BEREC Report on the outcome of the public consultation on the Draft BEREC Report on the entry of large content and application providers into the markets for electronic communications networks and services

3 October, 2024

Contents

1. Introduction

This report summarises the responses provided by the stakeholders during BEREC's public consultation on the Draft BEREC Report on the entry of large content and application providers (CAPs) into the markets for electronic communications networks and services (BoR (24) 51[1]), further "the Draft Report", as well as BEREC's views on the issues raised by the respondents. The Draft Report was opened to public consultation from 13 March till 24 April 2024.

18[2] respondents contributed to the public consultation, namely:

1. Akamai

2. Computer and Communications Industry Association – CCIA Europe (CCIA Europe)

3. Cloudflare

4. Contributor 4

5. Contributor 5

6. ECTA

7. ETNO

8. Google

9. GSMA

10. Information Technology Industry Council (ITI Council)

11. Meta

12. Microsoft

13. Motion Picture Association (MPA)

14. MVNO Europe

15. Netflix

16. Shift Project

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[1] BoR (24) 51, Draft BEREC Report on the entry of large content and application providers into the markets for electronic communications networks and services, 07.03.2024, see: https://berec.europa.eu/en/document-categories/berec/reports/draft-berec-report-on-the-entry-of-large-content-and-application-providers-into-the-markets-for-electronic-communications-networks-and-services.
[2] One joint contribution received from two separate stakeholders – GSMA and ETNO that are counted as individual respondents in this report

17. Telefonica

18. 4iG Plc. (4iG)

BEREC is grateful to have received the submissions and has carefully considered all of them. Accordingly, BEREC sets out its summary of assessments and responses in this report.

Comments, observations and recommendations raised by the respondents are summarised here below, and BEREC's views are presented in separate boxes. All non-confidential contributions are publicly available and accessible on BEREC webpage. This report is a summary and it does not explicitly elaborate on observations that are not directly related to the Draft Report subject to public consultation.

The Report on the outcome of the public consultation is organised following the sections of the Draft Report submitted to public consultation.

This Report on the outcome of the public consultation complements the final BEREC Report on the entry of large content and application providers (CAPs) into the markets for electronic communications networks and services[3]. Both reports are being published simultaneously.

2. General views

In this section, BEREC presents a short summary of the general views and comments shared by the stakeholders.

Akamai provides comments on the Draft Report's CDN case study focusing on: 1) the analysis of competition in the commercial CDN market; 2) the usage of the terms "major CAPs" versus "large CAPs", and 3) CDNs' impact on ISP's transit profits.

CCIA Europe discusses the relationship between CAPs and ECS/ECN operators, highlights the CDN market as a dynamic and competitive ecosystem, and considers the term of "Large CAPs" too broad. In addition, **CCIA Europe** welcomes BEREC's continued fact-based analysis on these issues, and recommends taking a fine-grained analytical approach, to ensure that all regulatory analysis reflects the differences and specific characteristics of the services under scrutiny.

Cloudflare considers that the description/categorization of the companies under the scope of the BEREC Draft Report includes companies with a huge range of services that currently operate at EU's market for telecommunication and content services. Then provides inputs on some BEREC Draft Report chapters.

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[3] BoR (24) 139, BEREC Report on the entry of large content and application providers into the markets for electronic communications networks and services, 03.10.2024, see: https://www.berec.europa.eu/en/all-documents/berec/reports/berec-report-on-the-entry-of-large-content-and-application-providers-into-the-markets-for-electronic-communications-networks-and-services

Contributor 4 addresses regulatory interventions for market failures, considerations on the CDN markets, direct CAPs' connection of their data centres to submarine cables and the significance of CAPs' investments to overall submarine cable systems.

Contributor 5 welcomes BEREC's recognition of the growing complexity of the electronic communications ecosystem. This contributor agrees with the "state of play" as set in BEREC Draft Report and added its reflections on some aspects in different chapters.

ECTA refers that the issues raised in the BEREC Draft Report reflect well the overall picture and the main issues concerning the entry of large content and application providers into the markets for ECS/ECN and provides inputs in specific chapters. **ECTA** is convinced that the description of the facts and the issues listed in the BEREC Draft Report are relevant, notably regarding chapters 2, 3 and 7.

Google thanks BEREC for the interest in the wider digital ecosystem and how it interacts with the electronic communications services sub-sector. In addition, provides specific comments on different chapters of the Draft Report.

GSMA and ETNO underlines that BEREC's Draft Report comes at a critical time where the market for digital infrastructure has been undergoing massive changes. The following areas are highlighted as deserving further analysis: (i) the regulatory imbalances between CAPs and ECS/ECN providers, (ii) the imbalance in negotiation power between CAPs and ECS/ECN providers, (iii) the wider implications of internet relay services;

ITI Council provides the views of the tech sector addressing some elements that arise from the Draft Report, especially related to dynamics between large CAPs and ECS/ECN operators, and to the case study on CDN.

Meta agrees that CAPs and ECN/ECS operators offer complementary services, which mutually increase each other's demand. In addition, Meta gives arguments for reconsideration of the following aspects in the Draft Report: (i) BEREC statements that large CAPs' investments have limited impact on global network resilience, and (ii) BEREC's statement about the impact of large CAPs' investments in transport networks on the business model of carriers/traditional ISPs.

Microsoft shares the comments and observations with regards to the relationship between cloud and network services and their different role within the value chain; CAPs' investments in infrastructure deployment; and the effect of CAPs' investments on the global network resilience.

MPA elaborates on CAPs' investments in network infrastructure, collaboration between CAPs and ECN operators and also highlights a need to acknowledge the current vibrant market that exists for CDNs.

MVNO Europe submission primarily concentrates on limitations to access to services or functionalities imposed by operating system (OS) providers, while acknowledging the

significance of all the case studies explored by BEREC. Additionally, it focuses on BEREC's forthcoming initiatives in the context of topics explored in the Draft Report.

Netflix underlines the existence of a vibrant, diverse and competitive CDN market, and a need to reinforce Open Internet Regulation, including documentation of the large ISPs' interconnection practices.

Shift Project discusses the entry of large CAPs into the markets for ECN/ECS in terms of market dynamics and regulation of market power, and also highlights the importance of environmental assessment.

Telefonica indicates a lack of clear solutions to the challenges described and provides its comments on CAPs investments, different regulatory frameworks for CAPs and telco operators, CDN market, investments made by operators or other infrastructure players in the case of submarine cables, provision of services over network slicing.

4iG provides comments on competition among services provided by CAPs and ECS/ECN operators and the need for a level playing field; on submarine cable systems; and on the regulatory opportunities and burdens for the different actors.

BEREC's response:

BEREC thanks stakeholders for sharing their views on the Draft Report.

BEREC privileges a fact-based analysis and invites stakeholders to share data and relevant information to enable to ensure an evidence-based approach.

BEREC is pleased that many stakeholders share the view on the "state-of-play" of the relations among ECN/ECS providers, large CAPs and other players that operate in the internet ecosystem described in Draft Report.

Regarding the comments on the framework that apply to different players operating on the internet ecosystem, this BEREC Report does not aim at covering it. A broad analysis on this topic has been carried out in the BEREC Report on the Internet Ecosystem[4].

In addition, it is worth to mention that BEREC agrees that the latest developments in the internet ecosystem and technology trends are impacting the electronic communications, thus potentially requiring some adjustments, which deserve to be evaluated and addressed.

All the comments/inputs on specific topics covered in the BEREC Draft Report are addressed in the dedicated chapters here below.

