2. Analysis of the problem at hand

2.1. The EU telecommunications market today

The explosive growth of Internet traffic in the last 20 to 30 years, the ubiquitous presence of smartphones, and the development of ever faster electronic communications networks have led to the development of a digital economy with new high value-added services to citizens. This digital economy now represents 4-9% of the GDP in European countries, according to European Commission ("EC") data, showing some signs of growth since 2015.[5] However, considering that most economic activities nowadays rely on digital processes and an underlying digital infrastructure, the real GDP impact driven by digitization can be expected to be even higher than these figures.

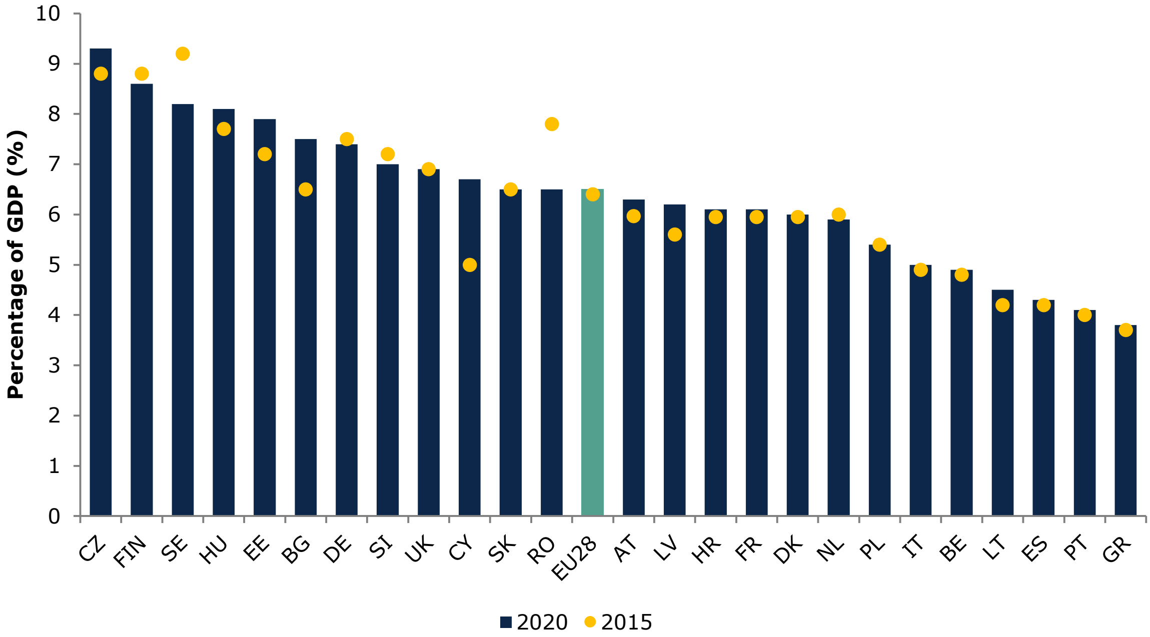

Exhibit 2.1: The digital economy as a percentage of GDP in 2015 and 2020 [Source: Axon, based on data from the European Commission]

An important share of digital services to users is provided by Internet enterprises, with market leaders among them now occupying an ever-present role in consumers' daily lives.

[5] European Central Bank, "The digital economy and the euro area", 2020; Available at: https://www.ecb.europa.eu/pub/economic-bulletin/articles/2021/html/ecb.ebart202008_03~da0f5f792a.en.html

- "Pre-fetching" practices allow OTTs that monetize their services through ads to download the content in the ad's link when this first appears on the user's screen, even before the user clicks on it. If the user clicks on the ad afterwards, the linked page is loaded from the initial cache. In those cases where the user does not click on the ads shown to him/her, the traffic generated to pre-fetch the content is simply useless.

At the same time, we can observe that OTTs do, indeed, take some steps towards increasing the efficiency of the media they use, e.g., through the use of latest high-efficiency protocols and encoding techniques, and Content Delivery Networks (CDN) and/or caches. However, as seen already, these measures are not enough: data traffic keeps increasing exponentially, leading to higher costs for EU telcos, especially in the most capillary part of their networks.

The fact remains, therefore, that without any monetary incentives for OTTs to ensure an optimal generation of traffic (i.e., traffic that is essentially demanded by the end user), these perceive traffic offloading to EU telcos as being free of charge, thus generating a "tragedy of the commons" problem.

