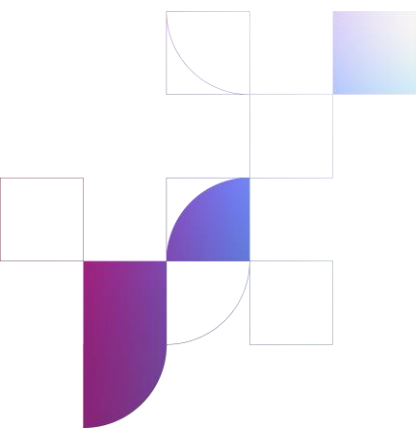


# **BEREC Report on the outcome of the public consultation on the draft BEREC Report on the IP Interconnection ecosystem**

5 December 2024



**Contents**

<b>1. Introduction .....</b>	<b>2</b>
<b>2. General comments.....</b>	<b>3</b>
<b>3. Comments on the IP-IC data analysis overview .....</b>	<b>5</b>
<b>4. Comments on Traffic developments.....</b>	<b>7</b>
4.1. General data traffic trends in Europe .....	7
4.2. Focus on specific trends .....	9
4.3. Future trends.....	10
<b>5. Comments on Pricing and cost developments .....</b>	<b>11</b>
<b>6. Comments on Market developments in IP-IC.....</b>	<b>12</b>
6.1. Large CAPs establishing own infrastructure.....	12
6.2. Investments in CDNs .....	13
6.3. Substitutability .....	13
<b>7. Comments on Generic structure of IP-IC issues.....</b>	<b>15</b>
<b>8. Comments on Bargaining situation (in particular) between CAPs and IAS providers.....</b>	<b>19</b>
<b>9. Comments on Relationship between IP-IC and OIR.....</b>	<b>26</b>
<b>10. Conclusions .....</b>	<b>28</b>
<b>ANNEX – Stakeholders that submitted a contribution .....</b>	<b>30</b>



# 1. Introduction

The Body of European Regulators for Electronic Communications (BEREC) has developed an updated version of the *BEREC Report on the IP Interconnection Ecosystem* (hereinafter “the IP-IC Report”), which contributes to the ongoing debate on IP interconnection (IP-IC). This update builds upon BEREC's prior reports on IP-IC within the context of net neutrality, which were published in 2012 and 2017. In the IP-IC Report, BEREC has re-examined its 2017 conclusions and evaluated the current state of IP-IC in Europe.

A draft of the updated IP-IC Report (hereinafter “the Draft IP-IC Report”) was issued for consultation from 11<sup>th</sup> June to 1<sup>st</sup> August 2024 (12:00 CEST).

In accordance with BEREC's policy on public consultations, this report summarises stakeholders' views in response to the consultation and outlines how they have been taken into account.

BEREC welcomes all contributions and thanks all stakeholders for their submissions. In total, BEREC received 36 responses to the public consultation from various types of stakeholders which are grouped in this report in the following categories:

- civil society (organisations representing citizens/consumers);
- CAPs (Content and Application Providers and their representative organisations, CDN providers as well as cloud and hosting providers<sup>1</sup>);
- IAS providers<sup>2</sup> (providers of Internet Access Services and their representative organisations);
- IXPs (Internet eXchange Points);
- academics/experts.

31 contributions<sup>3</sup> have been published, as five stakeholders provided only a confidential version, and one provided both a public and a confidential version. One additional contribution was received after the above-mentioned deadline and has thus not been taken into account for this public consultation. The contributions will be available after the adoption of the final Report at the following link:

<https://www.berec.europa.eu/en/all-documents/berec/public-consultations>

BEREC summarises the responses to the consultation under the following headings, which generally follow the structure of the IP-IC Report:

---

<sup>1</sup> In this report, BEREC has grouped CDN providers as well as cloud and hosting providers in the general category of “CAPs”, for the sake of simplicity and as their comments were very similar.

<sup>2</sup> For the purpose of this report, the notions of “internet access service (IAS) provider” and “internet service provider (ISP)” are used as synonyms.

<sup>3</sup> The stakeholders having submitted a public version of their contribution are listed in the Annex.

- General comments
- Comments on IP-IC data analysis overview
- Comments on Traffic developments
- Comments on Pricing and cost developments
- Comments on Market developments in IP-IC
- Comments on Generic structure of IP-IC issues
- Comments on Bargaining situation (in particular) between CAPs and IAS providers
- Comments on Relationship between IP-IC and the Open Internet Regulation (OIR)
- Conclusions

In this document, for practical reasons, the term “stakeholders” will be used rather than the names of individual respondents to the consultation. To support the readability of the document, comments and questions raised by stakeholders are addressed and grouped per topic or per sub-topic where appropriate.

## 2. General comments

This chapter provides a general overview of comments received from various stakeholders. Most of these comments will also be discussed in further detail in the following chapters.

Various stakeholders welcome BEREC’s comprehensive and evidence-based analysis of the IP-IC ecosystem. In particular, many CAPs, IXPs and experts generally support BEREC’s conclusions, while several IAS providers disagree with some of the statements and criticise the fact that BEREC analysed the IP-IC markets in isolation rather than assessing the broader impact of CAPs on the global internet ecosystem from a more nuanced perspective.

Various stakeholders concur with BEREC’s assessment that the IP-IC market is well-functioning and competitive, generally driven by effective market dynamics and cooperative behaviour among market players. Especially, some CAPs, IXPs and an academic stakeholder mentioned that the vast majority of interconnection agreements are based on voluntary negotiations and are settlement-free. Several CAPs also consider that this cooperative behaviour has enhanced content quality, delivery efficiency, as well as user experience. On the contrary, several IAS providers challenge BEREC’s conclusion that the European market for peering and transit remains competitive. They also disagree with BEREC’s finding that the IP-IC market is driven by functioning market dynamics and cooperation among market players.



Some CAPs and experts underline the crucial role of CAPs' investments into their own infrastructure, in particular into CDNs and subsea cables, and thus contribute to a more resilient IP-IC ecosystem (see Chapter 6 for further information). Indeed, some CAPs clarified that their infrastructure investments are even more important because the ISPs' customers' demand for content is increasing. Some IXPs also emphasised the growing number of IXPs and the importance of their role in supporting resilient interconnection between networks, thus contributing to a competitive environment.

Several IAS providers consider that the largest CAPs have the strongest bargaining power, and that these CAPs' behaviour and the level of their concentration in the market would be detrimental to the open internet. These IAS providers also call for a contribution by the CAPs to the deployment of the access networks to deliver content to the end-users, while CAPs disagree with imposing the sending party network pays (SPNP) principle in the IP-IC ecosystem. By contrast, some IXPs indicate that pricing should not be regulated since it could increase transaction costs and reduce the propensity to peer, potentially decreasing interconnection points and making internet connectivity more vulnerable to outages.

Concerning bargaining power, several CAPs agree with BEREC's conclusion that the bargaining situation in the IP-IC market seems balanced, while IAS providers disagree with this conclusion. One expert noted that there is no power asymmetry that disadvantages CAPs, while large ISPs may hold a relative advantage.

Several IAS providers stated that they have to apply and to comply with a different regulatory framework than CAPs. Thus, they see a need to address these regulatory asymmetries by imposing new policies to restore the balanced bargaining power between the different market players. In particular, they call for a mandatory dispute resolution mechanism<sup>4</sup>. On the contrary, several CAPs and IXPs have shared their concerns about the potential negative impacts on net neutrality, if any new measures, such as a dispute resolution mechanism, were imposed.

