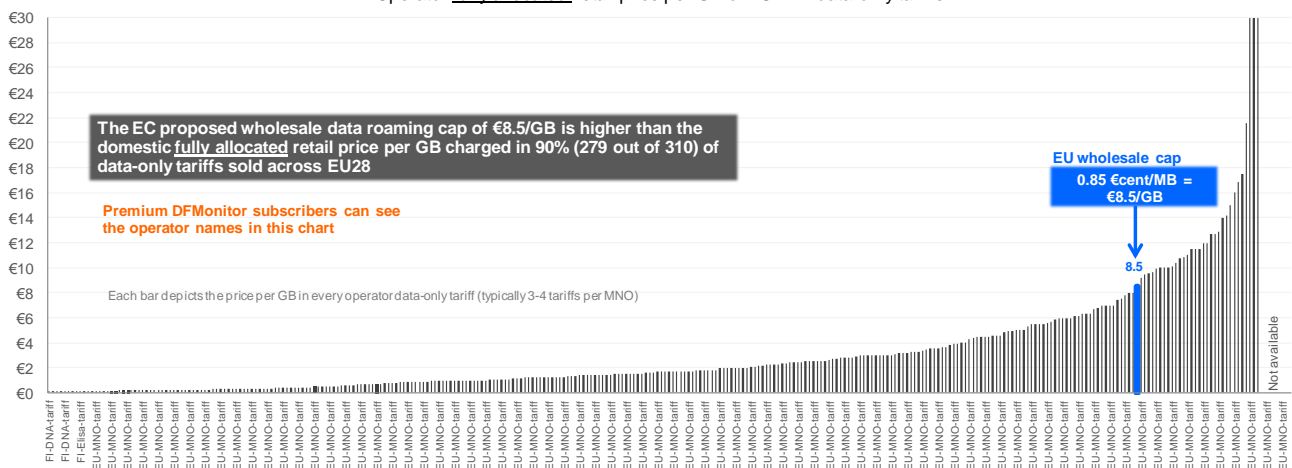


The EC proposed wholesale data roaming cap of €8.5/GB is much higher than domestic retail prices across most EU states

- The European Commission proposed wholesale data roaming cap of €8.5/GB is higher than the domestic fully allocated retail price per GB charged in 90% (279 out of 310) of 4G data-only tariffs sold across EU28.
- The Commission proposed wholesale data roaming cap of €8.5/GB is higher than the domestic fully allocated retail price per GB charged in 66% (252 out of 380) of 4G unlimited minute & SMS smartphone tariffs sold across EU28.
- The Commission proposed wholesale data roaming cap of €8.5/GB is primarily based on the dubious methodology of an external study that derived a factitious (artificially high) cost per GB that has little to do with the actual underlying costs.
- The Commission justified the €8.5/GB wholesale cap by conveniently comparing it to the domestic retail price per GB of the least expensive bundles (i.e. €10/GB to €20/GB) while turning a blind-eye to the fact that the majority of smartphone (66%) and data-only (90%) tariffs have lower GB prices.
- During the consultation 50% of MNOs stated that wholesale roaming prices are much higher than costs and much higher than domestic retail prices. This is in line with our research findings.
- The Commission proposed wholesale data roaming cap of €8.5/GB appears to be carefully calibrated to protect the very high domestic retail prices charged by operators in tight oligopoly markets (e.g. Germany, Spain) while penalizing operators with competitive much lower domestic retail prices (e.g. Finland, Denmark, Poland).
- **EU should disregard the Commission's proposal and mandate instead a wholesale data roaming cap that does not exceed the average domestic retail price level in any of the 28 countries (i.e. lower than €1/GB).**
- **The likely knock-on effect if the EU were to adopt the Commission proposed wholesale data roaming cap of €8.5/GB will be the reintroduction of roaming surcharges and/or domestic retail price increases by operators in competitive markets where domestic retail prices are low.**

Rewheel / Digital Fuel Monitor public research note, 29th June 2016

The EC proposed wholesale data roaming cap of €8.5/GB is higher than the domestic retail price per GB in 90% of data-only tariffs sold across EU28
Operator fully allocated retail price per GB of 4G LTE data-only tariffs



¹Fully allocated retail price per GB = [Tariff monthly retail price incl. VAT divided by GB volume allowance]

²Plans with unlimited data volume were assigned a finite volume of 150 GB. 150 GB was the highest finite volume sold for €35 in EU28 in data-only tariffs

Prices April 2016 dfmonitor.eu

Premium DFMonitor subscribers have access to the full version of the research note that includes additional tariff info and the median (smartphone & data-only) fully allocated price per GB for each of the 96 EU MNOs present in EU28.

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1 Study motivation, main findings and recommendation

EU Regulation 2015/2120¹, adopted by the European Parliament on 27th of October 2015 included amendments to the Roaming Regulation 531/2012². These amendments oblige mobile telecommunications operators not to levy any surcharge in addition to the domestic retail price on any EU roaming customer for any regulated voice call, SMS or use of data outside the customer's home country for periodic roaming from the 15th June 2017 onwards subject to a fair usage policy.

On the 15th of June 2016 the European Commission adopted³, after various analyses and a public consultation, a proposal to set maximum wholesale roaming charges at € 0.04/min, € 0.01/SMS and € 0.0085/MB (€8.5/GB) in the EU.

BEREC took note⁴ of the Commission's proposal and indicated that it will provide its expert opinion by early fall 2016. BEREC highlighted in its communiqué that *"has identified accompanying measures to be necessary as these reduce the side effects of abolishing roaming surcharges for both end users and operators. Designing such measures, which have interlinked effects at the retail and wholesale levels, involves taking account of the different objectives such as preventing competitive distortions, protecting the interests of European consumers and promoting competition and investment."*

Herein using DFMonitor latest (April 2016) tariff data, we have benchmarked the European Commission proposed maximum wholesale data roaming charge (cap) per gigabyte against the fully allocated retail price per gigabyte (GB) for two types of plans: 4G LTE SIM-only plans with unlimited (>1,000) minutes and SMS and 4G LTE SIM-only data-only (MBB, tablet, etc.) plans. Beside comparing the Commission proposed wholesale data roaming cap of €8.5/GB against the fully allocated retail price per GB for each of the 380 smartphone and 310 data-only tariffs available across EU28 from 96 mobile network operators (MNOs) we have also compared it to median price charged by each operator and to the country weighted (by SIMs) average price (country weighted average price of operator median prices).

Benchmark findings

- The EC proposed wholesale data roaming cap of €8.5/GB is much higher than domestic retail prices across most EU states.
- The European Commission proposed wholesale data roaming cap of €8.5/GB is higher than the domestic fully allocated retail price per GB charged in 90% (279 out of 310) of 4G data-only tariffs sold across EU28.
- The Commission proposed wholesale data roaming cap of €8.5/GB is higher than the domestic fully allocated retail price per GB charged in 66% (252 out of 380) of 4G unlimited minute & SMS smartphone tariffs sold across EU28.

Detailed tariff, operator median and country weighted average benchmark findings can be found in Section 2 of the report.

