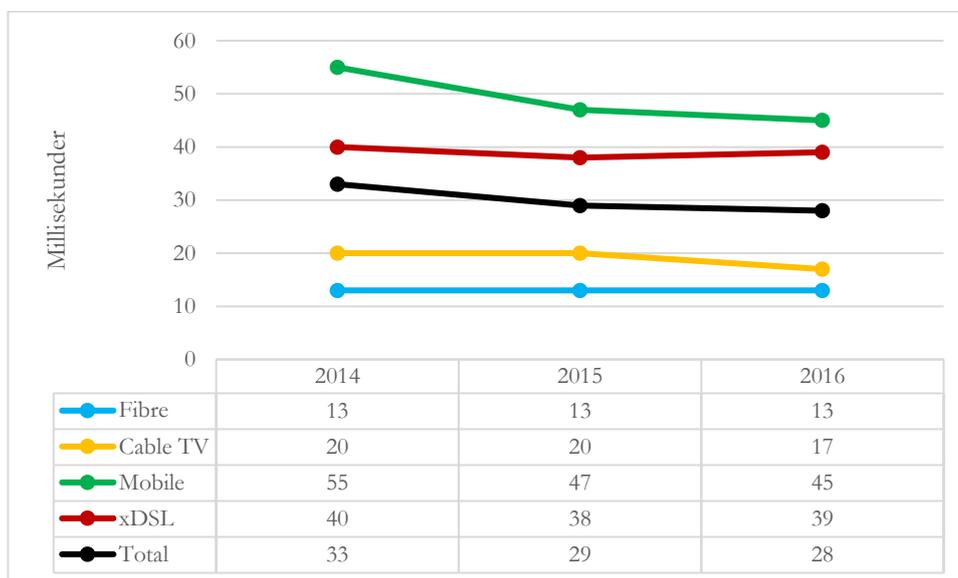
Technology	2008	2009	2010	2011	2012	2013	2014	2015	2016
Mobile	2	3	4	5	9	12	16	19	17
xDSL	8	9	9	9	10	11	12	13	14
Cable TV	12	21	26	38	39	49	69	84	94
Fiber	35	43	46	47	50	57	71	76	86
Total	12	15	17	17	21	29	44	53	59

Source: Bredbandskollen, Surf hastighet i Sverige 2008-2016, diagram O3-2

3.5.2 Latency

According to Bredbandskollen, latency is defined as how long it takes for a data packet to move from one computer to the receiver and back again. Latency differ depending on the technology used. Fibre connections have shorter latency while the mobile networks have the longest. With regard to measurements made over fibre the average latency is 13 milliseconds. Fibre subscriptions with a capacity of 500-1000 Mbit/s, however, have an average latency of just below 11 milliseconds.

Figure 7 Average Latency per Technology



Source: Bredbandskollen, Surf hastighet i Sverige 2008-2016, diagram O7-1

3.6 Complaints

Since the Regulation became effective PTS has received complaints from consumers, industry players and other stakeholders.

A large number of the complaints have been related to the zero-rating offers in the mobile market, especially Telia’s “Free surf social media” but also Tre’s “Free music streaming”. A handful of the complaints have come from industry players, where the majority highlight the need for stricter regulation, especially related to commercial practices.

Complaints from consumers (April 2016 – April 2017) 369

Complaints from industry players (April 2016 – April 2017) 5

Generally, the complaints are different compared to each other. The majority of the complaints are focused on application of the Regulation and commercial practices in more general terms. At the same time, there is a small group of users with specific IP solutions that address PTS because they believe there is a reason to assume infringement of the Regulation.

In addition to complaints from consumers and industry players, PTS has received hundreds of complaints from the “Save the internet” group, which consists of different types of stakeholders in the net neutrality area. These complaints have focused in particular on the preparation of BEREC guidelines with specific focus on the rules regulating commercial practices. In particular, a wish for stricter zero-rating regulation have been proposed.

3.7 PTS’ Work in BEREC

PTS has representatives that work actively and collaborate with other EU regulatory authorities within BEREC. Representatives from PTS participated in the preparation of BEREC’s net neutrality guidelines which were adopted in August 2016. Furthermore, the Authority is also engaged in BEREC’s working groups in the field of net neutrality in order to fulfil the established BEREC working program.

4 Activities after April 30, 2017

Below the Authority briefly describes the activities that are ongoing after the reporting period ending April 30, 2017.

4.1 Supervision According to Article 3

During May 2017, PTS initiated another review of Telia's offer for "Free surf social media". The supervision is related to PTS' responsibility of monitoring the open internet rules as set out in the Regulation. At this stage, focus lies on getting a better understanding of how Telia selects service providers included in the zero-rating offer, and how and if the offer affects the end users' choice and use of services and applications on internet.

During May 2017, PTS also initiated supervision of providers of internet access services and their traffic management practices as well as provision of services optimised for specific content or quality, specialised services. The aim is to obtain information on the scope and purpose of such provisions. PTS collects information from a selection of providers covering around 90 percent of the market.