Many CAPs, IXPs, experts and one civil society stakeholder noted that disputes between market players are rare and that they are not indicative of a systemic issue. They also noted that these disputes typically involve vertically integrated IAS providers that misuse their termination monopoly to introduce fees for IP-IC. According to CAPs and IXPs, these disputes have been resolved by the existing mechanisms, as proven by previous court decisions, and they thus see no need for imposing any additional tools. Many of them also consider that there is no sign of market failure which requires any regulatory intervention. Several IAS providers contradicted these points and mentioned that any absence of formal disputes should not be interpreted as indicative of a functioning market. They also consider that court proceedings

---

<sup>4</sup> BEREC referenced the NRAs' capacity to settle disputes between ECN-ECS providers and other undertakings benefitting from access or interconnection obligations for the purpose of providing publicly available ECS in the [BoR \(24\) 100](#) BEREC's input to the EC public consultation on the White Paper "How to master Europe's digital infrastructure needs?" (June 2024).

have long timelines and, as a result, could not be seen as an efficient mechanism to resolve such issues.

Several CAPs, a civil society stakeholder and an IAS provider recommend carrying out regular reviews and monitoring of the developments in the IP-IC ecosystem. Several CAPs and IXPs also propose to assess issues on a case-by-case basis. Some CAPs and experts support BEREC's continued engagement on the topic.

Regarding practices applied by some vertically integrated IAS providers, several CAPs, an academic stakeholder and a civil society stakeholder are of the opinion that these practices (can) violate the OIR. More precisely, they consider that these IAS providers require payments from CAPs to route their content through their networks to the end-users. On the other hand, IAS providers have a different interpretation of the OIR and they consider that the OIR applies to the provision of IAS and not to IP-IC services (see Chapter 9 for further information).

Several CAPs, experts and an IAS provider support BEREC's conclusion that the internet has managed to cope with traffic growth and higher peaks of traffic (see Chapter 4 for further information).

On the one hand, several CAPs and experts support BEREC's finding that there is evolution rather than revolution in IP-IC markets. On the other hand, several IAS providers disagree with this finding, especially since the IP-IC Report only covers the period until 2030 and because the IP-IC ecosystem is subject to rapid dynamics.

Additionally, some CAPs would prefer if the findings of the analysis were more prominently featured in the executive summary and the conclusion of BEREC's IP-IC Report. A few other respondents suggest the use of standardised acronyms and terminology. They also proposed the introduction of a glossary.

Finally, various stakeholders referred to the European Commission's (EC) White Paper "How to master Europe's digital infrastructure needs?". In particular, a CAP suggests incorporating the conclusions of BEREC's IP-IC Report in the EC's work, while another stakeholder indicated that they submitted proposals to the EC for imposing further rules for commercial negotiations between CAPs and ISPs.

### **3. Comments on the IP-IC data analysis overview**

#### ***Stakeholder responses***

On one hand, several CAPs support the findings of the Draft IP-IC Report and emphasise the importance of an evidence-based approach in understanding and describing the market trends, while recognising the complexity and diversity of the internet ecosystem.



On the other hand, several IAS providers expressed their concern that in order to have a complete picture, BEREC should have collected data from CAPs and also consider commercial CDNs. Additionally, the timeframe of the data collection was criticised, arguing that the IP-IC Report looks at a single point in time as opposed to a longer period (five years), and thus ignores seasonal effects.

Regarding more specific comments, one CAP requests a clarification related to Figure 1 on whether the percentages represent the total traffic received via different IP-IC methods or the usage distribution among IAS providers.

The same respondent proposes a correction of the 4<sup>th</sup> bullet, related to the share of transit, to reflect that the considerable share of bilateral peering is due to large IAS providers' global backbones.

### ***BEREC response***

BEREC thanks the stakeholders for their feedback and has carefully considered the respondents' views.

For the preparation of the IP-IC Report, BEREC conducted a comprehensive desk research and organised a series of 12 virtual workshops. BEREC additionally collected data by means of a quantitative questionnaire, complemented with qualitative questions, on the state of the markets. The data collection has therefore been one pillar of the analysis.<sup>5</sup>

BEREC notes that several stakeholders welcome and support the evidence-based and empirical approach applied. Regarding the point raised on the scope of the data collection, BEREC highlights that its data collection covered (incoming and outgoing) traffic between IAS providers and any relevant actors, e.g. CAPs, CDN or cloud service providers. The collected data was validated, and incomplete or erroneous replies were eliminated. This enabled BEREC to draw conclusions on the state of the market and the IP-IC services used.

Additionally, BEREC reiterates that it made the convention to focus on weekdays and considers that the results (e.g. that ratio of traffic via different IP-IC services used) do not depend on this convention.

Regarding the comment on the seasonality, BEREC reiterates the description in the IP-IC Report by highlighting that the quantitative data collection provides a snapshot of the state of the markets, while information from desk research and workshops are used to assess market developments since the previous report issued in 2017. Regarding the comments on the definitions used in Figure 1 and associated conclusions below, BEREC has complemented the IP-IC Report with clarifications and reading aid (see page 9 of the IP-IC

<sup>5</sup> BEREC also clarifies that it followed up on the findings gathered from the 12 workshops conducted in September and October 2023, by distributing an additional ad hoc questionnaire to various stakeholders. While the IP-IC Report excludes the results of this additional questionnaire due to scheduling constraints, the results have been documented internally and informed BEREC's ongoing work. BEREC has updated the introduction of the IP-IC Report accordingly.



Report). BEREC has also updated the 4<sup>th</sup> bullet related to the share of transit (page 8 of the IP-IC Report).

## 4. Comments on Traffic developments

### 4.1. General data traffic trends in Europe

#### General comments regarding traffic trends

##### **Stakeholder responses**

Several IAS providers point out that data traffic over the internet is concentrated among a few large CAPs. In particular, one IAS provider indicates that the six largest CAPs (Amazon, Apple, Facebook, Google, Microsoft and Netflix) accounted for almost 48% of total global data traffic in the first half of 2022, and 70% at the backbone level. This may suggest a potential dominance of CAPs, risks of congestion and degraded quality.

Regarding the traffic growth, some IAS providers note that despite a possible stabilisation in traffic growth rates post-pandemic, the absolute growth remains significant, while another ISP indicates that global data traffic volume doubles approximately every three years, in both average and peak terms. The same ISP indicated that for EU traffic projections, average data traffic per user on fixed networks is expected to grow by 20% annually, reaching 900 GB per month by 2030. On mobile networks, data traffic is projected to quadruple by 2028. This ISP also emphasises the need for a nuanced understanding of data traffic growth and its implications for the IP-IC markets. Moreover, another stakeholder contests BEREC's assessment that IP traffic growth rate is stabilising and that the peak-to-average ratio remained stable from 2018 to 2022. According to its experience and various reports, IP traffic growth rate has increased from 2017 to 2023, with no indications of future stabilisation.

On the other hand, a CAP and an expert indicate that recent studies report a decrease in traffic growth, while a few other CAPs support BEREC's finding that the traffic growth rate has stabilised.

Regarding sources referred to in the Draft IP-IC Report, one stakeholder criticises the use of outdated sources and limited data. For example, it points out the reliance on a 2021 ARCEP document and transit volume figures from 2017 to 2021, which are seen as outdated in a rapidly changing market. Moreover, an expert notes that caution is needed when using Sandvine as a source due to its limited insight into EU ISPs.

Another stakeholder challenges BEREC's view on the stabilisation of the peak-to-average ratio. According to this stakeholder, busy hour internet traffic is growing more rapidly than





average traffic, driven by live video streaming of high-attendance events, which generates significant traffic peaks.

### ***BEREC response***

BEREC acknowledges that the contributions received reported diverging views on traffic growth rates. In BEREC's view, this heterogeneity shows that, despite the highlighted overall growth trend, traffic dynamics can differ substantially amongst operators. A stakeholder challenged BEREC's results about the peak-to-average ratio, highlighting the fact that the traffic growth is driven by peak traffic and the role played by events (sports, etc.) in this growth. Despite this, BEREC reiterates that networks and, in general, the internet ecosystem have managed to cope well with such growth levels.

