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# REPORT

## The Net Neutrality Situation in the EU

Evaluation of the First Two  
Years of Enforcement



VIENNA / 29.01.2019

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Evaluation of the First Two  
Years of Enforcement

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## Introduction and Summary

This report offers an analysis of the past two and a half years of net neutrality enforcement in the European Union. We examine the current situation on the telecom market in Europe with a particular focus on differential pricing practices (e.g. zero-rating). This report aims at informing the debate on the ongoing reform of Europe's net neutrality framework in light of the new mobile network standard 5G. Our analysis is based on several data sets, which we release in conjunction with this report. We hope to contribute with this report to a factual and evidence-based policy making process in the upcoming reform.

We base our analysis on a complete survey of differential pricing practices (DPP) in the European Economic Area (EEA). We have analysed data on all zero-rating and application-specific data volume offerings and release the full data set of the survey with this report. These types of commercial practices are characterised by Internet Access Service (IAS) providers giving preferential treatment to certain internet services or applications by not counting them towards the general data volume afforded to their internet subscribers as part of their contract. During the first two and a half years of the European net neutrality rules being in force, this practice has spread in all but two EU countries. In our report we demonstrate the systematic refrain of regulators to intervene against or even formally assess these practices.

Using our data, we can show how these commercial practices have a negative impact on the digital single market by hindering the provision of services from one European country into another. We present evidence how large internet companies from the USA are favoured by these commercial practices by telecom companies. Secondly, we highlight the privacy implications of these practices in providing evidence on how they rely on privacy-intrusive detection methods that monitor user behaviour and make use of deep packet inspection technology. Finally, we also release economic analysis assessing the impact of practices like zero-rating on the price of mobile data volumes in a country. This analysis shows that zero-rating coincides with a more negative development of the price of mobile data volume in a country.

The implementation of the European net neutrality regulation lacks a harmonised approach. Even on comparatively simple questions such as port blocking, national regulatory authorities have divergent interpretations of the same EU-wide ruleset. This report also evaluates the annual reporting obligations of national regulators and shows how national telecom regulatory authorities (NRAs) refrain from publishing reports or do not follow the minimal requirements issued by the European umbrella of telecom regulators (BEREC) to provide at least a minimum level of transparency and comparability across Europe.

One of the most important provisions of Europe's net neutrality framework are the transparency obligations towards consumers that are meant to ensure that internet speeds that telecom operators promise can be assessed by consumers against their real-world experience. Sadly, the requirement to clearly state minimum, average and maximum speeds in every contract for a fixed line internet connection is mostly ignored by the telecom industry and telecom regulators. We examine the status quo and offer a path forward.

Additionally, this report offers orientation on the questions regulators have to answer concerning the issues arising from the introduction of 5G. We examine the technological components of the

upcoming mobile network standard and offer guidance on the pitfalls that might be posed to the principle and effective regulation of net neutrality. We see it as a vital precondition for the ongoing reform of Europe's net neutrality framework to distinguish between the technical standards and capabilities of 5G and the wishes of the regulatory and marketing departments in the telecom industry.

Contrary to other European regulations like the General Data Protection Regulation (GDPR), the regulation which establishes Europe's net neutrality framework leaves the implementation of penalty provisions up to member states. This has led to a situation where some member states have not laid down rules for violations of net neutrality protections two years after the regulation entered into force. This report analyses the national laws to highlight their variance, ranging from eight to four digit euro amounts, and how some member states not complying with EU law and not introducing penalties has led to a situation where the largest telecom companies in Europe can choose not to comply with the law because it is financially advantageous for them.

Finally, we will also take a closer look at the issue of network measurement software and demonstrate how this issue is a central component in ensuring the continued availability of high-quality internet and the detection of net neutrality violations.

This report is accompanied by the following open data releases:

<b>Data Set</b>	<b>Methodology</b>	<b>Data</b>
Annual reports of NRAs	Annex 1	Annex 1
Penalty provisions for net neutrality violations	Annex 2	<a href="https://epicenter.works/document/1255">https://epicenter.works/document/1255</a>
Survey of all differential pricing offers in the EEA	Annex 3	<a href="https://epicenter.works/document/1521">https://epicenter.works/document/1521</a>
Mapping of applications to CAPs & countries	Annex 3	<a href="https://epicenter.works/document/1521">https://epicenter.works/document/1521</a>

# The Current Net Neutrality Situation in the EU

The principle of net neutrality is enshrined in the European Union in *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*, which went into effect on 30 April 2016 (hereafter “the Regulation”)<sup>1</sup>. As an EU Regulation, it requires no transposition into national law and enjoys primacy in application over national laws. It applies equally in all 28 EU member states and the three states of the European Economic Area (EEA) (Norway, Iceland and Liechtenstein). The national regulatory authorities (NRAs) and other competent authorities are tasked with the enforcement and supervision of this law.

The Regulation contains a review clause by which the European Commission has to provide an evaluation report of the net neutrality provisions of the Regulation by 30 April 2019. To prepare this review, the Commission has tasked the law firm Bird & Bird, in consortium with the research and consultancy company Ecorys, to conduct a review based on interviews among various stakeholders from NRAs, the telecom industry, content and application providers (CAPs), and consumer protection as well as civil society organisations<sup>2</sup>. In an open letter, several organisations have expressed concerns about a conflict of interest, as Bird & Bird is representing telecom companies in court cases brought by regulators and civil society which are based on the same regulation Bird & Bird now tasked with collecting information from these stakeholders on<sup>3</sup>.

The Regulation mandates the Body of European Regulators for Electronic Communication (BEREC) to lay down guidelines on the implementation of the net neutrality provisions of the Regulation by NRAs (hereafter “the Guidelines”)<sup>4</sup>. Although the Guidelines are not legally binding, NRAs have to take the “utmost account” of them in performing their supervision and enforcement duties according to Article 5 of the Regulation. The text of the Regulation represents a political compromise and leaves certain central questions of the net neutrality regime up for interpretation. Therefore, with the lack of case law of the Court of Justice of the European Union (CJEU), the Guidelines are the authoritative document on the effective net neutrality protections in Europe. Based on past experience, we observe that the enforcement is harmonised where the Guidelines offer clear, bright-line rules, and that in cases where the Guidelines are open for interpretation, the enforcement diverges between member states<sup>5</sup>.

On 30 August 2018, the first version of the Guidelines was adopted by BEREC which has been in effect since. According to the BEREC Draft Work Programme 2019, the Guidelines will be reformed by BEREC's net neutrality working group and for a public consultation will be conducted between October and December 2019.

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1 Regulation (EU) 2015/2120 of the European Parliament and of the Council of 25 November 2015 laying down measures concerning open internet access (2015)

2 <https://etendering.ted.europa.eu/cft/cft-display.html?cftId=2319>

3 <https://epicenter.works/document/1285>

4 BEREC Guidelines on the Implementation by National Regulators of European Net Neutrality Rules. BEREC report BoR(16) 127, August 2016

5 See chapter on port blocking

## Annual reporting

According to Article 5(1) of the Regulation, NRAs are obliged to publish annual reports on their monitoring and findings regarding the implementation of the Regulation's net neutrality provisions. Since the Regulation has come into effect, two such reports would have to have been published by all 31 NRAs from those countries where the Regulation applies. We provide a complete overview of these reports and their translations, where they exist, in Annex 1.

Liechtenstein has never published a report and responded to our inquiry to the responsible Office of Communication stating that according to statements from IAS providers in Liechtenstein, net neutrality is not an issue. Iceland has published a report in 2017, but failed to do so in 2018.

Eight NRAs have published their reports in both years, but only in the national language, without an English-language translation (DK, FI, GR, IT, LV, LU, SI, ES). Hungary and Portugal have translated their reports in 2017, but stopped doing so in 2018. Five NRAs have started to translate their reports into English in 2018 (AT, BE, CZ, PL, NL). Seven countries publish their reports only in the English language (CY, EE, IE, LT, MT, RO, UK). Seven NRAs have published their reports in both years in their national as well as the English language (BG, DE, FR, HR, NO, SK, SE).

Country	NRA	Report 2017		Report 2018	
		Native	English	Native	English
Austria	RTR	Exists	Non-existent	Exists	Exists
Belgium	IBPT / BIPT	Exists	Non-existent	Exists	Exists
Bulgaria	CRC	Exists	Exists	Exists	Exists
Croatia	HAKOM	Exists	Exists	Exists	Exists
Cyprus	OCECPR	Non-existent	Exists	Non-existent	Exists
Czech Republic	CTU	Non-existent	Exists	Exists	Exists
Denmark	DBA	Exists	Non-existent	Exists	Non-existent
Estonia	ETRA	Non-existent	Exists	Non-existent	Exists
Finland	FICORA	Exists	Non-existent	Exists	Non-existent
France	ARCEP	Exists	Exists	Exists	Exists
Germany	BNetzA	Exists	Exists	Exists	Exists
Greece	EETT	Exists	Non-existent	Exists	Non-existent
Hungary	NMHH	Exists	Exists	Exists	Non-existent
Iceland	PTA	Exists	Non-existent	Non-existent	Non-existent
Ireland	COMREG	Exists		Exists	
Italy	AGCOM	Exists	Non-existent	Exists	Non-existent
Latvia	SPRK	Exists	Non-existent	Exists	Non-existent
Liechtenstein	AK	Non-existent	Non-existent	Non-existent	Non-existent
Lithuania	RRT	Non-existent	Exists	Non-existent	Exists
Luxembourg	ILR	Exists	Non-existent	Exists	Non-existent
Malta	MCA	Exists		Exists	
Norway	Nkom	Exists	Exists	Exists	Exists
Poland	UKE	Exists	Non-existent	Exists	Exists

Country	NRA	Report 2017		Report 2018	
		Native	English	Native	English
Portugal	ANACOM	Non-existent	Exists	Exists	Non-existent
Romania	ANCOM	Non-existent	Exists	Non-existent	Exists
Slovak Republic	RÚ	Exists	Exists	Exists	Exists
Slovenia	AKOS	Exists	Non-existent	Exists	Non-existent
Spain	CNMC	Exists	Non-existent	Exists	Non-existent
Sweden	PTS	Exists	Exists	Exists	Exists
The Netherlands	ACM	Exists	Non-existent	Exists	Exists
United Kingdom	OFCOM	Exists		Exists	

Some of these reports offer genuine insights into the supervision and enforcement activities of the NRA. They provide detailed numbers and reasoning on concrete cases, results of surveys conducted or technical measurements, statistics on the development of the internet quality in a country and of the organisational changes the regulator has undergone to comply with the new EU regulation. Other reports are unequivocal statements of inactivity, with almost no differences in content between the years. Such reports reflect an understanding of enforcement where reporting the results of a survey on how compliant with the Regulation IAS providers see themselves is satisfactory; they offer no concrete numbers on cases or reasoning behind them, no results of surveys or technical measurements are provided, or any of such efforts mentioned, and most crucially no statistics on the development of internet quality are provided. The majority of reports lie in between those two extremes, but unfortunately only very few firmly reside in the former category.

BEREC has laid down criteria detailing the reporting obligations of NRAs in paragraph 183 of the Guidelines, which would satisfy interested parties and allow comparability:

*“As well as being published, the reports should be provided to the Commission and to BEREC. To enable the Commission and BEREC to more easily compare the reports, BEREC recommends that NRAs include at least the following sections in their annual reports:*

- overall description of the national situation regarding compliance with the Regulation;*
- description of the monitoring activities carried out by the NRA;*
- the number and types of complaints and infringements related to the Regulation;*
- main results of surveys conducted in relation to supervising and enforcing the Regulation;*
- main results and values retrieved from technical measurements and evaluations conducted in relation to supervising and enforcing the Regulation;*
- an assessment of the continued availability of non-discriminatory IAS at levels of quality that reflect advances in technology;*
- measures adopted/applied by NRAs pursuant to Article 5(1).”*

In the following we assess the quality of the annual reports according to BERECs standards. In order to ensure comparability, we only evaluated English-language reports. A report is considered compliant according to BEREC’s central criteria if all seven information categories listed in paragraph 183 of the Guidelines are present. When a report is not compliant, but no more than two sections are missing or incomplete, the table below will display it as “Almost” and list the missing sections with the following codes:

- the number and types of complaints and infringements related to the Regulation (**D**),
- main results and values retrieved from technical measurements and evaluations conducted in relation to supervising and enforcing the Regulation (**T**),
- an assessment of the continued availability of non-discriminatory IAS at levels of quality that reflect advances in technology (**C**),
- or only provide incomplete information in several categories (**U**).

Secondly, reports can distinguish themselves as particularly ambitious in verbosity, creativity or providing additional value to the net neutrality discussion. A report can be non-compliant, but extremely ambitious, like the report of French NRA ARCEP which is extremely insightful and reflects a long track record in shaping the net neutrality debate, but lacks the relevant information according to paragraph 183.

The more an NRA undertakes to fulfil its enforcement duties, the more it has to report. For example, if an NRA limits their activities to an online research of IAS offers and occasional meetings with IAS providers without launching any enforcement cases, the report will contain less information compared to an NRA conducting surveys, technical measurements to test for unreasonable traffic management practices, or providing such measurement software to citizens. Therefore, the number of pages of a report is included as a third metric. The results of the evaluation can be found in the following table:

Country	NRA	English Report 2017			English Report 2018		
		Compliant	Ambitious	Pages	Compliant	Ambitious	Pages
Austria	RTR	Non-existent			Yes	Yes	46
Belgium	IBPT / BIPT	Non-existent			Almost (TC)	Yes	24
Bulgaria	CRC	No	No	4	No	No	10
Croatia	HAKOM	No	No	11	No	No	11
Cyprus	OCECPR	Almost (C)	No	11	Almost (C)	No	9
Czech Republic	CTU	No	No	14	Almost (C)	No?	0
Denmark	DBA	Non-existent			Non-existent		
Estonia	ETRA	No	No	9	Almost (UD)	No	11
Finland	FICORA	Non-existent			Non-existent		
France	ARCEP	No	Yes	87	No	Yes	93
Germany	BNetzA	Almost (C)	No	22	Almost (C)	No	31
Greece	EETT	Non-existent			Non-existent		
Hungary	NMHH	Yes	Yes	23	Non-existent		
Iceland	PTA	Non-existent			Non-existent		
Ireland	COMREG	No	Yes	13	No	Yes	14
Italy	AGCOM	Non-existent			Non-existent		
Latvia	SPRK	Non-existent			Non-existent		
Luxembourg	AK	Non-existent			Non-existent		
Lithuania	RRT	Almost (UC)	No	5	Almost (UC)	No	7
Luxembourg	ILR	Non-existent			Non-existent		
Malta	MCA	No	No	13	No	No	16

Country	NRA	English Report 2017			English Report 2018		
		Compliant	Ambitious	Pages	Compliant	Ambitious	Pages
Norway	Nkom	Yes	Yes	11	Yes	Yes	17
Poland	UKE	Non-existent			Almost (D)	No	21
Portugal	ANACOM	Yes	No	46	Non-existent		
Romania	ANCOM	Almost (D)	No	16	Yes	No	16
Slovak Republic	RÚ	Almost (TC)	No	17	Yes	No	24
Slovenia	AKOS	Non-existent			Non-existent		
Spain	CNMC	Non-existent			Non-existent		
Sweden	PTS	Yes	Yes	26	Yes	Yes	19
The Netherlands	ACM	Non-existent			No	No	4
United Kingdom	OFCOM	Yes	No	21	Yes	Yes	25

However, the above table does not adequately reflect the means by which NRAs undertake their enforcement activities. According to the reports, some NRAs limit their enforcement efforts to questioning IAS providers as to their compliance with the Regulation and thereby effectively trusting the companies they should oversee, Bulgaria being one example. Sometimes, large numbers of end-user complaints on the non-conformity of products of one IAS provider are seen as resolved when the IAS provider reports that the customer complaints were deal with, and the NRA does not provide details on the underlying problems, remedies taken, average length of the dispute resolution process or exchanges between involved parties, Cyprus being one example. In contrast, other NRAs are exemplary in their level of activity and transparency. Their reports showcase real engagement with all stakeholders; these NRAs count experts for net neutrality cases among their staff, generally provide independent oversight of incumbent market participants and strongly engage in international cooperation; Norway, Hungary, and Austria being examples.

Worryingly, the criteria most often missing among the examined reports is information about the continued availability of IAS at adequate quality levels. This information could consist of analyses of the development of averages of upload and download speeds via particular access technologies or via fixed and mobile networks. The development of jitter or packet loss might also be valuable indicators. These indicators are important because they act as an early warning system for quality deterioration or standstill, indicating a failure of IAS providers to meet increasing network capacity demands.

The BEREC Guidelines derive the obligation to report on the continued availability of IAS at adequate quality level both from Article 5(1), obliging NRAs to promote the continued availability of such IAS, and from requirements that follow from Article 3(5) of the Regulation, which mandates that the provision of specialised services shall not be to the detriment of the availability or general quality of internet access services. An impairment of the availability or quality of IAS can only be assessed if historical network performance data is known to the NRA. Particularly as it is to expected that a large number of specialised services are introduced to the market with the advent of 5G, collecting information on the existing quality levels of IAS is crucial. A comparison of different access technologies and mobile network standards is also essential, bearing in mind that some of them might share the same fibre backbone capacity.

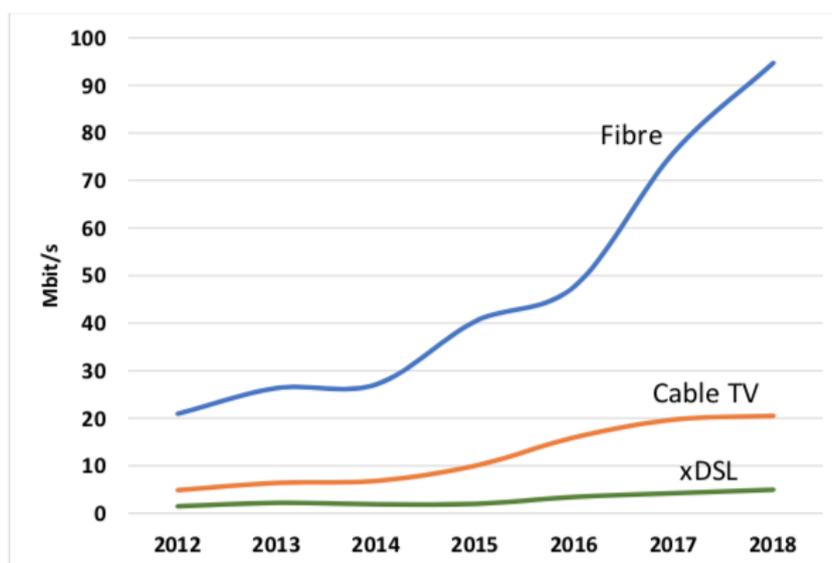


Figure 3 Average upload speed, broken down by technology 2012 - 2018

Illustration 1: Graph from the Norwegian 2018 report on IAS quality development via fixed access technologies

The Norwegian regulator is one of very few NRAs which fulfils this requirement. Rather than developing its own network measurement software generating data by user tests, it outsourced this task to a company that distributes hardware probes performing network measurements. Other open data projects like Measurement Lab already provide such information for most countries, leaving statistical analysis of the data as a task for the NRA. It is unclear why even NRAs with comparatively large resources at their disposal have not provided this information. The BEREC measurement tool, which we will describe later, further simplifies this task by providing another uniform data set and methods and software for statistical analysis software reusable among NRAs.

## Penalties for net neutrality violations

Article 6 of the Regulation obliges member states to implement national provisions for “effective, proportionate and dissuasive” penalties for infringements of Articles 3, 4 and 5, which constitute the main body of net neutrality provisions in the Regulation. We have mapped all national provisions for net neutrality violations<sup>6</sup> and find that 59% of countries have not implemented effective and dissuasive penalties (BG, CY, DE, DK, EE, ES, FI, GR, HR, IE, IT, LU, LV, NO, PT, SE, SI). The size of maximum monetary fines is distributed over a large spectrum, ranging from EUR 9.600,- in Estonia, to up to 10% of relevant turnover in the Netherlands or the United Kingdom.

Two Member states (IE, PT) have completely failed to establish penalties or clear enforcement powers, which means that only the most extreme cases of repeated offences might be penalised. The annual reports of the Irish NRA ComReg mentions the lack of enforcement powers several times as the cause of missing monitoring, supervision and enforcement activities in Ireland. This opinion of ComReg is peculiar as a lack of penalty provisions according to Article 6 has not hindered other NRAs from

6 See Annex 2 for an explanation of our methodology

exercising their supervision and enforcement powers based on Article 5, which is directly applicable in all member states<sup>7</sup>.

Eight countries (BG, CY, DE, EE, HR, LV, NO, SI) have set their penalties at a very low amount. Four countries (ES, GR, IT, LU) have set their penalties at a seven figure amount, and three countries (DK, FI, SE) have not set fixed amounts at all. In Austria maximum penalties are EUR 58.000, except in cases where the IAS provider gained an economic benefit of the infringement and penalties can range up to 10% of annual turn over. In fact, only eleven countries (BE, CZ, FR, GB, HU, LT, MT, NL, PL, RO, SK) have fulfilled their obligations under Article 6 of the Regulation as they have set penalties at a percentage of the annual turnover of the infringing company: in order to be dissuasive and proportionate, a penalty has to be measured against the annual turnover of the company found in violation. This has proven effective in other fields of ex-post regulation like competition and data protection. Such penalties act as an effective and equal deterrent for both small and big companies.