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[4] BoR (22) 167, BEREC Report on the Internet Ecosystem, 12.12.2022, see: https://www.berec.europa.eu/en/document-categories/berec/reports/berec-report-on-the-internet-ecosystem

3. Comments on Executive summary and Chapter 1 – Introduction

With regards to the usage of the terms "Major CAPs" vs "large CAPs", **Akamai** explains that the Draft Report uses the term "large CAPs" throughout when referring to large tech companies such as Amazon, Apple, Google, Meta, Microsoft, and Netflix. However, the report introduces the similar-sounding new term "major CAPs". Akamai proposes changing the term "major CAPs" to "surveyed companies" or "selected companies" to avoid confusion with the term "large CAPs".

CCIA Europe welcomes the analysis provided by BEREC, but would like to point out some specifications. In particular, CCIA Europe stresses that the best way to describe the relationship between "Large CAPs" and ECS/ECN operators is that of a symbiotic relationship between two separate sectors, where one benefits and depends on the other. According to CCIA Europe, Large CAPs are not "entering the market of ECS/ECN operators", and have no desire to do so, but rather have been investing in network infrastructure for the primary benefit of their customers. CCIA Europe also notes that the term "Large CAPs" in the Draft Report includes a broad number of companies which can be very different.

In **Cloudflare**'s opinion, BEREC has an important role to play in describing the current state of the EU's market for telecommunication and content services. However, to accurately describe the market, categories like "CAP" or "ECN" are too broad for all of the services a company offers. Cloudflare recommends that BEREC reconsider this grouping which can be arbitrary. Moreover, a relevant distinction must be made between the terms "CAP" and "CDN provider" since they play complementary but distinct roles. The term "large" and "major" CAPs are also used interchangeably, which leads to further confusion.

Contributor 4 underlines that cloud computing and electronic communications networks and services are complementary, not converging. Cloud providers rely on ECN/ECS providers as critical partners to reach their customers and their end-users. This dependency is asymmetric, as cloud providers do not control any bottleneck infrastructure. Additionally, regulatory interventions should aim to address market failures, and the use of cloud services in the telecom sector does not invoke any specific concern from either an economic or security perspective that would require new intervention.

Google considers that the relationship between CAPs and ECS is more accurately described as symbiotic rather than convergent, as their roles within the value chain remain distinct. Google notes that the Draft Report covers a range of interactions across the various layers of applications and services of the Internet ecosystem.

ITI Council states, that the Draft report introduces new terminology referring to the term "large CAPs" and "major CAPs" which can be unclear and not appropriate to treat all those services identically. ITI Council proposes referring to "companies surveyed" and "subsets of companies surveyed" or "commercial CDNs" rather than using the "major" classification. ITI Council also

recommends BEREC to be clear that its analysis is limited to CAPs which provide the services discussed in the report (namely CDNs, internet relay, subsea cables, public cloud infrastructure).

Meta welcomes BEREC's thoughtful approach in looking at this area, and its consultation, and supports BEREC's acknowledgment that CAPs and ECS/ECN operators offer complementary services where the growth of one service enhances the value proposition and demand for the other, ultimately fostering a mutually beneficial innovation.

Microsoft appreciates that BEREC acknowledges that companies like Microsoft have increasingly invested in connectivity infrastructure and in providing additional services related to ECN and ECS markets. Microsoft justifies the crucial role that cloud providers, with their digital infrastructure play in ensuring robustness, resiliency, security and effectiveness of today's internet.

In the view of **Shift Project,** the entry of large CAPs into the markets for ECN/ECN is raising concerns as accumulation of a significant variety of the internet ecosystem elements in the hand of a few Big Tech companies can have important consequences in term of market dynamics and could increase the power of few companies that drive the market behaviours. These companies are more and more vertically integrated allowing them to build autonomous systems. Shift Project believes, that it is therefore essential to introduce regulation to lower their market power, and thus their impact on the entire digital ecosystem.

Telefonica considers that the ECN/ECS are very dynamic, and competition is not only between traditional telco operators anymore but with other digital players that are playing an increasingly relevant role in the market.

BEREC's response:

Regarding the comment on the use of the terms "major CAPs" and "large CAPs", BEREC has reviewed the terms in the Report and only maintains "large CAPs". Moreover, in this report, the traditional commercial CDNs providers are not considered as large CAPs. Therefore, in order to clarify the scope of the services considered in the Report, without grouping the companies that provide them, the expression "surveyed companies" will be used when referring to the large CAPs and the major CDNs that responded to the dedicated BEREC questionnaire.

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4. Comments on Chapter 2 – Overview of large CAPs investments

CCIA Europe refers that large CAPs' investments into network infrastructure, research and development, as well as partnerships with telecom operators, have contributed to the good functioning of the internet ecosystem.

Furthermore, **CCIA Europe** dissents with some BEREC's statements that seem to imply that large CAPs assumed a role that was traditionally fulfilled by telecom operators and, as a result, these would be facing adverse consequences. When, on the contrary, large CAPs have, in most cases started to provide services which were not provided at all by telecom operators, or provided at a sufficient scale.

ECTA appreciates the Draft report in relation to the investment trends of the large CAPs, however notes that BEREC does not make a distinction between investments made by CAPs in what clearly constitutes ECN (networks transporting internet and cloud traffic) and ECS (CDNs, NI-ICS and NB-ICS provided by CAPs), and other activities engaged in by CAPs. ECTA believes that such distinction can be crucial to understand the competitive trends driven by the CAPs investments. Similarly, ECTA also notes that the Draft report does not analyse at all the capacity of the data centres and how such capacity has been evolved in time according to the specific CAP and reference regions by showing the market shares of the players in the data centre market. Nor does it examine investment in data centres at the beginning of 2000, when operators such as Level 3 (Colt today) built many of them.

On CAPs investing in infrastructure, **Google** explains its investments in different layers of the ecosystem where there is a gap or a business need or to help the consumer experience. This investment in infrastructure is complementary rather than duplicative of investment by the telecom operators. In some cases, like for submarine connectivity, that investment is done jointly with telecom operators. Moreover, Google emphasizes that there are many different categories of content and applications generally available on the Internet while there are very few examples of CAPs diversifying their businesses by launching new lines of business offering telecom-like services, apart from a handful of, for instance, Enterprise VoIP service providers. Looking ahead, Google believes that the long-term evolution of the telecom value chain is about CAPs including cloud increasingly bringing innovative applications to support telecom operators, not compete with them. Google also observes that regulatory attention may be warranted to the investments by ECN / ECS providers in the provision of cloud services. ISPs have a natural 'termination monopoly' in the market for serving Internet data requested by end-users that could be exploited by in order to serve their interests in the adjacent market of cloud services.

The **GSMA and ETNO** welcomes the presentation of detailed numbers of CAP investments in the report but stresses the large disproportion of the investments between CAPs and ECNs. According the **GSMA and ETNO,** the investment should be presented under the categories "solely for private purposes" vs. "available for third parties". Also, it would be important to dig deeper into the reasons for the deployment of own dedicated network infrastructure, as there might also be some additional incentives in addition to the better control of the provision of services in terms of improvement of quality.

Meta agrees that CAPs and ECS/ECN providers offer complementary services. Large CAPs' investments into their own private transport networks and subsea cables reduce the volume of traffic on traditional telcos' networks, while CAPs incur network costs for bringing content closer to telco end-users. Also Meta strongly disagrees with the use of STRAND consult claims

and considers them as misleading. since the definition of "internet infrastructure" in the STRAND Consult and Analysis Mason reports referred to by BEREC are not comparable. Moreover, the figure given by STRAND is incorrect. For instance, Meta mentions that they invested globally in digital infrastructure, with a capex to revenue ratio at 27% - that is in line with or higher than that of major European telecom operators.