In response to the comments regarding the need of more up to date data regarding traffic growth, BEREC has amended Section 3.1 (page 9) of the IP-IC Report, including a reference to a recent study by Telegeography, whose figures are coherent with the ones already reported. The first key finding of Section 3.4 (page 13) was also updated accordingly.

### ***Traffic asymmetries***

#### ***Stakeholder responses***

Large IAS providers point to traffic asymmetries (i.e. more traffic flowing towards IAS providers' networks than the other way) and indicate that many IAS providers apply traffic ratios.

Additionally, several IAS providers hold that, in cases of significant traffic asymmetries at the interconnection point, payments between partners are a common practice in commercial agreements and are in line with industry standards. One of them argues that IAS providers would not typically provide transport through their network without a payment and therefore interconnection or private peering would also be subject to charges. However, the reason why those charges are not levied is the fact the traffic is symmetric, so respective payments would largely offset each other resulting in a settlement-free peering.

On the contrary, according to one academic stakeholder, the ratio-based argument that an interconnection partner delivering more data to the ISP than it receives should pay fees, is not a standard industry practice. Most IAS providers do not receive payments for terminating traffic requested by their customers, and they either pay a transit provider or peer settlement-free. The vast majority of end-user networks download more data than they upload, making traffic ratios irrelevant to the decision to peer settlement-free.



**BEREC response**

BEREC observes that two parties may peer settlement-free when they derive similar value from peering, which also reflects their mutual interdependence.<sup>6</sup> In other words, traffic symmetry is not a strict requirement for settlement-free peering.

Concerning the argument that many IAS providers apply traffic ratios, BEREC points out that more than 99% of all agreements are settlement-free or “handshake” agreements (see Section 4.3.2 of the IP-IC Report). Aside from that, BEREC has added some clarifications to Section 3.1 of its IP-IC Report (see footnotes).<sup>7,8</sup>

## 4.2. Focus on specific trends

### Stakeholder responses

On the significant role of CDNs, several CAPs support BEREC’s findings. In particular, one CAP highlights BEREC’s acknowledgment of CDNs’ role in reducing costs for smaller CAPs, allowing them to benefit from economies of scale. Another CAP states that the installation of on-net CDNs within ISPs’ networks has contributed to efficient data traffic management. Additionally, the network infrastructure is well-equipped to handle increasing data demands due to ongoing technological enhancements and strategic deployments. Moreover, another CAP states that the increased use of on-net CDNs has lessened the need for long-distance transit by bringing traffic closer to end-users. Data indicates that traffic exchanged through CDNs is increasing relative to traffic transferred via transit and peering, with large CAPs investing in their own CDNs or transport infrastructure.

**BEREC response**

BEREC takes note of these comments.

<sup>6</sup> Similar former FCC Chief Technologist Professor Scott Jordan, [Jordan Declaration](#), e.g. paragraph 58: “When the two parties perceive an approximately equal value to the peering service they offer to one another, it is common for the peering agreement to be settlement-free (i.e., not to require payment from either party to the other)”.

<sup>7</sup> For instance, in Germany, only the incumbent requires a certain ratio of inbound to outbound traffic for peering, see WIK-Consult, [Competitive conditions on transit and peering markets – Implications for European digital sovereignty](#) (February 2022), Table 2-6, p. 46.

<sup>8</sup> While [Deutsche Telekom](#) uses a traffic ratio of max. 1,8:1 as requirement for settlement-free peering (see WIK-Consult, p. 43) the speed ratio for their access lines ranges from 2,5:1 to 6,25:1. Against this background as well as BEREC’s finding that the inbound-outbound traffic ratio across all respondents is 5,6:1, a “tight” traffic ratio at the wholesale level will in most cases “automatically” imply that the requirement for settlement-free peering is not met.

## 4.3. Future trends

### *Stakeholder responses*

#### Evolution of video codecs

Regarding the relevance of video codecs, an expert and some CAPs agree with BEREC that advances in compression techniques contribute to mitigating traffic growth.

#### Sustainability of data traffic growth

Regarding the sustainability of traffic growth, several CAPs concur with the BEREC conclusion that the internet ecosystem's ability to cope with increasing traffic volumes is still valid. In particular, one CAP acknowledges BEREC's observation that the rising prevalence of live-streaming and ultra-high definition (UHD) videos could drive data traffic growth. However, they note that this potential increase is being mitigated by CAPs through partnerships and technological advancements. In this regard, another CAP highlights that its own investments in infrastructure enhances the efficiency and reliability of content delivery. According to this CAP, the principles of open internet empower competition and investment in resilient, future-proof infrastructure. This CAP also notes that the growth in end-users' demand for internet content and associated traffic is sustainable over time due to ongoing investments and collaborative efforts by market players.

One association which represents CAPs mentions that its members invest heavily in CDNs, compression technology, caching and peering which contribute to network efficiency and sustainability. Network operators report that they can manage network growth without escalating costs in the long term.

Another CAP also concurs with BEREC's findings that the internet has effectively managed traffic growth without significant regulatory intervention.

#### Main drivers of data traffic growth

Several IAS providers argue that the Draft IP-IC Report underestimates the impact of new technologies, such as mass-market applications, artificial intelligence, virtual and augmented reality, as well as the related traffic growth. Furthermore, they express scepticism that technological advancements and competition alone will suffice to ensure the internet can meet growing demand. They also highlight that network adaptability depends on operators' willingness and ability to invest in network upgrades and expansions. Another stakeholder refers to several factors influencing traffic growth such as UHD video streaming as well as an increase in devices and connections, development of very high-capacity networks, M2M, as well as connected car technologies. An expert considers that BEREC should be cautious with traffic growth forecasts, especially for unproven applications like the Metaverse.



***BEREC response***

In their comments, several IAS providers referred to an underestimation of the effects of new technologies and mass-market applications. In this regard, BEREC points out that, while some of these have been mentioned as possible major factors for future traffic growth, those are not yet broadly commercially available and, thus, their effective impact on traffic is still not quantifiable. BEREC sees no need to change its IP-IC Report in this respect.

## 5. Comments on Pricing and cost developments

***Stakeholder responses***

A few CAPs support BEREC's view that competition and technological progress have resulted in declining prices and costs for IP-IC. Several IAS providers urge BEREC to consider the full cost implications of IP-IC. One IXP notes that network costs are driven by peak capacity rather than traffic volume. For this reason, network costs have not proportionately increased with traffic volume. This observation corresponds with BEREC's observations in Chapter 4 of the IP-IC Report.

Some CAPs agreed with BEREC's conclusions in relation to declining transit prices, pointing out that on-net caching provides localised peering which lowers costs, and notes that many peering agreements are "handshake" and settlement-free, and that upgrading network interfaces is a minor cost relative to total network costs. One CAP holds that the marginal cost of carrying more traffic is nearly zero. This CAP also agrees that technological progress and cooperation between ISPs and CAPs have held prices down.

One IAS provider highlighted that the data collection exercise did not contain information about costs. Another IAS provider believes that for mobile networks, operators bear set up costs for on-net CDNs. One CAP proposes to clarify the difference between cumulative bytes (MB, GB etc.), and bandwidth (Mbit/s, Gbit/s etc.).

***BEREC response***

BEREC identifies different viewpoints of stakeholders regarding the effects of on-net CDNs on traffic prices. Notwithstanding these different viewpoints, BEREC maintains its observation that on-net CDNs have contributed to a reduction in transit prices and improved quality for end-users.

Some IAS providers sought further information on costs. However, BEREC's IP-IC Report includes as much data as possible and available to BEREC. Furthermore, as costs are a key input to any price, BEREC believes that this is not a significant drawback as the IP-IC Report contains data on prices. BEREC took an evidence-based approach, and acknowledges that it was challenging to state information on costs (as several assumptions

need to be considered for the calculation of costs), while information on prices is generally available to market participants.

