TELEFONICA contribution on the draft BEREC Report on the IP interconnection ecosystem.

General Remarks.

The current report is the third of its kind, following the publication of BEREC IP-IC reports in 2012 and 2017. In its 2017 IP-IC report, BEREC described the developments in the IP-IC markets since 2012 as "evolution rather than revolution". In the current report, BEREC has provided an overview of developments in the IP-IC ecosystem over the past seven years and BEREC confirms that this observation still holds true. Also, includes an analysis of the likely trends from 2023 to 2030.

Telefonica disagrees with BEREC conclusion that after seven years from its last report of 2017, we are facing an evolution rather than a revolution. Specially, if we think this report also covers trends until 2030. As stated in Telefonica´s response to the draft BEREC report on the entry of large content and application providers into the markets for ECN/ECS, the market for digital infrastructure is undergoing massive changes and the dynamic and interaction in the internet ecosystem is developing with high speed. The risk to affect the open internet is huge, as large CAPs act independently of its competitors in the internet ecosystem through concentration, controlling more and more the open internet. These CAPs invest in ECN infrastructure, but only at the transport & interconnection layers, (i.e they are deploying their own submarine cables, in fact "buying up the most important part of the Internet", as the GSMA-ETNO literally stated in their response to the above-mentioned consultation on CAPs), not in the expensive delivery networks including access networks.

BEREC in its report has analysed the IP-IC market in isolation, without taking into account the impact of large CAPs in the global internet ecosystem, discarding factual and potential market failures. We believe the situation of the global jointly 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, should be taken into account along this BEREC report, as it could change some of its conclusions.

BEREC ignores the market power of large CAPs as owners of content that other end users desire. It also ignores that the negotiating position of ISPs is constrained by competition with other ISPs (end users can chose among several ISPs) and by an asymmetric regulatory framework (telco operators are subject to access obligation on the end user side, and to equal-treatment and no blocking obligations imposed by the OIR on the content provider side, amounting in practice must-carry). Not analysing this, and not accounting for high substitutability among ISPs in a highly competitive market and the essential nature ("must-have") of large CAPs for many end users is to make a flawed market analysis.

Finally, BEREC ignores the fact that the interconnection market was originally developed as a market between operators (peers) functioning under the bill-and-keep philosophy. CAPs, however, are not peers offering an expansion of the addressable market. Rather, they are B2B customers aiming to send their content to end users connected to operators' networks. The bill-and-keep model is not intended for that type of player, who uses it to its advantage extraordinarily distorting the market.

More concretely, BEREC has identified the following points:

i. Traffic developments

1) According to recent studies, the data traffic growth rate is stabilising, and the peak-to-average traffic ratio also appears to be stable between 2018 and 2022.
2) According to BEREC's analysis, on-net CDNs are installed in the vast majority of the respondent IAS providers' networks.
3) It is foreseeable that in the coming years, the increasing diffusion of UHD video content could further contribute to the growth of data traffic, as well as a greater consumption of live-streaming content could potentially have an impact on peak traffic and on the peak-to-average traffic ratio. In this context, the deployment of on-net CDNs and more efficient compression techniques are expected to offset the overall impact of these developments.

The global data traffic volume doubles approximately every three years, both in average and peak terms. In the EU, the average data traffic per user in fixed networks is expected to grow by 20% annually, reaching 900 GB/month by 2030. The mobile networks are also experiencing a rapid growth, with a projected quadrupling of data traffic by 2028.[1]

This assumption does not, however, take into account the impact of new mass market applications based on artificial intelligence, virtual and augmented reality. The latest data traffic forecasts project significant increases in data flows as a result of the commoditisation of different types of AI applications and services[2].