Microsoft indicates, that the CAPs' investments in internet infrastructure in the EEA are increasing. In the Draft report, BEREC refers to STRAND Consult findings, which suggest that the total internet infrastructure investments made by the CAPs only represent approximately 1% of their global revenue. Microsoft would like to contest this statement and encourage BEREC to use trustworthy and fact-based data. By Microsoft, it would be inappropriate to assess and compare the investment ratio of companies only on the basis of investments in connectivity. The development of VHCN is clearly an important goal but the take-up of those networks, through usage of digital services such as cloud or AI, is equally important. This is recognized in article 3(2)(a) of the EECC, as well as in the decision on the 2030 Digital Decade goals, which set concrete objectives for the take-up of cloud and AI services, in both private and public sector.

According to **Telefonica**, CAPs' direct capex on digital infrastructure is well behind of the European telco sector and they only concern transport & interconnection, and not the expensive delivery network, including access networks. Therefore, CAP investments should be mentioned by presenting the effort in each layer. "CAPs investment in transport infrastructure has grown", but Figure 2 clearly shows that most of the investment is in data hosting with very little investment in transport infrastructure and negligible investment in access networks (which is the core of the investment need to deliver content and services to end user).

BEREC's response:

On the comment made by CCIA Europe, BEREC did not imply that telecom operators would be necessarily facing adverse consequences due to the entry of Large CAPs into their market.

ECTA's suggestion to present a clear distinction between investments made by CAPs in what clearly constitutes ECN/ECS vs. other activities engaged in by CAPs can be of interest. However, relevant data to carry out this analysis are currently not available and could not be gathered via the dedicated questionnaire. The proposal of ECTA to include an analysis of the evolution of the capacity of the data centres over time is out of the scope of the present report, but BEREC will take this suggestion into account for future work. Lastly ECTA's suggestion to analyse the impact of other regulations (like GDPR) on CAPs investments is an interesting aspect but also out of the scope of this report.

On the concerns mentioned by Google regarding possible impact of a natural "termination monopoly" of ISPs in the market of internet access at the adjacent market for cloud service

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provision, BEREC notes that their analysis does not fall into the context of this report, but is addressed in the draft BEREC Report on the IP Interconnection ecosystem[5].

On the suggestions made by GSMA and ETNO to classify the investments as "private" or "available for third parties", and analyse possible incentives to invest in own dedicated infrastructure, BEREC notes that report is following such a reasoning, at a high level.

Regarding Microsoft and Meta's reactions on the STRAND Consult findings, BEREC has adjusted the text to ensure that this figure is appropriately contextualised.

On the comment by Microsoft that an assessment of the investments only on the basis of the goals set for connectivity and the related role for VHCN, BEREC acknowledges the importance of the usage of the digital services such as cloud and AI and has rephrased the relevant statement to show that the development of VHCN is needed to accommodate the high usage of digital services.

On Telefonica's view that CAPs investments are made solely in transport and interconnection, and not in the expensive delivery network, including access networks, BEREC notes that the report includes such a statement that large CAPs "have not yet invested in access networks in the EU".

On the comment made by Telefonica that although CAPs are increasing their investments, their direct capex on digital infrastructure is well behind of the European telco sector, BEREC notes that data on large CAPs Capex on infrastructure during the recent years have already been included in the report to present the dynamics and magnitude of the relevant investments.

5. Comments on Chapter 3 – Dynamics between large CAPs and ECS/ECN operators

Akamai notes that most providers of cloud or CDN services are not large CAPs and that many smaller competitors have very limited infrastructure and limited service offerings in the EU. This distinction is important to avoid inadvertently harming smaller CDN and cloud providers' continued ability to compete against large CAPs in the EU.

According to **Cloudflare**, the vast majority of the relationships between CAPs and ECS/ECN operators is the provision of complementary services. Moreover, **Cloudflare** believes that BEREC should not group CDNs and CAPs as one category, as it creates confusion throughout the report about what types of services BEREC is attempting to reference.

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[5] BoR (24) 93, Draft BEREC Report on the IP Interconnection ecosystem, 06.06.2024, see: https://www.berec.europa.eu/en/document-categories/berec/reports/draft-berec-report-on-the-ip-interconnection-ecosystem.

CCIA Europe believes that direct competition between CAPs and ECS/ECN providers is mainly absent, as for instance consumers do not see SMS and communication as substitutable.

Contributor 5 believes that the terminology should be clarified, as it believes that the degree of complementarity between the services provided by 'telco' and those provided by CAPs is often overstated. They do not see the virtuous cycle of CAPs-operators relationship since the increase in traffic volume exerts cost-burden on the networks and further shrink operators' ability to create value. This situation is in significant part fuelled by a clear regulatory asymmetry in the view of this stakeholder.

According to **Google** the CAP and ISP relationship is mutually beneficial, across all CAPs large and small. While large CAPs may compete directly with transit providers at the international wholesale layer of the ecosystem, they do not compete with the provision of ECS to the end user, since they are higher in the value chain / distribution and routing framework. With regards to online advertising competition, Google stresses that on top of the DMA, there are additional rules in the DSA on consumer protection and competition. Such rules would also apply to ISPs if they add online advertising to their business offering (such as through the Utiq[6] initiative).

GSMA and ETNO agree with BEREC's overall findings that large CAPs increasingly insource what was formerly purchased from traditional ECS/ECN providers. By doing so they have more control over their content delivery and strengthen their market position vis-à-vis ECS/ECN providers. Moreover, GSMA and ETNO would like to stress that the potential to innovate is therefore much higher at network borders than within the networks since, unlike ISPs, CAPs are not subject to the rules of the Open Internet Regulation; and that CAPs have not yet invested in access networks in the EU. Finally, according to GSMA and ETNO, there is no meaningful complementarity between online content and applications and connectivity since as traffic volumes increased and services develop and diversify, the ARPU of ECN providers does not increase.

ITI Council and Microsoft agrees that the connectivity and consumption of online content and applications are inherently linked. However, they assert that the relationship between cloud and network services is more accurately described as symbiotic rather than convergent, since their roles within the value chain remain distinct. ITI Council and Microsoft emphasize that online services provided by large CAPs operating in the application layer are not substituting traditional telephony or mobile networks. Moreover, Telecom law should regulate the hard infrastructure or 'carriage' layer, and not the layers above, such as software and applications. We would stress that this applies to all the application layer services encompassed by the CAP nomenclature.

Microsoft points out, that cloud services offered in the application layer are, to a significant extent, already covered by the EECC, either as NB-ICS or NI-ICS, when they offer similar

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[6] Towards a trusted and responsible digital world for everyone, see: https://utiq.com/.

service functionalities to traditional telco services, despite the fact that their infrastructure and delivery methods are fundamentally different.

MPA recognizes, that the Draft report rightfully flags that CAPs, and in particular VOD services, compete with some providers of ECNs themselves in the distribution of content. Such services, operate in a competitive and regulated market.

In terms of areas of competition, **4iG** highlights that the volume of number-based fixed and mobile voice services is showing a tendency towards a moderate shrinking. This may suggest that the impact of the growing use of number-independent voice services is not significant.

According to **Telefonica,** BEREC should also consider the global joint impact of CAPs becoming vertically integrated, gaining market power across the whole Internet value chain further leveraging into adjacent untapped markets and gaining market and bargaining power versus ECN and ECS providers. Moreover, Telefonica wants to highlight, that CAPs enjoy scale and higher returns on investments as their main business has been unregulated, and that some technical cooperation arrive when the network operators assume the investment for to make this possible.

BEREC's response:

Several CAPs and CAPs' associations pointed out that the relation between CAPs and ECS/ECN providers is predominantly cooperative and symbiotic rather than of a competitive nature. However, as there are relations of different natures (complementarity, competition, and cooperation), BEREC presents them in the report by giving several examples.

On the opinion expressed by ECS/ECN providers and their associations, BEREC is of the view that it is beyond the scope of this report to discuss differences in regulatory regimes between CAPs and ECS/ECN providers. The insights from the report will be used, however, when the EECC will be revised and BEREC may also work on this topic in the future. Having said this, BEREC wants to point out that there are also several regulations which currently apply or will apply to (large) CAPs' services, e.g. as part of the EECC, the DMA, the DSA and the DA. Further, the EECC aims at promoting, amongst others, competition and investments, which are important drivers for innovation.