Analysis findings

- The Commission proposed wholesale data roaming cap of €8.5/GB is primarily based on the dubious methodology of an external study that derived a factitious (artificially high) cost per GB that has little to do with the actual underlying costs.
- The Commission justified the €8.5/GB wholesale cap by conveniently comparing it to the domestic retail price per GB of the least expensive bundles (i.e. €10/GB to €20/GB) while turning a blind-eye to the fact that the majority of smartphone (66%) and data-only (90%) tariffs have lower GB prices.
- The European Commission proposed wholesale roaming cap of €8.5/GB will not prevent competitive distortions. On the contrary, the proposed wholesale roaming cap of €8.5 per gigabyte will introduce new considerable competitive distortions.
- The Commission proposed wholesale data roaming cap of €8.5/GB appears to be carefully calibrated to protect the very high domestic retail prices charged by operators in tight oligopoly markets (e.g. Germany, Spain) while penalizing operators with competitive much lower domestic retail prices (e.g. Finland, Denmark, Poland).
- The likely knock-on effect if the EU were to adopt the Commission proposed wholesale data roaming cap of €8.5/GB will be the reintroduction of roaming surcharges and/or domestic retail price increases by operators in competitive markets where domestic retail prices are low.

Recommendation

EU should disregard the Commission's proposal and mandate instead a wholesale data roaming cap that does not exceed the average domestic retail price level in any of the 28 countries (i.e. lower than €1/GB).

¹ http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L:2015_310_R_0001&from=EN

² <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:172:0010:0035:EN:PDF>

³ <https://ec.europa.eu/digital-single-market/en/news/commission-prepares-ground-end-roaming-charges-june-2017>

⁴ http://berec.europa.eu/eng/document_register/subject_matter/berec/press_releases/6094-berec-takes-note-of-the-european-commission8217s-proposals-on-roaming-and-welcomes-providing-its-expert-opinion

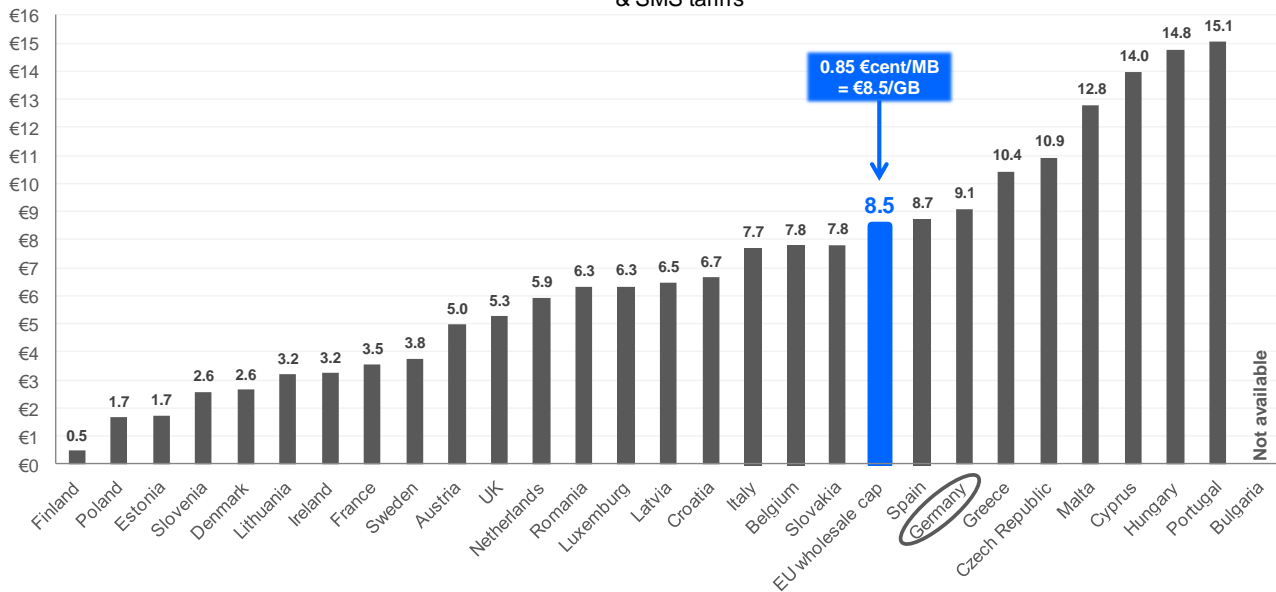
2 Wholesale data roaming cap versus domestic retail prices in EU28 – A DFMonitor benchmark

2.1 Smartphone plans

The European Commission proposed wholesale data roaming cap of €8.5/GB is higher than the weighted average domestic fully allocated retail price per GB charged in 4G LTE unlimited minute & SMS smartphone tariffs in 19 out of 28 EU states.

The EC proposed wholesale data roaming cap is higher than the average (smartphone) domestic retail price per GB in 19 out of 28 EU states

Country weighted (by SIMs) average fully allocated¹ retail price per GB of 4G LTE unlimited (>1000) min & SMS tariffs



¹Operator fully allocated retail price per GB = Median [MNO main brand tariff monthly retail prices incl. VAT divided by GB volume allowance]

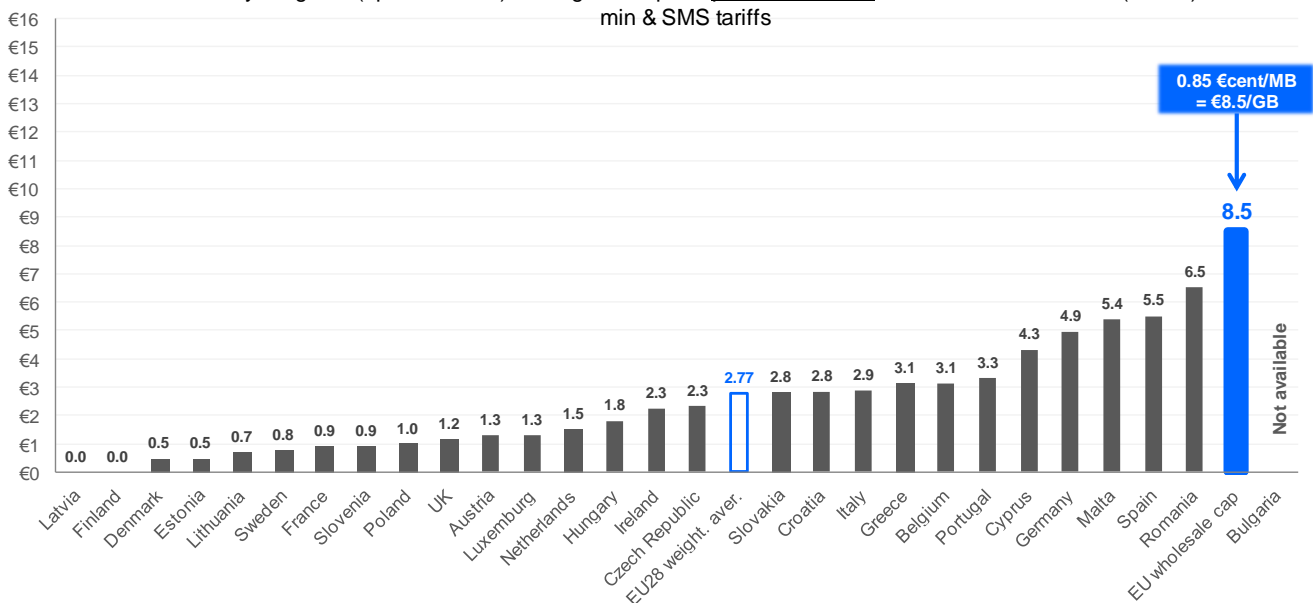
²Plans with unlimited data volume were assigned a finite volume of 60 GB. 60 GB was the highest finite volume sold for €35 in EU28

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The European Commission proposed wholesale data roaming cap of €8.5/GB is higher than the weighted average domestic retail price per incremental GB charged in 4G LTE unlimited minute & SMS smartphone tariffs in all 28 EU states.