Most citizens and internet application providers make use of the Internet access services of the big European telecom companies with annual revenues in the nine figures and above range. To such companies, a four to seven figure penalty is neither dissuasive nor effective as a deterrent for economically lucrative but infringing activity. Fixed penalties are either disproportionately burdensome for smaller companies or ineffective for larger ones. Setting no amount is also problematic, as such a regime lacks a clear dissuasive effect.

Country	Classification	Penalty
Austria	Low Very good	EUR 58.000,- or 10% of the annual turn over
Belgium	Very good	5% of the annual turnover
Bulgaria	Low	EUR 100.000,-
Croatia	Low	EUR 135.420,-
Cyprus	Low	EUR 170.000,-
Czech Republic	Very good	5% of the annual turnover
Denmark	No fixed amount	
Estonia	Very low	EUR 9.600,-
Finland	No fixed amount	
France	Good	3% of annual turnover
Germany	Low	EUR 500.000,-
Greece	Mediocre	EUR 2.000.000,-
Hungary	Good	0,5 % of annual turnover
Iceland	n.a.	
Ireland	No penalties	
Italy	Mediocre	EUR 2.500.000,-
Latvia	Very low	EUR 14.000,-
Luxembourg	Mediocre	EUR 1.000.000,-
Lithuania	Good	3 % of annual gross income
Malta	Very good	5% of the annual turnover
Norway	Low	Daily penalties for violation, maximum amount of 30 Court base charges (1130 NOK/EUR 119,-

<sup>7</sup> The Austrian NRA RTR has enforced the regulation from 2016 to 2018 purely based on the regulation.

Country	Classification	Penalty
		per 2018)
Poland	Good	3 % of revenue
Portugal	No penalties	
Romania	Good	2% of turnover
Slovak Republic	Very good	5% of the annual turnover
Slovenia	Very low	EUR 50.000,-
Spain	Mediocre	EUR 2.000.000,-
Sweden	No fixed amount	"PTS may issue fines as deemed appropriate."
The Netherlands	Very good	10% of the relevant revenue
United Kingdom	Very good	10% of the relevant revenue

The commercial practice of price discrimination when providing access to specific application providers (zero-rating) falls under the supervision and enforcement duties of the national regulators and needs to be addressed by national provisions on penalties. Sadly, two countries (BG, DE) have failed to do so and have excluded illegal commercial practices from their penalty provisions. This is particularly worrisome as zero-rating is the most common net neutrality violation in Europe and needs urgent intervention.

# Differential Pricing Practices

## Definitions and basic principles

Many IAS providers in Europe have adopted differential pricing practices (DPP). This term refers to the application-specific pricing of IAS, where access to individual applications or classes of applications is priced differently from general data volume. This practice is most common in the form of **zero-rating**, where data volume for certain applications is excluded from the general data cap of the subscription. Less common in Europe is **application-specific data volume**, where a certain amount of data volume only usable for certain applications is sold or given free of charge as part of a subscription.

Both practices are only applicable to internet subscriptions with a data volume cap. For the purpose of this report we assume that fixed line internet offers in Europe are flat-rated and fall outside the scope of differential pricing practices. According to our survey, 77% (144 cases) of DPP are classical zero-rating offers, whereas 23% (42 cases) of offers are application-specific data volume.

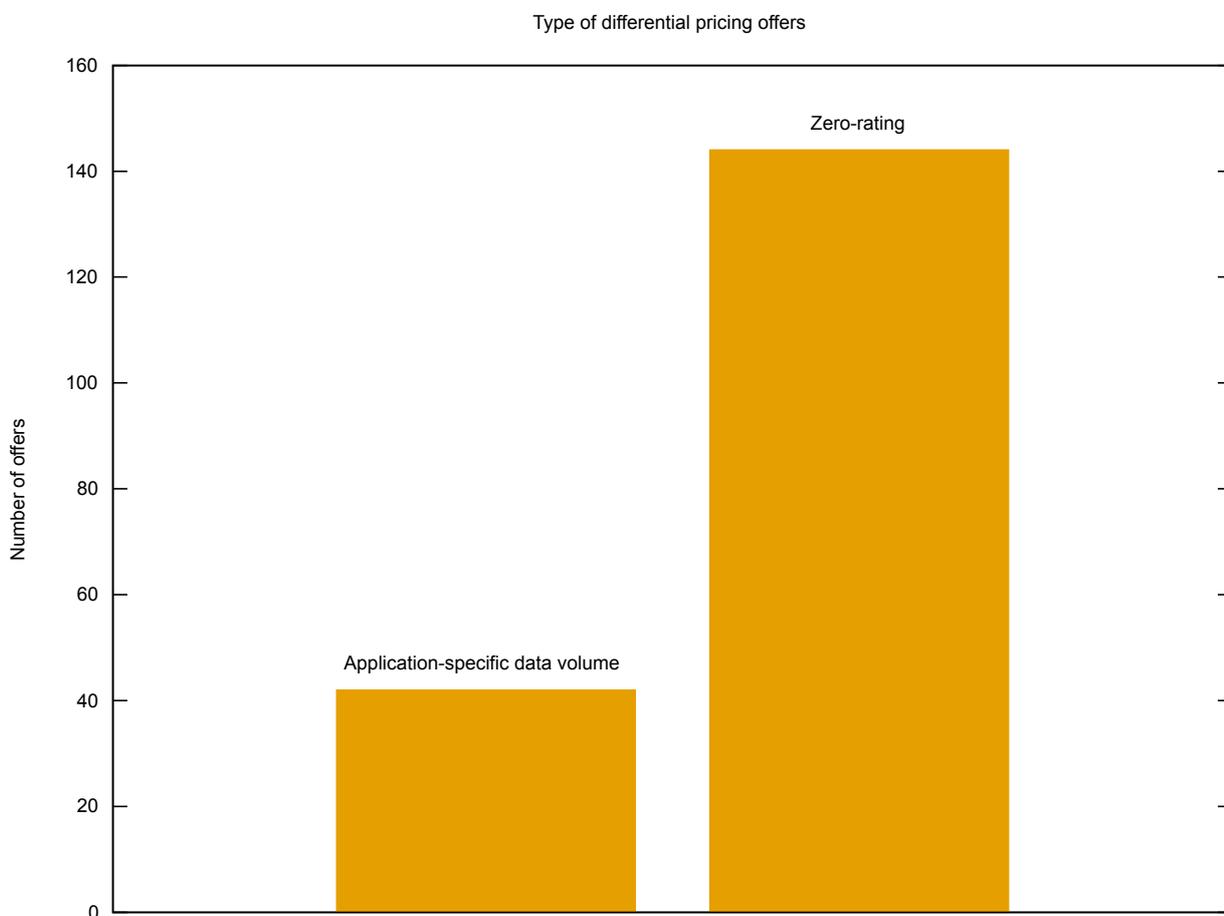


Illustration 2: Distribution of the two different types of differential pricing practices

A different term for this category of net neutrality violations is “economic discrimination” as it implemented in the billing equipment of IAS providers, which can be distinguished from technical

discrimination via traffic management measures. However, even though BEREC does not take this stance, both types of discrimination can be seen as “treatment of traffic” and thereby falling under the general non-discrimination rules of Article 3(3), first subparagraph.

The Regulation also treats these types of offers as commercial practices, covered by Article 3(2) and thus restricted as not to infringe on the end-user rights guaranteed by Article 3(1). According to the Framework Directive<sup>8</sup>, “end-users” means both consumers and CAPs<sup>9</sup>. Contrary to the net neutrality provisions of the Indian regulator TRAI, the Guidelines offer no bright-line rule on the legality of differential pricing practices, but lay down criteria for a case-by-case assessment of each offer by the competent NRA. In Recital 7 the Regulation foresees cases in which NRAs or other competent authorities are required to intervene, cases where commercial practices would be “undermining of the essence of the end-users’ rights”. As we will show, there has been a drastic increase of differential pricing practices in Europe, now covering all but one EU country, yet not a single such offer has been prohibited by an NRA<sup>10</sup>.

Differential pricing practices can be distinguished as either only offering preferential access to only **selected applications** or a class of applications (**class-based** offers). Zero-rated access to dominant or IAS-provider-affiliated video or music streaming applications, as well as zero-rating to dominant social networks like Facebook, WhatsApp or Instagram, constitute examples of offers covering only selected applications. Offers where a category of social networking, chat, video streaming, music streaming, maps or information content applications are packaged and priced differentially are examples of class-based offers. All class-based offers can further be distinguished as being **open** or **closed**, depending on whether there are mechanisms for CAPs to have their products included in the offer for differential pricing. In a closed offer, on the other hand, the IAS provider decides unilaterally which applications are differentially priced. Commercial agreements between the IAS provider and the CAP on the partnership may exist, but are not publicly available for interested parties. In an open offer, the IAS provider publishes a point of contact for interested CAPs or even publishes information about the underlying commercial agreement and technical conditions on how to join the programme as an interested CAP. According to our survey 67% of DPP offers (124 cases) are closed, whereas 33% (62 cases) of offers are open and publish information for CAPs interested in participating in the offer.

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8 Directive 2002/21/EC

9 See Paragraph 4 of the Guidelines

10 [https://berec.europa.eu/eng/events/berec\\_events\\_2018/171-public-debriefing-on-outcomes-of-the-36th-berec-plenary-meetings-3-5-october-2018](https://berec.europa.eu/eng/events/berec_events_2018/171-public-debriefing-on-outcomes-of-the-36th-berec-plenary-meetings-3-5-october-2018)

Open and closed differential pricing offers

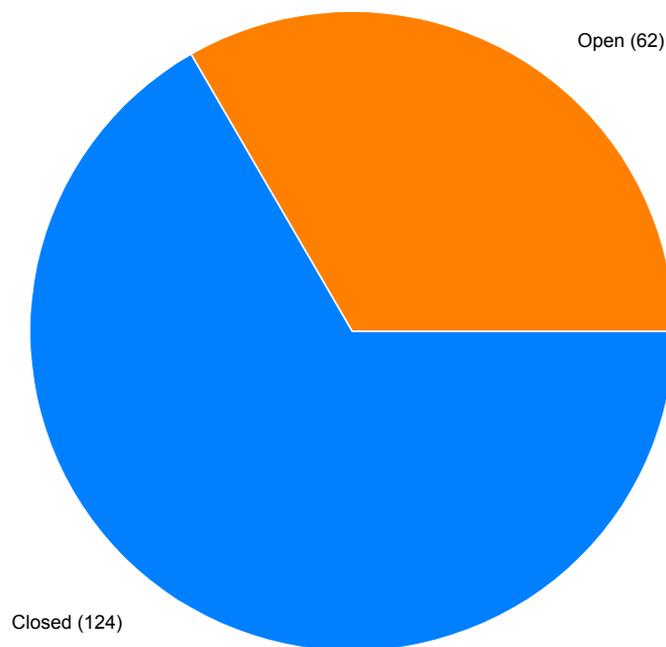


Illustration 3: Distribution between open and closed differential pricing practices

According to the annual reports of NRAs the number of DPP has drastically increased since the regulation came into force and in particular since the Guidelines have stated the understanding of regulators on this issue. After the Regulation was adopted, a debate on the status of such offers under the Regulation continued, in which the European Commission eventually had to modify information it had published online in which it stated that the Regulation amounted to a carte blanche for zero-rating<sup>11</sup>. During the creation process of the Guidelines, NRAs struggled to agree on a more comprehensive ruleset regarding commercial practices that infringe on end-user rights. BEREC didn't issue any instructions regarding the criteria of Recital 7 outlining cases where NRAs would have to intervene. Therefore, it is no surprise that in practice most NRAs are hesitant to come to decisions on the legality of these types of offers. According to the 2017 BEREC net neutrality implementation report, only in half of the countries with DPP offers had NRAs started a formal assessment. Where NRAs have assessed offers which include DPP, they have often not definitively ruled on the compatibility of the offer with the Regulation regarding DPP, but mention that the market situation will be continuously monitored and the decision may be revisited at a later stage. This appears has lead to an understanding by IAS providers that all forms of DPP have a carte blanche.

We believe that a strong factor in NRA's deliberations regarding an intervention against DPP themselves is the fact that any such decision would surely be challenged in court and therefore put

11 [https://edri.org/files/NN\\_analysis\\_20150715.pdf](https://edri.org/files/NN_analysis_20150715.pdf)

the NRA in question in the international spotlight. In this regard it is noteworthy that the Dutch NGO Bits of Freedom has challenged the Dutch regulator ACM's decision not to prohibit the zero-rating offer Datavrije Muziek by T-Mobile Netherlands in court. The case has not been adjudicated and awaits decision in the first instance at the Administrative Court of Rotterdam.

BEREC has announced that in the upcoming review of the Guidelines it will consider including a step by step assessment methodology for zero-rating<sup>12</sup>. With our full survey of all DPP offers in the EEA and other analysis provided in this report we hope to demonstrate the harm differential pricing practices have caused to the digital single market and to end-users, and we hope that the upcoming reform of the Guidelines will reflect this.

## Quantification of differential pricing practices

We have conducted a complete mapping of all differential pricing offers in the EEA. For this mapping a team of five people has analysed websites of 225 MNOs and MVNOs. The data was collected over a timespan of four months and has led to the identification of 186 differential pricing offers. This mapping includes a detailed typology of these offers including information on their roaming policy, whether they are open or closed for the participation of new CAPs, whether the offer is class-based or only for individual applications and a list of all applications and services participating in the offer. In a separate data set we have mapped these applications to CAPs, and researched the country in which the CAP is headquartered. The data set and methodology are available as open data on our website<sup>13</sup>. A full explanation of our methodology is available in Annex 2.

According to the debriefing of the 36th BEREC plenary meetings, 27 countries have zero-rating products<sup>14</sup>; the 2018 BEREC Report on the implementation of Regulation (EU) 2015/2120 and the BEREC Net Neutrality Guidelines<sup>15</sup> covers a different reporting period and contains information that all but two (FI, SI) countries have zero-rating products. Including the previous 2017 BEREC report<sup>16</sup> 17 NRAs (AT, BE, CY, CZ, DE, EE, FR, HR, HU, IT, LU, MT, NL, NO, PT, RO and SE) reported that they have begun a formal assessment of differential pricing products in the first two years since the regulation came into force, while 14 NRAs (BG, CZ, DK, GR, ES, FI, IS, IE, LT, LV, PL, SI, SK and UK) have not even started a formal assessment of these products in the two reporting periods or have not responded to this question in the BEREC questionnaire about their supervision and enforcement duties<sup>17</sup>. To this date not a single regulator has intervened against any of these products based on the commercial practices involved. In our analysis we find that 28 countries have differential pricing products, which is due to the fact that all such products have disappeared from the Bulgarian market in 2018 and are therefore not included in our survey due to our collection timespan. We do not know what prompted this change, but the 2018 report of the Bulgarian regulator does not indicate any measures taken.

12 [https://berec.europa.eu/eng/document\\_register/subject\\_matter/berec/opinions/8317-berec-opinion-for-the-evaluation-of-the-application-of-regulation-eu-20152120-and-the-berec-net-neutrality-guidelines](https://berec.europa.eu/eng/document_register/subject_matter/berec/opinions/8317-berec-opinion-for-the-evaluation-of-the-application-of-regulation-eu-20152120-and-the-berec-net-neutrality-guidelines)

13 <https://epicenter.works/document/1521>

14 [https://berec.europa.eu/eng/events/berec\\_events\\_2018/171-public-debriefing-on-outcomes-of-the-36th-berec-plenary-meetings-3-5-october-2018](https://berec.europa.eu/eng/events/berec_events_2018/171-public-debriefing-on-outcomes-of-the-36th-berec-plenary-meetings-3-5-october-2018)

15 See BoR (18) 170 page 8-9: [https://berec.europa.eu/eng/document\\_register/subject\\_matter/berec/reports/8256-report-on-the-implementation-of-regulation-eu-20152120-and-berec-net-neutrality-guidelines](https://berec.europa.eu/eng/document_register/subject_matter/berec/reports/8256-report-on-the-implementation-of-regulation-eu-20152120-and-berec-net-neutrality-guidelines)

16 See BoR (17) 240 page 8: [https://berec.europa.eu/eng/document\\_register/subject\\_matter/berec/reports/7529-berec-report-on-the-implementation-of-regulation-eu-20152120-and-berec-net-neutrality-guidelines](https://berec.europa.eu/eng/document_register/subject_matter/berec/reports/7529-berec-report-on-the-implementation-of-regulation-eu-20152120-and-berec-net-neutrality-guidelines)

17 The BEREC reports cover the period from May till April, starting with the entry into force of the regulation on 30. April 2016.

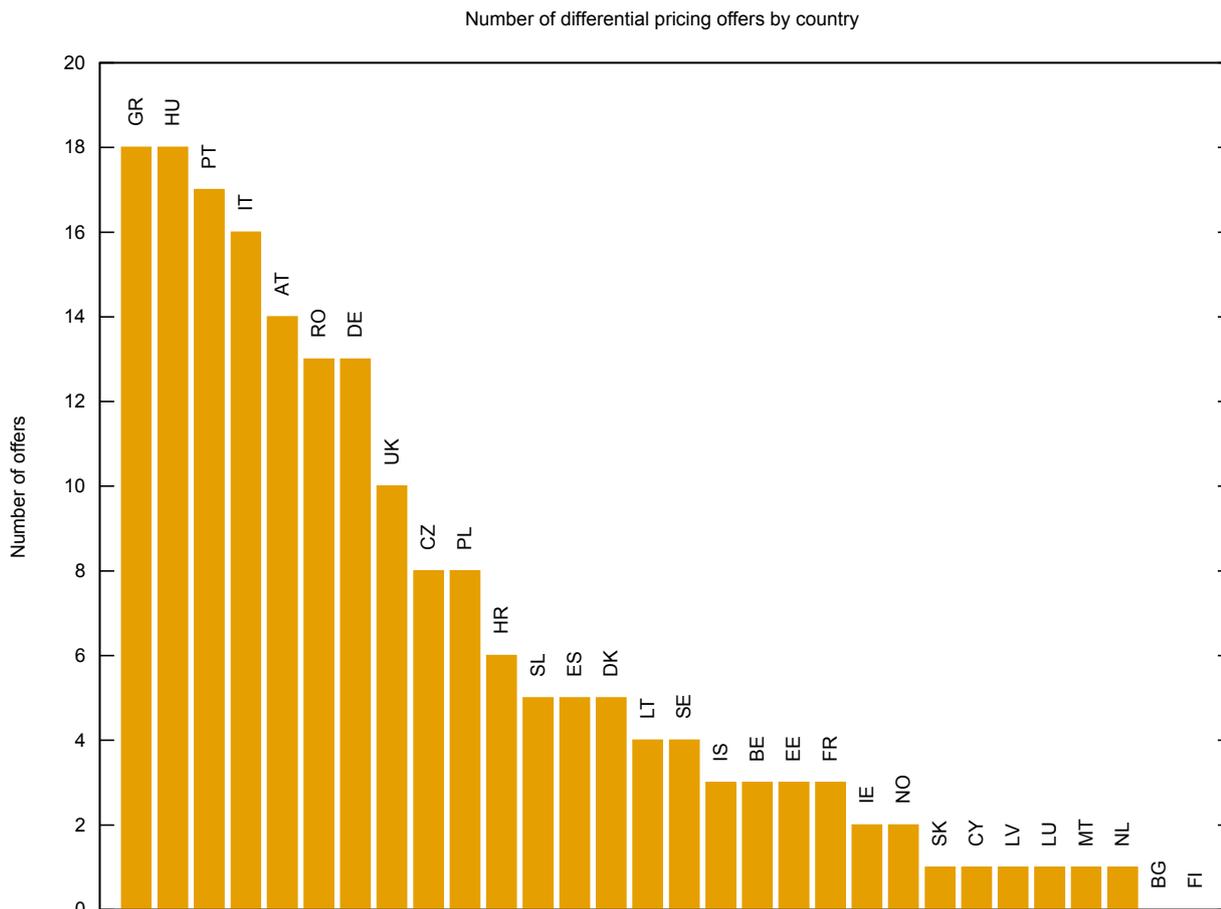


Illustration 4: Number of differential pricing offers by country

Our data shows that countries with differential pricing offers tend to have an increasing number of them. Product differentiation and, in case of lower data volume levels in that market, competition between IAS providers in other dimensions than general data volume might be catalysing factors. 11 countries have more than 5 differential pricing offers (GR, HU, PT, IT, AT, RO, DE, UK, CZ, PL, HR), 9 countries have between 3 and 5 offers (SL, ES, DK, LT, SE, IS, BE, EE, FR), 6 countries have between 1 and 2 offers (IE, NO, SK, CY, LV, LU, MT, NL). In 2 countries we did not find a single offer (BG, FI).