Following the statement made by some ECS/ECN providers that the importance of CAPs on the demand for ECS is overstated, BEREC will rephrase the Draft report.

However, regarding the comment by some ECS/ECN providers that they would not benefit from CAPs services since this would mean that the ARPU of ECS/ECN providers would go up while the opposite was true, BEREC is of the view that ARPU is not the only measure which should be looked at. Also, the take-up rate in the networks and the total revenues which increase with a higher take-up rate are important and allow ECS/ECN providers to operate profitably. Retail prices and ARPUs are of course not only influenced by demand but also by costs and, importantly, competition.

Following CCIA Europe's view that SMS and communication applications provided by Large CAPs are not in competition as consumers do not see these services as substitutable, BEREC would like to point out that SMS clearly showed a downward trend after the introduction of OTT messenger services. Therefore, BEREC is of the view that there seemed to be a certain degree of substitution. In response to 4iG, who is uncertain about BEREC's claim that voice services were not affected by substitution to OTT services since they also show a (moderate) shrinking tendency BEREC rephrased the report to clarify this point.

Regarding Telefonica's comment, pointing out that CAPs investments in backbone infrastructure and data centres are providing them with more control over their content delivery and strengthen their market position vis-à-vis ECS/ECN providers, BEREC agrees that CAPs in some aspects have become less dependent on ECN/ECS providers. Therefore, BEREC adapted the report accordingly.

6. Comments on Chapter 4 – Case study 1: Content delivery networks

Akamai points out the inaccurate description of competition in the commercial CDN market and disagrees with BEREC's statement that *"The commercial CDN services market in Europe currently appears to be concentrated around few players"* and that "*such concentration is expected to grow significantly in the coming years"*. According to Akamai, a large number of CDN providers are active in the market: commercial CDN providers such as Akamai, Cloudflare, Fastly, Edgio, CDNetwork, as well as large CAPs such as Amazon, Alibaba, Google, and Microsoft who now all compete against each other. Moreover, according to Akamai**,** the CDN market is today highly customised and customers can easily switch CDN providers and/or use multi-CDNs.

Akamai also states that BEREC uses inaccurate measures for market shares which are often "*estimated*" values. According to Akamai, BEREC's Draft report states that *"the top three CDN providers controlled in 2020 more than half the market"*, while the accompanying footnote however, notes that *"By customers, we mean small and medium-sized CAPs..."*. To Akamai, It is unclear why BEREC chooses to ignore large CAP customers that continue to be major users of commercial CDNs. The BEREC Draft report, moreover, later contradicts its statement about three CDN providers controlling more than half the market. It notes that ten companies "*together account for more than 50% of the market share.*" For these reasons, Akamai kindly requests that BEREC removes the sentence: *"the top three CDN providers controlled in 2020 more than half the market"*. Akamai also provides figures concerning its CDN revenues showing that they continue to decline and that less than half of Akamai's revenue comes from their delivery business. Akamai states that the Draft report fails to deliver on its promise of "sound and evidence-based analysis" to substantiate the following claims: (i) "*The commercial CDN services market in Europe currently appears to be concentrated around few players*"; (ii) "*such concentration is expected to grow significantly in the coming years.*"; (iii) "*the top three CDN providers controlled in 2020 more than half the market*". Akamai kindly requests that

BEREC deletes the first two statements from the report's executive summary, chapter 4, and the conclusions, and delete the last statement from section 4.3. Concerning CDNs' impact on ISP's transit profits, Akamai points that section 4.4 notes that "*As CDNs moved closer to the consumer, smaller ISPs started to host CDNs, resulting in lower wholesale revenues for the Tier 1 ISPs.*" One of the main sources for this argument is a BEREC report from 2012. Akamai finds this argument somewhat outdated and missing the point that investments made by CDN providers have greatly benefited all ISPs and reduced their need to invest in costly infrastructure to carry duplicate traffic.

With regard to BEREC's analysis of the CDN market, **CCIA Europe** also believes that (i) the CDN market is a competitive ecosystem; (ii) CDN provision by large CAPs is not harmful to telecom operators, but rather has positive effects on their business model.

Like Akamai, **Cloudflare** also objects to the conclusion reached that the CDN market is concentrated, after first noting that "*the CDN market may be segmented based on several criteria*" and that "*it is not straightforward to obtain CDNs' market shares as they vary between sources and according to whether they are measured on a traffic, customers or revenue basis*". In Cloudflare's view, the different sources quoted by BEREC in the Draft report are not giving a conclusive picture or clear evidence about concentration, and that such a conclusion is therefore premature. Additionally, Cloudflare remarks that the cited methodology weights every website equally, and makes no adjustments for amount of traffic or website "hits". The Draft report appears to list four different data sources for the size of CDNs relative to each other. It appears that in two of those sources, Cloudflare is the biggest. In the other two, Akamai leads, followed by Amazon, then Cloudflare. As an additional data point, Cloudflare is not listed in the top 20 sources of data entering ISP networks in France. Cloudflare also observes that, regardless of the conclusion reached about concentration, the CDN market is incredibly competitive. Since CDNs sit "in front" of origin servers, website owners can easily swap out CDNs. Increasingly, Cloudflare sees large customers using a "multi-CDN" approach, bidding CDNs against each other to find the lowest price. Cloudflare also comments on the ways in which CDNs interconnect with Internet Service Providers (ISPs). The CDNs and large ISPs don't operate in a two-sided market. A two-sided market needs many buyers and many sellers. When an end-user requests content from a CDN, the CDN has to find a way to reach the user's ISP. There is a single seller for capacity to reach that end user. This dynamic allows ISPs to charge for peering and reduces interconnection and performance for consumers.

Contributor 4 notes that the Draft BEREC report's concerns over the number of CDN providers are unwarranted. The Draft report itself notes the presence of a "large number of smaller providers", suggesting that barriers to entry in CDN services are not insurmountable.

Contributor 5 agrees with the trend identified in BEREC's Draft report, that an increasing volume of internet traffic is transported using CDNs and, beyond a number of benefits, however highlights several issues / risks, such as i) the impact on IP Transit Market, which is flattening significantly as an increasing percentage of traffic is delivered via peering with CDNs, either off-net or on-net. This will impact negatively on transit providers, as declining prices lead to declining revenues; ii) Limited 'Mutual Benefit' resulting from CDN investments

since the savings made by ISPs in the core network do not outweigh the significant investment required on the access network.

Netflix recommends that BEREC's report emphasizes the healthy competition dynamics of the CAP and CDN infrastructure markets, and acknowledge that enforcement of Open Internet Regulation, including documenting large ISPs' interconnection practices, remains critical to the preservation of competition and user choice.

In the same line, **GSMA, ETNO, Telefonica** note that CAPs normally provide and maintain the cache servers (on-net CDNs), but ECNs bear the set-up costs and operational costs, which further limits the benefits. The cost savings resulting from CDNs and on-net CDNs (i.e. cost saving related to international transport and operators' national backbone) are not significant when compared to the total and traffic related networks costs, considering that CDN investment has very limited bearing on the volume of traffic on the access network. For mobile networks, the use of on-net CDNs is even less viable as the international transport cost saving is relatively lower when compared to total network costs, as access networks bear the highest share. CDNs do not reduce bandwidth requirements for mobile access networks since cache servers must be located upstream where mobile traffic is aggregated.