The EC proposed wholesale data roaming cap is higher than the average (smartphone) domestic retail price per incremental GB across EU28

Country weighted (operator SIMs) average retail price per incremental¹ GB of 4G LTE unlimited (>1000) min & SMS tariffs

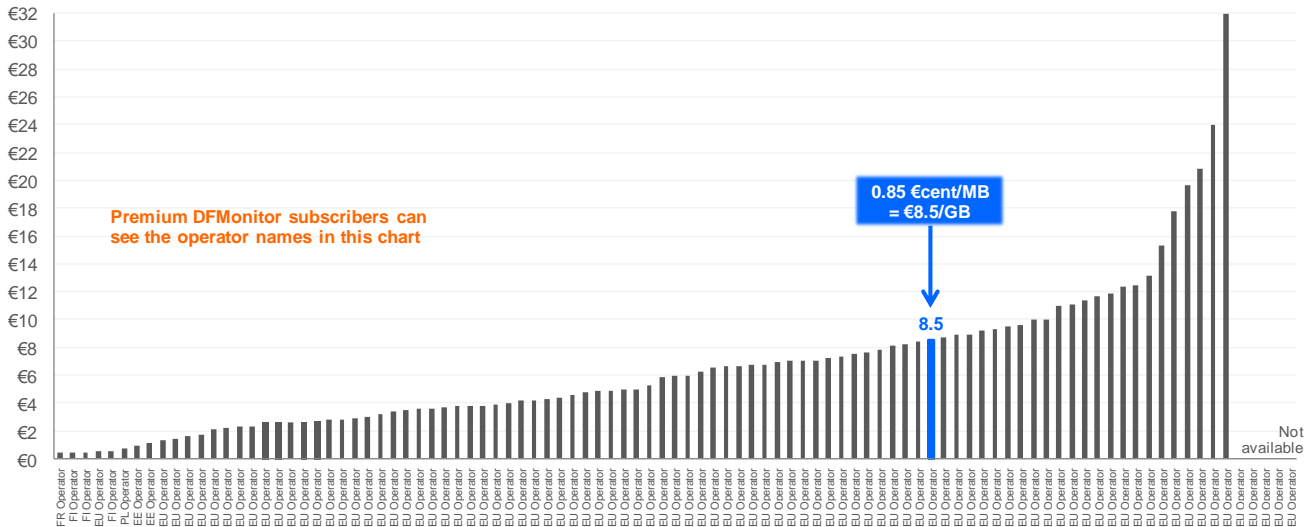


¹Retail price per incremental GB = [Does not include base price. Base price is the tariffs' approximate price for zero GBs]

Prices April 2016 dfmonitor.eu

The European Commission proposed wholesale data roaming cap of €8.5/GB is higher than the median domestic fully allocated retail price per gigabyte charged in 4G LTE unlimited minute & SMS smartphone tariffs by 71% (68 out of 96) of EU operators.

The EC proposed wholesale data roaming cap is higher than the median (smartphone) domestic retail price per GB for 68 out of 96 EU operators
 Operator fully allocated¹ retail price per GB of 4G LTE SIM-only unlimited (>1000) minute & SMS tariffs



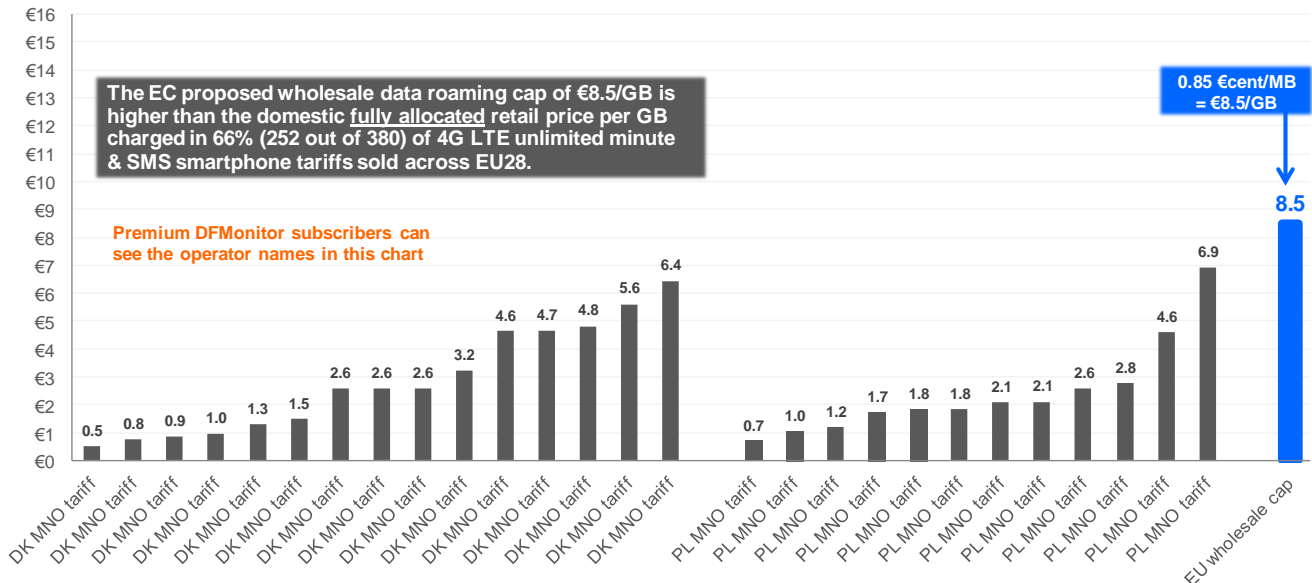
¹Operator fully allocated retail price per GB = Median [MNO main brand tariff monthly retail prices incl. VAT divided by GB volume allowance]
²Plans with unlimited data volume were assigned a finite volume of 60 GB. 60 GB was the highest finite volume sold for €35 in EU28

Prices April 2016 dfmonitor.eu

The European Commission proposed wholesale data roaming cap of €8.5/GB is higher than the domestic fully allocated retail price per GB charged in 66% (252 out of 380) of 4G LTE unlimited minute & SMS smartphone tariffs sold across EU28.

The European Commission proposed wholesale roaming cap of €8.5/GB is higher than the domestic fully allocated retail price per gigabyte charged by all operators across all 4G LTE unlimited (>1000) minute & SMS tariffs in the Danish & Polish 4-MNO competitive markets.