In 73 cases (39%) we did not find a roaming policy which clarifies how the differential pricing practice relates to the use of data services in the EEA. We found that this information is often difficult to locate on IAS providers’ websites, thus often remaining opaque to the average customer. The lack of a roaming policy is a severe issue which has led to several regulatory interventions<sup>18</sup>. The competent authorities of the affected countries should examine those cases.

18 BNetzA in “StreamOn”: [https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Telekommunikation/Unternehmen\\_Institutionen/Breitband/Netzneutralitaet/Entscheidung\\_zu\\_StreamOn.html](https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Telekommunikation/Unternehmen_Institutionen/Breitband/Netzneutralitaet/Entscheidung_zu_StreamOn.html), ANACOM assessing various differential pricing practices: <https://www.anacom.pt/render.jsp?contentId=1456674>

Existence of roaming policy with differential pricing offers

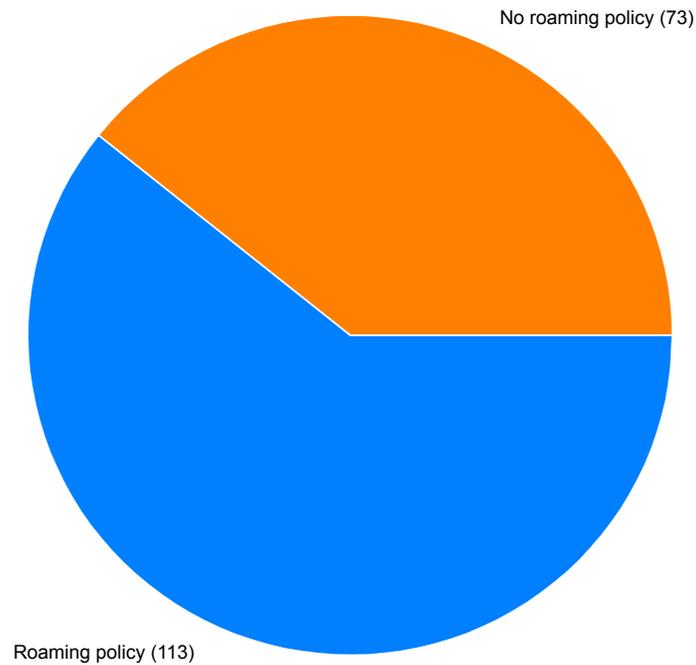


Illustration 5: Existence of roaming policy with differential pricing offers

## New entry barriers for the provision of online services

The participation of applications and services in differential pricing offers provides a benefit over competing offerings. This is particularly the case with zero-rating offers, but can be demonstrated more easily with offers of application-specific data volumes as the per-GB price of the associated data volume can be compared with the price of general data volume. In our submission to the Portuguese regulator ANACOM<sup>19</sup> we calculated the price per GB for the different IAS offering called “Smart Net”.

19 See submission from April 2018: <https://epicenter.works/document/1111>

Type	Tariff	Datavolume (GB)	price (€)	€/GB
prepaid	auto upload	0,25	€ 1,99	€ 7,96
	S	0,2	€ 2,80	€ 14,00
	M	1	€ 3,30	€ 3,30
	L	3	€ 4,00	€ 1,33
postpaid	S	0,5	€ 14,99	€ 29,98
	M	1	€ 22,99	€ 22,99
	L	3	€ 32,99	€ 11,00
	XL	30	€ 59,99	€ 2,00
	S*	0,5	€ 26,99	€ 53,98
	M*	1	€ 35,99	€ 35,99
	L*	3	€ 59,99	€ 20,00
	XL*	30	€ 69,00	€ 2,30
Smart Net	Messaging, Social, Video, Music, E-Mail & Cloud	10	€ 6,99	€ 0,70
	MEO	∞	€ -	€ -

\* without 24 months contract period

*Illustration 6: Price comparison of general data volume and application-specific data volume offerings of the Portuguese incumbent MEO*

Using applications participating in the DPP is two up to 77-fold cheaper compared to using applications via general data volume. This strong incentive for customers to use participating applications infringes on the rights of consumers to use applications of their choice and the rights of CAPs to provide services independent of the origin of their users.

Our survey of DPP collected the information of participating applications and services, the associated CAP and the country of their headquarters. A detailed methodology is available in Annex 3. Based on this data set we conclude that the majority of applications gaining a benefit from DPP comes from outside the European digital single market. **Among the top 20 zero-rated applications only three are from the EEA.**

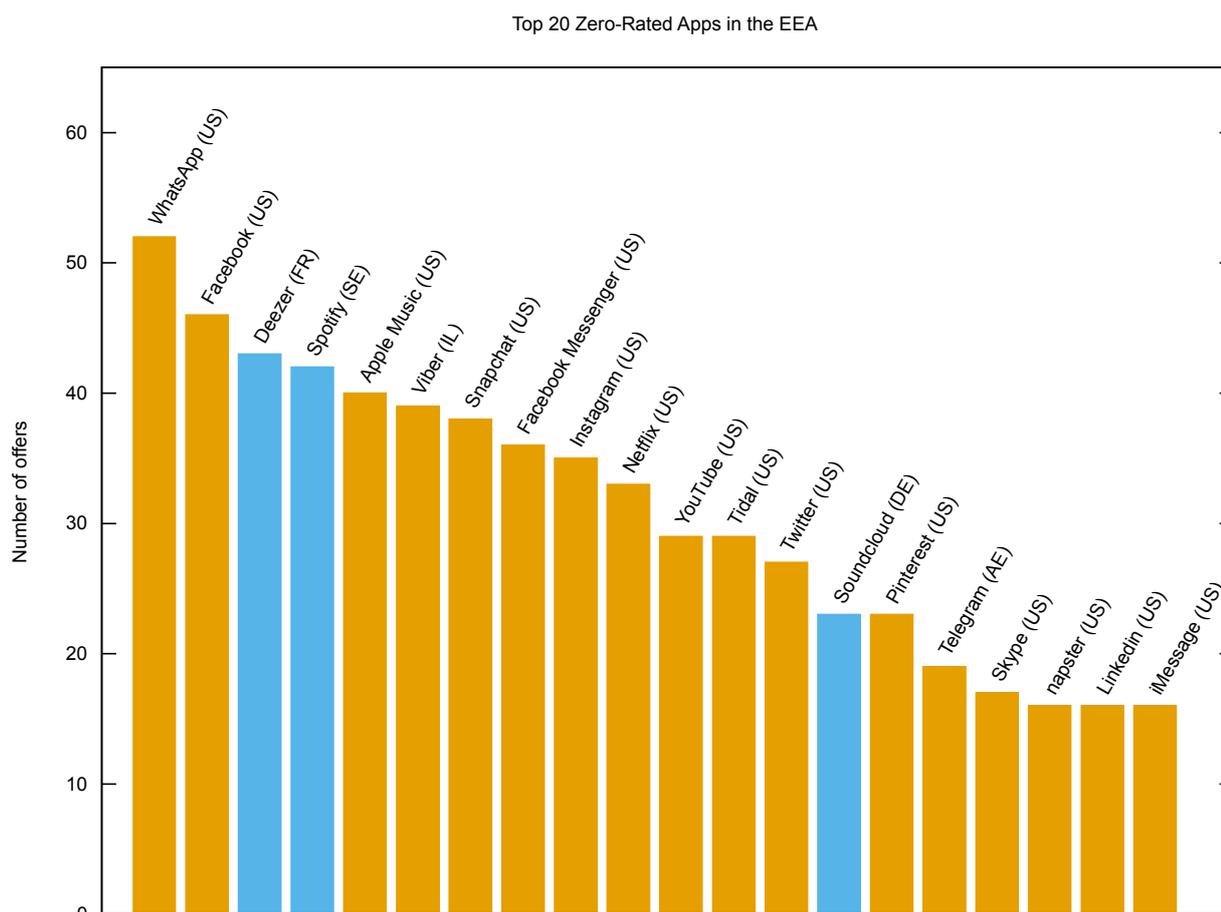


Illustration 7: Top 20 zero-rated apps in differential pricing offers in the EEA. Offers from the EEA are highlighted in blue.

Therefore, our data shows a **strong bias against the European digital single market**. If we aggregate our information about all partnerships between IAS providers and applications and services we see that with 49,2% most partnerships happen between applications and services and IAS providers of the same country, whereas 31,5% of partnerships are struck with applications and services that are headquartered in the USA, and only 13,6% come from EEA countries other than the country where the IAS provider offers the product. Finally, 5,8% of such partnerships are with applications and services from the rest of the world.

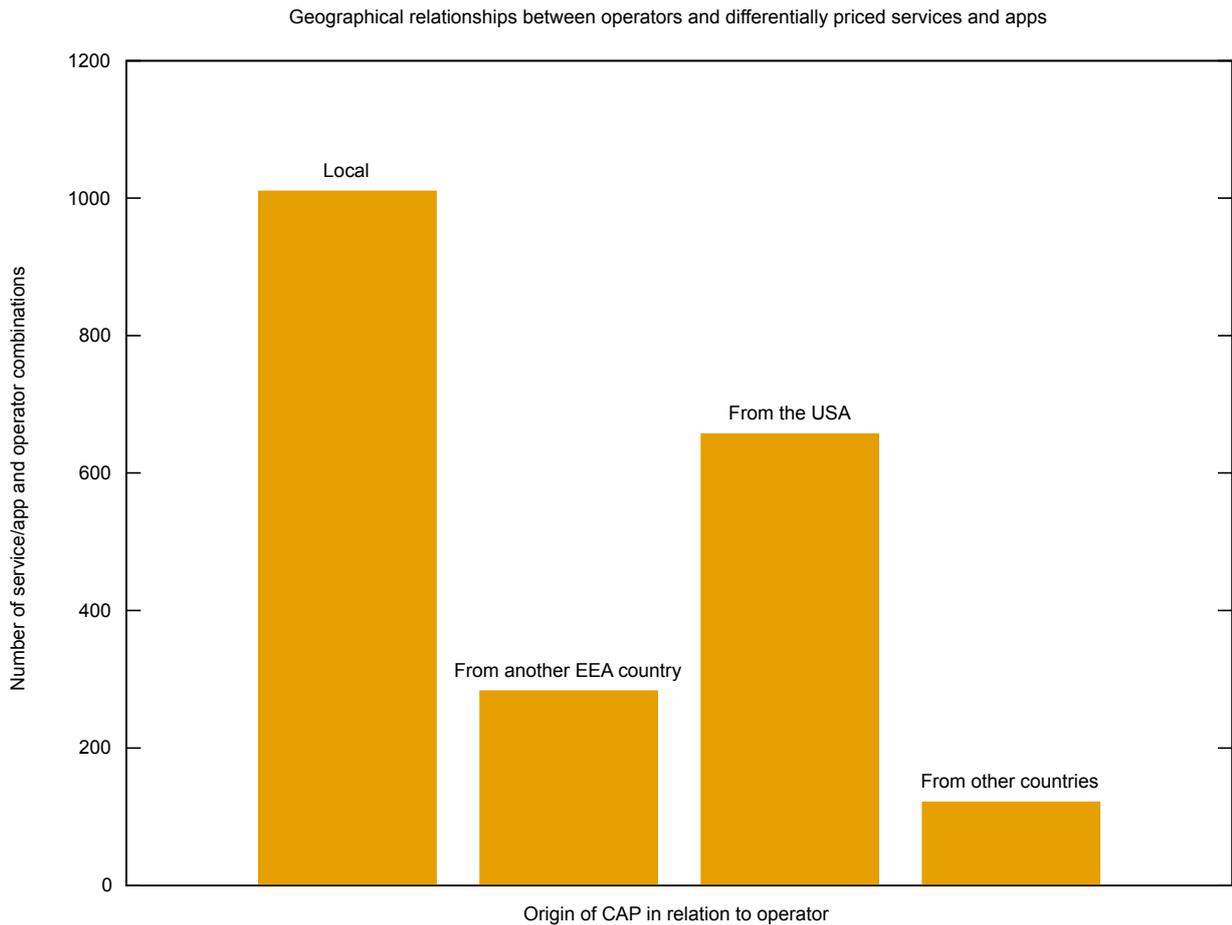


Illustration 8: Geographical relationships between IAS providers and CAPs in differentially priced offers

If we further dissect these relationships and remove the closed DPP, in which the IAS provider does not provide information for CAPs on how to participate in the offer, we can see that the number of local applications and services decreases from 49% to 27% and the number of relationships with applications and services that are based in the USA increases from 32% to 49%. The percentage of relationships with applications and services in EEA countries outside of the country where the IAS is provided stays mostly unchanged from 14% to 17% while relationships with applications and services from other countries stay mostly unchanged from 6% to 7%.

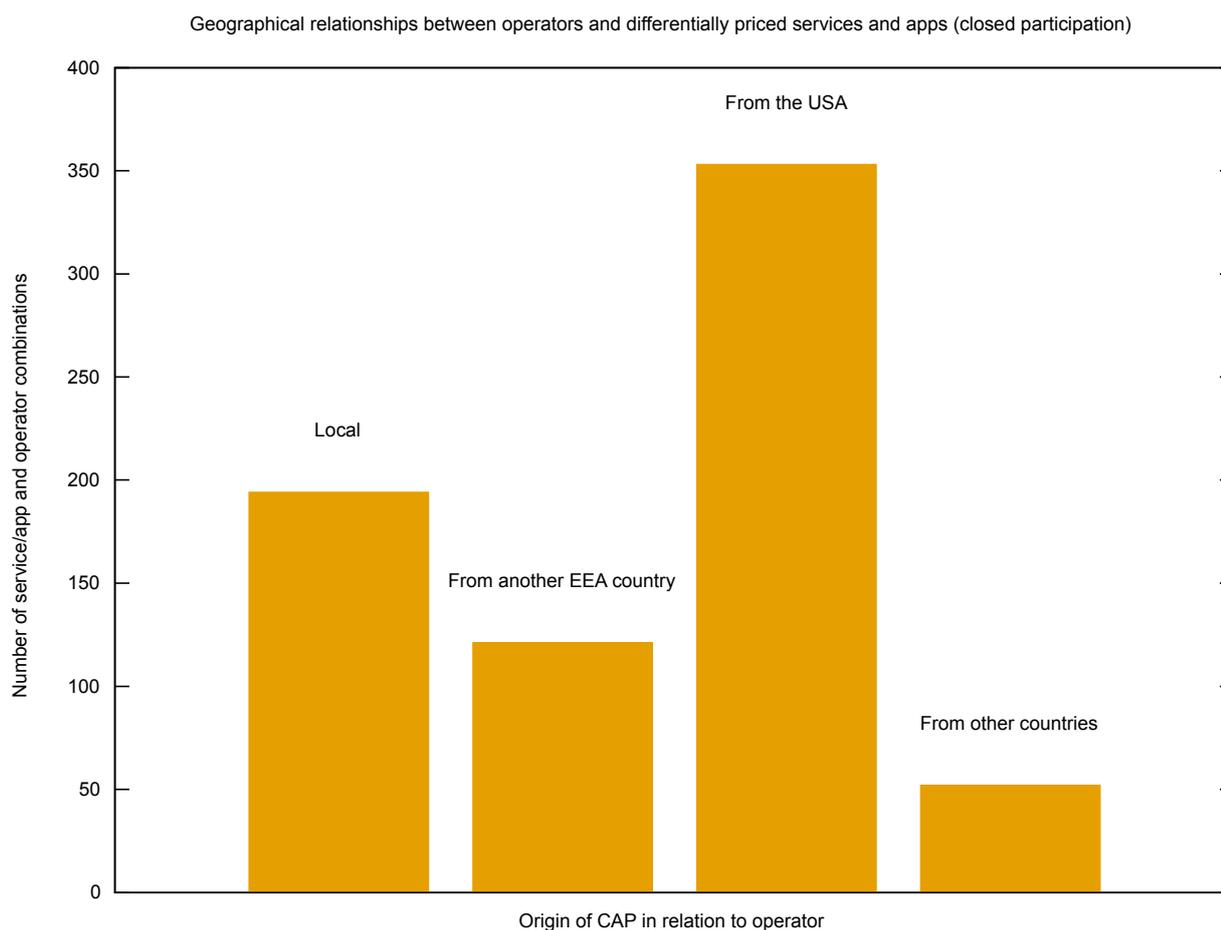


Illustration 9: Geographical relationships between IAS providers and CAPs in closed differentially priced offers which provide CAPs no information on participation

Consequently, we can infer that viewing national markets each on their own, open participation has a positive effect on the diversity of the applications offered via DPP to consumers. However, the majority of offers with DPP (67%) are closed and therefore only include a hand-picked number of applications selected by the IAS provider. Particularly in such closed relationships the gatekeeper function of IAS providers in defining the internet experience of their users and the economic viability in offering services in the European digital single market is significant. We assume that not all of these relationships between IAS providers and CAPs are structured in a competitive and non-discriminatory way. Unfortunately, in the 15 countries where the NRAs have at least formally assessed the DPPs operating in their market, none have released information on the nature of such relationships. Only the Polish regulator UKE published information on the nature of such a relationship in their annual report<sup>20</sup>:

*“One undertaking providing zero-rate service indicated that it collects fees from the providers of content which is then offered at a zero-rate to end-users.”*

Such a **sponsored data** regime, where an IAS provider leverages its monopoly vis-à-vis CAPs to access to their customers, giving CAPs who pay the IAS provider a competitive advantage over those

20 See page 10: [http://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=53475](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53475)

that do not, severely impact CAPs' rights to provide applications and service irrespective of their customers' location. However, according to a BEREC report, the Polish regulator UKE has not even launched a formal investigation into this product<sup>21</sup>.

The Belgian regulator BIPT also reported a sponsored data offer which was discontinued before the regulator could come to a formal assessment. In the same 2018 report BIPT also mentions the complaint of a developer of a chat app against the zero-rating of WhatsApp by the largest Belgian mobile operator Proximus. The developer saw himself infringed in his rights to offer a service and unable to compete with the Facebook owned WhatsApp service under these circumstances. BIPT dismissed the complaint of the developer based on a statement of Proximus that users might also choose another application besides WhatsApp and that the application choices Proximus is offering its users are based on what Proximus believes to be consumer preferences<sup>22</sup>.

Open DPPs allow CAPs to participate in an offer if they provide certain technical information and enter into a contract with the IAS provider. However, The transparency of the participation process for CAPs interested in joining these offers varies greatly between IAS providers. The technical information that CAPs have to provide to the IAS provider consists of identification criteria (see chapter below) to distinguish data traffic associated with the application or service to be included in the offer from other traffic.

Based on our analysis of the contractual conditions of several of these offers we could find penalty provisions where the CAP agrees to liability of wrongfully billed data volume. Other provisions include CAPs having to give a one month (or 30 day) notice about changes in their service or application which might affect the identification of the associated data, and CAPs giving the IAS provider access to unreleased beta versions of the application in order to enable them to test the identification of the service under laboratory conditions.

Sometimes the identification of the service also requires changes to the architecture of the service, like switching from Content Delivery Networks (CDNs) or to self-hosted services or separating particular customer segment to a different server farm. This can be demonstrated by the months-long efforts of the music streaming operator Spotify to separate the content distribution to their free and premium customers, in order to enter into the zero-rating programme "StreamOn" of Deutsche Telekom while preserving their business model<sup>23</sup>. These obligations violate one of the core principles that enabled the internet to become an engine for economic growth: innovation without permission. Instead of a level playing field the internet architecture becomes intertwined with commercial agreements and a requirement for technical cooperation between a CAP and the IAS providers whose customers this CAP might want to offer a competitive service to<sup>24</sup>.

Furthermore, it is important to highlight that commercial agreements for DPP constitute a long-term partnership between the IAS provider and the CAP in which resources have to be contributed to sustain this ongoing collaboration and account for the liability the CAP has to agree to when entering into the agreement. This is demonstrated by the fact that Vimeo does not participate in the

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21 See page 9: [https://berec.europa.eu/eng/document\\_register/subject\\_matter/berec/reports/8256-report-on-the-implementation-of-regulation-eu-20152120-and-berec-net-neutrality-guidelines](https://berec.europa.eu/eng/document_register/subject_matter/berec/reports/8256-report-on-the-implementation-of-regulation-eu-20152120-and-berec-net-neutrality-guidelines)

22 See paragraph 59 and 82-85: [https://www.ibpt.be/public/files/en/22531/Net\\_Neutrality\\_Annual\\_Report\\_2017-2018.pdf](https://www.ibpt.be/public/files/en/22531/Net_Neutrality_Annual_Report_2017-2018.pdf)

23 See <https://www.teltarif.de/streamon-spotify-telekom-gruende-fehlt/news/68711.html> (German)

24 A more detailed analysis of Vodafone Pass and the zero-rating offers of T-Mobile can be found in our submissions to the German regulator in their assessment of these offers: <https://epicenter.works/document/483> and <https://epicenter.works/document/893>

“StreamOn” programme of Deutsche Telekom<sup>25</sup>. In its open letter addressing the German regulator regarding the programme, Vimeo states that although they are a 200 employee strong company, they cannot sustain cooperations with all the IAS providers whose customers they want to reach with their service. With our data sets, we can for the first time quantify these limitations on the number of partnerships CAPs will enter into with IAS providers.