While we agree on the main drivers of data traffic growth today, it is important to highlight that the data traffic transmitted over the internet is increasingly concentrated on fewer and fewer data sources, due to the exponential growth of individual CAPs and segments. The six largest CAPs (Google, Netflix, Amazon, Facebook, Microsoft, Apple) accounted for almost 48% of the total global data traffic in the first half of 2022[3], while at the backbone level the same parties accounted for 70% of data traffic[4]. This creates a potential dominance of these large CAPs in the internet ecosystem.

The development of data traffic has implications for the structure of the Internet connectivity market, such as the increasing asymmetry and concentration of data flows. Together, the concentration of asymmetric traffic at peak hours can increase the risk of congestion and worsen the quality of experience for other internet services on the network. Since large CAPs have a role to play in the when, how, and how much traffic is delivered, they are ultimately partly responsible for such impacts while rarely made accountable for it.

[1] Arthur D. Little, The Evolution of Data Growth in Europe, Report 2023, p. 18.
[2] Omdia: Road to 2030: AI and the Future of Network Services – Traffic Outlook and Implications, 2024
[3] Sandvine, Global Internet Phenomena Report, 2023, p. 10.
[4] Telegeography: The state of network report, 2023 edition

Finally, we remain sceptical about general blanket statements concerning the internet's ability to cope well with traffic growth and peak traffic, with competition and technological progress as a safety net. Networks only adapt to significant changes in traffic patterns and demands, if a network operator makes an investment decision to upgrade, re-dimension or expand its network. Whereas the underlying technical internet standards are flexible and adaptable, the internet will cope with increasing traffic volumes only if network operators are able to manage and invest in the networks accordingly.

ii. Pricing and costing developments

4) Pricing and costs for IP-IC services continue to exhibit a downwards trend.
5) Technological developments, such as the installation of on-net CDNs, are a key reason why increases in data traffic have not passed through to prices and costs.
6) Network usage has increased, but due to continuous technological developments as well as competitive pressure, marginal network costs are observed to have declined to the point that they outweigh any increased costs associated with increased network use.

We will answer this section together with section iii) *Market developments in IP-IC below*.

iii. Market developments in IP-IC

7) BEREC observes that CAPs' investments into backbone infrastructure continue to exert a competitive pressure on transit providers.
8) At BEREC workshops, some stakeholders reported that CAPs may struggle to find alternatives to reach end-users if practices of vertically integrated IAS and transit providers leverage their termination monopoly.
9) IAS providers vertically integrated with Tier 1 transit providers generally use their own transit services. In this instance, CAPs typically pay for interconnections (via peering or transit services).
10) BEREC holds that there is limited substitutability between transit and peering when low latency and high bandwidth are required. For qualitative reasons, certain services offered by some CAPs may thus benefit to be provided via peering connections.

We agree with BEREC's observation that large CAPs are increasingly present in the connectivity value chain by investing in their own backbone networks, CDNs, data centres, hosting and cloud computing. These developments continue to exert competitive pressure on transit providers.

Role of private CDNs and cache servers.

According to Wik Consult/ BNetzA study (2022), there have been significant shifts in the CDN market in recent years. All major CAPs now operate their own CDNs and place little reliance on the offerings of specialised CDN providers. As a result, the CDN business of specialised CDN providers has developed less strongly than CDN traffic as a whole. The study also noted that internet access providers and carriers have not been able to develop a successful in-house CDN business, whereas some of the large CAPs have developed their own (successful) commercial CDN business.

Large CAPs install proprietary cache servers within ECNs, their global backbone infrastructure connecting their data centres and their proprietary OTT ecosystems are providing them with more control over their content delivery and strengthen their market position vis-à-vis providers of ECNs. As a matter of fact, large CAPs have already built not only proprietary OTT ecosystems but are also aiming for a "private" Internet.

Smaller CAPs seem to be more open to collaboration and partnerships with providers of ECNs for the delivery of their content, as shown by the interest in developing the Open Caching technology. Such technology may allow the development of neutral and standardised distribution platforms that rely on the ISP infrastructure (e.g. Mobile Edge Computing) and provide transparent (on-net) CDNs services giving more control to both content providers and ISPs at the same time. It is important to note that if smaller CAPs cannot make use of independent commercial CDNs for quality assured data transport anymore, this makes them highly dependent on large CAPs as well. This can lead to foreclosure incentives of large CAPs against their own competitors and can have wide implications on the downstream markets.