The EC wholesale data roaming cap is higher than the GB price charged by all operators across all tariffs in the Danish & Polish 4-MNO markets
Fully allocated¹ retail price per GB of 4G LTE unlimited (>1000) minute & SMS plans



¹Fully allocated retail price per GB = [Tariff monthly retail price incl. VAT divided by GB volume allowance]
²Plans with unlimited data volume were assigned a finite volume of 60 GB. 60 GB was the highest finite volume sold for €35 in EU28

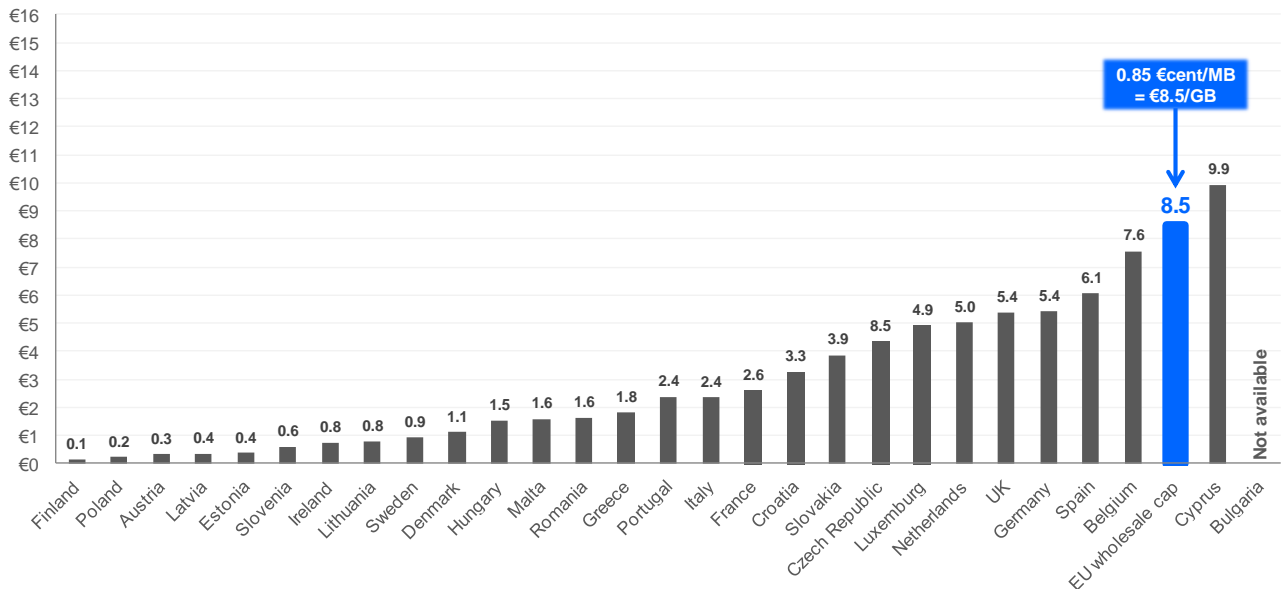
Prices April 2016 dfmonitor.eu

2.2 Data-only plans

The European Commission proposed wholesale data roaming cap of €8.5/GB is higher than the weighted average domestic fully allocated retail price per GB charged in 4G LTE data-only tariffs in 26 out of 28 EU states.

The EC proposed wholesale data roaming cap is higher than the average (data-only) domestic retail price per GB in 26 out of 28 EU states

Country weighted (by SIMs) average fully allocated¹ retail price per GB of 4G LTE data-only tariffs



¹Operator fully allocated retail price per GB = Median [MNO main brand tariff monthly retail prices incl. VAT divided by GB volume allowance]

²Tariffs with unlimited data volume were assigned a finite volume of 150 GB. 150 GB was the highest finite volume sold for €35 in EU28 in data-only tariffs

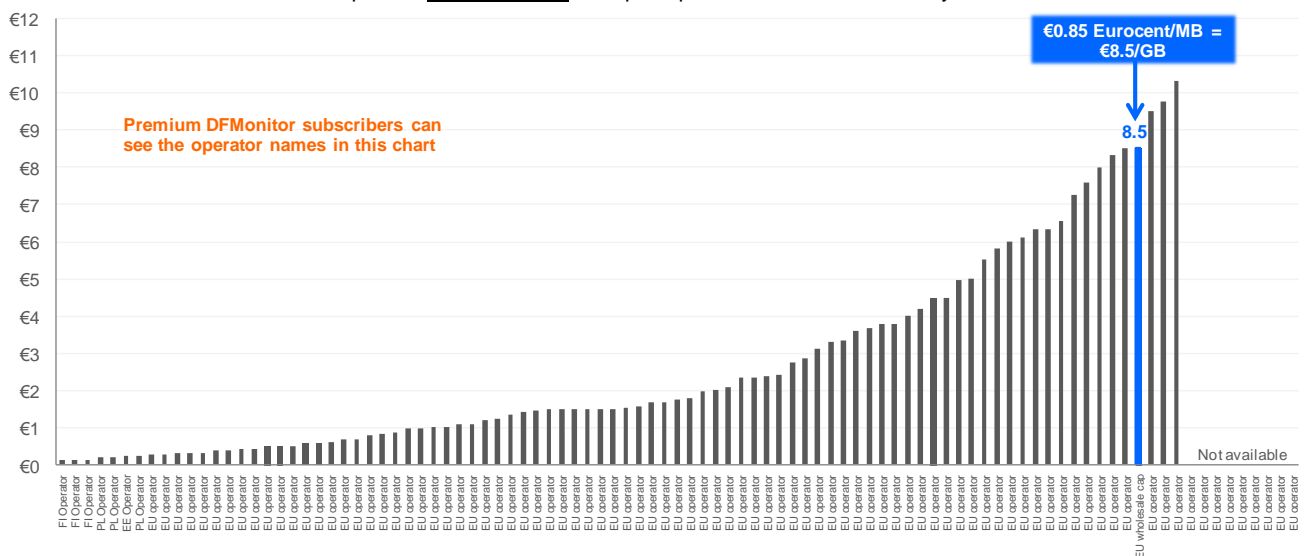
Prices April 2016 dfmonitor.eu

The European Commission proposed wholesale data roaming cap of €8.5/GB is higher than the weighted average domestic retail price per incremental GB charged (from €0.0/GB in Finland to €5.2/GB in Belgium) in 4G LTE data-only tariffs in all 28 EU states according to DFMonitor 5th release that tracked prices in EU28 and OECD countries during April 2016.

The European Commission proposed wholesale data roaming cap of €8.5/GB is higher than the median domestic fully allocated retail price per gigabyte charged in 4G LTE data-only tariffs by 88% (84 out of 96) of EU operators.

The EC proposed wholesale data roaming cap is higher than the median (data-only) domestic retail price per GB for 84 out of 96 EU operators

Operator fully allocated¹ retail price per GB of 4G LTE data-only tariffs



¹Operator fully allocated retail price per GB = Median [MNO main brand tariff monthly retail prices incl. VAT divided by GB volume allowance]

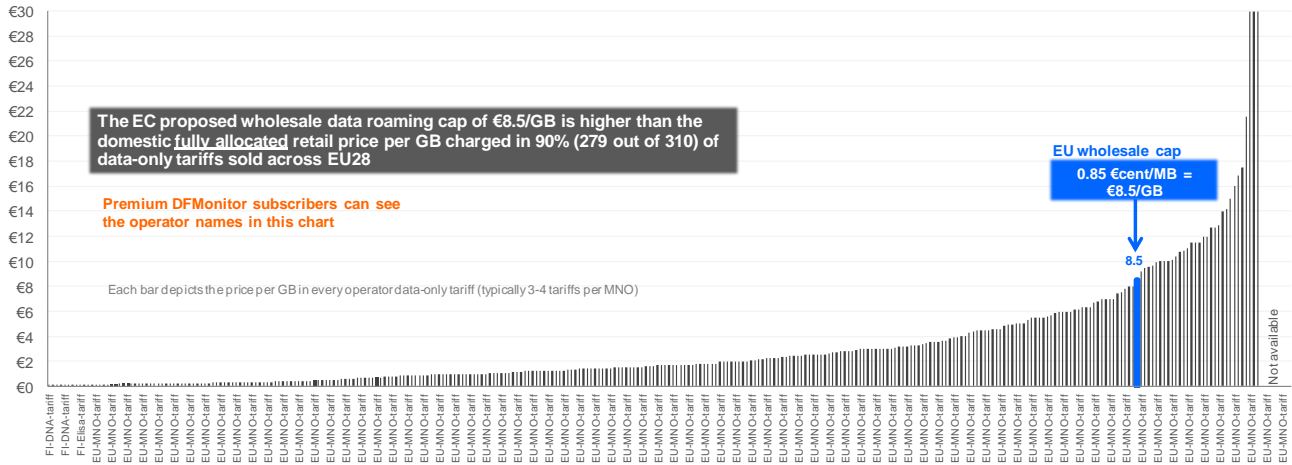
²Tariffs with unlimited data volume were assigned a finite volume of 150 GB. 150 GB was the highest finite volume sold for €35 in EU28 in data-only tariffs