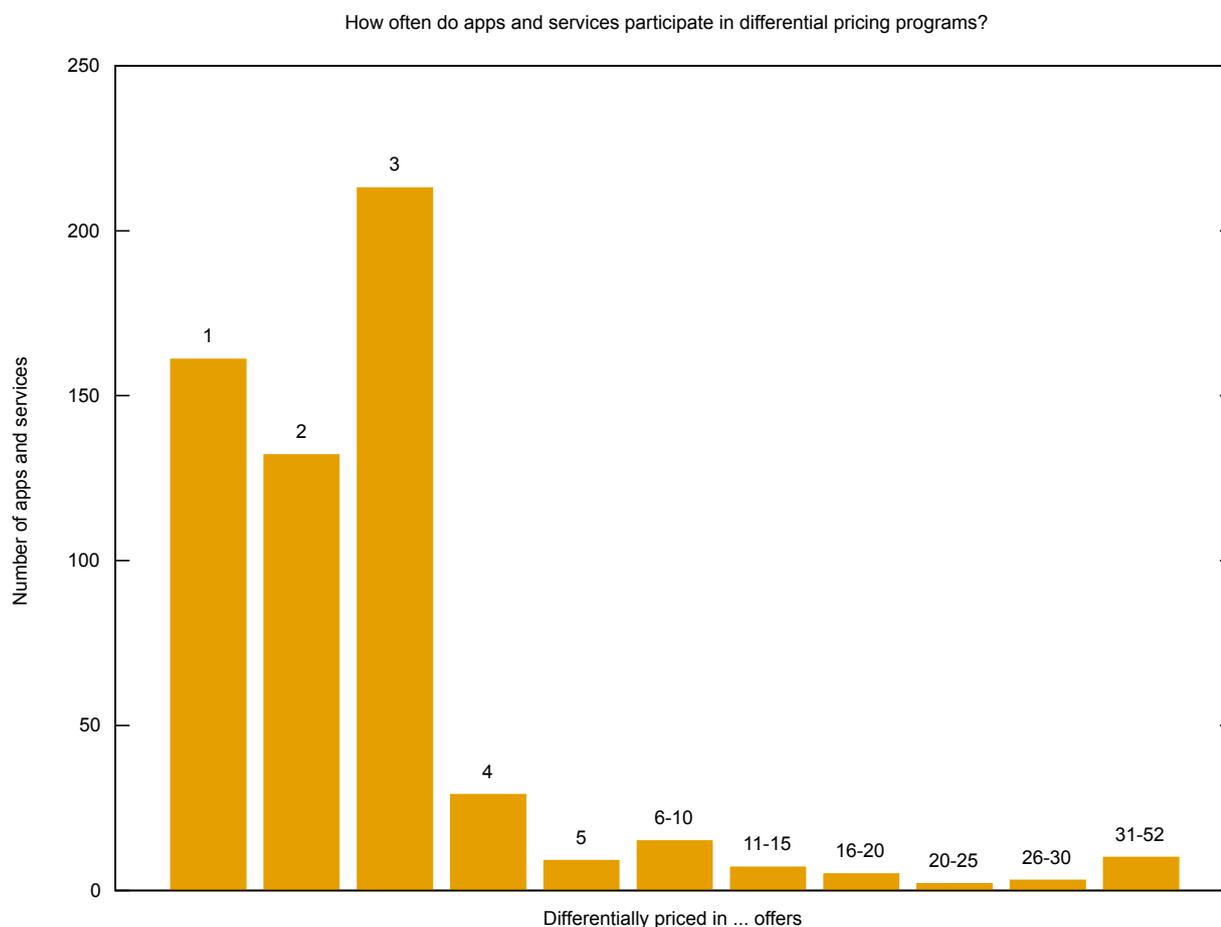


Illustration 10: Number of differential pricing cooperations CAPs have entered into

This data shows that the absolute majority of CAPs only enters into a maximum of three differential pricing offers. Without having assessed the size of the CAP we expect a proportional relationship with the number of collaborations that can be sustained. Given the fragmented environment of hundreds of IAS providers in the digital single market **we caution European decision makers about these new market entry barriers that negatively impact every SME providing digital services in Europe.**

Finally, we want to also share our conclusions on the particular forms of sign-up procedures that IAS providers offer to CAPs. For the most part, the commercial agreements and technical documentations for CAPs to assess a potential partnership are not freely available on the website of the IAS provider. Most IAS providers only offer a web form or an e-mail address for interested parties. At least in the

25 See Open Letter from Vimeo to the German NRA:  
[https://www.tagesspiegel.de/downloads/19872192/2/vimeo\\_stellungnahme\\_stream-on.pdf](https://www.tagesspiegel.de/downloads/19872192/2/vimeo_stellungnahme_stream-on.pdf)

case of Vodafone Pass the CAP also has to sign a non-disclosure-agreement (NDA) before the technical and commercial conditions of the partnership become available to them<sup>26</sup>. We would again like to highlight that this is the opposite of an open internet with freely accessible and inter-operable standards that allow to innovate without permission.

In the case of T-Mobile and Vodafone these zero-rating programmes are a group-wide strategy where technical and commercial requirements for participation are similar in every country. Contrastingly, incumbent operators like MEO in Portugal only added an e-mail address for interested CAPs weeks before the Portuguese regulator ANACOM issued a decision in which the differential pricing practice was allowed to continue without substantial modification. As of early 2018, we knew of several CAPs who had contacted MEO using this e-mail address, but to this day not one has received a response. For this report, in order to assess the openness of IAS providers to new services, we have systematically contacted operators regarding their differential pricing offers under the name of an unestablished service provider and measured the response time. The measurements are based on the response times to an English speaking request of a hypothetical SME with a service fitting to the DPP programme that was sent to the announced point of contact for CAPs that want to join the DPP programme in question. For the 62 open differential pricing offers we could identify 18 points of contact from 17 IAS providers in 14 countries (AT, CZ, DE, GR, HU, IT, LU, NL, NO, PT, RO, ES, SE NS UK).

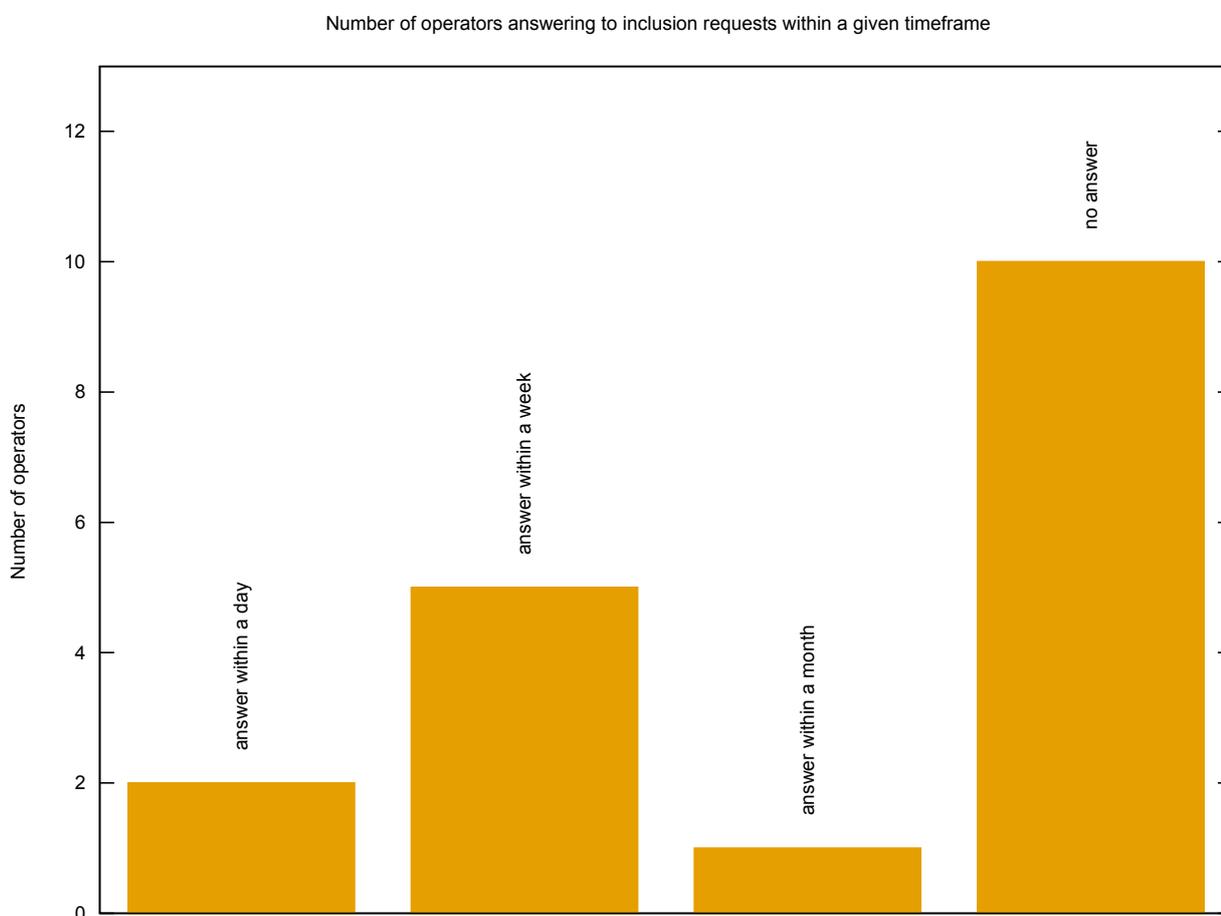


Illustration 11: Duration of the response time of IAS providers on CAP request to participate in DPP

26 See <https://www.vodafone.com/content/partner-portal.html>

Within a month of the request, we received 8 responses; however 10 operators did not reply with even a minimal response (or request for signing an NDA). **This measurement clearly highlights that the fact that a differential pricing practice is class-based and open on paper does not mean that it is non-discriminatory in practice.** In their decisions regarding such offers, NRAs have often not taken the concrete circumstances under which CAPs can enter into open DPP programmes into account. In effect, open DPP programmes can discriminate against certain CAPs while outwardly presenting an open and non-discriminatory process. We therefore call for more regulatory scrutiny, testing and assessing the real inclusion process.

As a particularly negative example, we would like to point out the initial registration process for the open class-based zero-rating programme of Telekom.hu. The web for provided requires a CAP to provide a telephone number with a Hungarian country code<sup>27</sup>.

Illustration 12: Screenshot of the sign-up form for CAPs to a Hungarian open class-based zero-rating offer

BEREC tried to account for the negative effects of DPP for individual applications on the right of consumers to use applications and services of their choice and the right of CAPs to offer services in paragraph 42 of the Guidelines. It states that class-based DPP are beneficial in that regard over DPP which only include individual CAPs.

*“The ISP could either apply or offer zero-rating to an entire category of applications (e.g. all video or all music streaming applications) or only to certain applications thereof (e.g. its own services, one specific social media application, the most popular video or music applications). In the latter case, an end-user is not prevented from using other music applications. However, the zero price applied to the data traffic of the zero-rated music application (and the fact that the data traffic of the zero-rated music application does not count towards any data cap in place on the IAS) creates an economic incentive to use that music application instead of competing ones. The effects of such a practice applied to a specific application are more likely to “undermine the essence of the end- users’ rights” or lead to circumstances where “end-users’ choice is materially reduced in practice” (Recital 7) than when it is applied to an entire category of applications.”*

27 See <https://www.telekom.hu/lakossagi/szolgáltatások/partneri-jelentkezés>

This paragraph has contributed to the proliferation of open class based differential pricing offers in Europe, but its vague language does not include any requirement of non-discriminatory treatment, transparency or inter-operability in practice.

A class-based approach which does not infringe on the rights of CAPs would need to be based on technical characteristics that every application or service can acquire without interaction with the IAS provider. An interoperable standardised procedure for CAPs to announce criteria by which to identify traffic associated with their applications to be implemented by IAS providers in their network is not a priori impossible, but a standardisation effort would be required.

## Economic analysis of the impact of DPP on the price of mobile data volumes

Since it is an intuitive assumption that zero-rating and differentially priced offers are more attractive where data volume is expensive, as they significantly affect crucial aspects of the differentially priced offers (such as the time a streaming service can be used on a given budget), we sought to examine this hypothesis by analysing price developments in markets with and without zero-rating offers.

For this purpose we combined data by consultancy ReWheel on the availability of zero-rating offers in different EU markets with data published by the European Commission on prices of data volume in these markets. Initially, we examined the correlation between availability of zero-rating offers in 2014 and 2015 with the general price development in these markets between 2015 and 2016. The one-year gap between these observations accounts for the fact that many customers have contracts with cancellation periods of several months up to several years. As the Commission data gives differentiated price data depending on size of the included data volume and targeted end devices, we conducted this analysis using an OLS regression model. The detailed methodology can be found in Annex 4.

For this period between 2015 and 2016, we found that in markets where zero-rating offers had existed in both years, prices increased by 2%, whereas in markets with no zero-rating offers in both years, prices dropped by 8%. The introduction of zero-rating offers was limited to a single market, which does not provide statistically reliable results. Countries in which zero-rating offers disappeared from the market, displayed a 10% decrease in prices, however this result is not statistically significant ( $p=0.348$ ).

Upon the publication of Commission data on prices for the year 2017, we repeated our analysis for zero-rating offers introduced in 2016 or 2017. However, initially this did not produce statistically significant results in any category. Closer examination of the data however revealed Finland to be an outlier market, in which the replacement of a single offer significantly changed the prices in almost all data volume baskets. This is likely due to the fact that unlimited data plans, which do not sensibly admit a price per gigabyte calculation, are prevalent in Finland.

We therefore repeated the analysis but excluded Finland from our dataset. In this case, we found a statistically significant result ( $p=0.04$ ) for markets in which zero-rating was introduced between 2015 and 2016. These markets showed a 1% price increase between 2016 and 2017, whereas markets without zero-rating in both cases showed a 10% price decrease.

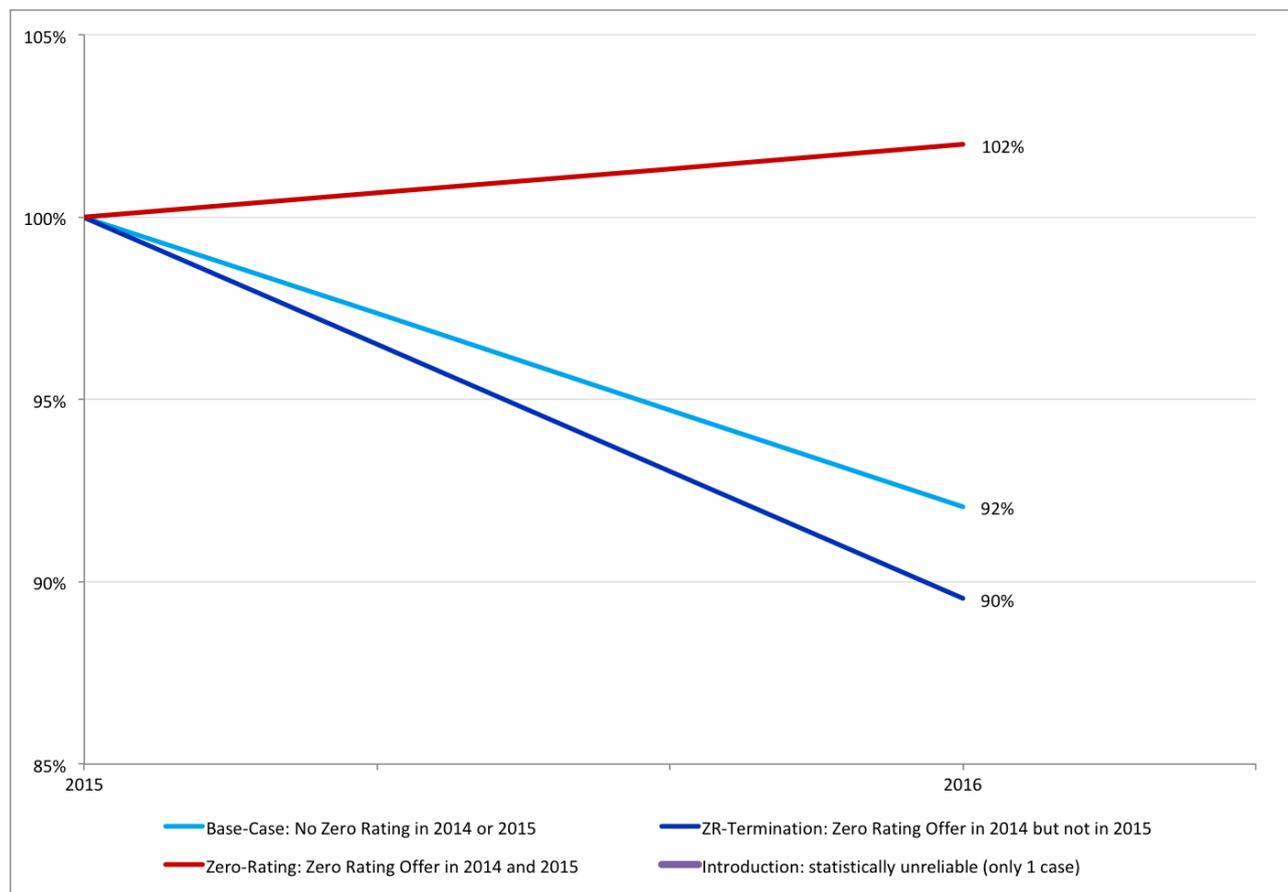


Illustration 13: Price developments in markets between 2015 and 2016 based on availability of zero-rating offers in 2014 and 2015

In conclusion, where we found statistically significant results, these confirmed the initial hypothesis: **the existence or introduction of zero-rating offers is associated with markets which exhibit price developments that are adverse to consumers.** However, since zero-rating offers are now prevalent in almost all EU countries this analysis cannot be extended into the future. The overall increase in differential pricing offers might prolong or even strengthen the effect. Further analysis on an operator-by-operator basis would therefore be advisable.

To our knowledge we are the first organisation to conduct such an analysis examining the correlation of the existence of differential pricing practices and the price of mobile data volume. As a donation-funded NGO our capacity to acquire proprietary data sets for our analysis is limited. We are therefore thankful that the Austrian regulator RTR has taken up this idea and will continue examination of similar questions in 2019 on an operator basis with a proprietary data set.

We assume our findings can be explained in part by the fact that zero-rating distorts the normal competition between IAS providers based on data volumes and speeds. Instead the number of applications participating in DPP become a factor by which consumers differentiate between IAS offers<sup>28</sup>. Incumbent operators like Deutsche Telekom in Germany or Vodafone in the UK can attract more applications than smaller operators. Thereby, they create a “unique selling proposition” to attract

28 Vodafone Pass (UK) and T-mobile (DE) advertise their products with the number of CAPs participating in them: <https://www.vodafone.co.uk/mobile/pay-monthly/vodafone-passes> and <https://www.netzwelt.de/mobilfunktarif/166813-streamon-neuen-streaming-partner-gibt-dezember-2018.html>

consumers and no longer need to compete on the dimension of data volumes, where MVNOs and smaller operators can match their offers, in effect leading to a slow down of data volume growth or drop in prices.

We expect that in markets like Portugal, where all IAS providers entertain DPP, the growth rate of data volume will have slowed down even more than in markets where there are still MNOs not engaging in DPP. Analysis of Rewheel indicates that this assumption could be correct.

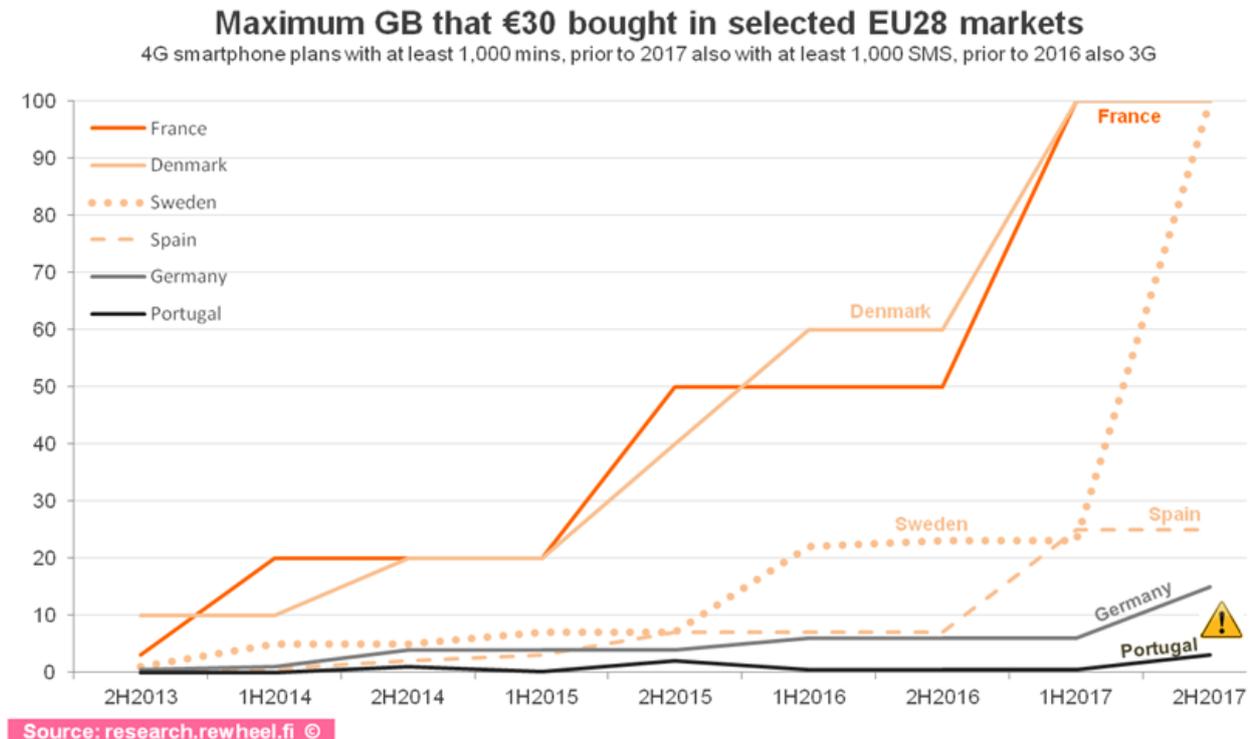


Illustration 14: Analysis of Rewheel on the development of mobile network prices

For our submission to the Portuguese regulator ANACOM<sup>29</sup> in early 2018 we calculated the price for mean data price in three OECD consumer buckets according to the Mobile Broadband Price Monitor of the European Commission for 2016, which further substantiates this hypothesis.