The investment of large CAPs in proprietary CDNs aims to strengthen their position against direct competitors and other market players and tailor such CDNs to their own specific content rather than helping providers of ECNs to cope with the large amount of traffic they generate. The cost saving for ECNs resulting from CDNs and on-net CDNs (i.e. the cost savings related to the international transport and operators' national backbone) are insignificant when compared to the total and traffic related network costs, considering that CDN investment has very limited bearing on the volume of traffic on the access network. Even less so for mobile networks, as the international transport cost saving is relatively lower when compared to total network costs. Access network bears highest share and CDNs do not reduce bandwidth requirements for mobile access networks since cache servers must be located upstream where mobile traffic is aggregated.

This was also recognised by BEREC in its preliminary position on the internet ecosystem in which it assessed cost drivers of fixed and mobile networks which concluded that the cost of increasing IP interconnection links capacity and backbone capacity can be considered very low, in particular when compared to the cost of building access networks.

CAPs (LTGs) normally provide and maintain the cache servers (on-net CDNs) but operators have to bear the set-up costs and operational costs, further limiting eventual benefits. Additionally, use of on-net CDNs may trigger a rebound effect which will further increase the traffic on the access and core networks of ISPs (thus further triggering an investment need).

The efficiency of the on-net CDN systems will largely depend on the content (e.g., user generated content v. on-demand video) and the algorithms and configurations used by the CAPs and CDN providers (operators have no visibility hereof). On-net CDNs host only specific types of content (that of the CAP which places its private CDN into a telco network) and on-net CDNs do not scale with many different on-net CDNs because operating multiple CDNs in a network is operationally complex. Even when on-net CDNs are used, embedded cache servers are not able to meet all traffic demand and part

of the traffic still needs to be downloaded from the other cache servers of the CDN network or the origin and thus eliminating part of the international transport and national backhauling cost savings[5].

The effect of on-net CDNs is specific to individual ISPs depending on their network type, network size and composition of their customer base. In certain geographical markets on-net CDNs may be important for ISP rankings with respect to latency among other CAP-chosen criteria and thus contribute to the decision of ECNs whether to accommodate on-net CDNs in their networks.

In the case of our operating business in Spain, on-net CDNs represent approximately 16% of peak bandwidth capacity usage; current agreements are based on a free scheme as CDNs have refused to pay for the traffic. A balanced negotiation should have not resulted in a free agreement despite some backbone savings for network provider due to lower bandwidth for CAP-CDN connection.

IASs do not hold a termination monopoly.

BEREC notes in its report that there are signs of IASs leveraging their termination monopoly. BEREC highlights as a key finding (section 6) that content providers may struggle to find alternatives to reach end users if practices of vertically integrated IAS and transit providers leverage their termination monopoly. Some stakeholders claim that IASs in particular vertical integrated IASs refrain from upgrading interconnection links leading to congestions while offering a more costly premium transit as an alternative.

The GSMA and ETNO maintain the view, that neither IASs nor vertical integrated IAS hold a termination monopoly to the detriment of content providers not being able to reach end users for the reasons outlined below.

First of all, if IAS were able to leverage a monopoly against content providers it would imply that there was no alternative to routing traffic and no countervailing bargaining power present. In fact, content providers always have the possibility to provision their traffic through commercial CDNs, cloud providers or other carriers, thus contradicting the very definition of a monopoly. Large CAPs, in other words, have a variety of options to deliver their content, most of them outside the control of the terminating ISP.