Prices April 2016 dfmonitor.eu

Nearly one third (31 out of 96) of EU operators charged a median data-only domestic fully allocated retail price per GB that was less than €1/GB while over half of operators (52 out of 96) charged a retail price that was less than €2/GB.

The European Commission proposed wholesale data roaming cap of €8.5/GB is higher than the domestic fully allocated retail price per GB charged in 90% (279 out of 310) of 4G data-only tariffs sold across EU28.

The EC proposed wholesale data roaming cap of €8.5/GB is higher than the domestic retail price per GB in 90% of data-only tariffs sold across EU28
 Operator fully allocated¹ retail price per GB of 4G LTE data-only tariffs



¹Fully allocated retail price per GB = [Tariff monthly retail price incl. VAT divided by GB volume allowance]

²Plans with unlimited data volume were assigned a finite volume of 150 GB. 150 GB was the highest finite volume sold for €35 in EU28 in data-only tariffs

3 The European Commission’s dubious analysis

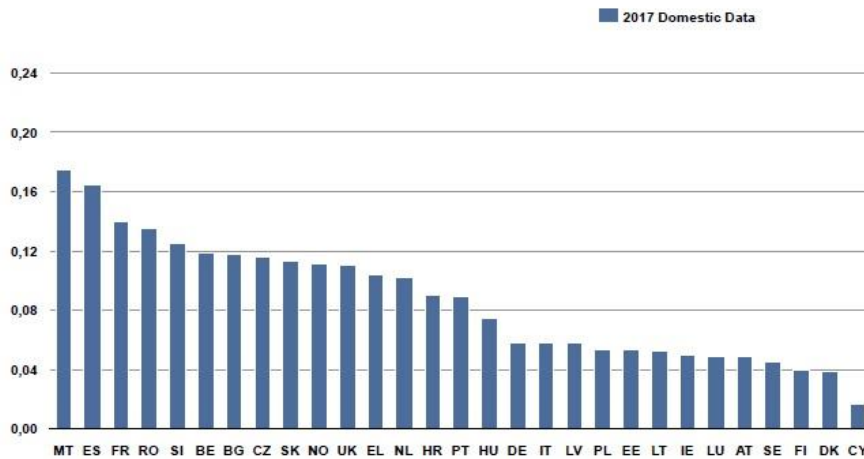
3.1 Questionable cost modelling methodology

TERA Consultants was contracted by the European Commission to carry out an assessment⁵ of the cost of providing wholesale roaming services in the EU. TERA Consultants developed a bottom-up (BU) cost model that estimated the costs of providing roaming wholesale voice, SMS and data services in 28 Member States of the European Union and Norway. The BU cost model developed by TERA Consultants is a Long Run Average Incremental Cost Plus (LRAIC+) model where all joint and common costs (e.g. corporate overheads) in addition to the incremental service costs are allocated to services. TERA Consultants noted that an LRAIC+ rather than a Pure LRIC cost modelling approach was chosen because the adopted IV Roaming Regulation mandates cost recovery including joint and common costs.

According to TERA Consultants network based common costs were allocated with a capacity-based (costs are allocated to services based on the capacity of the network used by each service).allocation approach while overhead costs with an Equi Proportionate Mark Up or EPMU (each service is allocated a share of the common costs in proportion to that service’s share of total attributable costs) allocation approach.

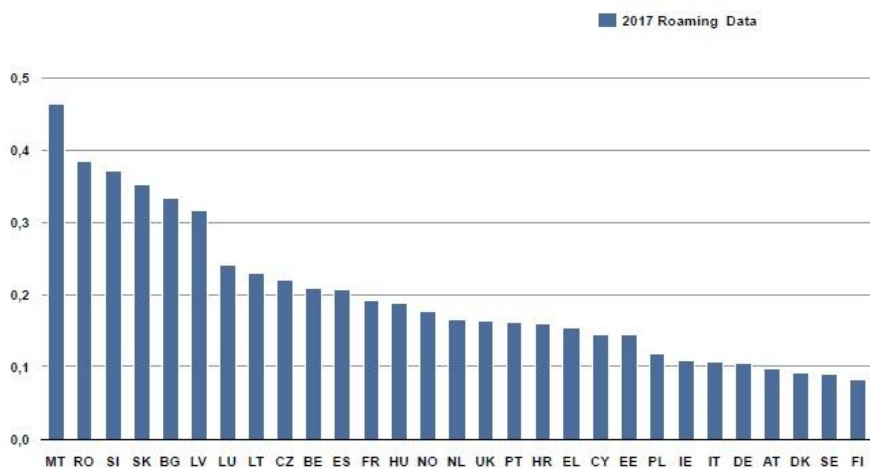
The outcome of the BU cost modelling was an estimated cost for 2017 for an efficient operator⁶ present in each of the 28 EU Member States for voice origination and (€cent/min) roaming services and data (€cent/min) roaming services. Below we have copied the charts where the estimated 2017 Domestic Data cost (per megabyte) and 2017 Roaming Data cost (per megabyte) is presented for each of the 28 EU Member States. Please note that the Roaming Data cost includes the Domestic Data cost and in addition roaming-specific costs that were estimated by TERA Consultants with a top-down approach.

Figure 79 - Data (€cts/MB)



Source: TERA Consultants analyses

Figure 3 - Data (€cts/MB)



Source: TERA Consultants

⁵ <http://www.teraconsultants.fi/en/news-publications/publications/assessment-of-the-cost-of-providing-wholesale-roaming-services-in-the-eu>

⁶ Hypothetical Efficient Operator (HEO) with a 1/N market share with N being the number of MNOs in the market

TERA Consultants when presenting the 2017 Domestic Data cost noted that “*Countries with high costs are generally countries with low data usage (based on BEREC data).*”

This comes as no surprise! When dividing the predominantly fixed costs of running a mobile network (which are quite similar across all EU28 Member States) with mobile data traffic volumes that vary⁷ by as much as 37 times between different EU Member States you are bound to conclude that countries with high so called (unit) costs are countries with low data usage.

Now it is important to clarify that when Tera Consultants wrote “*Countries with high cost...*” they probably meant high unit costs or to be precise high allocated cost per megabyte carried.