The GSMA and ETNO consider that that the CDN market is very concentrated, and the concentration is likely to increase in the coming years as all major CAPs now operate their own CDNs (vertical integration) and place little reliance on the offerings of commercial CDN providers. GSMA, ETNO and Telefonica note that over the last years fewer players have offered CDNs to third parties, and this has a direct effect on the options of smaller CAPs that may face higher input costs. Also, smaller CAPs may be disadvantaged in delivering content to end users as a result of the crowding out of specialised commercial CDNs making them more dependent on large CAPs (vertically integrated CDNs). This is a development that BEREC should monitor closely as it might result in foreclosure effects by large CAPs such as self-preferencing to decrease competition. Additionally, GSMA, ETNO, Telefonica state that there is the bargaining power between ECS/ECN providers and large CAPs is unbalanced for a number of reasons. With regards to usage of the term "termination of traffic to the end-users" in the report, GSMA and ETNO suggest to replace it with "delivery of the traffic" indicating that it is more correct to describe the actual service provided by the ISPs.

ITI Council does not agree with BEREC that the market for commercial CDN services is concentrated and highlights some issues in the Draft report, such as an incomplete picture of CDN market players; the use of conflicting metrics to assess the market share of CDNs; and the omission of the increased competition from the entry of "large" CAPs into the CDN market. Given the complexities involved in obtaining accurate market share values, ITI Council urges BEREC to correct the Draft report.

Meta notes that the Draft report only focuses on Public CDNs while the concept of Private CDNs should be further developed. The "self-provisioning" aspect of CDNs is analogous to non-public ECN/ECS discussed in BEREC's recent report on international submarine connectivity. Meta believes BEREC should draw the same conclusion for Private CDNs as it

does in that Report for submarine cable systems: "*submarine cable systems operated by [CAPs] connecting their data centres to exploit the capacity exclusively for their own use… could be qualified as non-public ECN and/or non-publicly available ECS*". This would be an important clarification (as it was for submarine cable systems) and a helpful contribution to regulatory certainty.

MPA and **Netflix** consider the conclusion that the CDN market is concentrated around few providers is not correct.

BEREC's response:

On the one hand, some CDN providers, large CAPs and internet associations point out that the CDN market is very dynamic and competitive, and agree with BEREC that the large CAPs have deployed their own CDNs and even compete commercially with traditional CDN providers. They do not agree that the market is highly concentrated or will be in the future, challenging the information contained in the studies and documents cited by BEREC because some sources may not be consistent with others. On the other hand, GSMA, ETNO and Telefonica consider the CDN market is very concentrated, and the concentration is likely to increase in the coming years. They point out that large CAPs have their own CDN (vertical integration) and they don't rely on commercial CDN providers. This has a direct effect on the options of smaller CAPs that may face higher input costs. Also, smaller CAPs may be disadvantaged in delivering content to end-users as a result of the crowding out of specialised commercial CDNs making them more dependent on large CAPs (vertically integrated CDNs). However, the respondents do not provide references or data for many of the claims made. BEREC has thus carried out a review of the sources with the aim of getting a picture as close as possible to the reality of the CDN market, and adapted the report accordingly.

On the comment made by Akamai that the statement "*As CDNs moved closer to the consumer, smaller ISPs started to host CDNs, resulting in lower wholesale revenues for the Tier 1 ISP.*" is based on an outdated source. BEREC considers that CAPs' investments into backbone infrastructure continue to exert a competitive pressure on transit providers so the source has been updated with a most recent report from BEREC[7].

Regarding the comment made by Meta to develop the concept of "self-provisioning" in the report as it was developed in BEREC's recent report on international submarine connectivity[8], BEREC considers this legal qualification is not the aim of this report.

Concerning the issues raised by GSMA, ETNO and Telefonica about the increasing imbalance in bargaining power between ECS/ECN providers and large CAPs, these issues go beyond

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[7] See BoR (24) 93 - Draft BEREC Report on the IP Interconnection ecosystem hhttps://www.berec.europa.eu/en/document-categories/berec/reports/draft-berec-report-on-the-ip-interconnection-ecosystem.

[8] BoR (24) 85, BEREC Report on the general authorisation and related frameworks for international submarine connectivity, 06.06.2024, see: https://www.berec.europa.eu/en/document-categories/berec/reports/berec-report-on-the-general-authorisation-and-related-frameworks-for-international-submarine-connectivity.

the aim of the present report but are addressed in the "Draft BEREC Report on the IP Interconnection ecosystem"[9].

7. Comments on Chapter 5 – Case study 2: Submarine cables

CCIA Europe welcomes BEREC's analysis of the current landscape of subsea cables, as well as the recognition of their fundamental importance for Europe's connectivity. However, **CCIA Europe** disagrees with the following statement in the report: *"with large CAPs increasingly building their own transport networks (including submarine cables), a relevant part of the traffic originating these revenues is being internalised by CAPs, which significantly impacts the business model of carriers/traditional ISPs who have to reorganise their position in the market".* In this regard, CCIA Europe notes that while traditional ECN/ECS operators were originally providing undersea connectivity, they did so at higher prices than market standards, and with low capacity, which did not meet the necessities of Large CAPs. This explains why large CAPs started deploying their own undersea cables. Based on the above, it seems not accurate to infer that Large CAPs have internalised revenues which were previously of ECN/ECS operators, as the services and products required by Large CAPs did not exist and were not offered by ECN /ENS operators. In addition, CCIA Europe would like to clarify that Large CAPs deploying undersea cables does not come to the detriment of ECS/ECN operators. On the opposite, many submarine cables are built in consortia and partnerships between Large CAPs and telecom operators, with obvious benefits for both parties.

Cloudflare shares and appreciates BEREC's attention to connectivity and competition in Europe, however Cloudflare thinks that the conclusion of this chapter, that increased involvement in submarine cables by large companies *"has profound implications for connectivity, competition, and infrastructure investment within the sector"* overstates the changes and their impact on connectivity. For instance, for cachable content, it is common for ISPs to interconnect with CDNs in the local market or country of their user, which means content is also served locally. Only when the CDN does not have a copy of a file in its cache does it need to fetch that content from an origin server. Here as well, origin servers have been localising. It is now common for large CAPs to have multiple "cloud regions" on every major continent. For cacheable content, only when the origin is across an ocean or sea does the CDN need to use submarine capacity for that traffic. For these reasons, it seems implausible that *"most internet traffic traverse international submarine cables"*. However, it is plausible that most international Internet traffic, or inter-regional Internet traffic, traverses submarine cables. Following from this example, and as the Draft report correctly points out, one of the most common needs for submarine capacity now is non-cacheable cloud-to-cloud traffic. Cloudflare

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[9] See BoR (24) 93 - Draft BEREC Report on the IP Interconnection ecosystem https://www.berec.europa.eu/en/document-categories/berec/reports/draft-berec-report-on-the-ip-interconnection-ecosystem.

recalls that the Draft report says there is a shortage of submarine cables between the EU and Latin America, and that such a shortage adds to costs, and increases "risk associated with data sovereignty for both EU and Latin America". Cloudflare invites BEREC to clarify what they mean by "risks to data sovereignty". Additionally, Cloudflare states that the Draft report also does not acknowledge that large service providers continue to develop both new submarine system routes, as well as additional capacity on existing routes, such as SeaMeWe-6 (with development from Orange), Amitie (with development from Orange and Vodafone), MAREA (with development from Telxius), 2Africa (with development from Orange and Vodafone) or Blue (with development from Sparkle). These developments continue where there is acceptable business opportunity to invest.