Further, no telco operator could actually refuse the termination of the big CAPs' services (e.g., youtube content). If it tried, end users would be immediately impacted and would switch to another ISP. Retail customers expect the provision of the big CAPs' services to them, and if they are not available it is clear they would readily change their connectivity supplier. Therefore, it is not realistic to say that telcos have a termination monopoly. Rather the opposite, it is large CAPs who have a content provision monopoly.

[5] For instance, even within the same popular video session, some video chunks are served from different locations of the CDN hierarchy or even from the origin:
https://blogs.cisco.com/sp/cdn-caching-and-video-streaming-performance (figure 3)

Another aspect that in our view does not support the claim of termination monopoly is the existence of highly competitive retail connectivity markets. Today, content providers have various ways of reaching the end users. In Europe a significant percentage of end users if not all have coverage from different connectivity. Should an end customer face any restriction to access service provided by a CAP, he could swiftly change ISP provider.

Finally, should ISPs be leveraging or abusing such termination monopoly, and given the lack of legal restrictions to charge a price for IP-IC, ISPs would not be freely accepting free settlement or free IP-IC with CAPs, or with on-net CDNs as explained in the section on the role of CDNs. On this regard, BEREC approach to IP-IC pricing only considering costs of ports needed should be contested; BEREC should consider the full end-to-end cost of providing the service of IP data transport to end-users, including access network costs: growth of IP-IC data traffic does not only require increasing or upgrading ports, but also upgrading access networks.

Until the 2000, the IP interconnection market was based on two main types of arrangements: transit and peering. Transit was the dominant form for a long time as most operators relied on large international carriers. Peering was mainly practised among network operators of similar size and traffic volumes.

In the meantime, the internet has evolved from what was earlier a user-centric communications network to a transport infrastructure for the consumption of an increasingly expanding number of media and content. Today, as noted above approximately 70% of the data transported through the backbone to consumers is generate by just a few large content providers (Google, Meta, Amazon, Microsoft and Netflix). Telcos operators are thus faced with significant amounts of traffic at their interconnection links that are originally designed to handle symmetric traffic. We do not believe this is a situation that can be regarded a termination monopoly, that IAS do accommodate an unlimited amount of data on links that are designed for symmetric traffic. This is a view that is also supported in the case of Cogent versus Orange[6] - *data may be freely exchanged within the limit of a pre-established ratio and requesting payment in the case of a highly asymmetric traffic exchange does not in itself constitute an anticompetitive practise.*

iv. Generic structure of IP-IC issues: Disputes

11) BEREC considers that the IP-IC ecosystem is driven by functioning market dynamics and by the cooperative behaviour of market players. Despite this, BEREC is aware that some IP-IC disputes have occurred since 2017 and this was also raised by several stakeholders in BEREC's workshops.
12) BEREC notes that stakeholders typically did not call for regulation but suggested monitoring and a case-by-case assessment.
13) According to BEREC's stakeholder workshops, most disputes stem from vertically integrated IAS providers attempting to leverage their termination monopoly into the transit/peering market and to introduce (higher) fees for IP-IC directly from CAPs.

We do not agree with BEREC's conclusion that the IP-IC ecosystem is driven by functioning market dynamics and by the cooperative behaviour of market players, or that the IP-IC bargaining situation between market players seems balanced. The market only works, if the telcos bear the data traffic costs caused by the CAPs. The caps are not willing to negotiate on a fair distribution of these costs. Furthermore, the number of disputes or interventions is not, in our view, an adequate measurement for analysing the functioning of a market. To the contrary, the absence or low ratio of disputes could be a sign of a market failure.

In the same vein, Letta´s report:

(…) another critical issue concerns the evolution of wider global digital markets and of internet architecture, and the resulting unbalanced relationship between TLC and large online platforms. While the regulation continued to assume the prevalence of TLC operators in the digital world, other players - such as large online platforms - were assuming the role of gatekeepers in access to online services and thus as drivers of demand. In other words, existing sectoral regulation has introduced significant regulatory asymmetries between TLC operators and large gatekeepers in many emerging relevant markets".