For this reason, we believe it is important to establish a price signal that will, on the one hand, allow telecom operators to increase their investment in very high-capacity networks and, on the other hand, create incentives for OTTs to optimize their traffic volumes, especially by reducing inefficiently generated traffic. The need for such adjustments, while not sufficient to solve the problem at hand, is evident in light of the present situation's serious costs for telcos – as described in the next subsection – and its broader negative externalities in the form of increased energy consumption and CO2 emissions.

2.3. Quantification of costs borne by EU telcos from OTT traffic

As may be inferred from the previous subsection, given the high share of data traffic concentrated in the hands of a small number of OTT players, these might logically be expected to contribute to a significant portion of EU telcos' costs to manage and deploy the networks conveying such traffic. This is consistent with the "beneficiary pays" model that is largely followed in most infrastructure markets (e.g., energy, water and transportation).

3. Socio-economic impact assessment

The primary objective of this section is to assess the potential impact, on key sustainability indicators, of a proportionate participation of OTTs in the costs of the traffic they induce on telecoms networks, insofar as these costs relate to the development of the necessary telecommunications infrastructure (i.e., 5G and FTTH). As quantifying such a proportionate participation falls outside this study's scope, and for the sake of illustration only, this section explores the impact of a €20 billion/year hypothetical participation from OTTs[34] in network infrastructure deployment – a rounded, purely indicative, base reference as an example for the order of magnitude discussed in section 2.3. The conclusions at the end of this section then summarise the socio-economic implications of alternative levels of participation of OTTs, ranging from €10 billion up to €30 billion, along the levels discussed in section 2.3.

The impact analyses presented in this section are economic, social and environmental.

3.1. Analysis of the economic impact

The impact on the economy can be looked at from multiple angles, but the two most prominent ones, which are discussed below, include Gross Domestic Product (GDP), and Employment.

3.1.1. Impact on GDP

Background

ETNO[35] estimates that 5G alone can bring €113 billion annual uplift on European GDP by 2025 (stemming from four distinct verticals[36] and environments[37]). It also estimates that communities with more than half of the population connected to FTTH broadband, with speeds of at least 1 Gbps, had a per capita GDP of 0.9 to 2.0 percent higher than those without fibre broadband.

34 As suggested in section 4, we would expect such participation to come only from a handful of OTT providers – those generating the vast majority of data traffic.

35 ETNO, "Connectivity & Beyond", 2021; Available at: https://etno.eu//downloads/reports/connectivity%20and%20beyond.pdf

36 First-order benefits for Automotive, Healthcare, Transport, Utilities verticals.

37 Second-order benefits for Smart City, Non-urban, Smart Home and Workplace environments.

networks.[53] This forecast assumes that the current levels of investment for 5G networks will be maintained by EU telcos.

If OTTs were to contribute with, e.g., €20 billion per year to the costs of usage of telecom infrastructure in Europe, and assuming 60% of it were to be allocated to the 5G networks (in line with the considerations mentioned in section 3.1.1), we could expect faster levels of take-up of 5G networks. Based on historical data, we can observe a relevant correlation between 5G user take-up and the share of 5G traffic. Extrapolating this relationship, by considering the increased reach that 5G networks, as a whole, would have with increased investment (see section 3.1.1 for further details), we could expect that the percentage of traffic in the EU's 5G networks could be increased to represent 71.5% of all mobile traffic in 2025.

Considering that 5G networks are expected to be 10 times more efficient, this would lead - in a steady-state situation - to an overall reduction of 38.7% in total energy consumed in the EU's mobile access networks in 2025[54].

Meanwhile, in the core network, data traffic efficiency is not expected to be substantially better than with 4G. If we assume a 20% improvement in energy efficiency,[55] following the same logic as for access networks, we could observe a decrease of 5.5% in energy consumption[56].

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53 Ericsson, "Ericsson Mobility Visualizer", 2022; Available at: https://www.ericsson.com/en/reports-and-papers/mobility-report/mobility-visualizer?f=8&ft=2&r=1&t=1,20&s=4&u=3&y=2021,2026&c=3

54 This is calculated based on the following considerations:

- No contribution from OTTs: Considering 5G to be 10 times more energy efficient than its predecessors, and considering 46.5% of traffic handled in 5G, we could estimate an energy consumption factor of 1x46.5% + 10x(1-46.5%) = 5.8
- Contribution from OTTs: Considering 5G to be 10 times more energy efficient than its predecessors, and considering 71.5% of traffic handled in 5G, we could estimate an energy consumption factor of 1x71.5% + 10x(1-71.5%) = 3.56

As a result, with a €20 billion contribution from OTTs, energy consumption would drop by 38.7%.