While prices and costs may not always align (e.g. in case of price discrimination), BEREC refers to its finding that “*competition and technological progress exert downward pressure on costs, which then feed through to prices*”<sup>9</sup>. Thus, in the long run, it is not plausible to assume that the development of prices is decoupled from the development of costs. Accordingly, BEREC referred to its previous reports, both of which identified “*that prices for IP-IC services and costs for interconnection infrastructure were falling over longer time horizons*”.<sup>10</sup> Furthermore, IAS providers themselves refer to declining costs per GB.<sup>11</sup> Thus, BEREC sees no need to change its IP-IC Report in this respect.

## 6. Comments on Market developments in IP-IC

### 6.1. Large CAPs establishing own infrastructure

#### ***Stakeholder responses***

Several IAS providers acknowledge the increasing involvement of large CAPs in the connectivity value chain. They indicate that CAPs’ investments in their own backbone networks, CDNs, data centres, hosting and cloud computing services enhance their control over content delivery and consequently place competitive pressure on traditional transit providers. They submit that, as a result, major CAPs now predominantly operate their own CDNs, which reduces their reliance on specialised CDN providers.

On the other hand, those IAS providers also indicate that smaller CAPs are more inclined to collaborate with ECN providers for content delivery, playing a crucial role in developing Open Caching technology, which could facilitate the creation of neutral and standardised distribution platforms that rely on ISP infrastructure, such as Mobile Edge Computing. However, if smaller CAPs are unable to use independent commercial CDNs, smaller CAPs may become increasingly dependent on large CAPs’ CDNs, potentially leading to foreclosure risks and affecting downstream markets.

#### ***BEREC response***

BEREC takes note of the comments related to CAPs’ investments and is of the opinion that the market currently exhibits multiple options for specialised commercial CDNs which are used

<sup>9</sup> IP-IC Report, Chapter 9, 2<sup>nd</sup> paragraph

<sup>10</sup> IP-IC Report, Chapter 4, 1<sup>st</sup> paragraph

<sup>11</sup> IP-IC Report, Section 4.1, Figure 4 showing that Vodafone’s network costs have declined from 2017 until 2021 with roughly 70% as well as BT reporting similar results.

by CAPs. BEREC refers to its *Report on the entry of large content and application providers into the markets for electronic communications networks and services*<sup>12</sup>, in which the different business models are addressed in further detail. Apart from this, BEREC sees no need to change its IP-IC Report in this respect.

## 6.2. Investments in CDNs

### **Stakeholder responses**

Regarding caches, one stakeholder disagrees with BEREC's statement that when CAPs place their cache servers in the IAS providers' access networks that "*this implies that there is no longer an exchange of traffic across network boundaries when an IAS provider's customer uses content and/or applications*". Relatedly, one CAP indicated that traffic is crossing the network boundary from the IAS provider's network to the CAP's network, even though it is doing so within the physical boundary of the IAS provider's facility. For this reason, this stakeholder sees little technical difference between on-net CDNs and public peering with CDNs. This stakeholder considers that the benefits of on-net CDNs are the same as localised public peering. In the case of their on-net caches, the architecture is the same as bilateral peering. Therefore, it is this CAPs' recommendation to not ascribe changes to "on-net CDNs" specifically but rather localised interconnection.

### **BEREC response**

Regarding the comments related to on-net CDNs and the need for interconnection, BEREC has clarified, in Chapter 3 of the IP-IC Report, that the cache will relieve the interconnection link (peering or transit) between the CAP and the IAS provider.

In particular, the installation of an on-net cache means that data crosses the interconnection point once instead of several times (i.e. each time it is requested by the end-user) which reduces the overall traffic which passes through the interconnection link.

Regarding the concept of "on-net CDNs", BEREC sees no need to clarify the wording in its IP-IC Report.

## 6.3. Substitutability

### **Stakeholder responses**

A CAP, a few experts as well as one civil society stakeholder point out that peering and transit can be substitutes for one network to reach another network when they both offer normal

<sup>12</sup> [BoR \(24\) 139](#) Report on the entry of large content and application providers into the markets for electronic communications networks and services (October 2024)

performance or in a well-functioning market. According to this CAP, despite the increment for higher bandwidth and the lower latency connectivity, the particularly high density of IXPs and interconnections in Europe implies that traversing a transit provider to reach an ISP does not add meaningful latency to a connection by itself. Similarly, an academic stakeholder argues that generally, if the transit network is well-dimensioned, reliable and has enough interconnection capacity with the ISP, it can serve as an adequate alternative to peering with the ISP, even for traffic that needs low delay or high bandwidth. The same stakeholder describes the traffic routes of the CAP, the transit network and the ISP being collocated in the same data centre, where the provision of transit has virtually no impact on the performance as long as the capacity between them is well-dimensioned.

On the other hand, a stakeholder states that peering is not a substitute for transit as peering offers better quality.

One CAP indicates that the increase in the usage of on-net CDN has reduced the demand for long-distance transit. Thus, the amount of traffic exchanged through CDNs is rising compared to transit and peering. As a consequence of this, peering often serves as a substitute for transit, especially when low-latency, high-bandwidth connections are required.

A civil society stakeholder is of the view that competition in the transit market restricts ISPs' ability to exploit their termination monopoly. Similarly, an expert emphasises the critical and essential role of transit providers to ensure end-users have a universal ability to reach nearly all internet endpoints. They offer a viable alternative to peering or CDN delivery, serving as a backup when direct interconnection agreements are unattainable. An academic stakeholder had a more critical view pointing out that, on the one side, transit providers can constrain an ISP's ability to charge monopoly termination fees in a well-functioning market. On the other hand, the large ISPs apply strategies that make it impossible for Tier 1 transit providers to prevent ISPs from exploiting their termination monopoly.

At the same time, one CAP argues that the overall market for transit and peering is competitive, but each network has a termination monopoly over the IP addresses on their network, so the ability to reach individual IAS subscribers cannot, by definition, be competitive.

#### ***BEREC response***

BEREC already acknowledged in the Draft IP-IC Report that substitutability in IP-IC markets relates (among others) to the ability of actors to use and switch between types of services (peering, transit, CDNs). Nevertheless, BEREC has clarified, in Section 5.3 of its IP-IC Report, that still transit can be provided under certain circumstances with a level of quality that it may serve as an adequate alternative to peering.

BEREC also wants to reiterate its view that, for each party to a peering agreement, peering provides clarity of the status of the interconnection and avoids dependency on a third network.





This makes it more suitable in case of services which require high bandwidth or low latency.<sup>13</sup> BEREC sees no need to change its IP-IC Report in this respect.

## 7. Comments on Generic structure of IP-IC issues

### General comments on the generic structure of IP-IC issues

#### **Stakeholder responses**

Various stakeholders point out that some IAS providers, primarily vertically integrated IAS providers with Tier 1 transit providers or large incumbent IAS providers, mainly in their home networks, engage in specific interconnection practices. Such practices lead to congestion which has the effect of forcing companies to pay recurring termination fees for direct interconnection to reach this ISP's customers.

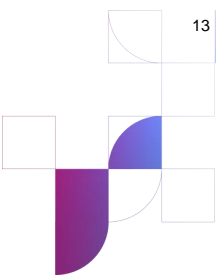
An academic stakeholder referred to the playbook that could be used by vertically integrated IAS providers. This playbook could not only be used when all routes are congested, but also when IAS providers apply tight traffic ratios that might prevent a transit provider, who peers settlement-free with a vertically integrated IAS provider, from taking on additional traffic (as then the settlement-free peering might turn into a paid relationship). Additionally, where a transit provider has uncongested connectivity to an IAS provider, it may not serve as a substitute for a CAP for direct interconnection with the IAS provider, if the transit provider passes on termination charges to the CAP. More specifically, this respondent argues it would be wrong to assume that small CAPs are unlikely to be affected by such IAS providers' playbook strategies. If these small CAPs use services from e.g. CDN or transit providers and if those have to pay high termination fees towards an IAS provider, then these costs would be passed on to the small CAPs.