29 <https://epicenter.works/document/1111>

Mean Data price (€(PPP)/GB)**		
Handheld offers* 2016		
1	Finland	0,00 €
2	Denmark	7,92 €
3	Austria	10,87 €
4	Sweden	12,39 €
5	Lithuania	14,60 €
6	Italy	15,73 €
7	Norway	17,61 €
8	Luxembourg	18,20 €
9	Ireland	20,77 €
10	Poland	20,83 €
11	United Kingdom	22,70 €
12	Estonia	28,66 €
13	France	33,82 €
14	Germany	43,88 €
15	Croatia	44,93 €
16	Romania	51,06 €
17	Latvia	52,03 €
18	Iceland	52,08 €
19	Slovenia	52,65 €
20	Belgium	66,94 €
21	Netherlands	69,03 €
22	Czech Republic	75,10 €
23	Spain	84,12 €
24	Slovakia	85,24 €
25	Bulgaria	88,52 €
26	Malta	92,10 €
27	Portugal	101,38 €
28	Cyprus	147,82 €
29	Hungary	202,48 €
30	Greece	567,68 €

Mean Data price (€(PPP)/GB)**		
Handheld offers* 2016 (offers with phone excluded)		
1	Finland	0,00 €
2	Austria	9,11 €
3	Denmark	10,48 €
4	Lithuania	14,16 €
5	Norway	15,92 €
6	Italy	18,60 €
7	Sweden	20,01 €
8	Poland	20,19 €
9	Luxembourg	21,46 €
10	United Kingdom	26,54 €
11	Estonia	30,07 €
12	France	34,11 €
13	Ireland	35,79 €
14	Romania	38,06 €
15	Germany	41,63 €
16	Croatia	52,54 €
17	Latvia	53,62 €
18	Spain	59,52 €
19	Iceland	60,81 €
20	Belgium	72,74 €
21	Slovenia	76,01 €
22	Czech Republic	77,35 €
23	Netherlands	83,63 €
24	Malta	89,28 €
25	Slovakia	92,02 €
26	Portugal	109,16 €
27	Hungary	208,58 €
28	Cyprus	209,48 €
29	Bulgaria	232,54 €
30	Greece	283,53 €

Mean Data price (€(PPP)/GB)**		
Laptop and Tablet offers* 2016		
1	Finland	0,00 €
2	Latvia	1,20 €
3	Poland	1,54 €
4	Austria	1,55 €
5	Sweden	1,64 €
6	Estonia	1,89 €
7	Italy	2,41 €
8	Iceland	2,47 €
9	Denmark	2,62 €
10	Lithuania	3,52 €
11	France	4,55 €
12	Slovenia	5,14 €
13	Romania	5,69 €
14	Bulgaria	6,86 €
15	Germany	8,25 €
16	Norway	9,10 €
17	Czech Republic	9,28 €
18	Slovakia	10,56 €
19	Belgium	12,46 €
20	Malta	12,65 €
21	Spain	13,03 €
22	United Kingdom	14,73 €
23	Luxembourg	18,73 €
24	Greece	20,98 €
25	Ireland	21,51 €
26	Hungary	23,23 €
27	Netherlands	27,95 €
28	Portugal	31,47 €
29	Croatia	59,63 €
30	Cyprus	73,87 €

\*Offers with 0MB are excluded

\*\* 0,00€/GB for Unlimited

Source: Calculations based on "Mobile Broadband Prices in Europe 2016" EU Commission report



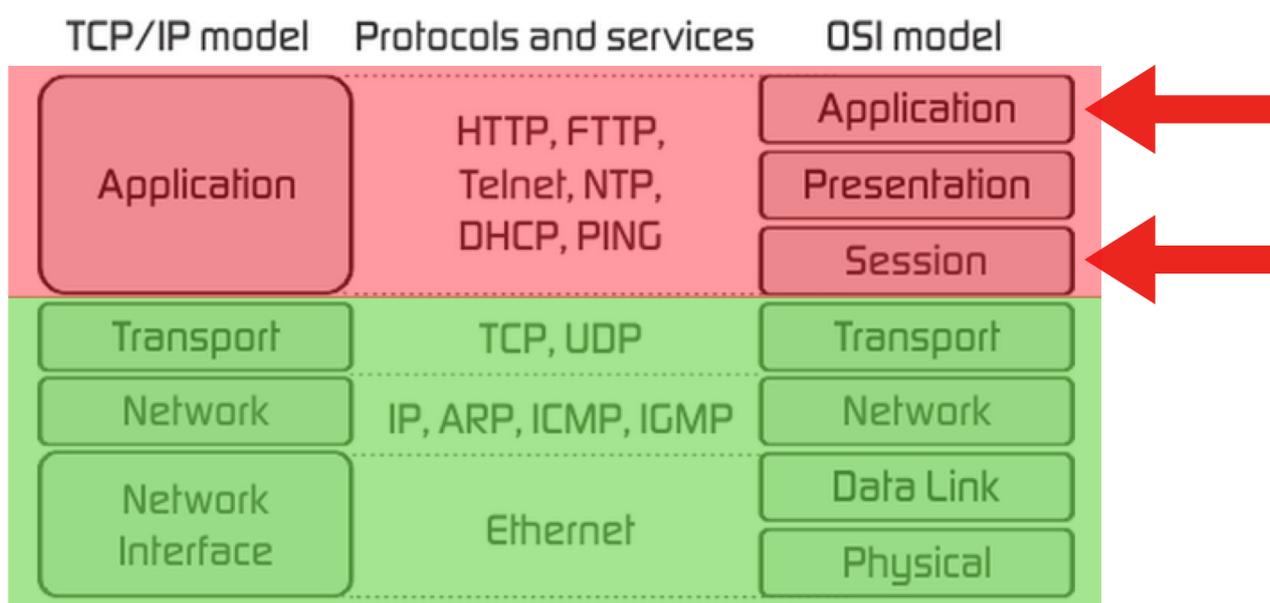
criteria amounts to the processing of every request for a video, an approximation of the playback position and the video quality requested by the user.

The Regulation clearly stipulates that traffic management measures “shall not monitor the specific content”, which BEREC has detailed in paragraphs 69 and 70 of the Guidelines:

*69. In assessing traffic management measures, NRAs should ensure that such measures do not monitor the specific content (i.e. transport layer protocol payload).*

*70. Conversely, traffic management measures that monitor aspects other than the specific content, i.e. the generic content, should be deemed to be allowed. Monitoring techniques used by ISPs which rely on the information contained in the IP packet header, and transport layer protocol header (e.g. TCP) may be deemed to be generic content, as opposed to the specific content provided by end-users themselves (such as text, pictures and video).*

Here we illustrate this guidance from BEREC and highlight the layer in the TCP/IP and OSI-model in which SNI, URL and DNS criteria reside:



*Illustration 16: Specific (red) and generic (green) content according to the BEREC Guidelines. The arrows point to the layers inspected when using SNI, URLs, or DNS as identification criteria*

The processing of such data is only possible with **Deep Packet Inspection (DPI)** equipment. To our knowledge the privacy policies of most operators do not properly inform about the privacy impacts from entering into such differential pricing programs. Even if one takes the view that informed consent of customers can solve this issue, it is insufficient to remedy the processing of information from non-consenting third parties communicating with users of such offers.

# Review of Selected Regulatory Actions

## Port blocking

Article 3(3) of the Regulation restricts traffic management practices when providing internet access service by placing a general non-discrimination obligation on IAS providers, subject to the exception of “reasonable traffic management measures”.

For reasons exhaustively enumerated in the third subparagraph, providers can go beyond reasonable traffic management measures, in order to comply with certain other legal obligations, in order to “preserve the integrity and security of the network, of services provided via that network, and of the terminal equipment of end-users”, and in order to “prevent impending network congestion and mitigate the effects of exceptional or temporary network congestion, provided that equivalent categories of traffic are treated equally”.

The main forms of traffic management broadly fall into two categories. Traffic shaping, where relaying networking equipment is configured to reorder packets in its internal packet buffers, thereby prioritising certain data streams over others or delaying the relay of certain streams, can be used for purposes such as lowering the latency of certain connections (such as Voice over IP services) or for prioritising internal management traffic over other traffic in cases of congestion.

A more severe form of traffic management is the outright blocking of certain services, i.e. not relaying certain types of network traffic at all. This often takes the form of not relaying traffic addressed to a particular port number at the receiving host. As port numbers correspond to particular types of services, such “port blocking” effectively suppresses the use or provision of certain services. As such, there is an inherent tension between port blocking measures and the preservation of the end-user rights defined by Article 3(1), providing that “end-users shall have the right to [...] use and provide applications and services [...] of their choice”, particularly where the port blocking is a permanent measure.

As port blocking is selective to particular services, it is a discriminatory traffic management practice and does not qualify as “reasonable traffic management” as defined by the second sub-paragraph of Article 3(3). IAS providers practicing port blocking must therefore rely on the aforementioned exceptions given in the third subparagraph in order to be in compliance with the Regulation. These exceptions are limited in purpose as well as in time by the Regulation (“as necessary for as long as necessary”). As a result, the assessment of a port blocking measure must be conducted on a case-by-case and port-by-port basis in order to determine whether there is sufficient justification for the practice under review.

In addition to information requests to IAS providers that are available to NRAs for monitoring purposes according to Article 5(2) of the Regulation, port blocking is comparatively simple to detect by technical measurements. Such technical measurements are also suggested by paragraph 172 of the Guidelines.

In view of this and the sensitivity of port blocking regarding the protection of end-user rights, we view enforcement action on port blocking as indicative of the rigorousness of wider enforcement practices

regarding traffic management. Unfortunately, detailed information on port blocking cases is not contained in most NRAs' net neutrality reports.

Where there is information given, NRAs sometimes mention the blocking of very popular types of ports. For instance, the Polish report mentions two cases of a blocking of ingress traffic to port 80. The blocking of this port makes the provision of web services impossible for end-users. Despite this, the report mentions that the regulator did not consider any traffic management practices to be in violation of the regulation.

The blocking of port 25 (TCP), in particular its permanent blocking, presents an interesting case as regards to differing decisions of regulators regarding justifications for the blocking of this port. Port 25 is used to deliver e-mail to mail transfer agents, i.e. the ability to being able to send e-mail or to relay e-mail depends on the ability to connect to port 25 or receive connections on port 25. End-users, wanting to send e-mail can often also rely on other ports (465 and 587) to submit their e-mail to a mail submission agent. Where they want to operate a mail transfer agent themselves, however, proper interoperability requires port 25 to be reached.

Due to its importance for e-mail delivery, connections to port 25 are abused by malware that may be installed on customers' terminal equipment in order deliver spam e-mail, and as a consequence can lead to the blacklisting of network segments with e-mail providers. As such, IAS providers justify the blocking of port 25 with the preservation of the integrity and security of the network. However, regulators differ in their assessment of this this argument. For instance, both the Austrian and the Latvian regulators detail cases in their reports where port 25 was blocked permanently by an IAS provider. The Latvian regulator, responding to an end-user complaint where a user could only submit e-mail by port 25 due to restrictions of their terminal equipment, considered this permanent blocking unjustified. The Austrian regulator on the other hand considered the blocking of port 25 justified as a replacement for a different noncompliant traffic management measure.

According to a BEREC report on the implementation of the Regulation<sup>32</sup>, the French regulator does not consider the blocking of port 25 to restrict users' freedom to provide services as the allocation of IP addresses to end-users only takes place dynamically and the provision of e-mail services is therefore unrealistic in the first place. However, this ignores the possibility of using dynamic DNS services, which allow the operation of e-mail services even when only dynamically assigned IP addresses are available.

Among the wider area of monitoring the compliance of traffic management practices port blocking cases are comparatively simple and therefore reveal an inconsistent picture lacking a harmonised approach. In December 2018, ENISA published a methodology for assessing whether traffic management practices can be justified under the "security and integrity" exception.<sup>33</sup> It remains to be seen whether this leads to a more consistent and transparent enforcement of the Regulation in this area.

## Application-agnostic usage-based congestion management

The Cyprus NRA OCECPR has detailed in their 2017 report an interesting case of congestion management:

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32 [https://berec.europa.eu/eng/document\\_register/subject\\_matter/berec/reports/8256-report-on-the-implementation-of-regulation-eu-20152120-and-berec-net-neutrality-guidelines](https://berec.europa.eu/eng/document_register/subject_matter/berec/reports/8256-report-on-the-implementation-of-regulation-eu-20152120-and-berec-net-neutrality-guidelines)

33 <https://www.enisa.europa.eu/publications/guideline-on-assessing-security-measures-in-the-context-of-article-3-3-of-the-open-internet-regulation>

*“A cable ISP makes use of a traffic management system which monitors all network channels (local cable network) within 15 minutes. If any channel reaches a certain high level of usage (currently set at 85%), the system reduces the access speed for the 25 most active users of that channel, based on the data volume of the previous 15 minutes, by 20 % of maximum speed. If a subscriber whose speed is already reduced is still among the 25 most active users, the low speed is maintained for the next time, provided that the channel continues to be highly utilized. Otherwise, the access speed is restored to the maximum level.”*

This type of application-agnostic usage based congestion management has also been implemented by the American IAS provider Comcast in 2008 as detailed in an RFC<sup>34</sup>.

OCECPR argues that the IAS provider in question violated Article 3(3) of the Regulation by distinguishing between users making use of the same channel. However, Article 3(3)(c) allows IAS providers to take measures going beyond non-discriminatory traffic management “as necessary, and only for as long as necessary, in order to [...] prevent impending network congestion and mitigate the effects of exceptional or temporary network congestion, provided that equivalent categories of traffic are treated equally”. The type of application-agnostic traffic management practiced by the IAS provider in question is mentioned in paragraph 92 of the Guidelines as an alternative to application-specific traffic management practices to mitigate impending network congestion.

While the concrete choice of parameters (trigger level, monitoring window time, etc.) may be up for debate, we similarly consider such measures to be preferable to traffic management practices based on application or service type, which are more intrusive into the privacy of all users in the affected parts of the network.

In its 2017 report the Hungarian regulator NMHH mentions a similar case of congestion management of an IAS provider that throttles “excess traffic generating subscribers” which has led to an investigation<sup>35</sup>.

## Throttling of adaptive bitrate video-streaming services

Since the advent of the Regulation and the corresponding Guidelines, several zero-rating products have been introduced in the European market that combine the detection of specific categories of traffic for zero-rating purposes with the throttling of traffic belonging to that category. Products with this property include “StreamOn” by Deutsche Telekom in Germany, and “FreeStream” by Austrian MNO A1. In both cases, regulators have intervened regarding these practices insofar as throttling is concerned, however court cases are still pending. Additionally, in Germany, the Terms and Conditions of “Pass” products by MNO Vodafone contain a clause that gives the operator the right to introduce such a practice.

The first of these products to be introduced was “StreamOn”, which consists of three different packages called “StreamOn Music”, “StreamOn Music&Video”, and “StreamOn Music&Video Max” that customers can order free of charge in addition to a mobile phone contract. The availability of the packages depends on the type of contract that the customer uses, where “StreamOn Music&Video” is available only in contracts with higher included data volume, and “StreamOn Music&Video Max” is usually available only to customers with mobile-landline hybrid contracts (“MagentaEINS”). Both

34 See RFC6057: <https://tools.ietf.org/html/rfc6057>

35 See page 10: [http://english.nmhh.hu/document/189682/report\\_on\\_net\\_neutrality\\_hungary\\_between\\_30\\_april\\_2016\\_30\\_april\\_2017.pdf](http://english.nmhh.hu/document/189682/report_on_net_neutrality_hungary_between_30_april_2016_30_april_2017.pdf)

“StreamOn Music&Video” and “StreamOn Music&Video Max” feature zero-rating of an identical range of video streaming services, however only in the case of “StreamOn Music&Video”, adaptive-bitrate video streaming services are throttled to a bandwidth of 1.7 Mbit/s (SD or DVD Quality, 480p).

Adaptive-bitrate streaming video is a video streaming technique whereby the same source material is encoded using various bitrates (quality levels) and delivered in a way such that streaming clients can switch between different bitrate material seamlessly. For this purpose, the streaming client initially downloads a so-called “manifest” file which contains information on the different quality sources and performs transmission speed measurements during playback to fill its playback buffer with source material in a bitrate that can be played back without interruption using the given internet connection. The streaming client can also use additional criteria to select the bitrate to be played, such as honouring a specific user request, or (as streams with different bitrates are usually encoded using different video resolutions) selecting a stream that corresponds to the display resolution of the playing device.

When video is streamed using the adaptive-bitrate streaming technique, throttling the video stream will therefore not cause playback to stutter but instead, the streaming client will select an appropriately low-quality stream in order to make uninterrupted playback possible. However, detecting adaptive-bitrate video traffic in an operator’s network for the purpose of throttling such transmissions is not straightforward at all. The most-used adaptive-bitrate video streaming protocols make use of HTTP or its encrypted variant HTTPS for the transmission of both the manifest file as well as the video streams themselves. In particular where these connections are encrypted, they are not superficially different from regular web traffic, and even circumstantial indicators such as bandwidth usage patterns over time are not necessarily different from video streams not using the adaptive-bitrate streaming technique. The fact that video streaming providers who want to participate in the “StreamOn” product as a zero-rated stream must provide Deutsche Telekom with specific information on how to detect their particular streaming traffic enables Deutsche Telekom to use these same identifiers to throttle their video streaming traffic.

Article 3(3) of the Regulation concerns itself with technical discrimination of traffic such as the throttling of specific video streams. Subject to specific exceptions which do not apply in the case of StreamOn, it provides that:

*Providers of internet access services shall treat all traffic equally, when providing internet access services, without discrimination, restriction or interference, and irrespective of the sender and receiver, the content accessed or distributed, the applications or services used or provided, or the terminal equipment used.*

*The first subparagraph shall not prevent providers of internet access services from implementing reasonable traffic management measures. In order to be deemed to be reasonable, such measures shall be transparent, non-discriminatory and proportionate, and shall not be based on commercial considerations but on objectively different technical quality of service requirements of specific categories of traffic. Such measures shall not monitor the specific content and shall not be maintained for longer than necessary.*

Since throttling of specific video streams undoubtedly amounts to “restriction or interference” and is not “irrespective of the sender and receiver”, it is necessary to evaluate whether this aspect of StreamOn meets the criteria of the test for “reasonable traffic management measures” as defined in the second subparagraph of Article 3(3). However, this is not the case: the fact that Deutsche Telekom

specifically throttles video streams, which are very traffic intensive, video traffic that it does not bill to its customers (when they have booked the “StreamOn Music&Video” package), and that it only does so for customers with specific types of contract (and not customers in their hybrid-landline segment who are eligible for “StreamOn Music&Video Max” where no throttling takes place) are clear indications that the throttling is based on commercial considerations. Additionally, since StreamOn can make use of traffic identifiers that can only be detected using Deep Packet Inspection equipment, where it does so, Deutsche Telekom “monitor[s] specific content” in order to perform the throttling.

Before the German regulator, BNetzA, Deutsche Telekom justified the throttling using an argument originally published by Prof. Dr. Thomas Fetzter<sup>36</sup>, whereby Article 3(3) only applies when IAS providers perform traffic management unilaterally, i.e. when the customer does not consent to it as part of their contract with the IAS provider, and agreements between IAS providers and customers are only governed by Articles 3(1) and 3(2). Both BNetzA and the Administrative Court of Cologne, where Deutsche Telekom applied for judicial review of BNetzA’s decision, rejected this argument.<sup>3738</sup> The Court in particular noted that, as IAS providers provide internet access services primarily in fulfilment of a contract with their customers, Deutsche Telekom’s interpretation would render Article 3(3) largely ineffective<sup>39</sup>.