55 Anders S. G. Andrae and Tomas Edler, "On Global Electricity Usage of Communication Technology: Trends to 2030", 2015; Available at: https://www.mdpi.com/2078-1547/6/1/117/pdf

56 In this case, the energy consumption factors would look as follows:

- No contribution from OTTs: 8x46.5% + 10x(1-46.5%) = 9.1
- Contribution from OTTs: 8x71.5% + 10x(1-71.5%) = 8.6

In total, considering that 85% of the energy is consumed in the access network (and 15% in the core network),[57] in a steady-state situation, we could expect an overall decrease in the energy consumed by mobile networks of 31.5% in 2025[58].

Impact on energy consumption	Percentage of energy savings
RAN	-38.7%
Core	-5.5%
Total	**-31.5%**

Exhibit 3.5: Impact on energy consumption on mobile telecommunications networks considering traffic total volume steady-state situation [Source: Axon]

Impact analysis (FTTH)

As presented in section 3.1.1, operators have been investing in FTTH for several years already, but there is still a long way to go. Currently, 51% of the households in Europe are covered by FTTH networks,[59] and this is expected to grow to around 75% by 2025 if the current investment levels in FTTH (roughly €10 billion per year) are maintained.

However, with a €20 billion participation per year to the usage costs of networks, (of which we would consider 40% to be allocated to FTTH deployment), we estimate that FTTH coverage could reach 88% in 2025, which represents an increase of around 13 percentage points from the base case in the same year[60].

Given that FTTH networks are expected to be 85% more efficient than other types of fixed networks[61], following the same logic described in the previous subsection, we could expect a reduction of 30.8%[62] in energy consumption in the EU's fixed access networks in 2025 – assuming legacy networks are progressively switched off as the FTTH footprint grows.

57 ABI Research Interdigital, "Environmentally Sustainable 5G Deployment: Energy Consumption Analysis and Best Practices", 202; Available at: https://www.interdigital.com/download/5fc4474dcd829e04839e8d77 ABI Research Interdigital, "Environmentally Sustainable 5G Deployment: Energy Consumption Analysis and Best Practices", 202; Available at: https://www.interdigital.com/download/5fc4474dcd829e04839e8d77 ABI Research Interdigital, "Environmentally Sustainable 5G Deployment: Energy Consumption Analysis and Best Practices", 202; Available at: https://www.interdigital.com/download/5fc4474dcd829e04839e8d77 ABI Research Interdigital, "Environmentally Sustainable 5G Deployment: Energy Consumption Analysis and Best Practices", 202; Available at: https://www.interdigital.com/download/5fc4474dcd829e04839e8d77

58 Calculated as:

- No contribution from OTTs: 85% x 5.8 + 15% x 9.1 = 6.3
- Contribution from OTTs: 85% x 3.6 + 15% x 8.6 = 4.3

The reduction is thus 31.5%.

59 ETNO, "The State of Digital Communications 2022", 2022; Available at: https://www.etno.eu/downloads/reports/state_of_digi_2022.pdf

60 Refer to Section 3.1.1 for further details on these calculations.

61 ETNO, "The State of Digital Communications 2022", 2022; Available at: https://etno.eu/component/attachments/attachments.html?task=download&id=8165

62 Obtained based on the change in FTTH coverage with and without the contribution of OTTs in 2025.

In this case, we do not expect any significant improvement in the efficiency of the core network. Assuming that 15% of the energy is consumed in the core network, we can expect an overall decrease in the energy consumed by EU's fixed telecommunication networks of 20.8% in 2025.

Impact on energy consumption	Percentage of energy savings
Access	-30.8%
Core	-
Total	**-20.8%**

Exhibit 3.6: Impact on energy consumption on fixed telecommunications networks considering traffic total volume steady-state situation [Source: Axon]

Conclusion

The ITU[63] estimates that, by 2025, at a global scale, mobile networks will be responsible for an energy consumption of 170 TWh, and fixed networks will add another 100 TWh.

Considering that the EU would represent roughly 14% of mobile data traffic and 13% of fixed broadband subscriptions in 2025,[64] we can estimate that European mobile operators would consume around 23.3 TWh in 2025, with fixed operators consuming around 13.5 TWh, a figure which is reasonably aligned with the latest information provided by ETNO.