An academic stakeholder and another respondent consider that those practices do not only consist of congesting interconnection points or upgrading unpaid connections more slowly than paid ones, but also includes the practice of refusing to peer settlement-free within their home country (thus leading to "tromboning").

Various stakeholders point out that there is no practical difference between paid peering and being forced to use an ISP's transit service to reach its own network. Both basically involve a fee for terminating traffic to its users, thus masking termination fees within transit fees. They stress that this strategy allows large IAS providers to charge direct interconnection fees that significantly exceed market rates or use transit providers that incorporate these fees, limiting competition and enabling IAS providers to maintain supra-competitive pricing. In general,

---

<sup>13</sup> see BoR (17) 184, pp. 13-14





some CAPs, as well as a few experts, emphasise that the problems stem from the abuse of termination monopolies rather than a refusal to peer.

On the other hand, several IAS providers stress rather critically that there are no strategies regarding artificial congestion from their side, rather CAPs have alternative options to route traffic to IAS providers. This routing decision would be solely taken by the CAPs and IAS providers would have no influence on this. CAPs could not only peer but also use transit and/or CDNs. These IAS providers oppose the idea that IAS providers engage in strategies like “selective routing policies” or “artificially congested interconnections”. Instead, they argue that large CAPs, particularly those that send large volumes of data, can congest specific interconnection points by spontaneously re-routing a portion of their traffic via indirect connections to an IAS provider’s network. Thus, the quality of service for all online services, routed via the affected interconnection interfaces, would be influenced.

By contrast, a CAP disputes the notion that CAPs are responsible for congestion indicating that they actively seek alternative paths to mitigate performance issues and that they have no incentive to degrade internet performance. Similarly, an academic stakeholder indicates that the narrative by major IAS providers publicly blaming CAPs for routing traffic in ways that create congestion has been used in both the US and Europe. However, evidence and regulatory findings from the US directly contradict this narrative.

#### ***BEREC response***

BEREC observes that both market sides (IAS providers vs. CAPs) hold each other responsible for causing congestion.

BEREC considers that while its generic description of IP-IC issues is not wrong, this description has been broadened because the strategies described in the IP-IC Report are not only conceivable in cases where all alternative routes are congested. BEREC has thus clarified this point in Chapter 6 of the IP-IC Report.

As regards the reference to “tromboning”, BEREC has added this as a specific example of the generic structure of IP-IC issues as described in Chapter 6 of its IP-IC Report.

Experts argue as well that, while exploiting the termination monopoly, IAS providers would hide termination fees within transit charges, and also point out that these transit charges would be a multiple of market transit prices. In line with the Draft IP-IC Report, BEREC points out that under competitive conditions such excessive prices would not be conceivable. This gives rise to the concern that there are cases where the termination monopoly might be exploited. BEREC has clarified this point in Chapter 6 of its IP-IC Report.

Some IAS providers claim that routing decisions would be solely taken by CAPs over which IAS providers would have no influence. BEREC does not agree with this view. IAS providers have full control over their own network (autonomous system), they operate and thus determine which interconnection interfaces are used to exchange traffic with specific destinations. Typically, ISPs set up different interconnections and announce their network

to the routes from which they want to receive traffic bearing in mind in particular reachability, capacity and performance considerations. ISPs can implement alternative routes or upgrade existing interconnections, and thus improve the performance of delivery of specific applications to end-users. These actions may be taken by the ISP following concertation with CAPs. BEREC has clarified this point in Chapter 6 of the IP-IC Report.

While BEREC does not intend to judge upon individual disputes in Europe, it points to the evidence in the US<sup>14</sup> proving that, in the US, ISPs deliberately let interconnection interfaces congest in order to extract recurring termination fees.<sup>15</sup> This evidence supports the possibility that such strategies might occur in practice. BEREC has clarified this point in Chapter 6 of the IP-IC Report.

### Rationale of applying a non-cooperative strategy

#### **Stakeholder comments**

Referring to findings from economic literature, an ISP argues that it would be a rational strategy to apply such a credible threat even if the threatening party was making losses in the short term. A CAP could signal that it is willing to use the deterioration in quality as lever and that it will refuse to pay a fee for IP data transport also in other bilateral negotiations with carriers. Contrary to this view, an academic stakeholder argues that it is rational for an ISP to use the playbook and to degrade the quality of the IAS provided to ISP's customers to gain termination fees, even if some customers would switch to another ISP. This stakeholder supports its view by referring to a variety of evidence provided in the US. Thus, responses from both sides basically argue that short-term costs of a non-cooperative strategy are outweighed by long-term benefits.

#### **BEREC response**

Concerning this aspect, BEREC has complemented Chapter 6 of the IP-IC Report, with a reference pointing to the findings from the US.<sup>16</sup>

<sup>14</sup> Federal Communications Commission (FCC), New York Attorney General (NY AG)

<sup>15</sup> NY State 2017 Open Internet [Comments](#), p. 1: “These investigations have uncovered documentary evidence revealing – for the first time – that from at least 2013 to 2015, major [internet access] providers made the deliberate business decision to let their networks’ interconnection points become congested with Internet traffic and used that congestion as leverage to extract payments from backbone providers and edge providers [i.e. providers of internet content, applications, and services], despite knowing that this practice lowered the quality of their customers’ Internet service.

*This practice was not limited to a single instance or locality: NYOAG has found that this practice was used for years by at least two of the country’s biggest [internet access] providers who operate in New York and in many other states”.*

<sup>16</sup> NY AG [comments](#), p. 7, citing Time Warner Cable internal strategy presentation: ““[T]he short-term costs” that Spectrum-TWC incurred from the more expensive routing would therefore “eventually lead to longer-term revenue growth and cost containment.””; NY AG comments, p. 8: “Spectrum-TWC was well aware that its customers suffered significant service degradation as a result of its interconnection disputes”.

Implications of the availability and pricing of transit**Stakeholder comments**

An academic stakeholder criticises large IAS providers as well as BEREC, because they assume that the availability and pricing of transit would constrain negotiations over settlement-free peering and prevent monopoly pricing. According to this stakeholder, this assumption would be refuted by evidence of high termination fees and slow upgrades of unpaid connections.

**BEREC response**

The availability of several service types (peering, transit, IXPs, on-net CDNs) contributes to competition and efficient commercial terms between ISPs and other players in IP-IC markets. ISPs, and CAPs alike, are not required to enter negotiations or contracts due to the availability of other players which are able to provide the service of receiving or sending traffic (e.g. transit provider). This decentralised nature of the internet contributes to low transaction costs (e.g. costs of negotiation), higher resilience and innovation. BEREC sees no need to change its IP-IC Report in this respect.

Non-disclosure agreements**Stakeholder comments**

Civil society stakeholders noted that non-disclosure agreements (NDAs) would obscure issues also pointing to fear of repercussions which some CAPs may refer to.

**BEREC response**

Already in its workshops, BEREC heard this argument that there may be a fear of speaking out from several stakeholders, independently from each other. BEREC is concerned to hear this, as this would give rise to concerns. While NDAs as such are not unusual in markets, they could aggravate this fear of speaking out. BEREC has clarified this point in Chapter 6 of its IP-IC Report.

More specific points**Stakeholder comments**

A CAP requests a correction in Figure 11 by recommending removing an incorrect arrow to reflect that all content is served via CDN as per the text.



**BEREC response**

BEREC has updated Figure 11 in its IP-IC Report accordingly.