Similar cases have been evaluated by many NRAs and in some cases regulatory intervention was hesitant<sup>40</sup>. We would urge BEREC to clarify this issue in the upcoming reform.

## Network measurement software

Net neutrality relates to network measurement software like environmental protection relates to air pollution sensors. In order to enforce the principle in practice it is important to empower as many people as possible to measure for compliance from their vantage point, while obtaining an open data record on the development of the situation over time. From the perspective of the Regulation we can identify four concrete use cases for such tools which all reflect on NRAs:

1. The detection of unreasonable traffic management practices<sup>41</sup>. Some NRAs rely in their enforcement of the provisions on traffic management completely on end-user complaints or the statements of IAS providers about their networks. It is reasonable for a regulator to provide a toolset to citizens or its own technical department to identify potential violations of net neutrality. Simple tests include the detection of port blocking, more elaborate tests are necessary to identify the throttling or modification of individual applications or classes of applications.
2. Establishing the real performance and quality parameters of an IAS by a monitoring mechanism certified by the NRA and thereby enable the end-user to trigger remedies against non-compliant IAS contracts<sup>42</sup>. (see chapter below)

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36 Fetzter, Thomas: Zulässigkeit von Zero-Rating-Angeboten und Traffic-Shaping-Maßnahmen. MMR 2017, 579

37 BNetzA, Entscheidung zur Zubuchoption “StreamOn” der Telekom Deutschland GmbH. Online at: [https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Telekommunikation/Unternehmen\\_Institutionen/Breitband/Netzneutralitaet/Entscheidung\\_zu\\_StreamOn.pdf](https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Telekommunikation/Unternehmen_Institutionen/Breitband/Netzneutralitaet/Entscheidung_zu_StreamOn.pdf)

38 Verwaltungsgericht Köln, 1 L 253/18. Online at: [https://www.justiz.nrw.de/nrwe/ovgs/vg\\_koeln/j2018/1\\_L\\_253\\_18\\_Beschluss\\_20181120.html](https://www.justiz.nrw.de/nrwe/ovgs/vg_koeln/j2018/1_L_253_18_Beschluss_20181120.html)

39 *ibid.*, paragraph 21

40 See page 3-5 of the 2018 Romanian report: [http://www.ancom.org.ro/en/uploads/links\\_files/Raport\\_NN\\_2018\\_EN.pdf](http://www.ancom.org.ro/en/uploads/links_files/Raport_NN_2018_EN.pdf)

41 According to Article 3(3) of the Regulation.

42 According to Article 4(1) of the Regulation.

3. NRAs shall promote the continued availability of non-discriminatory IAS at levels of quality that reflect advances in technology<sup>43</sup>. Annual reports of NRAs which are fully compliant with the requirements set out in the BEREC guidelines paragraph 183 offer the multi-annual development of the actual performance of IAS via specific access technologies (copper, coaxial, fibre, 3G, 4G, etc.)
4. Ensuring that the provision of specialised services does not deteriorate the availability or general quality of IAS for end-users<sup>44</sup>. This requirement has to be seen in conjunction with the previous one. It requires historical data on the development of the actual internet performance in a country. With upcoming 5G networks and the intensified usage network slices the establishment of a record on IAS performance becomes a time critical requirement for NRAs. It is to be expected that the backhaul of 5G networks will share parts of the same backbone as existing networks and cannot therefore not be viewed in isolation.

Since the regulation came into effect, BEREC has launched a project to create a Europe-wide measurement solution which aims at providing a uniform solution to these problems. After a broad stakeholder consultation, the methodology of this tool was adopted and handed via a call for tenders<sup>45</sup> to a consortium of Alladin-IT GmbH from Austria and zafaco GmbH from Germany<sup>46</sup> who will release the BEREC reference measurement tool in late 2019. The tool follows the three principles several civil society stakeholders have asked for<sup>47</sup>:

*1) Open Methodology – the specification of the technical measurement and analytical choices about processing and aggregating the data have to be published in full detail and be up for consultation and peer review.*

*2) Open Data – measurement results should be accessible in an open, machine readable form under a free licence via a centralised platform.*

*3) Open Source – the measurement tools which are developed, used or propagated by NRAs should be open source and, if at all possible, published under a free software licence.*

Following these principles does not only inspire trust from internet users which in turn incentivises them to test their own internet connection and create valuable data sets, it also helps the enforcement of NRAs. Opening up the measurement data to independent researchers allows for independent evaluation, European-wide comparison and is ultimately changing the risk assessment of IAS providers. Any unreasonable traffic management practice which might be recorded in a freely accessible data set can at any later point cause an investigation into the IAS provider's traffic management policies and spark a public discussion.

Although the BEREC measurement tool will be freely available as open-source software, it is unclear as of now how many NRAs will adopt it or even certify the tool according to the Regulation (see next chapter). It is also unclear if a European-wide open data poll will be created or which types of traffic management practices this tool will be able to detect. For example, the aforementioned very common

43 According to Article 5(1) of the Regulation.

44 According to Article 3(5) of the Regulation.

45 <https://etendering.ted.europa.eu/cft/cft-display.html?cftId=2319>

46 [https://berec.europa.eu/eng/news\\_and\\_publications/whats\\_new/5045-net-neutrality-measurement-tool-result-of-the-tender](https://berec.europa.eu/eng/news_and_publications/whats_new/5045-net-neutrality-measurement-tool-result-of-the-tender)

47 More on this subject in the written response to BEREC stakeholder meeting on network measurement <https://epicenter.works/document/353> and in the consultation response to the BEREC Net Neutrality Regulatory Assessment Methodology <https://epicenter.works/document/546>

violation of adaptive bitrate video throttling might not be detectable, although other measurement applications like Wehe have proven that this is possible<sup>48</sup>. Application-specific measurements are key to ensuring proper enforcement against the most common types of unreasonable traffic management practices.

In the 2018 BEREC report on the implementation of the Regulation and Guidelines, 19 NRAs have stated that they offer IAS quality monitoring tools (AT, CY, CZ, DE, DK, EL, HR, HU, IT, LT, LU, LV, NL, NO, PT, RO, SI, SK and UK) and 10 still do not (BE, BG, EE, ES, FI, FR, IE, MT, PL and SE). According to preliminary research<sup>49</sup> the following table lists the network measurement tools NRAs offer to their users:

Country	NRA	Measurement Tool
Austria	RTR	<a href="https://www.netztest.at">https://www.netztest.at</a>
Belgium	IBPT / BIPT	-
Bulgaria	CRC	-
Croatia	HAKOM	<a href="https://hakometarplus.hakom.hr/home">https://hakometarplus.hakom.hr/home</a>
Cyprus	OCECPR	<a href="http://2b2t.ocepr.org.cy">http://2b2t.ocepr.org.cy</a>
Czech Republic	CTU	<a href="https://www.netmetr.cz">https://www.netmetr.cz</a>
Denmark	DBA	<a href="https://tjekditnet.dk/">https://tjekditnet.dk/</a>
Estonia	ETRA	-
Finland	FICORA	-
France	ARCEP	<a href="https://www.arcep.fr/en/news/press-releases/detail/n/open-internet.html">https://www.arcep.fr/en/news/press-releases/detail/n/open-internet.html</a>
Germany	BNetzA	<a href="https://breitbandmessung.de/">https://breitbandmessung.de/</a>
Greece	EETT	<a href="https://hyperiontest.gr/?action=dashboard&amp;v=tools">https://hyperiontest.gr/?action=dashboard&amp;v=tools</a>
Hungary	NMHH	<a href="http://szelessav.net/en/internet_speedtest">http://szelessav.net/en/internet_speedtest</a>
Iceland	PTA	-
Ireland	COMREG	-
Italy	AGCOM	<a href="https://www.misurainternet.it/">https://www.misurainternet.it/</a>
Latvia	SPRK	<a href="https://itest.sprk.gov.lv/solis1">https://itest.sprk.gov.lv/solis1</a>
Luxembourg	AK	-
Lithuania	RRT	<a href="http://matuok.lt/">http://matuok.lt/</a>
Luxembourg	ILR	-
Malta	MCA	-
Norway	Nkom	<a href="http://www.nettfart.no">www.nettfart.no</a>
Poland	UKE	<a href="http://www.speedtest.pl/">http://www.speedtest.pl/</a>
Portugal	ANACOM	<a href="https://netmede.pt/">https://netmede.pt/</a>
Romania	ANCOM	<a href="http://www.netograf.ro/">http://www.netograf.ro/</a>
Slovak Republic	RÚ	<a href="https://www.meracinternetu.sk/sk/test">https://www.meracinternetu.sk/sk/test</a>
Slovenia	AKOS	<a href="https://www.akostest.net/en/newtest/">https://www.akostest.net/en/newtest/</a>
Spain	CNMC	-

48 <http://david.choffnes.com/pubs/imc095-molavi-kakhkiA.pdf>

49 Based on information from annual reports, websites and inquiries to NRAs. We welcome tips to [nn@epicenter.works](mailto:nn@epicenter.works).

Country	NRA	Measurement Tool
Sweden	PTS	<a href="http://www.bredbandskollen.se/">http://www.bredbandskollen.se/</a>
The Netherlands	ACM	<a href="https://speed.measurementlab.net/nl/#/">https://speed.measurementlab.net/nl/#/</a>
United Kingdom	OFCOM	<a href="https://checker.ofcom.org.uk/">https://checker.ofcom.org.uk/</a>

## Enforcement of transparency provisions

According to the transparency obligations for IAS providers of Article 4 of the Regulation, all contracts should include information about traffic management practices the IAS provider may apply, how they impact the service and privacy of the end-user, impacts of volume limitations and QoS parameters on the services used, the impact specialised services might have on internet access services, minimum/average/maximum speeds for fixed line connections and maximum and advertised speeds for mobile connections, and remedies available to the end-user in accordance with national law when there is a continuous or regularly recurring discrepancy between the actual performance of the internet access service regarding these contractual terms.

According to the debriefing of the 36th BEREC Plenary Meetings<sup>50</sup> even two and a half years after the Regulation came into effect in almost half of the countries, IAS providers have not yet included required speed information in their contracts. In our experience these problems include the lack of contractually agreed speeds and missing or incomplete information on traffic management practices applicable to this internet connection, and in particular in the privacy implications of traffic management practices and differential pricing practices. This serious consumer protection problem shows a lack of enforcement and supervision from NRAs as well as challenge for the European Commission regarding this **systematic disregard for European law**.

Furthermore, Article 4(4) of the Regulation lays out a procedure to remedy non-compliant internet access products:

*“Any significant discrepancy, continuous or regularly recurring, between the actual performance of the internet access service regarding speed or other quality of service parameters and the performance indicated by the provider of internet access services in accordance with points (a) to (d) of paragraph 1 shall, where the relevant facts are established by a monitoring mechanism certified by the national regulatory authority, be deemed to constitute non-conformity of performance for the purposes of triggering the remedies available to the consumer in accordance with national law.”*

Yet, in paragraph 161 of the Guidelines BEREC interprets this provision as not creating an obligation:

*“[...] the Regulation does not require Member States or an NRA to establish or certify a monitoring mechanism.”*

According to the 2018 BEREC implementation report<sup>51</sup> only four NRAs have certified a mechanism for monitoring the quality of IAS (HR, DE, IT and RO). The Polish regulator UKE has indicated in their 2018 report to certify a tool by the end of 2018 and the Austrian regulator RTR is working on a certified tool

50 See slides of BEREC Chair in the Public debriefing on outcomes of the 36th BEREC plenary meetings: [https://berec.europa.eu/eng/document\\_register/subject\\_matter/berec/download/0/8258-berec-chair-presentation-during-the-publ\\_0.pdf](https://berec.europa.eu/eng/document_register/subject_matter/berec/download/0/8258-berec-chair-presentation-during-the-publ_0.pdf)

51 [https://berec.europa.eu/eng/document\\_register/subject\\_matter/berec/reports/8256-report-on-the-implementation-of-regulation-eu-20152120-and-berec-net-neutrality-guidelines](https://berec.europa.eu/eng/document_register/subject_matter/berec/reports/8256-report-on-the-implementation-of-regulation-eu-20152120-and-berec-net-neutrality-guidelines)

after a recent reform in the national telecom code obliges them to do so. Contrary to the BEREC position in the Guidelines, we see an obligation for NRAs to offer consumers a trusted tool to assess the performance of their IAS products.

Some NRAs hold the opinion that once a NRA has certified a measurement software in their country it would act as a certified measurement software in all EEA countries. We hope the BEREC measurement tool will make this issue obsolete. Yet, we would like to highlight that measuring an internet connection against a measurement server not well connected with the home network/country could introduce systematic errors in the results.

The current regime could be seen as a complete nationalisation of the enforcement of Article 4. We call on BEREC to explore a more harmonised approach in the upcoming reform of the Guidelines and to safeguard against certain loopholes that operators have used to circumvent the provisions of the regulation<sup>52</sup>.

## Specialised services

The only enforcement case concerning a specialised service we are aware of was conducted in Austria, where the NRA prohibited the prioritisation of traffic associated with an IPTV product by Telekom Austria. Traffic transmitted as part a Video-on-Demand service separate from a constant-bitrate live feed was marked using “p-bit marking” according IEEE 802.1p, and traffic that was marked accordingly was prioritised in the access network to the detriment of the internet access service provided over the same network. The NRA concluded that this prioritisation was not objectively necessary in order to provide the service, and that providing the Video on Demand service as a specialised service constituted a violation of Article 3(5) of the Regulation.

This regulatory scrutiny is admirable and we believe there to be similar offers in the European market. To ensure compliance with the requirements laid out in Article 3(5), NRAs need to monitor the functionality of already provisioned specialised services to detect function creep, in which new functionality is added to already provisioned services and thereby circumvents the requirements of the Regulation that the content, application or service itself requires the specific quality of service. An example we believe to be a problem in Europe is on-demand pay-TV services in Triple Play products (IPTV).

We would urge EU decision makers to keep the current rules on specialised services in place. So far no example of a specialised service has emerged which could not be adequately assessed using the current framework and calls for diluting this central aspect of the European net neutrality protections have not been substantiated with evidence<sup>53</sup>.

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52 For example this case of T-Mobile Austria where the contractually agreed maximum speed was a fraction of the advertised speed [https://verbraucherrecht.at/cms/index.php?id=49&tx\\_ttnews%5Btt\\_news%5D=4292&cHash=dfc382acb93ce37d1a97fbfd44d1b5de](https://verbraucherrecht.at/cms/index.php?id=49&tx_ttnews%5Btt_news%5D=4292&cHash=dfc382acb93ce37d1a97fbfd44d1b5de) (German)

53 See the debate at the recent global IGF in Paris: <https://www.youtube.com/watch?v=RH6bdkf6Tb0>

# 5G – Challenges with the Next Generation Mobile Network Standard

## Network slicing

The 5G specifications include support for the provision of multiple “virtual” networks over the same physical infrastructure under the name “Network Slicing”, where “network slices” represent such isolated virtual networks. Crucially, network slices do not only provide for isolation but can also be configured to provide different QoS parameters to their users, and unlike other QoS techniques that operate on higher layers of the transmission stack, extend these techniques to the radio communications layer. In particular, the 5G specifications foresee at least two additional types of network slices next to the “enhanced Mobile Broadband” (eMMB) type: a slice type for “ultra-reliable low latency communications” (URLLC) and a low-power slice type for “massive IoT” (MIoT).<sup>54</sup>

The BEREC Guidelines explicitly mention 5G network slicing only in the context of “specialised services”, referring to Article 3(5) of the Regulation, which exempts the provision of certain types of services from other parts of the Regulation, provided they are not internet access services and do not negatively impact internet access services provided over the same network:

*“Providers of electronic communications to the public, including providers of internet access services, and providers of content, applications and services shall be free to offer services other than internet access services which are optimised for specific content, applications or services, or a combination thereof, where the optimisation is necessary in order to meet requirements of the content, applications or services for a specific level of quality.*

*Providers of electronic communications to the public, including providers of internet access services, may offer or facilitate such services only if the network capacity is sufficient to provide them in addition to any internet access services provided. Such services shall not be usable or offered as a replacement for internet access services, and shall not be to the detriment of the availability or general quality of internet access services for end-users.”*

This view on 5G network slices makes sense in the context of equipment manufacturers’ and mobile operators’ arguments as to the advantages of 5G over previous generations of mobile networks. However, 5G network slices have broader potential applications than only the provision of specialised services as a closer examination of the standard reveals. In particular, mobile devices will be aware of multiple types of network slices and will be able to access multiple slices (and as such, multiple types of slices) simultaneously,<sup>55</sup> and network slices will be able to be created, modified and destroyed dynamically.<sup>56</sup> This creates new flexibility for operators when using network slices to provide internet access services, which is not covered by Article 3(5).

In particular, network slices could be used as a QoS technology where users would access different services or types of services on the internet through different network slices. Such practices, where

54 3GPP TS 23.501 V15.2.0, section 5.15.2.2

55 *ibid.*, section 5.15

56 3GPP TS 22.261 V15.5.0, section 6.1.2

these slices offer different QoS parameters would have to be assessed according to the rules for traffic management in Article 3(3) of the Regulation, and where the use of network slices is billed depending on the slice used, this comes into the scope of Articles 3(1) and 3(2).

Additionally, an internet access service as a whole could be served through different network slices for specific customers, e.g. prioritising them over other customers. This practice is likely considered by BEREC to be in line with the Regulation, as in its 2016 report on the outcome of the public consultation on the draft Guidelines, BEREC states:<sup>57</sup>

*“In response to some stakeholders’ requests for the Guidelines to allow differentiated traffic management between different IAS subscriptions, BEREC considers that the Regulation does allow for such differentiation to some extent, for example to fulfil contractual agreements on data volumes and speeds.”*

Operators could also provide multiple internet access services with different QoS parameters (which could be implemented by providing multiple network slices with such differentiated QoS parameters) to the same user as part of the same access product. As part of a report on 5G in the context of the European net neutrality rules<sup>58</sup>, TNO concluded that such a model, though dependent on the interpretation of “sender” and “receiver” in Article 3(3) of the Regulation, is likely to be permissible.

The crucial distinction between whether the use of network slices for the prioritisation of certain traffic constitutes the provision of multiple internet access services on the one hand, or the provision of an access service with potentially unreasonable traffic management measures or bundled specialised services on the other, is made by whether **the choice of which of the multiple available access mechanisms to use rests entirely with the user**. Where network slicing is provided in a way that each slice with different QoS characteristics is not accessible in an application-agnostic manner, or where the decision on which application is to make use of which slice under which circumstances is not made by the user (e.g. through the configuration of their mobile device), the network slices in question must not be assessed as constituting of multiple internet access services, as they must each provide for the end-user rights of Article 3(1).

This view is analogous to the view expressed by BEREC in its Opinion for the evaluation of the application of Regulation (EU) 2015/2120 and the BEREC Net Neutrality Guidelines<sup>59</sup> clarifying the rules for the provision of internet access services with different QoS characteristics today. BEREC states:<sup>60</sup>

*For example, an ISP is allowed to sell IAS subscriptions with different QoS parameters (e.g. speed, latency, packet loss etc.) in mobile as well as fixed networks using QoS classes to implement these IAS subscription characteristics. This follows from Art. 3(2). Furthermore, the Regulation does not prevent end-users from buying more than one subscription with different QoS classes, and using them as they want for different applications. None of the aforementioned offers may limit end-users’ rights as Article 3(2) refers to Article 3(1) to prescribe this. It should be noted, that such QoS classes must be implemented in an application-agnostic manner.*

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57 See page 20: [https://berec.europa.eu/eng/document\\_register/subject\\_matter/berec/reports/6161-berec-report-on-the-outcome-of-the-public-consultation-on-draft-berec-guidelines-on-the-implementation-by-national-regulators-of-european-net-neutrality-rules](https://berec.europa.eu/eng/document_register/subject_matter/berec/reports/6161-berec-report-on-the-outcome-of-the-public-consultation-on-draft-berec-guidelines-on-the-implementation-by-national-regulators-of-european-net-neutrality-rules)

58 <https://www.tno.nl/en/about-tno/news/2018/4/5g-net-neutrality-a-tno-study/>

59 [https://berec.europa.eu/eng/document\\_register/subject\\_matter/berec/opinions/8317-berec-opinion-for-the-evaluation-of-the-application-of-regulation-eu-20152120-and-the-berec-net-neutrality-guidelines](https://berec.europa.eu/eng/document_register/subject_matter/berec/opinions/8317-berec-opinion-for-the-evaluation-of-the-application-of-regulation-eu-20152120-and-the-berec-net-neutrality-guidelines)

60 *ibid.*, p. 7-8

It should be mentioned that significant use of 5G networks and network slicing for the provision of specialised services appears uncertain at the moment. A report on the implications of 5G deployment on future business models by DotEcon and Axon Partners commissioned by BEREC<sup>61</sup> examined various potential use-cases for 5G network features, including network slicing, taking into account the existing capabilities of 4G networks, and concluded that it could not find a “killer application” for 5G that would create a significant new revenue source for operators. The main benefit of 5G remains faster mobile broadband communications.