4.2 Measurement Tool

PTS has so far not developed or contracted its own measurement tool for monitoring the compliance with the provisions of the Regulation. On the other hand, the Authority follows and observes the work of BEREC in relation to development of a measurement tool. In addition, PTS is in contact with suppliers regarding the possibility of developing or contracting a suitable measurement tool. A final decision on the most suitable solution has not yet been taken.

4.3 Review of the Existing Regulation and Instructions

PTS is currently reviewing its own regulation and instruction of content and agreement in order for it to be in line with the Regulation and to avoid overlaps.

5 Summary and Findings

5.1 Introduction

Essentially, operators active on the retail markets for internet access services are acting in a competitive environment. The fixed and mobile markets have different characteristics. The fixed market is more geographically fragmented with hundreds of network owners whilst the mobile market is characterized by a few larger network owners with a national geographic footprint.

PTS considers that a competitive market for internet access services reduces the risk of operators engaging in activities that would infringe the Regulation. However, that is assuming that the end user actually have the possibility to choose between different providers of internet access services. Therefore, there is a greater risk that a single vertically integrated provider may restrict end users' access to an open internet, compared to a situation with more providers present on the market.

On the mobile market, the four major network owners have chosen slightly different strategies in terms of designing their offers. Telia and Tre are currently providing offers including zero-rated services and applications while Tele2 and Telenor are both promoting offers including unlimited data. In the fixed market, offers are more homogeneous and are focused on the price for specific up- and download speeds without data cap.

5.2 Reporting Period 2016/2017

The first year of the Regulation has been characterised by BEREC's adoption of the guidelines which attracted great interest among both industry players and various associations when consulted in the summer of 2016. PTS focus has also been on the supervision initiated in May 2016 concerning the three zero-rating offers currently available in the Swedish market, as previously described in this report.

PTS' first supervision concerned a limited part of Telia's and Tre's offers where PTS focused on the traffic management applied by the operators when the end user has consumed the data volume included in the subscription, but still can use the zero-rated applications while access to other applications or web-sites is blocked. Following Telia's appeal against PTS injunction, the case is now pending in court and when settled, this case should provide more clarity on how the Regulation ought to be interpreted.

With regards to the media attention, PTS would like to point out that the media often have depicted that PTS has tried to ban the zero-rating offers as

such, which is not the case. In the voluntary adjustment adopted by Tre, end users are still able to, within the data cap, use the zero-rated applications without this traffic being deducted from the agreed data volume. When the data cap is reached, the differential treatment of traffic, which was the subject of PTS' supervision, is no longer applied.

The Regulation comprises provisions, article 3.2, which allows authorities to investigate and prohibit a particular commercial practice, or offer, where and if it limits the end users' rights to access and distribute information and content via their internet access service, to use and provide applications and services and to use terminal equipment of their choice. PTS has thus not assessed Telia's and Tre's offers on the basis of these provisions.

5.3 Conclusions and Outlook

Given the short period of time the Regulation has been effective, it is not fair to draw any far-reaching conclusions about the effects of it. Still, PTS has made some observations while monitoring the provisions of the Regulation.

As described above, the internet access offers differ depending on whether provided on the fixed or mobile markets. In late spring of 2017, mobile operators' adaption to the new rules for international roaming within the EU has further contributed to the diversification of the mobile offers provided.

A competitive market is characterised, among other things, by the fact that different providers compete with different types of offers. This is generally positive for end-users and increases the possibility for them to shop around and compare offers. PTS will continue monitoring the market in order to identify any changes that would risk a negative development for the end-users.

One example of a market development that the Regulation aims counteracting is that internet subscriptions increasingly are offered with the use of selected services and applications promoted, while the proportion of 'pure' internet subscriptions without corresponding packages or bundles becomes less common. That is, if it becomes more difficult for the end user to choose freely from online content services. If the offers are open to all service and application providers or just to a few or even only to the operator's own services, is also an important development to monitor and evaluate. In this context, it would be important to assess the operators' market power, for example defined as market shares, in the assessment of potential consumer harm.

In the mobile networks, the end users of one operator share the limited capacity of the nearest base station. This may incentivise the provider of the internet access service to limit or restrict the connection in order to manage or limit data volumes. Given that the capacity for simultaneous use is limited in all mobile networks – while operators often share capacity through network sharing – there is a potential risk of different types of data constraints by several operators.

When it comes to fixed networks, the biggest risk, from a net neutrality perspective, arise when end users only have access to a single internet access provider. This holds particularly true in cases where a vertically integrated player would like to favour its own services. A counteracting trend in this case is that the incentives for restrictions, or even unauthorized traffic management, should decrease as more end users demand, and have access to high-capacity internet connections.

PTS monitoring of the market continues and, as mentioned in the report, the Authority has in May 2017 initiated further supervision. So far, PTS has focused the activities on events in the mobile networks, but PTS has also received indications that end users' experience restrictions in the fixed networks that could be covered by the rules of the Regulation. Furthermore, PTS will also continue to carry out surveys and collect data to monitor market developments and the evaluation of whether PTS needs a measurement tool, and if so, how to design it will also continue.

Finally, PTS may note that while the attention of the Authority's supervision has periodically been intense, the overall end user knowledge and understanding of the concept of net neutrality remains relatively low. PTS therefore intends to continue improving awareness through information efforts and by acting transparently when monitoring the Regulation.