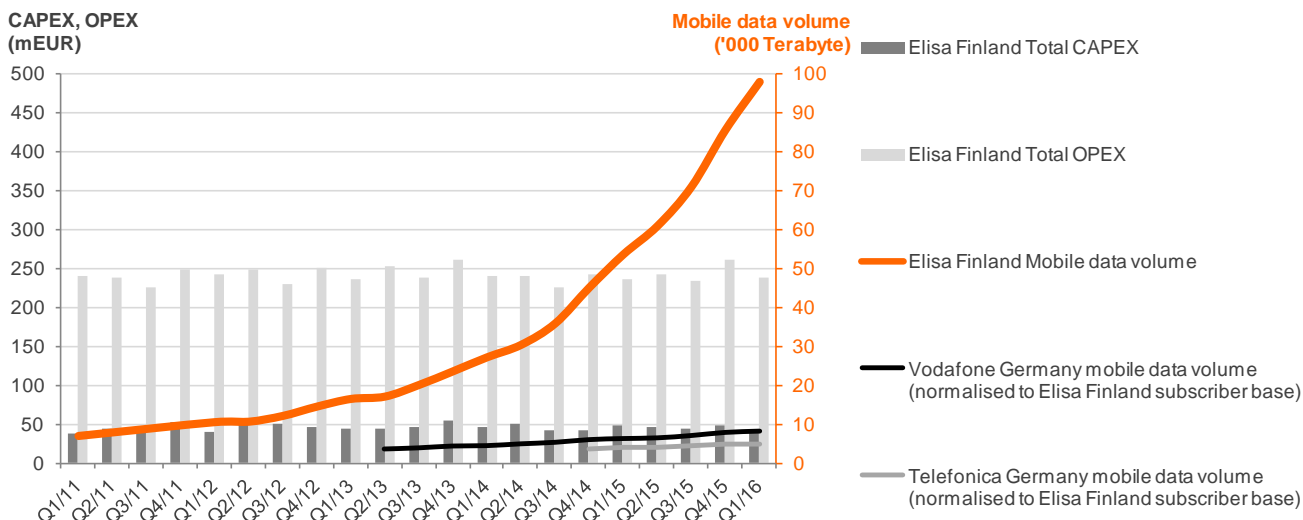
However, dividing the predominantly fixed costs of running a mobile network with the traffic volume does not produce a correct unit cost outcome. Not at least if we understand unit costs as a metric that drives the actual total operator cost.

Operator actual total costs are not driven by the data traffic volume simply because most costs are of fixed data traffic independent nature while traffic dependent marginal costs are nearly zero.

This fact has been highlighted⁸ by the Norwegian Competition authority during the 2014 TeliaSonera/Tele2 merger investigation. The Norwegian Competition authority rejected MVNO based commitments by citing Tele2’s internal documents that showed that Tele2 did not opt for an MVNO business model because according to Tele2 MVNOs in contrary to MNOs do not have a zero or nearly zero marginal cost when they add more customers or more traffic per customer.

Moreover, Elisa’s Finland reported data traffic, CAPEX and OPEX historic developments clearly illustrate this fact as seen in the chart below.

Elisa Finland network costs under control (despite mobile data consumption per capita in Finland overtaking Germany fixed-line consumption)



Elisa Finland: 39% mobile subscriptions market share, >97% LTE population coverage, no network and spectrum sharing, up to 300 MBit/s peak internet access data rate, advertised up to 5-240 typical data rate (depending on price), unlimited data volume on all smartphone and mobile broadband tariffs, no tethering restrictions. Actively promoting large screen video over 4G/LTE access

While Elisa Finland’s total mobile data traffic has grown 10 times (from 10,000 terabyte in 1Q2011 to 100,000 terabyte in 1Q 2016) total CAPEX and total OPEX has remained flat during the same period at 300 MEUR per quarter.

TERA Consultants in their report implicitly acknowledged the problem of calculating a meaningful mobile data unit cost when dividing the predominantly fixed costs with a data traffic volume that doubles every year and they tried to masquerade the problem by resorting to some sort of creative accounting (also known as ‘Greek statistics’). Below we copy TERA Consultants own words when they described this delicate operation.

“The volume of outputs is also extrapolated and a stable unit cost is derived by calculating the ratio of the Net Present Value of the annual costs to the Net Present Value of the number of outputs. The number of outputs is the number of minutes of calls for voice, the number of SMS for SMS and the number of data customers for data (and not the number of GBytes or Mbytes because calculating a stable cost per Mbyte generates high cost of data in the long term for customers).”

⁷ <http://www.dfmonitor.eu/overview/>

⁸ <http://www.konkurransetilsynet.no/globalassets/v-edtak-og-uttalelser/v-edtak-og-av-gjorelser/2015/2014-0289-355-v-edtak-v-2015-1---offentlig-versjon.pdf>

The sensitivity analysis carried out by TERA Consultants showed that when data traffic is decreased by 20% the so called unit cost per Mbyte increases by approximately 20% (Figure 87 in Tera Consultants' report) and when data traffic is increased by 20% the so called unit cost per Mbyte decreases by approximately 20% (Figure 89 in Tera Consultants' report).

TERA Consultants summarized this finding by stating that *"A drop of demand results in an increase of costs whereas an increase of demand results in a decrease of costs"*. Well again no surprises here.

So let's put all these to the test with a simple example.

The TERA Consultants' estimated cost per megabyte for a Finnish operator is 4 times lower than for a Spanish operator (€0.04cent/MB versus €0.16cent/MB) for domestic data and approximately 3 times lower for roaming data (€0.07cent/MB versus €0.21cent/MB). The main reason for this difference is not that the underlying real costs of producing a megabyte is three to four times lower for a Finnish operator compared to a Spanish operator but simply that the not very different predominantly fixed costs of running a mobile network in Finland and Spain are divided by the typical traffic volume carried by operators in each country. Now this conveniently makes Spanish operators appear having a so called high unit cost per megabyte while Finnish operators appear having a so called low unit cost per megabyte.

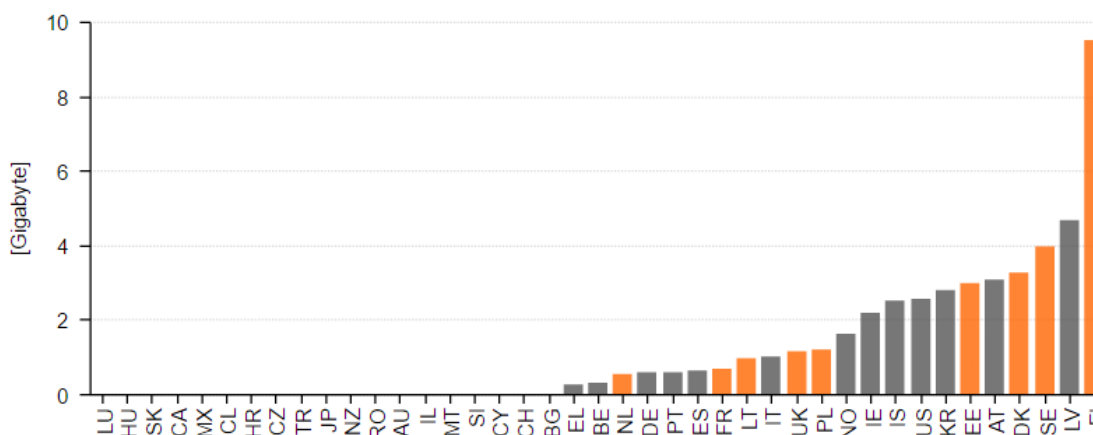
So let's assume that rather than imposing a wholesale data roaming cap throughout the EU the Council and Parliament mandate that each operator could charge wholesale roaming rates to recover their fully allocated unit costs (estimated by TERA Consultants). A Finnish operator could charge up to €0.7/GB (€0.07cent/MB) in wholesale for Spanish tourists visiting Helsinki while Spanish operators could charge three times more €2.1/GB for Finnish tourists sun tanning in Malaga.