## Edge computing

5G provides for the possibility of third-party services to be hosted from within an operator’s network for the purpose of achieving very low round trip times for users of specific applications. Where hosting in this manner is necessary to provide a particular type of service, mobile network operators find themselves in a gate-keeping role. Should open standards for the hosting of edge computing services not develop, it can “lock in” service providers to their specific realisation of edge computing.

The practical applications for edge computing remain uncertain. A potential application identified by the aforementioned DotEcon/Axon report are augmented reality services, where computing capacity provided via edge computing could lower necessary computing capacity on mobile devices themselves. However, the report could not identify a live use case that is likely to benefit.

## Applications within the limits of the Regulation

As described, new 5G features such as network slicing have potential applicability that is in line with the Regulation, and the assessment of whether this is the case highly depends on the use of these features and the design of access products and specialised services offered by network operators.

Of particular practical concern is that, should 5G lead to a significant increase in the use of specialised services over mobile networks, the provision of Article 3(5), second subparagraph, that specialised services cannot be provided to the detriment of availability or general quality of internet access services, may be difficult to enforce. While the deterioration of internet access services is in principle detectable by the examination of time-series data collected for example by the internet measurement tool or other independent network measurement databases, it may be difficult to definitively conclude that network resources occupied by specialised services provided over the same network infrastructure are to blame. In this context, we find the fact that many NRAs in Europe do not report on the continued availability of non-discriminatory IAS at levels of quality that reflect advances in technology in their reports worrying. Without historical data, a later impact assessment on the effects of the provisioning of new specialised services becomes impossible.

The aforementioned TNO report examines the regulatory complexity of questions introduced specialised services provided using 5G capabilities by examining three different use cases in more detail. We are looking forward to continuing this discussion.

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61 [https://berec.europa.eu/eng/document\\_register/subject\\_matter/berec/reports/8008-study-on-implications-of-5g-deployment-on-future-business-models](https://berec.europa.eu/eng/document_register/subject_matter/berec/reports/8008-study-on-implications-of-5g-deployment-on-future-business-models)

# Methodology & Data

## Annex 1 – Annual NRA reports

According to Article 5 of the Regulation NRAs are obliged to release annual reports about their findings according to their supervision and enforcement duties under the Regulation. This data set shows the fulfilment of this obligation of the 31 EU and EEA countries in the scope of the Regulation. In the cases of Spain and Denmark the listed national telecom regulatory agency is not tasked with the protection of net neutrality for consumers, although they participate in the regulatory discussion on the EU level and are Body of European Regulators for Electronic Communications (BEREC) member organisations.

All underlying data was gathered from the websites of the NRAs, the information service portal of BEREC and inquiries to the NRA in question. Data was gathered from 24 August until 11 September 2018. Additionally to the annual net neutrality reports and their English translations, if they exist, we also gathered data on information to end-users about complaint mechanisms for net neutrality violations and reporting on previous enforcement cases.

Net neutrality reports of the years 2017 and 2018 were collected, in the native language as well as in English.

Name of the item	Category of the item	Description
Country	General information	The country name.
NRA	General information	The name and abbreviation of the National Regulatory Authority (NRA) tasked with telecom regulation.
2017 and 2018: Report (Native)	Net Neutrality Report	The Hyperlink to the Net Neutrality Report of the NRA in the native language of the Member State. If there is more than one native language, the language of the largest demographic group was added.
2017 and 2018: Report (English)	Net Neutrality Report	The Hyperlink to the Net Neutrality Report of the NRA in English language.

### Data Set

Country	NRA	Report 2017		Report 2018	
		National Language	English	National Language	English
Austria	Austrian Regulatory Authority for Broadcasting and Telecommunications, RTR-GmbH	<a href="https://www.rtr.at/de/inf/NNBericht2017">https://www.rtr.at/de/inf/NNBericht2017</a>	<a href="https://www.rtr.at/en/inf/NNBericht2017">https://www.rtr.at/en/inf/NNBericht2017</a>	<a href="https://www.rtr.at/de/inf/NNBericht2018">https://www.rtr.at/de/inf/NNBericht2018</a>	<a href="https://www.rtr.at/en/inf/NNBericht2018">https://www.rtr.at/en/inf/NNBericht2018</a>
Belgium	Institut Belge des Postes et Télécommunications, IBPT / BIPT	<a href="http://www.bipt.be/public/files/nl/22267/2017-06-29_NN-2016-2017_NL.pdf">http://www.bipt.be/public/files/nl/22267/2017-06-29_NN-2016-2017_NL.pdf</a>	-	<a href="http://www.ibpt.be/public/files/nl/22531/Netneutraliteit_jaarverslag_2017-2018.pdf">http://www.ibpt.be/public/files/nl/22531/Netneutraliteit_jaarverslag_2017-2018.pdf</a>	<a href="http://www.ibpt.be/public/files/en/22531/Net_Neutrality_Annual_Report_2017-2018.pdf">http://www.ibpt.be/public/files/en/22531/Net_Neutrality_Annual_Report_2017-2018.pdf</a>

Country	NRA	Report 2017		Report 2018	
		National Language	English	National Language	English
Bulgaria	Communications Regulation Commission, CRC	<a href="http://www.crc.bg/files/bg/Anual_Report-NN_2017.pdf">http://www.crc.bg/files/bg/Anual_Report-NN_2017.pdf</a>	<a href="http://www.crc.bg/files/en/CRC_Anual_Report-NN_2017_EN.pdf">http://www.crc.bg/files/en/CRC_Anual_Report-NN_2017_EN.pdf</a>	<a href="http://crc.bg/files/bg/%D0%93%D0%BE%D0%B4%D0%B8%D1%88%D0%B5%D0%BD%D0%B4%D0%BE%D0%BA%D0%BB%D0%B0%D0%B4%D0%B7%D0%B0_2017%D0%93_25062018.pdf">http://crc.bg/files/bg/%D0%93%D0%BE%D0%B4%D0%B8%D1%88%D0%B5%D0%BD%D0%B4%D0%BE%D0%BA%D0%BB%D0%B0%D0%B4%D0%B7%D0%B0_2017%D0%93_25062018.pdf</a>	<a href="http://www.crc.bg/files/en/NN_Impl_and_Sup_NN_Questionnaire_2018_EN_final_za_zasedanie1.pdf">http://www.crc.bg/files/en/NN_Impl_and_Sup_NN_Questionnaire_2018_EN_final_za_zasedanie1.pdf</a>
Croatia	Croatian Regulatory Authority for Network Industries, HAKOM	<a href="https://www.hakom.hr/UserDocImages/2018/mreznaneutralnost/lzvie%C5%A1%C4%87e%20o%20provedbi%20EU%20NN%20Uredbe%202018-HR.pdf">https://www.hakom.hr/UserDocImages/2018/mreznaneutralnost/lzvie%C5%A1%C4%87e%20o%20provedbi%20EU%20NN%20Uredbe%202018-HR.pdf</a>	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=45876">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=45876</a>	<a href="https://www.hakom.hr/UserDocImages/2018/mreznaneutralnost/lzvie%C5%A1%C4%87e%20o%20provedbi%20EU%20NN%20Uredbe%202018-HR.pdf">https://www.hakom.hr/UserDocImages/2018/mreznaneutralnost/lzvie%C5%A1%C4%87e%20o%20provedbi%20EU%20NN%20Uredbe%202018-HR.pdf</a>	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53357">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53357</a>
Cyprus	Office of the Commissioner of Telecommunications and Postal Regulation, OCECPR	-	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=45877">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=45877</a>	-	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53358">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53358</a>
Czech Republic	Czech Telecommunication Office, CTU	-	<a href="https://www.ctu.eu/sites/default/files/obsah/stranky/159928/soubory/ctuberecnnimpquestionnaireen.pdf">https://www.ctu.eu/sites/default/files/obsah/stranky/159928/soubory/ctuberecnnimpquestionnaireen.pdf</a>	<a href="https://www.ctu.eu/sites/default/files/obsah/stranky/227071/soubory/zpravann2018czfinal.pdf">https://www.ctu.eu/sites/default/files/obsah/stranky/227071/soubory/zpravann2018czfinal.pdf</a>	<a href="https://www.ctu.eu/sites/default/files/obsah/stranky/227071/soubory/zpravann2018enfinal.pdf">https://www.ctu.eu/sites/default/files/obsah/stranky/227071/soubory/zpravann2018enfinal.pdf</a>
Denmark	Danish Business Authority, DBA	<a href="https://ens.dk/sites/ens.dk/files/Tele/nn_rapport_2017.pdf">https://ens.dk/sites/ens.dk/files/Tele/nn_rapport_2017.pdf</a>	-	<a href="https://ens.dk/sites/ens.dk/files/Tele/netneutralitet_rapport_2018.pdf">https://ens.dk/sites/ens.dk/files/Tele/netneutralitet_rapport_2018.pdf</a>	-
Estonia	Estonian Technical Regulatory Authority, ETRA	-	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=46074">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=46074</a>	-	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53363">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53363</a>
Finland	Finnish Communications Regulatory Authority, FICORA	<a href="https://www.viestintavirasto.fi/attachments/Verkkoneutraliteetin_vuosiraportti_2017.pdf">https://www.viestintavirasto.fi/attachments/Verkkoneutraliteetin_vuosiraportti_2017.pdf</a>	-	<a href="https://www.viestintavirasto.fi/attachments/Verkkoneutraliteetin_vuosiraportti_2018.pdf">https://www.viestintavirasto.fi/attachments/Verkkoneutraliteetin_vuosiraportti_2018.pdf</a>	-
France	Autorité de Régulation des Communications électroniques et des Postes, ARCEP	<a href="https://www.arcep.fr/uploads/tx_gspublication/rapport-etat-internet-france-2017-mai2017.pdf">https://www.arcep.fr/uploads/tx_gspublication/rapport-etat-internet-france-2017-mai2017.pdf</a>	<a href="https://www.arcep.fr/uploads/tx_gspublication/State-Of-Internet-in-France-2017_may2017.pdf">https://www.arcep.fr/uploads/tx_gspublication/State-Of-Internet-in-France-2017_may2017.pdf</a>	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53365">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53365</a>	<a href="https://www.arcep.fr/uploads/tx_gspublication/report-state-internet-2018_conf050618-ENG.pdf">https://www.arcep.fr/uploads/tx_gspublication/report-state-internet-2018_conf050618-ENG.pdf</a>
Germany	Federal Network Agency, BNetzA	<a href="https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Telekommunikation/Unternehmen_Institutionen/Breitband/Netzneutralitaet/Netzneutralitaet_Jahresbericht%202016_2017.pdf?__blob=publicationFile&amp;v=7">https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Telekommunikation/Unternehmen_Institutionen/Breitband/Netzneutralitaet/Netzneutralitaet_Jahresbericht%202016_2017.pdf?__blob=publicationFile&amp;v=7</a>	<a href="https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Telekommunikation/Unternehmen_Institutionen/Breitband/Netzneutralitaet/Netzneutralitaet_Jahresbericht%20Germany%20Annual%20Report%202016_2017.pdf?__blob=publicationFile&amp;v=2">https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Telekommunikation/Unternehmen_Institutionen/Breitband/Netzneutralitaet/Netzneutralitaet_Jahresbericht%20Germany%20Annual%20Report%202016_2017.pdf?__blob=publicationFile&amp;v=2</a>	<a href="https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Telekommunikation/Unternehmen_Institutionen/Breitband/Netzneutralitaet/Netzneutralitaet_Jahresbericht%202017_2018.pdf?__blob=publicationFile&amp;v=2">https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Telekommunikation/Unternehmen_Institutionen/Breitband/Netzneutralitaet/Netzneutralitaet_Jahresbericht%202017_2018.pdf?__blob=publicationFile&amp;v=2</a>	<a href="https://www.bundesnetzagentur.de/SharedDocs/Downloads/EN/Areas/Telecommunications/Companies/MarketRegulation/NetNeutrality/NetNeutralityInGermanyAnnualReport2017_2018.pdf?__blob=publicationFile&amp;v=2">https://www.bundesnetzagentur.de/SharedDocs/Downloads/EN/Areas/Telecommunications/Companies/MarketRegulation/NetNeutrality/NetNeutralityInGermanyAnnualReport2017_2018.pdf?__blob=publicationFile&amp;v=2</a>
Greece	Hellenic Telecommunications and Post Commission, EETT	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=45883">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=45883</a>	-	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53636">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53636</a>	-
Hungary	National Media and Infocommunications Authority, NMHH	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=45884">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=45884</a>	<a href="http://english.nmhh.hu/document/189682/report_on_net_neutrality_hungary_between_30_april_2016_30_april_2017.pdf">http://english.nmhh.hu/document/189682/report_on_net_neutrality_hungary_between_30_april_2016_30_april_2017.pdf</a>	<a href="http://english.nmhh.hu/document/196458/NN_jelentes_NMHH2018_vegleges.pdf">http://english.nmhh.hu/document/196458/NN_jelentes_NMHH2018_vegleges.pdf</a>	-
Iceland	Post and Telecom Administration, PTA	<a href="https://www.pfs.is/library/Skrar/Frettaskrar/Nethlutleysi_skyrsla_PFS_4.april2016.pdf">https://www.pfs.is/library/Skrar/Frettaskrar/Nethlutleysi_skyrsla_PFS_4.april2016.pdf</a>	-	-	-
Ireland	Commission for Communications Regulation, COMREG	<a href="https://www.comreg.ie/publication-download/implementation-eu-net-neutrality-regulations-ireland-2017">https://www.comreg.ie/publication-download/implementation-eu-net-neutrality-regulations-ireland-2017</a>	-	<a href="https://www.comreg.ie/publication-download/implementation-of-eu-net-neutrality-regulations-in-ireland-2018">https://www.comreg.ie/publication-download/implementation-of-eu-net-neutrality-regulations-in-ireland-2018</a>	-

Country	NRA	Report 2017		Report 2018	
		National Language	English	National Language	English
Italy	Autorità per le Garanzienelle Comunicazioni, AGCOM	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=45888">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=45888</a>	-	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53370">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53370</a>	-
Latvia	Public Utilities Commission, SPRK	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=45890">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=45890</a>	-	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53371">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53371</a>	-
Luxembourg	Office for Communications / Amt für Kommunikation, AK	-	-	-	-
Lithuania	Communications Regulatory Authority, RRT	-	<a href="http://old.rtt.lt/download/23017/rrt%20(lt)%20nn%20report%20to%20ec.pdf">http://old.rtt.lt/download/23017/rrt%20(lt)%20nn%20report%20to%20ec.pdf</a>	-	<a href="http://old.rtt.lt/download/23858/rrt%20(lt)%20nn%20report%20to%20ec%202018%20(final).pdf">http://old.rtt.lt/download/23858/rrt%20(lt)%20nn%20report%20to%20ec%202018%20(final).pdf</a>
Luxembourg	Institut Luxembourgeois de Régulation, ILR	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=45892">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=45892</a>	-	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53373">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53373</a>	-
Malta	Malta Communications Authority, MCA	<a href="https://mca.org.mt/sites/default/files/MCA%20Net%20Neutrality%20Report%202017.pdf">https://mca.org.mt/sites/default/files/MCA%20Net%20Neutrality%20Report%202017.pdf</a>		<a href="https://mca.org.mt/sites/default/files/MCA%20Report%20to%20the%20Commission%20Final%20-%2020180628.pdf#overlay-context=">https://mca.org.mt/sites/default/files/MCA%20Report%20to%20the%20Commission%20Final%20-%2020180628.pdf#overlay-context=</a>	
Norway	Norwegian Communications Authority, Nkom	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=45895">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=45895</a>	<a href="https://eng.nkom.no/topical-issues/news/_attachment/29398?ts=15d4ef8080c">https://eng.nkom.no/topical-issues/news/_attachment/29398?ts=15d4ef8080c</a>	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53379">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53379</a>	<a href="https://eng.nkom.no/topical-issues/news/_attachment/35123?ts=1644a7fb2b7">https://eng.nkom.no/topical-issues/news/_attachment/35123?ts=1644a7fb2b7</a>
Poland	Office of Electronic Communications, UKE	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=45896">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=45896</a>	-	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53380">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53380</a>	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53475">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53475</a>
Portugal	Autoridade Nacional de Comunicações, ANACOM	-	<a href="https://www.anacom.pt/streaming/Neutrality29062017Report.pdf?contentId=1416481&amp;field=ATTACHED_FILE">https://www.anacom.pt/streaming/Neutrality29062017Report.pdf?contentId=1416481&amp;field=ATTACHED_FILE</a>	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53381">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53381</a>	-
Romania	National Authority for Management and Regulation in Communications, ANCOM	-	<a href="http://www.ancom.org.ro/en/uploads/links_files/Raport_NN_2017_en.pdf">http://www.ancom.org.ro/en/uploads/links_files/Raport_NN_2017_en.pdf</a>	-	<a href="http://www.ancom.org.ro/en/uploads/links_files/Raport_NN_2018_EN.pdf">http://www.ancom.org.ro/en/uploads/links_files/Raport_NN_2018_EN.pdf</a>
Slovak Republic	Regulatory Authority for Electronic Communications and Postal Services, RÚ	<a href="https://www.teleoff.gov.sk/data/files/48182_rocna-sprava-2016-2017.pdf">https://www.teleoff.gov.sk/data/files/48182_rocna-sprava-2016-2017.pdf</a>	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=45899">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=45899</a>	<a href="https://www.teleoff.gov.sk/data/files/48182_rocna-sprava-2016-2017.pdf">https://www.teleoff.gov.sk/data/files/48182_rocna-sprava-2016-2017.pdf</a>	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53383">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53383</a>
Slovenia	Agency for Communication Networks and Services of the Republic of Slovenia, AKOS	<a href="https://www.akos-rs.si/files/Telekomunikacije/Porocila_in_raziskave/nacionalna%20poro%C4%8Dila%20o%20nevtalnosti%20interneta/Nacionalno-porocilo-o-nevtalnosti-interneta-2017.pdf">https://www.akos-rs.si/files/Telekomunikacije/Porocila_in_raziskave/nacionalna%20poro%C4%8Dila%20o%20nevtalnosti%20interneta/Nacionalno-porocilo-o-nevtalnosti-interneta-2017.pdf</a>	-	<a href="https://www.akos-rs.si/files/Telekomunikacije/Porocila_in_raziskave/nacionalna%20poro%C4%8Dila%20o%20nevtalnosti%20interneta/Nacionalno-porocilo-o-nevtalnosti-interneta-2018.pdf">https://www.akos-rs.si/files/Telekomunikacije/Porocila_in_raziskave/nacionalna%20poro%C4%8Dila%20o%20nevtalnosti%20interneta/Nacionalno-porocilo-o-nevtalnosti-interneta-2018.pdf</a>	-
Spain	Comisión Nacional de los Mercados y la Competencia, CNMC	<a href="http://www.mincotur.gob.es/telecomunicaciones/banda-ancha/Documents/NN_informe_espana_2016.pdf">http://www.mincotur.gob.es/telecomunicaciones/banda-ancha/Documents/NN_informe_espana_2016.pdf</a>	-	<a href="http://www.mincotur.gob.es/telecomunicaciones/banda-ancha/Documents/NN_informe_ESPANA_2017.pdf">http://www.mincotur.gob.es/telecomunicaciones/banda-ancha/Documents/NN_informe_ESPANA_2017.pdf</a>	-
Sweden	National Post & Telecommunications Agency, PTS	<a href="https://pts.se/globalassets/startpage/dokument/icke-legala-dokument/rapporter/2017/internet/natneutralitetsrapporten-pts-er-2017-15.pdf">https://pts.se/globalassets/startpage/dokument/icke-legala-dokument/rapporter/2017/internet/natneutralitetsrapporten-pts-er-2017-15.pdf</a>	<a href="https://pts.se/globalassets/startpage/dokument/icke-legala-dokument/rapporter/2017/internet/report-eu-net-regulation-pts-er-2017-">https://pts.se/globalassets/startpage/dokument/icke-legala-dokument/rapporter/2017/internet/report-eu-net-regulation-pts-er-2017-</a>	<a href="https://www.pts.se/globalassets/startpage/dokument/icke-legala-dokument/rapporter/2018/internet/final-pts-net-neutralitetsrapporten-">https://www.pts.se/globalassets/startpage/dokument/icke-legala-dokument/rapporter/2018/internet/final-pts-net-neutralitetsrapporten-</a>	<a href="https://pts.se/globalassets/startpage/dokument/icke-legala-dokument/rapporter/2018/internet/final-pts-net-neutrality-report-2017-">https://pts.se/globalassets/startpage/dokument/icke-legala-dokument/rapporter/2018/internet/final-pts-net-neutrality-report-2017-</a>

Country	NRA	Report 2017		Report 2018	
		National Language	English	National Language	English
			<a href="#">15.pdf</a>	<a href="#">2017-2018-.pdf</a>	<a href="#">2018.pdf</a>
The Netherlands	Authority for Consumers and Markets, ACM	<a href="https://www.acm.nl/sites/default/files/old_publication/publicaties/17570_jaarverslag-netneutraliteit-2016-2017.pdf">https://www.acm.nl/sites/default/files/old_publication/publicaties/17570_jaarverslag-netneutraliteit-2016-2017.pdf</a>	-	<a href="https://www.acm.nl/sites/default/files/documents/2018-06/jaarverslag-netneutraliteit-2017-2018.pdf">https://www.acm.nl/sites/default/files/documents/2018-06/jaarverslag-netneutraliteit-2017-2018.pdf</a>	<a href="https://www.acm.nl/sites/default/files/documents/2018-06/2017-2018-annual-report-on-net-neutrality.pdf">https://www.acm.nl/sites/default/files/documents/2018-06/2017-2018-annual-report-on-net-neutrality.pdf</a>
United Kingdom	Office of Communications, OFCOM	<a href="https://www.ofcom.org.uk/data/assets/pdf_file/0018/103257/net-neutrality.pdf">https://www.ofcom.org.uk/data/assets/pdf_file/0018/103257/net-neutrality.pdf</a>		<a href="https://www.ofcom.org.uk/data/assets/pdf_file/0026/115397/net-neutrality-report-2018.pdf">https://www.ofcom.org.uk/data/assets/pdf_file/0026/115397/net-neutrality-report-2018.pdf</a>	

## Annex 2 – Penalty provisions

The data for this table was gathered with a series of Freedom of Information requests to the European Commission<sup>62</sup> and BEREC. We had to insist on our request and even initiate proceedings with the European Ombudsman to acquire this data. The initial document we received is dated 30 April 2018 and led to an open letter of several NGOs on this issue<sup>63</sup>. This data set does not include potential new developments in all countries, but we included the recently adopted penalty provisions in the Austrian Electronic Communications Code<sup>64</sup>.