Contributor 4 states that the submarine cable industry is undergoing substantial transformation due to a combination of growing customer capacity demand and the constraints of an aging, low-capacity base of existing cable systems on the larger corridors. While Contributor 4 agrees with BEREC's observation that CAPs investments have positively impacted innovation in submarine cable technology, capacity, and resilience in Europe, they consider that the Draft report overemphasizes the claim that CAPs can directly connect their data centres to submarine cables, bypassing existing Cable Landing Stations (CLS). Contributor 4 considers that BEREC's claim that CAP investments only add resilience to a *"small extent"* overlooks the important role these investments play in enhancing overall system resilience. While CAPs may be focusing their efforts on expanding capacity along key international corridors, this should not diminish the significance of their contributions. Many existing submarine cable systems are aging and have limited capacity: a single fibre pair on modern systems is equal to the whole cable capacity of some of the systems approaching end-of-life. The modern, high-bandwidth cables being deployed by CAPs are significantly enhancing resilience by providing multiple diverse cable routes and distributed landing points. Moreover, Contributor 4 notes that cable projects commonly involve both CAPs and traditional telco partners, therefore further ensuring access and resilience to the global network. Same as Cloudflare, Contributor 4 considers that the claim that there is a shortage of subsea cables between the EU and Latin America is not accurate, as the EU-Latin America route has traditionally been a niche path with relatively low volumes of traffic. Additionally, Contributor 4 disagrees with the claim that routing EU-Latin America traffic through the US adds to costs since the indirect US routing is often the most cost-effective option for Internet traffic.

According to **ECTA**, in relation to the case study on the submarine cables market, it would be important for BEREC to clarify in the final text of the report what is being intended by the international IP traffic: does this include only the intercontinental IP traffic or does it refer to the IP traffic between each EU Member State?

According to **Google**, the Draft report states that before large CAPs entered this market, large telcos invested in these cables and sold capacity to third parties (leased lines/circuits) which apparently accounted for a 'substantial portion' of their revenue. However, as the Draft report recognises, large CAPs have largely invested in submarine cables to interconnect their data centres and regional PoPs to their global data centres. This strengthens their self-reliance and

operational efficiency. Crucially, CAPs did this largely for their own private use, whereas the sector had started dis-investing or not investing substantially in this type of infrastructure. According to Google, what is needed to ensure diversity and resilience in submarine cable connectivity is a predictable and investment-friendly legislative regime.

GSMA, ETNO and **Telefonica** highlight that, while large CAPs continue to invest heavily in subsea cables notably on the routes connecting Europe with the US, ECS/ECN providers are forced into routes which are "not economically profitable".

Telefonica highlights that in the case of submarine cables, BEREC does not appear to include investments made by operators or other infrastructure players (which are in turn invested in by operators) and seems to consider only CAP agent investments; many operators have sold their investments to infrastructure companies (in which they may still hold investments and pay for services). This is the case for Telxius. In fact, some of the submarine cables are included as examples are not only invested by CAP agents.

Meta thinks BEREC's market assessment is perceptive and largely correct. However, Meta does not agree with: (i) BEREC statements that large CAPs' investments have limited impact on global network resilience since CAPs' investments to enhance infrastructure, integrate edge computing, collaborate with network providers, invest in R&D, create opportunities for telcos to build different/alternative routes and collectively contribute to route diversity and resilience of the internet infrastructure; (ii) The report's claim that CAPs are mainly focused on deploying submarine cables connecting Europe and North America. This ignores the route diversity from significant CAP investments in systems connecting Europe with Africa (2Africa, Equiano), Middle East (2Africa, IEX) and Asia (2Africa, IEX). The report comments on there being only two systems connecting Europe to Latin America using this fact to suggest a shortage. However, the significance of this is unclear. For example, the report does not present any evidence of a capacity shortage and offers no analysis of traffic demand to support its claims. Finally, (iii) the report fails to acknowledge that CAPs have a different connectivity requirement than telcos. In building submarine cables, CAPs' purpose is primarily to connect their data centres, most of which are located in Europe and North America, explaining their focus on these routes. The report suggests this focus increases costs and "risks associated with data sovereignty" - statements that are not supported with any analysis or evidence. (iv) BEREC's statement that with large CAPs increasingly building their own transport networks (including submarine cables), the business model of carriers/traditional ISPs is significantly impacted. CAP investment in transport networks (particularly subsea cables) allows traditional telcos/ISPs to avoid or reduce CapEx costs that they would otherwise have to make, with often unclear ability to recoup those costs. A major reason CAPs started to build their own network infrastructure (particularly submarine cable systems) is because products of the scale and quality needed by CAPs were not available. Furthermore, the comments in this section fail to acknowledge that in many cases, CAPs became owners of new systems in collaboration with telcos. Furthermore, telcos in their capacity as consortium members benefit from the technical, legal, and operational expertise of CAPs while sharing the costs of shared facilities with them.

4iG advocates a stronger focus in EU funding programmes – available also for private sector- for investment in submarine communication cables not just between Europe and the Latin Americas but other secondary routes providing geographical diversity of transmission between the EU and other global destinations to effectively address the challenges posed by the existing infrastructure and to build a resilient subsea cable network in Europe, new routes need to be developed.

BEREC's response:

Concerning CCIA Europe's and Google's comments, BEREC believes that, regardless of price level to be paid to ECN/ECS providers, part of their revenues is now being internalised by CAPs, implying that the traditional ISPs have to reorganise their position in the market. In the same line, and responding to the issue raised by Cloudflare and CCIA Europe, BEREC considers that the investments done by large CAPs in submarine cables have implied relevant changes to the business model of carriers/traditional ISPs.

BEREC agrees with the statement by Cloudflare and Contributor 4 that it is not "most internet traffic that traverse international submarine cables", but international, and more specifically, intercontinental traffic and the report has been adapted accordingly. Regarding the clarification on "risks to data sovereignty" requested by Cloudflare, BEREC has adapted the text pointing to added risks on data interception in intermediate landing stations located in third countries. On the new submarine cables cited by Cloudflare, they are all included in Table 1 and BEREC has added a text before this table to highlight that when submarine cables are deployed via a consortium, telecommunication operators also participate in these partnerships. On Meta's comments regarding significant CAP investments in systems connecting Europe with Africa, BEREC has adapted the text to make clear that large CAPs have also invested in connecting these areas of the world.

BEREC has adapted the text regarding the possibility for CAPs to directly connect their submarine cables to data centres without having to connect to existing landing stations, acknowledging the point raised by Contributor 4 that many times the cable landing stating remains essential.

On the increase of resilience due to the deployment of new submarine cables connecting Europe and North America, BEREC has adapted the text, acknowledging that new capacity adds resilience, but still signalling the differences with deployments in routes with less submarine cables as the connection between Latin America and Europe. Concerning Meta's comment on global network resilience, BEREC agrees that these submarine cables enhance infrastructure, integrate edge computing and other elements, but the connection between Europe and north America have already deployed a large number of submarine cables, adding new cables few to resilience compared to other areas.

On the comments by Meta on the lack of investment on new routes with Latin America by large CAPs, BEREC understand the reasons why CAPs prefer to deploy in other areas (primarily to connect their data centres, most of which are in Europe and North America,

explaining their focus on these routes). In any case the report is not pointing to shortage of capacity, but to a very limited number of submarine cables for such large area comprising many countries, leading to a lower resiliency than in other areas in terms of cables directly connecting Europe with Latin America.

The motivation for CAPs to deploy submarine cables is explained in section 5.2 of the report (business models) and BEREC have added a text in this line to explain the focus on the routes connecting Europe with North America.

On the question whether it would be more expensive to route EU-Latin American traffic through the USA, BEREC considers that it depends on the occupation in submarine cables for the direct and indirect route and the text has been adapted by also adding a reference to the increased latency for longer distance when routing EU-Latin America via the USA.

On the issues raised by Contributor 5 about the lack of clarity in the definitions in the EECC for determining the regime applicable and the requirements that apply in practice to qualify as ECS/ECN providers, BEREC refers to the BEREC Report on the general authorisation and related frameworks for international submarine connectivity[10]. Regarding the request of ECTA to clarify scope of the case study, and what it includes, the report and the section, as expressed in the introduction, focuses on investments by CAPs. This implies that the section is focused mainly on intercontinental traffic, although in some cases these submarine cables also connect EU member states.