## 8. Comments on Bargaining situation (in particular) between CAPs and IAS providers

### General assessment of bargaining situation

#### **Stakeholder responses**

IAS providers argue that there is an asymmetry in the relative bargaining power which favours large CAPs vis-à-vis IAS providers. Accordingly, they typically argue that they could not apply congestion strategies vis-à-vis other market players, but rather CAPs would cause congestion (see previous chapter for further information).

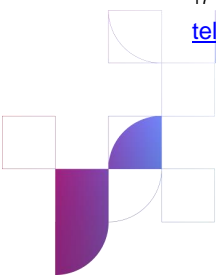
On the other hand, several CAPs, experts and IXPs consider the bargaining power generally to be balanced and/or point to a functioning IP-IC market. Some CAPs, experts and a civil society stakeholder specifically refer to strategies by IAS providers to exploit their termination monopoly to extract payments from other market players (see previous chapter for further information). One CAP refers to the finding from the German Monopolies Commission (“*it is not apparent that OTT providers exploit their increased bargaining power*”).<sup>17</sup>

One academic stakeholder argues that the focus on which a party has more bargaining power in network fee negotiations is both misguided and harmful as this inquiry would make no sense unless one accepts the underlying notion that online services should be paying IAS providers.

**BEREC response**

As regards the criticism that raising the question of relative bargaining power was harmful as it would start from an underlying assumption that there should be network fees, BEREC disagrees. BEREC considers that addressing the question of relative bargaining power is helpful to assess the underlying economics of IP-IC. Accordingly, the answer to this question is an important factor impacting on the overarching question of whether the IP-IC market is functioning effectively. BEREC points out that the question of relative bargaining power was not raised with an implicit assumption that there should be network fees in the first place. Furthermore, BEREC refers to the mutual interdependence between CAPs and

<sup>17</sup> Monopolkommission, [A contribution from data traffic-intensive over-the-top \(OTT\) providers to the costs of telecommunications network expansion should be rejected!](#) (May 2023)



IAS providers<sup>18</sup>. Against the background of these arguments, BEREC sees no need to change its IP-IC Report in this respect.

### Asymmetric regulation

#### **Stakeholder responses**

Large ISPs also point to asymmetric regulations as ISPs would be subject to the OIR.

#### **BEREC response**

As regards the ISPs' claim that there is a regulatory asymmetry, BEREC notes that the OIR applies to ISPs, while other regulations apply to CAPs (e.g. Digital Markets Act, Digital Services Act). Thus, BEREC sees no need to modify its IP-IC Report in this respect.

### Mutual interdependence / must-have content / number of customer end-users

#### **Stakeholder responses**

Furthermore, ISPs typically argue that large CAPs' bargaining situation would be superior as they avail of "must-have content" and also have a dominant position in core revenue-generating markets. Relatedly, these ISPs criticise the fact that BEREC conducted an isolated analysis of the IP-IC market, which did not consider the impact of large CAPs in the global internet ecosystem, vertical integration of CAPs and their leveraging of market power into adjacent markets. One stakeholder underlines that the existence of an interdependency does not mean that there is a balanced bargaining power between CAPs and ISPs.

More generally, several ISPs doubt the existence of cooperative agreements/symbiotic relationships<sup>19</sup> between CAPs and ISPs. This would only hold if ISPs and CAPs are perfect substitutes.

Opposed to these views, a few CAPs hold that it could not be inferred from the size or popularity of the services, they offer, that CAPs exert bargaining power over ISPs. They refer to the mutual interdependence between ISPs and CAPs.

Referring to findings of the Federal Communications Commission (FCC), one academic stakeholder and a civil society stakeholder point out that only the largest ISPs in a country can force others to pay termination fees. Such a practice could be applied because only these

---

<sup>18</sup> [BoR \(22\) 137](#) BEREC preliminary assessment of the underlying assumptions of payments from large CAPs to ISPs (October 2022), Chapter 4, p. 10

<sup>19</sup> This topic has also been addressed in the [BoR \(24\) 139](#) BEREC Report on the entry of large content and application providers into the markets for electronic communications networks and services (October 2024) as well as in [BoR \(22\) 137](#).



ISPs control access to so many customers so that CAPs could not afford to forgo access to or suffer degraded performance for that many subscribers. Relatedly, an expert holds that over the past 20 years that large IAS providers leveraged their millions of customer end-users to expand into the whole IP transit business.

According to the academic stakeholder, other ISPs would not do so and also would not experience problems with degraded connections into their network, which raises the question of whether one would expect to see these problems with other networks too if CAPs were the ones who create this congestion.

Similarly, another expert reasons that “must-have content” does not imply higher bargaining power for CAPs, as otherwise one could expect CAPs to extract paid peering from smaller IAS providers, which does not occur.

### **BEREC response**

While must-have content *ceteris paribus* increases the relative bargaining position of large CAPs, on the other hand large IAS providers control access often to a high percentage of internet access lines.<sup>20</sup> As pointed out already by BEREC in its Draft IP-IC Report, this translates into a relative competitive edge for large IAS providers which control many access lines vis-à-vis smaller IAS providers. BEREC specifies that, as a result of the above, it is unlikely that a small IAS provider would be able to enforce termination rates vis-à-vis CAPs. BEREC also refers to the findings from the FCC on the relevance of the amount of end-users an IAS provider controls access to.<sup>21</sup> BEREC has clarified these points accordingly in Chapter 7 of the IP-IC Report.

As regards the criticism of having conducted an “isolated” analysis, BEREC points out that it addressed a variety of different factors which may shift the bargaining situation *ceteris paribus* in different directions. BEREC conducted a comprehensive analysis of the IP-IC ecosystem, as BEREC has done in its previous reports<sup>22</sup> leading to consistent results. Thus, BEREC sees no need to change its IP-IC Report in this respect.

<sup>20</sup> The FCC stated: “Our economic analysis suggests that the ability of a BIAS provider to charge for access to subscribers increases with the number of subscribers; the greater the number of subscribers, the more the BIAS provider can charge on a per-subscriber basis”, (FCC, 2016, [Charter/TWC Merger Order](#), paragraph 115).

<sup>21</sup> The FCC observed “The success of a BIAS provider charging paid peering depends on the two factors: the number of subscribers (or “eyeballs”) that the BIAS provider serves (and thus the portion of an edge provider’s business that those BIAS subscribers represent) and the BIAS providers’ control over interconnection capacity into its network.” (FCC, 2016, Charter/TWC Merger Order, paragraph 100); (the notion of “BIAS” stands for “broadband Internet access service”).

<sup>22</sup> [BoR \(12\) 130](#) An assessment of IP interconnection in the context of Net Neutrality (December 2012); [BoR \(17\) 184](#) BEREC Report on IP-Interconnection practices in the Context of Net Neutrality (October 2017); BEREC’s reports are also consistent with WIK’s 2022 report [Competitive conditions on transit and peering markets - Implications for European digital sovereignty](#).

Large ISPs vs. small ISPs**Stakeholders' responses**

A few experts and CAPs emphasise that large IAS providers have a relative bargaining power advantage vis-à-vis small IAS providers. One CAP calls upon BEREC to explicitly note this.

One expert points to the Draft IP-IC Report's empirical observation that the smallest IAS providers have the lowest proportion of paid peering, while the largest IAS providers have the largest proportion. This, according to the expert, could be considered an indication of the bargaining power that large IAS providers have in negotiating with third parties (CAPs, CDN and transit providers), in that they can extract paid peering terms.

**BEREC response**

Assuming that large CAPs could actually exploit their bargaining position and strategically route traffic vis-à-vis large ISPs, then BEREC would consider that this would happen even more vis-à-vis smaller ISPs. However, BEREC has clarified in Chapter 7 of its IP-IC Report that, to its knowledge, this is not the case in practice.