Classification	Explanation
No penalty	There are no explicit penalties for violating Article 3, 4 and 5 of the Regulation. Multiple infringements might be penalised as most countries have remedies in cases a decision of an NRA is not followed.
No fixed amount	The height of the penalty is left completely to the discretion of the NRA. While such a penalty can be proportionate, it is doubtful it would fulfil the requirement of being effective and dissuasive.
Very low	Penalties not exceeding EUR 50.000,-
Low	Penalties not exceeding EUR 500.000,-
Mediocre	Penalties not exceeding EUR 5.000.000,-
Good	Penalties up to 3% of annual revenue
Very good	Penalties above 3% of annual revenue
n.a.	No information about this country

## Annex 3 – Mapping of differential pricing practices

### Study objectives

The objective of this mapping is to create a complete data set about offers of zero-rating (ZR) and application specific data volume (ASDV) in the European Economic Area (EEA). This geographical area is the scope of the net neutrality protections of the European Union<sup>65</sup>. Additionally, Switzerland is also included in the data set.

- Zero-rating is defined as the practice of an unlimited data volume for specific applications or classes of applications.
- Application specific data volume is the practice of providing data volume which is only usable for a specific application or category of applications.

Both these forms of commercial practices rely on the existence of volume restrictions in the underlying internet access offer. Because most fixed line internet access offers in the EEA are flat rates this mapping only analysed mobile internet offerings of both Mobile Network Operators (MNO) and Mobile Virtual Network Operators (MVNO).

62 [https://www.asktheeu.org/en/request/portuguese\\_sanctions\\_for\\_net\\_neu\\_2](https://www.asktheeu.org/en/request/portuguese_sanctions_for_net_neu_2)

63 <https://epicenter.works/document/1255>

64 <https://epicenter.works/document/1266>

65 Regulation (EU) 2015/2120

This type of commercial practices is rarely a unilateral action of an IAS provider. Instead they often depend on agreements between the IAS provider and the CAP. Such agreements often incorporate marketing deals, technical obligations to keep data volume associated with the application of the commercial offering identifiable by the billing equipment of the IAS provider and liability provisions. The data set and the subsequent study evaluate participating applications, their CAPs and – as far as possible – the underlying agreements.

### **Data collection methodology**

This mapping is built without proprietary information sets. All data sources are publicly available. The results of this study are released under a free license and in a machine readable form<sup>66</sup>.

### **Sampling of MNOs and MVNOs**

Mobile Network Operators (MNOs) were collected from the MNOs included in the European Commission's Study „Mobile Broadband Prices in Europe 2017“<sup>67</sup>. Other MNOs and Mobile Virtual Network Operators (MVNOs) were primarily included from the 9<sup>th</sup> Digital Fuel Monitor<sup>68</sup> and secondarily from other sources such as Wikipedia<sup>69</sup> and information provided by NRAs. This mapping includes a total of 225 of IAS providers. Our aim was to produce a complete survey of all mobile IAS providers in the EEA, but given the lack of a freely available data source, we cannot guarantee that we have achieved this goal.

### **Collection of zero-rating offers**

Data was gathered in from 1 July until 5 November 2018.

All data on the commercial offers were collected from the websites of the IAS providers. The websites of all offers included in the data set were saved to archive.org and additionally in certain cases as html files<sup>70</sup>. The team of data collectors included five people which could read and understand English, German, Portuguese, Polish, Greek, and Icelandic. For the remaining operator websites, which were not available in these languages, the team used the automatic translation function of Google.

### **Structure of the data set for commercial offerings**

The table below is a list of the items which were documented for every offer.

<b>Name of the item</b>	<b>Category of the item</b>	<b>Description</b>
Country	General information	The Name of the country where the IAS provider is providing its service
Country code	General information	The ISO 3166-1 country code
Currency	General information	The currency of the country
Region	General information	The region of the country (EU28, EEA, Switzerland)
VAT	General information	The value-added tax of the offer/country

66 <https://epicenter.works/document/1521>

67 European Commission: Mobile Broadband Prices in Europe 2017. <https://ec.europa.eu/digital-single-market/en/news/mobile-broadband-prices-europe-2017>

68 Digital Fuel Monitor 9th release 1H2018: <http://research.rewheel.fi/>

69 [https://en.wikipedia.org/w/index.php?title=List\\_of\\_mobile\\_network\\_operators\\_of\\_Europe&oldid=853720484](https://en.wikipedia.org/w/index.php?title=List_of_mobile_network_operators_of_Europe&oldid=853720484)

70 Such cases include websites of Vodafone which prohibit their retention by the Internet Archive project.

Mobile operator	General information	The name of the MNO/MVNO
Name of the offer	General information	Name of the offer as it is presented on the webpage
Collection date	General information	The date of the collection
Type	General information	Whether the offer is a zero-rating offer, an offer with Application-Specific-Data-Volume or if the MNO/MVNO has no such offers
Participation for CAPs	General information	Whether CAPs can join the offer (open) or if there is no information for CAPs that intend to join the offer (closed)
Data volume for specific Apps (GB)	Specific information on the offer	The amount of application-specific data volume
Price	Specific information on the offer	The price of the offer in local currency including the VAT. This attribute reflects either the price of the base tariff or the offer on top of it. The price is zero for offers which are included to a base tariff free of charge.
Contract duration	Specific information on the offer	The minimum duration in months. When there was no further information about this, the suggestion was 1 month.
Number of participating CAPs	Participation of Content-Application and Service Providers (CAPs)	The number of CAPs participating in the offer at the time of collection.
Number of CAPs affiliated with IAS provider	Participation of Content-Application and Service Providers (CAPs)	The number of participating CAPs which are associated with the IAS provider.
Number of CAPs from country	Participation of Content-Application and Service Providers (CAPs)	The number of participating CAPs which are based in the country of the offer.
Number of CAPs from other EU countries	Participation of Content-Application and Service Providers (CAPs)	The number of participating CAPs which are based in the digital single market (EEA countries).
Number of CAPs from USA	Participation of Content-Application and Service Providers (CAPs)	The number of participating CAPs which are based in the United States of America (USA).
Requires NDA from CAP	Participation of	Whether the MNO/MVNO requires a non-

	Content- Application and Service Providers (CAPs)	disclosure agreement (NDA) from participating CAPs.
Point of Contact for Participation	Participation of Content- Application and Service Providers (CAPs)	The Point of contact for CAPs who want to join the offer.
min. Duration until response	Participation of Content- Application and Service Providers (CAPs)	Minimum duration that the MNO/MVNO needed to answer a request of a CAP to participate in the offer.
Chat / Messaging CAPs	Participation of Content- Application and Service Providers (CAPs)	Names of the chat/messaging applications which are participating in the offer.
Social-Media CAPs	Participation of Content- Application and Service Providers (CAPs)	Names of the social media applications which are participating in the offer.
Audio CAPs	Participation of Content- Application and Service Providers (CAPs)	Names of the audio streaming applications which are participating in the offer.
Video CAPs	Participation of Content- Application and Service Providers (CAPs)	Names of the video streaming applications which are participating in the offer.
Maps CAPs	Participation of Content- Application and Service Providers (CAPs)	Names of the map service applications which are participating in the offer.
Cloud Storage CAPs	Participation of Content- Application and Service Providers (CAPs)	Names of the cloud storage applications which are participating in the offer.
Info-Content CAPs	Participation of Content- Application and Service Providers (CAPs)	Names of the information content applications (such as Newspapers, Wikipedia, etc.) which are participating in the offer.
Other CAPs	Participation of Content- Application and Service Providers	Names of other applications which don't belong to the other categories.

	(CAPs)	
Policy on Roaming	Roaming	Information whether roaming is restricted and further details of the roaming policy.
Fair-Use Data Volume (GB)	Roaming	How many GB of the offer the customer can use in other (EU) countries.
link to website	Additional information	URI of the MNO's/MVNO's website.
link to consumer offer	Additional information	URI where the offer can be found.
link to CAP information	Additional information	URI where further information on the CAPs are provided.
link to FAQ	Additional information	URI of the Frequently Asked Questions (FAQ).
link to technical/commercial specification	Additional information	URI where further technical and commercial specification can be found.
Note / Comments	Additional information	Additional notes on offer specific information.

**Attribution of applications to CAPs and regions**

A separate data file released with this mapping shows the attribution of applications to an IAS provider and the country of origin of the CAP.

<b>Name of the Item</b>	<b>Description</b>
Product	Name of the Application as it was spelled on the website of the offer of the IAS provider.
Provider	CAP which offers this product.
Country	The country of the headquarter of the CAP.
Region	Whether the county is part of the digital single market, the USA or other world regions.
ISP affiliation	The IAS provider with which this product is affiliated. Also partial ownership counts as affiliation.

## Annex 4 – Economic analysis

### **Zero-rating in 2014/2015 and price developments in 2015/2016**

In order to calculate the influence of zero-rating offers on prices of mobile internet offers we used a multiple regression model with an ordinary least squares (OLS) estimator. This allows us to calculate the average change in prices between 2015 and 2016 and measure the influence of availability of zero-rating offers on this change.

#### **Method**

We used a standard multiple regression model with an OLS estimator to test for the influence of zero-rating offers. The null hypothesis is represented by the following statement: “The availability of zero-rating offers in 2014 and/or 2015 in a country’s market has no influence on the change of price of mobile internet offers between 2015 and 2016.”

Since most offers include a minimum term of contract with fixed prices, we expect to see possible changes to market prices due to the availability of zero-rating offers to occur no earlier than one year after their entry into market. Based on our data, we can thus correlate the change of availability of zero-rating offers between 2014 and 2015 with the change of prices between 2015 and 2016.

Although the cheapest offer in a market does not necessarily include zero-rating of services, it is the best benchmark for competitors and thus a driver of market prices.

To measure the availability or change in availability of zero rating offers, we use three variables (ZR\_to\_ZR15, NoZR\_toZR15, ZR\_to\_NoZR15). Starting from the base case, that no zero-rating offer is available in 2014 and 2015, the variables represent the following cases:

- ZR\_to\_ZR15: Zero-rating offer available in 2014 and 2015
- NoZR\_toZR15: No zero-rating offer available in 2014 but available in 2015
- ZR\_to\_NoZR15: Zero rating-offer available in 2014 but non available in 2015

With these variables we constructed the following linear regression model:

$$y = \alpha + \beta_1 \cdot \text{ZR\_to\_ZR15} + \beta_2 \cdot \text{NoZR\_toZR15} + \beta_3 \cdot \text{ZR\_to\_NoZR15} + \varepsilon,$$

whereby

- $\alpha$  is the mean change in prices without the influence of zero-rating offers in the base case with no zero-rating offer in 2014 or 2015 describes, and
- $\varepsilon$  represents random noise in our data.

#### **Data**

The EU Commission published consecutive reports in 2015 and 2016 collecting all available mobile internet offers in EU28 countries, Norway, Iceland, Japan, Korea, Turkey and the USA.<sup>71</sup> The reports

71 EU Commission: Mobile Broadband prices (February 2015) <https://ec.europa.eu/digital-single-market/en/news/mobile-broadband-prices-february-2015>  
Mobile Broadband Prices in Europe 2016 <https://ec.europa.eu/digital-single-market/en/news/mobile-broadband-prices-europe-2016>

classify these offers according to OECD methodology in 15 (2015) and 18 (2016) baskets with different data sizes<sup>72</sup> and determine the cheapest offer for each basket in each country.

From these reports we calculated the change in price of the cheapest offer between 2015 and 2016 in every EU member state, as well as Iceland and Norway.

We referenced these numbers with the availability of zero-rating offers in the years 2014 and 2015 based on a report from ReWheel.<sup>73</sup> This dataset is more extensive than the collection of zero-rated websites in the EU Commission report.<sup>74</sup>

With 30 countries and 15 baskets each we are able to test our model on 450 observations.

The different cases are not equally often represented in the sample, as the following distribution shows:

- ZR\_to\_ZR15: 13 countries,
- NoZR\_toZR15: 1 country (Cyprus),
- ZR\_to\_NoZR15: 8 countries,
- NoZR\_to\_NoZR: 8 countries.

This means that all 15 observations for the NoZR\_toZR15-dummy derive from one country. Results for this variable thus do not represent the general case of introducing a zero-rating offer to a market but describe the particular case of Cyprus. We therefore cannot derive meaningful information for this case from our dataset.

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72 OECD: Methodology for constructing wireless broadband price baskets  
[https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DSTI/ICCP/CISP\\_%282011%295/FINAL&docLanguage=En](https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DSTI/ICCP/CISP_%282011%295/FINAL&docLanguage=En)

73 Rewheel „Zero-rated mobile apps in EU28 & OECD“ 2014, 2015, 2016; licensed non-public information

74 Mobile Broadband Prices in Europe 2016 <https://ec.europa.eu/digital-single-market/en/news/mobile-broadband-prices-europe-2016>

**Findings**

Source	SS	df	MS			
Model	<b>.784198423</b>	<b>3</b>	<b>.261399474</b>	Number of obs =	<b>450</b>	
Residual	<b>23.8284747</b>	<b>446</b>	<b>.053427073</b>	F( 3, 446) =	<b>4.89</b>	
Total	<b>24.6126732</b>	<b>449</b>	<b>.054816644</b>	Prob > F =	<b>0.0023</b>	
				R-squared =	<b>0.0319</b>	
				Adj R-squared =	<b>0.0253</b>	
				Root MSE =	<b>.23114</b>	

Change1516	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ZR_to_ZR15	<b>.0993285</b>	<b>.0268181</b>	<b>3.70</b>	<b>0.000</b>	<b>.046623</b>	<b>.1520341</b>
NoZR_toZR15	<b>-.0851608</b>	<b>.0619338</b>	<b>-1.38</b>	<b>0.170</b>	<b>-.206879</b>	<b>.0365574</b>
ZR_to_NoZR15	<b>-.0252114</b>	<b>.0268181</b>	<b>-0.94</b>	<b>0.348</b>	<b>-.0779169</b>	<b>.0274942</b>
_cons	<b>.9205744</b>	<b>.0211004</b>	<b>43.63</b>	<b>0.000</b>	<b>.8791059</b>	<b>.9620429</b>

*Illustration 17: Regression estimates as calculated by Strata*

Based on 450 observations the results indicate a general falling trend in prices per GB. The value "cons" shows the result for the constant factor  $\alpha$  with a value of 0.920, representing an average price reduction of 8% between 2015 and 2016. With a standard error of 0.021, this result is highly significant (the 2-tailed p-value ( $P > |t|$ ) is 0.000).

Due to the arguments mentioned above, we cannot derive any meaningful information from the results of the NoZR\_toZR15 variable.

In the case of a cessation of zero-rating offers in a country (ZR\_to\_NoZR15) the findings are not conclusive (p-value is at 0.348, well above a reasonable threshold of at least 0.05). Based on our dataset we can therefore deduce no statistically significant influence of a cessation of zero-rating offers on the change of price.

Markets with zero-rating offers in the two previous years (ZR\_to\_ZR15) however show statistically significant lower changes in prices than markets without. On average the price is 9.9% higher in the second year than it is in comparable markets without zero-rating offers. This translates into an average increase of prices by nearly 2 % in stark contrast to the reduction of price in markets without zero-rating offers.

Based on these findings we can reject the null hypothesis. We found that the availability of zero-rating offers coincides with prices being on average 9.9% higher than we would predict them to be without such offers present.

In summary, we have presented evidence that the prevalence of zero-rating offers coincides with an adverse development of consumer prices for mobile internet volumes.

**Zero-rating in 2015/2016 and price developments in 2016/2017****Method**

Our method is analogous to the previous analysis on zero-rating in 2014/2015 and price developments in 2016/2017.

**Data**

For 2017 price data, we used the Price Simulation Tool for mobile broadband prices in Europe 2017 published by the European Commission.<sup>75</sup> The 2017 data shows a slightly different definition of the “Handset 1” and “Handset 2” baskets, which previously required included data volume of 102,4 and 512 MB, however in 2017 had 100 MB and 500 MB limits. As these represent common quantities for included data volume in mobile broadband offers, cheaper offers now being included in these baskets lead to a larger price reduction.

The data featured 11 countries without zero-rating either in 2015 nor in 2016 (\_cons), 5 countries which introduced zero-rating (NoZR\_toZR16) and 13 countries which had zero-rating in both years (ZR\_to\_ZR16). Only in 1 country (Bulgaria) zero-rating offers disappeared (ZR\_to\_NoZR16).

As initial analysis did not provide any statistically significant results, we further examined the data and identified Finland as an outlier where the replacement of a single offer affected all 100 MB/200 MB and 500 MB baskets. We therefore excluded data from Finland from this analysis.

**Findings**

Source	SS	df	MS	Number of obs = 464		
Model	1.52310831	3	.50770277	F( 3, 460) = 2.73		
Residual	85.5627171	460	.186005907	Prob > F = 0.0435		
Total	87.0858254	463	.188090336	R-squared = 0.0175		
				Adj R-squared = 0.0111		
				Root MSE = .43128		

Change1617	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ZR_to_ZR16	-.0393662	.0453519	-0.87	0.386	-.1284888	.0497564
NoZR_toZR16	.1166674	.0567392	2.06	0.040	.0051673	.2281675
ZR_to_NoZR16	-.1827408	.1118911	-1.63	0.103	-.402622	.0371403
_cons	.9021622	.034096	26.46	0.000	.8351589	.9691654

Illustration 18: Regression estimates as calculated by Strata

75 <https://ec.europa.eu/digital-single-market/en/connectivity>

Based on 464 observations, the results, as previously, indicate a general falling trend in prices per GB. The value "cons" shows the result for the constant factor  $\alpha$  with a value of 0.902, representing an average price reduction of 10% between 2016 and 2017. With a standard error of 0.034, this result is highly significant (the 2-tailed p-value ( $P > |t|$ ) is 0.000).

In the case of the introduction of zero-rating offers in a country (NoZR\_toZR16) the findings show an average 11.7% increase over the base case (cons), which results in an average price increase of 1.4%. With a standard error of 0.567, this result is statistically significant ( $P > |t|$  is 0.040).

As Bulgaria is the only country represented in the ZR\_to\_NoZR16 variable, we cannot derive any meaningful results from this variable.

Markets where zero-rating offers existed in both years (ZR\_to\_ZR16) show an additional 3.9% price decrease over the base case, however this result is not statistically significant ( $P > |t|$  is 0.386).

Based on these findings we can reject the null hypothesis. We found that the introduction of zero-rating offers coincides with prices being on average 11.6% higher than we would predict them to be without offers being introduced. However, the results are less conclusive as no statistically significant price development in the case of existing zero-rating offers in 2015 and 2016 could be observed.

This evidence augments our conclusions from the previous analysis using data from the previous year.

## Index of Abbreviations

5G	The fifth generation of cellular mobile communications
ASDV	Application-specific data volume
BEREC	Body of European Regulators for Electronic Communications
CAP	Content and Application Providers
CJEU	Court of Justice of the European Union
CDN	Content Delivery Network
DPA	Data Protection Authority
DPP	Differential pricing practices
EEA	European Economic Area
EU	European Union
FAQ	Frequently Asked Questions
GB	Gigabyte
IAS	Internet Access Service
ISP	Internet Service Provider
IPTV	Internet Protocol Television
MIoT	Massive Internet of Things
MNO	Mobile Network Operator
MVNO	Mobile Virtual Network Operator
NDA	Non-disclosure Agreement
NRA	National Regulatory Authority
NGO	Non-governmental Organization

OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary least squares
QoS	Quality of Service
SNI	Sever Name Identification
TCP	Transmission Control Protocol
URI	Uniform Resource Identifier
USA	United States of America
URLLC	Ultra-Reliable Low Latency Communications
VAT	Value-Added Tax
VoIP	Voice over Internet Protocol
ZR	Zero-rating