On the comments raised by Telefonica, BEREC acknowledges that operators are also investing on submarine cable and has adapted the text, but recalls that the focus of the report is on the investments done by large CAPs and not by all market players.

On the comments by 4Gi advocating for a strong focus on EU funding programs for investment in submarine cables, BEREC agrees and reminds about the existing EU funding programs, as the Connecting Europe Facility Digital program that is contributing to increase the capacity and resilience of digital backbone infrastructures.

8. Comments on Chapter 6 – Case study 3: Internet relay services

According to **Cloudflare**, Internet relay services are an important technology that prevent ISPs from inspecting traffic flows and disrupt a "business model [which] rely on users' data monetisation" and this should be encouraged by regulators. Cloudflare notes, that the introduction to Chapter 6 of the Draft report has the potential to create confusion between a VPN used by an enterprise to allow remote employees to access resources, and the use of a

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[10] BoR (24) 85, BEREC Report on the general authorisation and related frameworks for international submarine connectivity, 06.06.2024, see: https://www.berec.europa.eu/en/document-categories/berec/reports/berec-report-on-the-general-authorisation-and-related-frameworks-for-international-submarine-connectivity.
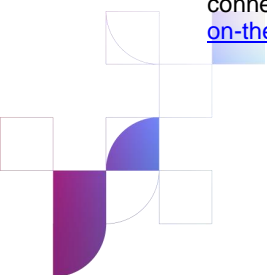
VPN by consumers to proxy their traffic. Concerning the impact of relay services on interconnection, Cloudflare stresses that any other network than the relay service provider can be responsible of "relay #1".

Contributor 5 agrees with BEREC's overview of how the introduction of internet relay services has impacted ECS / ECN providers. However, it should be stressed that with these services, network operators lose visibility of a significant number of DNS requests and are therefore unable to see the names of the websites that people are visiting on their networks, and for users of such services, the existing distributed system is replaced by a dedicated system whereby the large CAP providing the servers establishes the DNS resolver. Contributor 5 underlines, that this will have an impact on: (i) Ability to effectively support law enforcement efforts; (ii) Ability to manage traffic effectively on the network; (iii) Ability to offer differentiation-based services.

GSMA and **ETNO** agree with BEREC's analysis of the potential impact of private relay services on operator networks (fixed, mobile etc.), but further analysis would be needed. Internet relay services are not a VPN and need to be distinguished from them. Also there exist several types of relay services (e. g. Apple iCloud Relay, Microsoft Edge Secure Network and Google IP Protection), although, always with the same players in the background (e.g. Cloudflare, Akamai, Fastly). If Internet relay services become more common, the Internet traffic would be processed by only a few CAPs, which contradicts all the basics of the decentralised Internet that we know today. Moreover, the Internet relay services are currently not considered a publicly ECN, and therefore not submitted to e.g., the directive on Network and Security Systems, legal interception measures, and privacy legislation. Furthermore, GSMA and ETNO note that many of the mentioned implications are not only caused by Internet relay services but also by other services, introduced by CAPs, such as e.g. DNS encryption (e. g. DNS-over-TLS, DNS-over-HTTPs, oblivious DNS-over-HTTPs) and/or encrypted network protocols (e.g. QUIC), that cannot be intercepted.

By **Telefonica,** concerning the nature of the services**,** BEREC seems to consider Internet Relay Services as a kind of VPN. This is debatable because there is no notion of network or management in connectivity. In other words, there is no management of the service, but simply encryption of content between two ends (browser and relay, or between relays). Telefonica further explains, that telco networks are prepared and configured so that each customer's traffic leaves the Internet through the most optimal peering point according to their location to provide them with the best possible latency and QoE, while this is not the case when internet relay services are activated. Thus, Telefonica disagrees with BEREC statement: "in principle, VPN or internet relay services do not make it more difficult to use and control the network efficiently, since the data traffic would be concentrated towards the VPN/relay service providers, and all traffic originally transported to different destinations and interconnection points now can be transported to the interconnection towards the VPN/relay service provider". Moreover, **Telefonica** disagrees with the following statement in BEREC's Report: "Internet relay services are made possible by innovative transport protocols such as QUIC and represent a contribution to increasing data security and privacy". Telefonica thinks it gives an

additional level of privacy, but not security: there are already mechanisms that offer security, such as TLS/HTTPS (even more so with initiatives such as TLS 1.3 or SNI encryption). This is focused on not being able to see anything at all, but not on preventing identity theft etc. Telefonica adds that internet relay services prevent security, child protection, sponsored services, packages per application, etc. BEREC should therefore refer to "content-based services" instead of "advertising". Moreover, Telefonica encourages BEREC to further investigate the impact of relay services for operators, including: (i) the ability to legally inspect, filter and/or block data across the network; (ii) the launch of innovative services; (iii) the ability to route traffic optimally; (iv) overall network resilience. Telefonica also acknowledges all the disadvantages of 6.4 identified by BEREC, however suggests to add the following points: (i) difficulty of this model to comply with regulatory standards or to ensure secure service (e.g. attack filtering); (ii) control of the content that you can/cannot access is loss (e.g. if you access content that you should not be able to access by law); (iii) the control of user traffic is concentrated in the few operating system owners, since the encrypted connection begins in the OS, outside the scope of the operators and regulators; (iv) it is difficult to correctly operate and plan the network and maintain an adequate user experience as it does not depend on a single agent. The relays become a 2nd agent of the provision of internet access "de facto".

BEREC's response:

BEREC thanks contributors for the valuable input. BEREC notes that many aspects raised by the stakeholders are already discussed in the report. Especially the access and control on data-streams and content are addressed in the chapters on traffic identification and management, on ECS operators' services, on network security and privacy and on impact on traffic concentration and innovation. It is acknowledged and already included in the chapter on network security and privacy that the use of encryption gets more and more popular.

BEREC would like to stress that no business model or technology is rated in the report. The report only points out technical, economical and societal characteristics and effects. For example, additional hubs are not reducing the performance per se. Internet relay services may challenge the access of on-net CDNs, but can provide better performance in case of congested interconnections by allowing the utilization of other (not congested or better dimensioned) interconnections.

The comment by Telefonica on data security is relevant and the report was adjusted accordingly.

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9. Comments on Chapter 7 – Restrictions on access to services or functionalities by OS providers

Contributor 5 agrees with BEREC that there is a real risk that OS providers impose de *facto* standardisation to the slicing identification mechanism and that as an effect, operators may lose part of the control over which traffic corresponds to each slice. According to Contributor

5, the Digital Markets Act could mitigate some issues, for instance thanks to Article 6(7), which obliges that Gatekeepers to provide operators with access to and interoperability with key features of the OS to facilitate per application slicing. Moreover, beyond MVNOs, BEREC's analysis on restrictions should also focus on the challenges faced by MNOs.

Concerning OS & slicing, **GSMA, ETNO and Telefonica** advise BEREC to further assess whether and how to incentivise or mandate the OS to systematically share information with MNOs.

MVNO Europe appreciates BEREC's wide recognition of the challenges faced by some MVNOs and smaller mobile operators. The challenges identified by MVNO Europe in previous submissions to BEREC include setting up certain device functionalities like APN-related services, Voice over LTE (VoLTE), and Voice over WiFi (VoWiFi), as well as configuring network profiles for eSIM technology, as correctly indicated in the Draft Report.

MVNO Europe expresses disappointment over the lack of tangible progress following Apple's compliance plan's implementation under the DMA and highlights that the services offered by Apple iOS 17.4 fail to address serious issues that arise for companies that have not entered into a dedicated so-called Carrier Partner Agreement with Apple. For instance, they still do not enable MVNOs to use features like Visual Voicemail or Apple Watch Enablement. Moreover, some features cannot be configured manually by customers (e.g. MMS APN, which results in customers being unable to send/receive MMS messages), and with the sunset of 2G and 3G networks, handsets are not able to access emergency communications unless they are compatible with VoLTE, and some cars' eCall systems may cease functioning properly.