Large CAPs vs. small CAPs**Stakeholder responses**

Various stakeholders (CAPs, academic and civil society stakeholders) specifically address the relative bargaining situation between large and small CAPs.

An academic stakeholder and a civil society stakeholder make similar arguments that it would be wrong to assume that small CAPs are unlikely to be affected by such IAS providers' playbook strategies. Smaller entities (CAPs, CDN or hosting providers) could even suffer disproportionately compared with corresponding larger entities. Relatedly, a CAP does not agree with the WIK statement (referenced by BEREC) that "*it is questionable whether smaller CAPs, whose share of traffic at peak times is relatively small, could also be affected by comparable restrictions*". Another CAP points to BEREC's statement that "*relative bargaining disadvantage for smaller CAPs compared to larger CAPs when trying to peer directly with an IAS provider (of a given size)*", and asks BEREC to explicitly note that large ISPs have an advantage in bargaining power when compared to smaller ISPs. Even the largest CAPs would advertise open peering policies without interconnection payments.

Furthermore, an academic stakeholder considers that small CAPs would also be affected. Indeed, if small CAPs purchase services from CDN or transit providers, and if the latter had to pay high termination fees to an IAS provider, then these costs would be passed-on to the small CAPs.





Pointing out that smaller CAPs would be *more* affected than larger ones, a CAP argued that smaller entities would not be big enough to get direct paid peering and a civil society stakeholder indicated that smaller entities could not afford to pay these fees.

An academic stakeholder mentioned that even if smaller CAPs decided to pay for better quality, they would be placed at a distinct disadvantage, as they incur higher costs per bit compared to their larger competitors. This stakeholder reported that reaching a Deutsche Telekom customer could be 3 to 20 times more expensive than reaching customers of other German ISPs.

An argument related to the effects on smaller players was raised by a civil society stakeholder who urges BEREC to consider the geographical dimension of IP-IC issues and that there may be disproportionate effects on users and CAPs from different regions.

#### ***BEREC response***

Regarding the comments on the effects on smaller players, BEREC has clarified, in Chapter 7 of the IP-IC Report, that with such pass-on costs smaller CAPs would be affected as well.

Regarding the argument that smaller CAPs would have a relative bargaining disadvantage vis-à-vis larger CAPs, BEREC notes that in its Draft IP-IC Report it has already addressed this point (p. 32, last paragraph). However, BEREC has clarified, in Chapter 7 of its IP-IC Report, that this could also mean that small CAPs would actually pay more per bit in case a direct peering is agreed upon. (Note: as regards the implications for smaller CAPs in the context of disputes, see Chapter 7 of this report).

More specifically, BEREC has clarified, in Chapter 7 of its IP-IC Report, that the relative bargaining disadvantage does not only relate to smaller CAPs vs. large CAPs, but also applies to situations involving small vs. large CDN providers or small vs. large hosting providers when negotiating with ISPs.

As regards the geographical dimension of IP-IC issues, BEREC acknowledges that there may be different effects on users/CAPs from different regions, but sees no need to specifically address this point in its IP-IC Report.

#### ***End-user switching***

##### ***Stakeholder responses***

Stakeholders also expressed opposing views on whether end-users would switch their ISP if they encounter qualitative issues.

Several ISPs argue that end-users would hold ISPs responsible in case of qualitative issues or if they cannot access the desired content. End-users would blame their ISPs which would cause a reputational damage for these ISPs. Due to competition in the market for IAS, end-





users have the option to switch their ISP. A few ISPs infer from this that they could not refuse to terminate CAPs' services, thus negating the idea of the termination monopoly. Separately, they state that end-users would not switch CAPs due to lock-in effects.

An academic stakeholder and a civil society stakeholder reason that high switching costs (time-consuming, difficult, costly) would prevent end-users from switching. They further state that incomplete customer information prevents switching. End-users typically do not know if the issue was actually caused by an ISP or due to any other factors (e.g. application, browser etc.) and they also do not know if the performance of another ISP was actually better. Also, product differentiation (e.g. due to family or legacy plans) could be an obstacle to switching.

This civil society stakeholder and the academic stakeholder disagree that end-users would blame the ISP. Discussions in online forums would show that most users have no idea about the cause of a problem and therefore would rather not switch. They also point to IAS providers' forums where the staff respond to customer complaints on IP-IC by referring to a blog post that basically argues that CAPs had caused the issues.

Furthermore, an academic stakeholder refers to econometric findings from the US. The latter provided evidence that in instances when end-users suffered from lower streaming quality, it turned out that even in competitive regions (i.e. end-users could in principle switch), the ISP did not experience a significant increase in customers switching (when compared with "non-competitive" regions). This consultation response also refers to the evidence provided by the FCC that end-users do not switch.<sup>23,24</sup>

### **BEREC response**

As regards the switching arguments raised, BEREC considers the following: while switching *could* happen, it is doubtful whether this would actually happen to such an extent that it limits IAS providers' relative bargaining position. Firstly, switching involves transaction costs<sup>25</sup> (time, technical feasibility). Secondly, discussions in internet forums show that many end-users do not know the source of the problem (in particular if only certain applications are affected) or they are referred to blog posts basically arguing that CAPs had caused the issues.<sup>26</sup> Thirdly, Ofcom has shown that switching rates are low.<sup>27</sup> Similar evidence is

<sup>23</sup> The FCC also stated that "(...) *The available evidence suggests that consumers, possibly for a combination of these aforementioned reasons, do not switch BIAS providers when confronted with poor edge provider performance. (...)*" (FCC 2016, [Charter/Time Warner Cable Merger Order](#), paragraph 111).

<sup>24</sup> The FCC explained that "(...) *the evidence suggests that any subscriber departures, if they occur, would be minimal.*" (FCC 2016, Charter/Time Warner Cable Merger Order, paragraph 112).

<sup>25</sup> The FCC concluded: "*[W]e find that broadband Internet access providers have the ability to use terms of interconnection to disadvantage edge providers and that consumers' ability to respond to unjust or unreasonable broadband provider practices are limited by switching costs.*" ([FCC, 2015 AT&T/DirectTV Merger Order](#), paragraph 217).

<sup>26</sup> [Deutsche Telekom blog post](#) often referenced to by Deutsche Telekom as response to customer complaints in its forum.

<sup>27</sup> [Which?](#) provides that "*The switching rates for both broadband and mobile, 15% and 10% respectively for 2023, are relatively low compared to other utilities (20% for electricity and 18% for gas in 2020 before prices reached*

provided by the FCC, whose findings are also supported by an econometric analysis.<sup>28</sup> BEREC has clarified these points in Chapter 7 of its IP-IC Report.

### Availability of alternative routes

#### **Stakeholder responses**

ISPs typically argue that CAPs can avail of alternative routes to route the traffic. This would make them less dependent of ISPs. It implies that only CAPs and not ISPs control routing decisions. Thus, large CAPs could cause congestion by “spontaneously” re-routing the traffic, thereby deteriorating all traffic that uses a specific interconnection interface and influencing end-user experience. This could be used as a credible threat vis-à-vis ISPs and used as a lever when bargaining with them.

#### **BEREC response**

Regarding the argument that CAPs could use strategic routing as a lever when bargaining with IAS providers, BEREC refers to its response to Chapter 7 of this report and the related clarification in the IP-IC Report. As regards the availability of alternative routes, BEREC stresses that even where this is true (e.g. if different transit providers are available), due to the nature of the termination monopoly, there is typically only one route to reach the IAS providers’ end-users (see also Chapter 6 of the IP-IC Report).