In this sense, we welcome and strongly support the EC White Paper when recognizing that "commercial negotiations and agreements could possibly be further facilitated by providing for a specific timeline and by considering the possibility for requests for dispute resolution mechanisms, in case of commercial agreements could not be found within a reasonable period of time."

Court proceedings are not an efficient mechanism to address a market failure. From our own experience, court proceedings require significant resources and take years to complete. A final judgement takes effect only between the litigating parties and is highly case specific. Recent Meta-DT judicial case provides ample support to the proposed approach, exemplifying evidence of ISPs providing a valuable service deserving a fair remuneration, CAPs asymmetric bargaining power to determine unfair or no commercial terms, and long resolution time judicial processes.

We support the view that in a free-market economy commercial agreements should be reached based on commercial negotiations, however, due to the large asymmetries in bargaining power, as commented below, there is ample evidence that such commercial negotiations are not taking place on equal footing. It is therefore not possible to restore a more balanced relationship without a binding dispute resolution mechanism. This mechanism should be established through targeted regulatory action.

v. Bargaining situation (in particular) between CAPs and IAS providers

14) BEREC considers that, on a general level, the IP-IC bargaining situation between market players seems balanced. BEREC also notes that smaller players typically bear higher relative costs which may affect their bargaining position.
15) BEREC notes that relative bargaining power may change over time.

16) Several factors impact on the relative bargaining power between providers such as the degree of substitutability between transit and peering, the cost structure of transit and peering, economies of scale as well as market and technological developments.

We do not agree with BEREC's conclusion that the IP-IC ecosystem is driven by functioning market dynamics and by the cooperative behaviour of market players, or that the IP-IC bargaining situation between market players seems balanced. The number of disputes or interventions is not, in our view, an adequate measurement for analysing the functioning of a market.

Due to the flattening of the internet, the interaction between large CAPs and ISPs has become closer, as most large CAPs now have a direct interconnection with ISPs around the world essentially bypassing the open internet. This commercial relationship is characterized by asymmetric bargaining power due to the global size of large CAPs, their strong presence in adjacent markets and asymmetric regulation. Several factors indicate that large CAPs have superior bargaining power, namely:

- Private peering is generally subject to charges. The reason why charges for IP data transport services are sometimes not levied is the fact that the amount of traffic in both directions is rather symmetric and respective payments would largely offset each other. This relationship is generally referred to as "settlement-free peering". Network operators are typically not inclined to provide IP data transport services on a settlement-free basis to a network with a significant traffic asymmetry, which is the case between large CAPs and ISPs. IP data transport is a valuable service, which can be charged, as already acknowledged by the Court in Germany in the case Deutsche Telekom against Meta.
- Large CAPs have become indispensable for ISPs, as they provide the content and applications that end users expect from any internet service and that play a key role in their everyday lives due to their strong network effects. The fact that large CAPs in most cases do not pay for this valuable IP data transport service and make use of their dominant position in their core revenue generating markets underlines the imbalance in the ecosystem.
- Large CAPs are less dependent on ISPs, as they have alternative options (routes) to reach their end users via other networks, such as commercial CDNs, cloud operators, or other carriers. These networks are interconnected to the ISPs' networks through existing peering and transit agreements, which enable the free flow of traffic between different networks in line with the Open Internet Regulation (OIR) which results in a "must carry" obligation. Therefore, large CAPs do not need to obtain direct connectivity from a particular ISP to access its customers. A vertically integrated ISP must deliver any traffic that enters its network to end users on a non-discriminatory basis. As a result, even without a direct commercial agreement with a carrier, a CAP is still able to reach its end users via indirect connections and/or CDNs and/or cloud operators.
- Large CAPs have a significant quality lever over ISPs, as they can influence the quality of service and network stability of ISPs by their own routing decisions. Large CAPs, which send particularly large volumes of data, can congest specific interconnection points by spontaneously re-routing a portion of their traffic via indirect connections to the ISP's network, thereby affecting the quality of service for all online services routed via the affected interconnects. This can induce a quality-adjusted price increase for end users on the ISP's network, which would deteriorate the ISP's competitive position if the CAP leaves connections to other ISPs unaffected.