So the TERA Consultants' (endorsed by the Commission) calculated cost for producing additional gigabytes to serve Spanish tourists in the heavily utilized Finnish mobile networks is three times lower than the cost of producing additional gigabytes in the practically empty Spanish mobile networks. Nonsense!

The cost of expanding network capacity to serve the need for additional gigabytes is roughly the same in both Finland and Spain while the probability of having to expand network capacity and thus the probability of having to incur actual incremental costs for serving the data need of roamers is much higher in Finland since Spanish network utilization (i.e. GB per person per month) is several times lower (Spanish networks are sitting empty compared to Finnish mobile networks).

The cost modelling methodology of dividing predominantly fixed operator costs (which are broadly similar across EU28 markets) with the country average data traffic volumes that vary greatly (up to 37 times) produces a factitious (artificially high) unit cost per megabyte in countries with much lower average data usage (e.g. Spain, Germany):

Mobile data consumption per capita per month in 2015



Source: regulator websites, Rewheel analysis, where 2015 data was not available: Rewheel estimation

<http://dfmonitor.eu/overview>

As a result of this erroneous methodology countries where domestic retail prices for data are low (e.g. Finland) and consequently average mobile data usage is high appear to have low so called unit cost per megabyte while countries where domestic retail prices for data are high and consequently average mobile data average usage is low (e.g. Germany, Spain) appear to have high so called unit cost per megabyte.

This erroneous methodology artificially inflates the calculated cost per megabyte in order to protect both incoming roaming revenues of South European operators and more importantly the very high domestic retail prices charged by operators in tight oligopoly markets (e.g. Germany, Spain) while penalizing operators with competitive much lower domestic retail prices (e.g. Finland, Denmark, Poland).

3.2 The Commission's gross oversight of the much lower domestic retail data prices

The European Commission based its decision to set a wholesale data roaming cap of €8.5/GB on the estimations derived by the TERA Consultants cost model in conjunction with other data sources and observations, in particular: effective wholesale roaming charges observed on the market, domestic retail and wholesale prices, and for voice, national regulated mobile termination rates (MTRs) as seen in the text copy below from the Report⁹ it prepared for the Parliament and the Council.

“While a certain degree of uncertainty necessarily remains over the cost estimates provided by the cost model, they provide a useful benchmark, which may be used in conjunction with other data sources and observations, in particular: effective wholesale roaming charges observed on the market, domestic retail and wholesale prices, and for voice, national regulated mobile termination rates (MTRs).”

Based on these different data sources, the cost of providing wholesale roaming services in the European Economic Area (EEA) can confidently be assumed to be below 4 ¢cent/minute, 1 ¢cent/SMS and 0.85 ¢cent/MB, including transit costs borne by the visited operator.”

On the Staff Working Document¹⁰ accompanying the Commission's Report¹¹ on the review of the wholesale roaming market the Commission briefly and erroneously addressed the crucial issue of whether domestic retail prices are higher or lower than the proposed wholesale data roaming cap of €8.5/GB.

The Commission wrote in Section “6.5.4. Wholesale roaming prices vs wholesale and retail domestic prices and underlying costs” of the Staff Working Document:

“Retail domestic prices for data in the least expensive domestic bundles are mostly between 1 ¢c/MB and 2 ¢c/MB. As to retail domestic data prices in the least expensive data-only domestic tariff plans of 5 GB and 10 GB for laptops and tablets, they are always below 1 ¢c/MB in all countries. However, the latter prices are likely to include certain assumptions about customers' actual use of the full data package, so effective aggregate unit prices may be higher.”

The Commission's conclusions copied above regarding domestic retail mobile broadband (data-only) prices are based on a Mobile Broadband Prices (prices from February 2015) study¹² conducted by van Dijk Management Consultants. Below we copy a table from the van Dijk study that illustrates the baskets considered for data-only (laptop and tablet use) and smartphone (handset) use.

	Laptop use (data volumes)	Tablet use (data volumes)	Handset use (data volumes + voice/SMS basket)
Basket 1	500 MB	250 MB	100 MB + 30 calls basket
Basket 2	1 GB	500 MB	500 MB + 100 calls basket
Basket 3	2 GB	1 GB	1 GB + 300 calls basket
Basket 4	5 GB	2 GB	2 GB + 900 calls basket
Basket 5	10 GB	5 GB	2 GB + 100 calls basket

Table 1: Mobile broadband baskets, proposed by OECD

So the Commission concluded based on the van Dijk study that domestic retail prices for data in the least expensive domestic bundles are mostly between €10/GB (1 ¢c/MB) and €20/GB (2 ¢c/MB). Moreover, domestic retail prices in the least expensive data-only domestic tariff plans of 5 GB and 10 GB for laptops and tablets are always, according to the Commission, below €10/GB (1 ¢c/MB) in all countries.

So the Commission appears to suggest that since domestic retail prices are generally (save few exceptions in data-only plans with so called large 5 GB and 10 GB volume allowance) between €10/GB and €20/GB a wholesale data roaming cap of €8.5/GB will be reasonable because it will be lower than retail prices in most countries, for most operators and for most tariffs.

The Commission's claim is a misrepresentation and a gross oversight of the actual domestic smartphone and in particular data-only fully-allocated retail price per GB across EU28 markets.

⁹ <https://ec.europa.eu/digital-single-market/en/news/commission-prepares-ground-end-roaming-charges-june-2017>

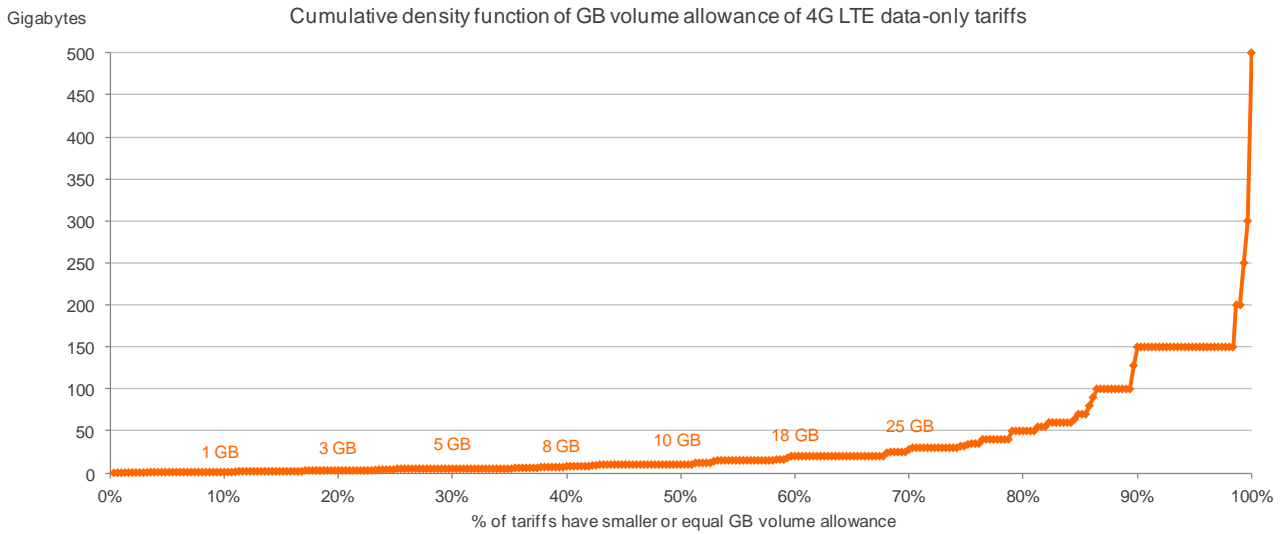
¹⁰ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52016SC0200&from=en>