### Number of disputes

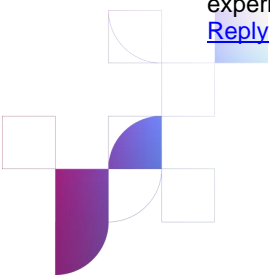
#### **Stakeholder responses**

While several CAPs note that IP-IC disputes are rare and balanced in terms of bargaining power, indicating a mature and resilient market, ISPs argue that a low number of disputes should not be interpreted as evidence of a functioning market. Instead, they argue that regulation was needed as court proceedings are seen as time-consuming. Separately, a few CAPs, IXPs and experts precisely see the low number of disputes as evidence of a bargaining balance and functioning IP-IC markets.

---

*the Energy price cap and removed any financial incentive to switch providers). ... the switching rates are low due to consumers facing a range of barriers including confusing switching processes, bundling, loyalty to their current provider and general concerns such as service downtime and mistakes made when switching.”*

<sup>28</sup> This econometric analysis assessed Comcast’s churn rates. It turned out that in “competitive” regions, where this ISP competed with other ISPs, there was no significant increase in customers switching – when they experienced a degraded quality – compared with “non-competitive areas” ([Sappington, Dish Comcast Merger Reply](#), pp. 159-161, paragraphs 21-23).



**BEREC response**

According to large IAS providers, the number of disputes should not be misunderstood as evidence of a functioning market, and they also refer to disputes in other industries. BEREC does not agree with this view and specifies that a low number of disputes is one – but not the only – indicator for a generally functioning market.<sup>29</sup> BEREC has clarified this point in Chapter 6 of its IP-IC Report.

Implications of investments by CAPs**Stakeholder responses**

ISPs argue that the large CAPs' investments in own networks, data centres and CDNs reduce their dependency on transit providers and commercial CDN providers. They would establish direct interconnection with ISPs instead.

**BEREC response**

BEREC takes note of this comment.

Final remark on this chapter

Against the background of all the arguments raised by different stakeholders, BEREC maintains its view that the IP-IC bargaining situation between market players appears balanced.

## 9. Comments on Relationship between IP-IC and OIR

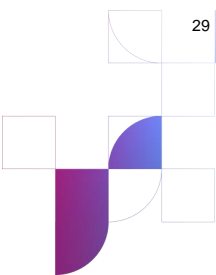
**Stakeholder responses**

(Large) ISPs argue that, in essence, IP-IC falls outside the scope of the OIR. Extending the OIR to cover IP-IC would thus unjustifiably restrict ISPs' freedom to negotiate IP-IC arrangements.

While most of all other respondents (CAPs, academics, civil society) also support BEREC's broader reading, some of them argue that the latter does not go far enough. Indeed, one CAP urges BEREC to provide additional guidance on this subject matter. One expert advocates for regulation whereby ISPs would be required to purchase enough uncongested transit capacity.

---

<sup>29</sup> Another indicator for a functioning market is e.g. the continuous decline in prices and cost.



This would thus ensure end-users get the full internet access they pay for, while allowing CAPs, CDNs and transit providers to exchange traffic without mandatory paid agreements.

***BEREC response***

In BEREC's view, ISPs' argument that IP-IC falls outside the scope of the OIR is not valid as it is based on a purely literal and selective reading of both the OIR and BEREC's corresponding Open Internet Guidelines<sup>30</sup>. By contrast, BEREC's position reflects the consistent case law of the ECJ pursuant to which "*every provision of EU law must be placed in its context and interpreted in the light of the provisions of EU law as a whole, regard being had to the objectives thereof and to its state of evolution at the date on which the provision in question is to be applied*" (C-611/22 P, paragraph 127).

BEREC further notes, in this regard, that its interpretation of the OIR's scope with respect to IP-IC is shared by all other categories of stakeholders (CAPs, academic stakeholder/experts, and civil society organisations and members) who submitted views during the public consultation of the Draft IP-IC Report.

Regarding the request for additional guidance, BEREC notes, on the one hand, that this is beyond the scope of the present IP-IC Report. On the other hand, BEREC recalls the existing guidance provided by its Open Internet Guidelines, which should be read in conjunction with its IP-IC Report.

Concerning the call for additional regulation, as explained in the preceding chapters of the present report, the evidence does not point to the need for additional regulation nor is this an outcome many stakeholders call for.

---

<sup>30</sup> [BoR \(22\) 81](#) BEREC Guidelines on the Implementation of the Open Internet Regulation (June 2022)

## 10. Conclusions

BEREC thanks the stakeholders for their feedback on the various topics addressed in its Draft IP-IC Report and has carefully considered the respondents' views. In response to some of the comments provided, BEREC has updated some references and added some clarifications to its IP-IC Report, as summarised in the table below.

Chapter in the IP-IC Report	Page (IP-IC Report)	Change
1. Introduction	6	Addition of the reference to an ad hoc questionnaire
2. IP-IC data analysis overview	7	Update of Figure 1 description
	7	Additional footnote 17
	8	Update to the last bullet of main findings
3. Traffic developments	9	Chapter complemented with more updated data regarding traffic growth
	9	Additional footnotes at the end of Section 3.1.
	13	Update to the first key finding
5. Market developments in IP-IC	22	Clarification of a paragraph on Section 5.1.2.
	26	Clarification of a paragraph on Section 5.3.
6. Generic structure of IP-IC issues	29	Update of Figure 11 – removal of an arrow
	29	Clarification added on premium transit (termination fees)
	29	Clarification added on the “tromboning” issue
	30-32	Update to the bullets at the end of the chapter
	32	Additional footnotes 101-106
7. Bargaining situation (in particular) between CAPs and IAS providers	35	Additional footnotes 115, 116 on relative bargaining disadvantage. Correction in footnote 117



	36-37	Clarification added regarding the effects on smaller players
	36-37	Additional footnotes 121, 122, 124 on FCC statements
9. Conclusions	41	Update to the first key point on Traffic developments
Annex I: Country cases related to IP-IC	45	Update to the German case encompassing the recent developments



## ANNEX – Stakeholders that submitted a contribution

36 respondents contributed to the public consultation on the *Draft BEREC Report on the IP Interconnection ecosystem*, namely:

1. Telecom Industry Association [Tele Industrien-(TI)] - *[ISPs]*
2. Mike Blanche - *[experts]*
3. TOP-IX - *[IXPs]*
4. Dr. Konstantinos Komaitis - *[experts]*
5. 4iG Plc. (4iG) - *[ISPs]*
6. Leaseweb network - *[CAPs]*
7. CCIA Europe (CCIA) - *[CAPs]*
8. Information Technology Industry (“ITI”) - *[CAPs]*
9. CATNIX - *[IXPs]*
10. NIX.CZ - *[IXPs]*
11. Confidential response
12. Deutsche Telekom AG - *[ISPs]*
13. Confidential response
14. Motion Picture Association (MPA) - *[CAPs]*
15. Microsoft - *[CAPs]*
16. Google - *[CAPs]*
17. Meta - *[CAPs]*
18. Confidential response
19. Telefónica - *[ISPs]*
20. ANISP - *[ISPs]*
21. AEVOD - *[CAPs]*
22. ETNO & GSMA - *[ISPs]*
23. VAUNET - *[CAPs]*



24. Netflix - *[CAPs]*
25. Joel Lovén - *[civil society]*
26. Cloudflare - *[CAPs]*
27. AMS-IX<sup>31</sup> - *[IXPs]*
28. AMETIC - *[CAPs]*
29. Akamai Technologies (Akamai) - *[CAPs]*
30. Confidential response
31. Epicenter.Works - *[civil society]*
32. Zayo Europe (Zayo) - *[CAPs]*
33. Rudolf van der Berg - *[experts]*
34. DE-CIX - *[IXPs]*
35. Confidential response
36. Barbara Van Schewick - *[academics]*

---

<sup>31</sup> AMS-IX submitted the “Contribution to the European Commission’s White Paper” to BEREC’s Public Consultation on the “Draft Report on the IP Interconnection Ecosystem”.