- Large CAPs can impact the quality of services of a network carrier with an integrated ISP business towards its end customers, which is a central dimension of competition at retail level, and evidence shows that in case of any connection problem, end users react negatively towards their ISP and not the CAP. This effect is exacerbated by the fact that certain CAPs display to internet users ISPs ranking according to the quality level of the provision of their own service(s) with respect to CAPs' chosen criterion, effectively steering end-users to their preferred ISP. This is thus a powerful mechanism that can be used in negotiation between large CAPs and ISPs.

vi. Relationship between IP-IC and OIR.

17) The OIR, which aims to ensure an open internet, provides rules to this effect for the part of the internet value chain for which the IAS provider is responsible. The latter, therefore, is the addressee of the corresponding obligations laid down in the OIR, notably article 3.
18) Ensuring the effectiveness of the OIR necessarily entails a responsibility for IAS providers to abstain from any conduct that has the object and/or the effect of compromising the provision of an open IAS for end-users, including conduct that is technically implemented at the interface between the access network and other connected networks.
19) Finding that the OIR has been infringed, through circumventing conduct deployed in the context of IP-IC, requires a case specific examination. To this end, the relevant NRA should consider all of the circumstances within which the contentious practice takes place, notably its objective purpose and the legal and economic context of which it is a part.

As mentioned above, significant structural and commercial changes have taken place in the internet ecosystem since 2000 with the rise of large powerful players. This development has resulted in delayering effects in the market and no single player in the ecosystem today has end-to-end control over the end user quality and experience.

The current market context is also framed by the Open Internet regulation (OIR) that creates an obligation for operators only to ensure access for all end-users to all content, applications and services and to protect them from any restrictions to exercise this right. This means that telecom operators cannot compromise on quality of service.

Without putting into question the legitimate aims of the Open Internet, we find that when the current OIR apply the same definition of an end-user in both upstream and downstream markets, contrary to the DMA, this increasingly constitutes an unintended and unnecessary protection of some of the largest players in world.

We note in particular that a number of end-users (content providers) are involved in several layers of the digital ecosystem, for example CDNs, that can differentiate price and quality and also apply traffic management techniques. Operating system providers are another group of end-users that have control over certain parts of the value chain e.g. app stores and to some extend ISPs' possibility to offer certain functionalities. Internet platforms also apply algorithms to the content that influence what content can be seen by end users and content providers, browsers and CDNs are able to apply transport protocols that can dictate how traffic behaves during congestion events independent of the network operators.

That said, and as noted in above, content providers have various opportunities to choose the route of their traffic which gives them the possibility to spontaneously reroute their traffic through any route independently of its capacity. This spontaneous rerouting of very large traffic volume through any possible – and sometime not anticipated – route of the open internet can harm the consumer and also smaller content providers as a result of potential congestion and reduced quality.

Whilst we support of the open internet principles and their benefits to end-users, the current definitions under the OIR limits operators' standard commercial levers to negotiate on equal terms with CAPs and operators have limited power to counter-react if CAPs refuse to negotiate. Ensuring the effectiveness of the OIR is in our view also not just a responsibility of IAS providers. No single party in the ecosystem controls the entire user experience and we believe that a deeper and more nuanced look at roles of the different players in the ecosystem will prove that.

Finally, Telefonica disagrees with the BEREC statement that "the behaviour of the IAS provider in the IP-IC is covered by the OIR". Moreover, BEREC mentions that "abstaining from upgrading capacity on congested routes and/or limiting the number of interconnections" would go against the OIR and NRAs have a duty to intervene. That is in our view going beyond the scope and objectives of the OIR, and an artificial exercise to expand regulation into the whole connectivity market.