¹¹ <https://ec.europa.eu/digital-single-market/en/news/commission-prepares-ground-end-roaming-charges-june-2017>

¹² <https://ec.europa.eu/digital-single-market/en/news/mobile-broadband-prices-february-2015>

First of all as shown in chart below 50% of the 310 data-only tariffs sold by 96 operators during April 2016 in EU28 markets had a gigabyte volume allowance that was bigger than 10 GB. So the Commission's claim that there are some tariffs with large GB volume allowance of 5 GB and 10 GB (and hence price per GB below €10/GB) is a misrepresentation.

50% of the 310 data-only tariffs sold by 96 operators during April 2016 in EU28 markets included a volume allowance of more than 10 GB

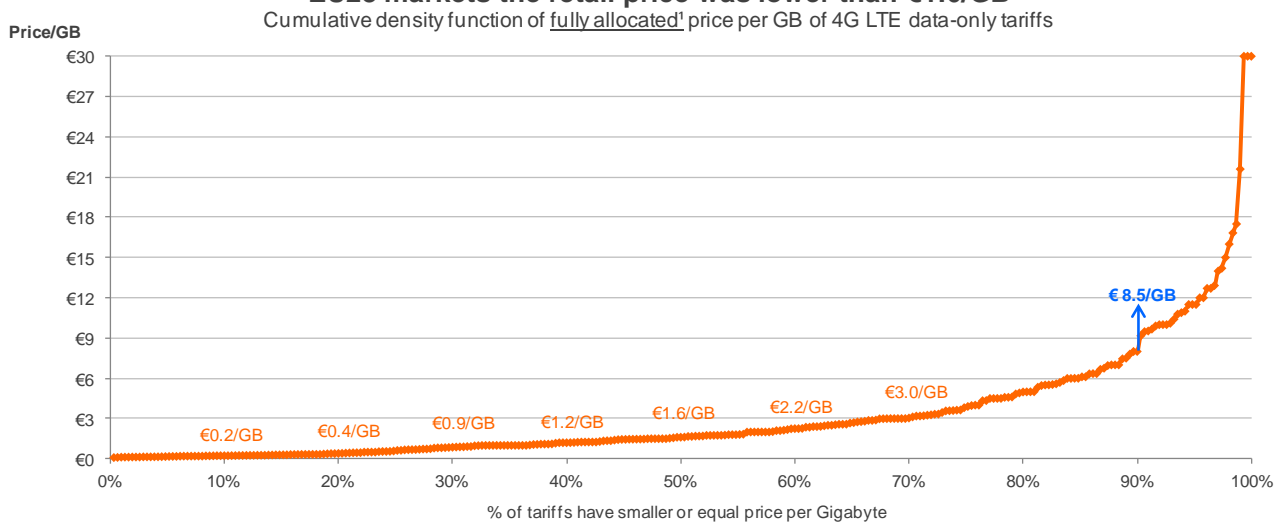


¹Plans with unlimited data volume were assigned a finite volume of 150 GB. 150 GB was the highest finite volume sold for €35 in EU28 in data-only tariffs

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Moreover, in 30% of the 310 domestic data-only tariffs sold by 96 operators during April 2016 in EU28 markets the fully allocated retail price was lower than €0.9/GB, in 50% lower than €1.6/GB, in 70% lower than €3.0/GB and in 90% lower than €8.5/GB.

In 50% of the 310 data-only tariffs sold by 96 operators during April 2016 in EU28 markets the retail price was lower than €1.6/GB



¹Fully allocated retail price per GB = [Tariff monthly retail price incl. VAT divided by GB volume allowance]

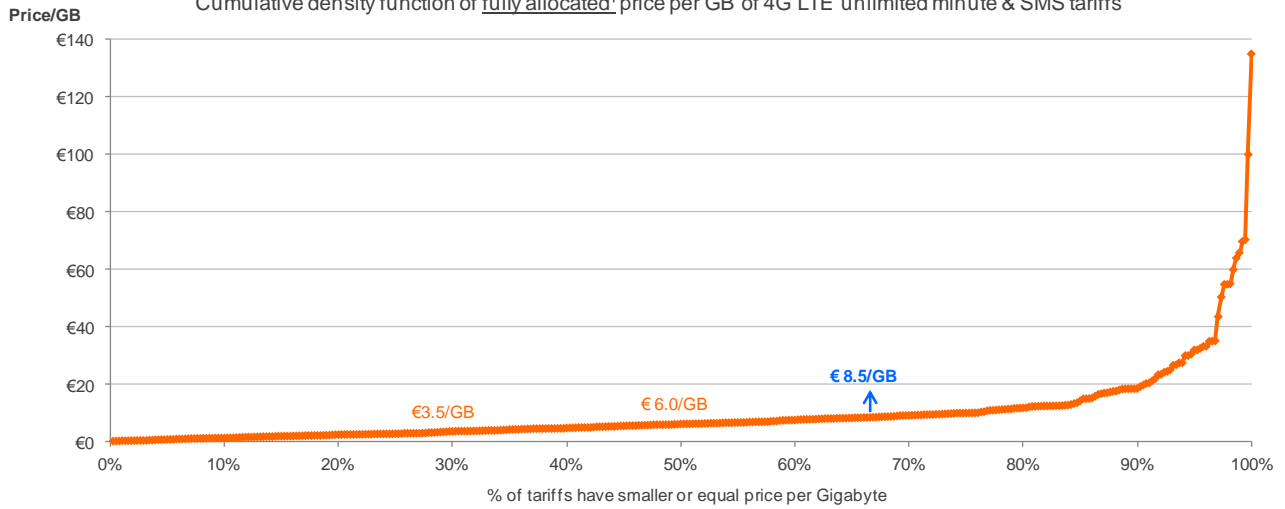
²Plans with unlimited data volume were assigned a finite volume of 150 GB. 150 GB was the highest finite volume sold for €35 in EU28 in data-only tariffs

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Furthermore, in 30% of the 380 domestic unlimited minute & SMS smartphone tariffs sold by 96 operators during April 2016 in EU28 markets the fully allocated retail price was lower than €3.5/GB, in 50% lower than €6.0/GB and in 90% lower than €8.5/GB, even though the entire monthly price that includes VAT is allocated solely to data (nothing is allocated to voice minutes and SMS).

In 50% of the 380 smartphone tariffs sold by 96 operators during April 2016 in EU28 markets the retail price was lower than €6/GB

Cumulative density function of fully allocated¹ price per GB of 4G LTE unlimited minute & SMS tariffs



¹Fully allocated retail price per GB = [Tariff monthly retail price incl. VAT divided by GB volume allowance]

²Plans with unlimited data volume were assigned a finite volume of 60 GB. 60 GB was the highest finite volume sold for €35 in EU28 in unlimited smartphone tariffs