According to **Telefonica**, Apple's announcement in 2023 regarding the implementation of RCS in iMessage is positive as it will ensure the interoperability of different messaging applications based on this standard, however authorities must monitor the effective implementation of the solution to avoid any delays.

BEREC's response:

Concerning the impact of operating systems on slicing and its standardisation, stakeholders from the ECS/ECN sector express concerns that are in line with the risks pointed out in the Draft report; additional information gathered through the public consultation was added to the final report.

Concerning the impact on the provision of RCS services, Telefonica provides details over recent developments that was added to the final report as a complement.

Concerning the specific challenges of MVNOs and smaller MNOs on access to OS carrier profiles and corresponding services, MVNO Europe confirms BEREC's finding and provides further complements, which was also added to the final report.

In general, BEREC considers that the stakeholder feedback on the OS based restrictions tends to confirm the findings developed in the Draft report. Moreover, BEREC integrated some

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complementary insights and clarifications gathered at a meeting organised with the main OS providers and the concerned operators' associations.

10. Comments on Chapter 8 – Conclusions

ITI Council appreciates BEREC's acknowledgement that certain large CAPs have increasingly invested in connectivity infrastructure and in providing additional services related to ECN/ECS markets, what clearly underlines the crucial role that these CAPs, including cloud providers, with their digital infrastructure (that also includes networks of submarine cables), play in ensuring robustness, resiliency, security and effectiveness of today's internet.

ITI Council also appreciates BEREC's recognition that investments by such CAPs in submarine cables have a positive impact on engineering innovations and push the boundaries for technical efficiency, contributing to lower latency and improved bandwidth and reliability. However, contrary to the assumption regarding CAPs investments' limited impact on the global network resilience, **ITI Council** asserts that such investments have a significant positive impact. Multiple, diverse routes help ensure outages have minimal to no impact on the services that depend on the cable. Europe needs more connectivity, not less of it, and the benefits of diverse subsea cables routes are broadly shared, which include improving network reliability, ensuring resiliency and increasing global connectivity thus reducing the digital divide. When physical damage does occur, redundant network paths can reroute traffic to minimize service disruption for customers and users.

According to **ITI Council** Governments and regulators can help reinforce diversity and thus resilience, by making it easier to land and maintain subsea cables.

BEREC's response:

BEREC welcomes the ITI Council comments on how the BEREC report covers the increasing investments in connectivity infrastructure and in the provision of additional services related to ECN/ECS markets.

When stating that CAPs investments have limited impact on the global network resilience, as already referred in the chapter dedicated to submarine cables, BEREC means that the submarine cables deployed by CAPs are mainly in geographic areas in which there were already cables from ECN/ECS operators and, simultaneously, that in most cases they essentially ensure redundancy to their own networks and services that are used globally. Thus, BEREC agrees these investments have a positive impact on the global network resilience, but they are also limited – in the BEREC Report some adjustments were made to better clarify the message.

BEREC agrees that is of utmost importance to promote the resilience of the networks in benefit of the users, and that Governments and regulators can help reinforce it, by, among other ways,

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clarifying the framework applicable to stakeholders investing in submarine cables and making it easier to land and maintain subsea cables.

11. Comments on Chapter 9 – Future work

Contributor 5 refers that further work in the following areas could be relevant: (i) exploring the impact of large digital ecosystems entering market for business communication services (also supported by **ECTA**); (ii) exploring the impact of the Open Internet rules applying at only one part of the end-to-end connectivity ecosystem; (iii) consider whether the current definitions in the EECC are fit for purpose; (iv) reviewing the EECC, to ensure that regulatory compliance requirements are sit in the correct place and are appropriately distributed; (v) examine whether the current rules need to be upgraded and evolved to be fit for the technical shifts that have taken place since the EECC was introduced, and are likely to take place in the future; (vi) consider how to address the limitations OS providers are placing on access to services and functionalities.

ECTA believes that access to services, functionalities, and technologies effectively or potentially restricted by OS providers should be subject to constant supervision and timely intervention by the NRAs.

GSMA and ETNO suggest other issues that could deserve further analysis, including: (i) the regulatory imbalances between CAPs and ECS/ECN providers, (ii) an imbalance in negotiation power between CAPs and ECS/ECN providers, and (iii) the wider implications of Internet relay services.

MPA suggests that BEREC, in their upcoming review of the internet interconnection market, should investigate the availability of uncongested transit routes into large vertically integrated Tier 1 ISPs', and whether interconnection practices may represent violations of Open Internet Regulations.

MVNO Europe proposes further analysis on OS providers' restrictions, through dedicated questionnaires, interviews or workshops with MVNOs, OS providers and consumer associations. MVNO Europe invites BEREC to come forward with tangible initiatives to tackle Apple's discriminatory practices, under Article 6(6) of the Digital Markets Act and/or electronic communications legislation.

According to **Shift Project**, the challenges raised by CAPs entry into the markets for ECN and ECS should also be assessed in regards of their impact on the way content is accessed and distributed. Moreover, it would be important that BEREC keeps monitoring and analysing by privacy issues and cybersecurity implications of services provided by non-European players. Shift Project would also strongly advocate to give a more central place to environmental assessment in BEREC work programme. It is therefore relevant to adapt the regulatory framework and ensure that the concerns raised by the entry of CAPs into the markets for ECN and ECS can be tackled.

BEREC's response:

Concerning the impact of large digital ecosystems entering into the market for business communication services, BEREC has recently commissioned the "Study on communication services for businesses in Europe: Status quo and future trends"[11]) and organised a workshop in October 2022, with the main stakeholders' associations. BEREC may consider to further investigate this topic in the future.

On the suggestion of further analyse the limitations imposed by OS providers on access to services and functionalities and on how to address them, BEREC organised a meeting with some relevant stakeholders, in order to gather their insights and have a better understanding of the potential issues faced by the different stakeholders. Such insights were integrated in the final report.

On the competition in the interconnection market, BEREC published a Draft report[12], based on several workshops with different stakeholders and an in-depth quantitative questionnaire complemented with a few qualitative questions on IP interconnection. The final report is expected to be published in December 2024.

On a deeper analysis of the framework applicable to vertically integrated CAPs, the revision of the current framework could take into account the players' dynamics and evolution in the ECN/ECS markets.

On the Shift Project's comment on giving a more central place to environmental assessment in BEREC work programme, it is important to highlight that BEREC is engaged in working on sustainability considering the ICT-related parts of the upcoming Green Deal and the Agenda 2030 targets to identify the sustainable development goals that could be relevant for BEREC. In addition, BEREC has added an environmental focus to its workstreams and is contributing to the assessment of the impact of the digital sector in the environment, as well as developing an understanding of how to reduce its carbon footprint.

BEREC welcomes the comments received on its future work, namely supporting: i) BEREC's input on the DMA within the High-Level Group, and ii) BEREC in-depth analysis on large CAPs increasingly investment in networks. This work will be carried out specifically for submarine cables in the BEREC Report on submarine cables connectivity in Europe, as included in BEREC work programme 2025.

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[11] BoR (22) 184, Study on Communication Services for Businesses in Europe: Status Quo and Future Trends, December 2022, see: https://www.berec.europa.eu/system/files/2022-12/BoR%20(22)%20184%20External%20Study%20on%20Communication%20Services%20for%20Businesses%20in%20Europe%20Status%20Quo%20and%20Future%20Trends_0.pdf.

[12] See BoR (24) 93 - Draft BEREC Report on the IP Interconnection ecosystem https://www.berec.europa.eu/en/document-categories/berec/reports/draft-berec-report-on-the-ip-interconnection-ecosystem.