Based on these figures, we can estimate that, in total, when considering both fixed and mobile networks, a €20 billion contribution from OTTs to the costs of network usage could result in a reduction of 10.1 TWh in energy consumed by EU telcos by 2025 (27.6% reduction).

3.3.2. Impact on carbon footprint

Background

The ICT sector, and telecommunications operators in particular, have a vital role to play in combatting global climate change by reducing their carbon footprint in the medium to long run. GHG emissions are commonly grouped under three distinct layers:

- **Scope 1:** Direct emissions from owned or controlled sources (e.g., operator facilities, company vehicles, etc.)

63 ITU, "Greenhouse gas emissions trajectories for the information and communication technology sector compatible with the UNFCCC Paris Agreement", 2019; Available at: https://www.itu.int/rec/T-REC-L.1470-202001-I/en

64 Based on data from World Bank and Ericsson.

- **Scope 2:** Indirect emissions related to energy consumption / efficiency (e.g., for fixed and mobile access networks)
- **Scope 3:** Emissions across the complete value-chain (e.g., capital goods, transportation and distribution, etc.)

Telecom operators have less control over their Scope 3 emissions but have accelerated their plans to reduce Scope 1 and 2 emissions.[65] As outlined in the latest annual report of ETNO, many members of ETNO have already announced ambitious plans to achieve zero emissions or carbon neutrality on Scopes 1 and 2 and subsequently on all three Scopes.

Operator	Target date for zero emissions in Scope 1 and 2	Target date for net zero emissions (Scopes 1, 2 and 3)
Deutsche Telekom	2025	2040
TDC	2028	2030
BT	2030	2045
KPN	2030	2040
Telenor	2030[66]	
Telia Company	2020 (achieved)	2030
TIM Group	2030	2040
Orange	2040	2040
Telefónica[67]	2025	2040

Exhibit 3.7: Selected Scope 1 & 2 and 3 emission reduction targets, ETNO members, group level [Source: ETNO[68]]. Note: net zero and carbon neutrality definitions used by companies differ; they may not be entirely comparable.

Reaching the net zero or carbon-neutral targets set by the EU and those set by telecom operators requires telcos to increase energy efficiency and renewable energy technologies in their networks. Ultimately, increasing energy efficiency and energy consumption from renewable sources will lead to lower carbon footprint of the sector, benefitting the environment.

65 ETNO, "The State of Digital Communications 2022", 2022; Available at: https://etno.eu/component/attachments/attachments.html?task=download&id=8165

66 For European operations only: https://www.telenor.com/sustainability/responsible-business/environment-and-climate/climate-impact/

67 Telefonica data for Scope 1 and 2 refers to its main markets: Spain, Germany and Brazil.

68 ETNO, "The State of Digital Communications 2022", 2022; Available at: https://etno.eu/component/attachments/attachments.html?task=download&id=8165

In this context, there is already a declining trend in Scope 1 and 2 GHG emissions by telecom operators, as reported by ETNO.[69] In 2020, ETNO members' Europe-only Scope 1 and 2 GHG emissions stood at 2.77 thousand tonnes of Carbon Dioxide equivalent (tCO_2e), a decline of 22% from the previous year.

This is also driven by European telecom operators' migration of their power sources from non-renewable to renewable sources to reduce their carbon footprint. As such, the same source shows that 62.2% of Scope 1 and 2 energy consumption of ETNO members (at a group level, including operations outside Europe) were from renewable sources in 2020, up from 44.4% in 2017. At Europe-only level, this figure was 75.3% in 2020, up from 60.4% in 2017.

Impact analysis

The ITU has forecasted that mobile networks around the globe would emit 92.0 Mt CO_2e in 2025, and fixed networks would emit 41.8 Mt CO_2e in 2025.[70] Out of that, 73.0 Mt CO_2e in mobile networks will be derived from energy consumption; the equivalent figure will be 35.2 Mt CO_2e for fixed networks. Considering the share of mobile data and fixed broadband lines in Europe, we could estimate that around 4.8 Mt CO_2e will be emitted from fixed networks and 10.0 Mt CO_2e from mobile networks in the EU, just from electricity needs.

69 ETNO, "The State of Digital Communications 2022", 2022; Available at: https://etno.eu/component/attachments/attachments.html?task=download&id=8165

70 ITU, "Greenhouse gas emissions trajectories for the information and communication technology sector compatible with the UNFCCC Paris Agreement", 2020; Available at: https://www.itu.int/rec/dologin_pub.asp?lang=e&id=T-REC-L.1470-202001-I!!PDF-E&type=items

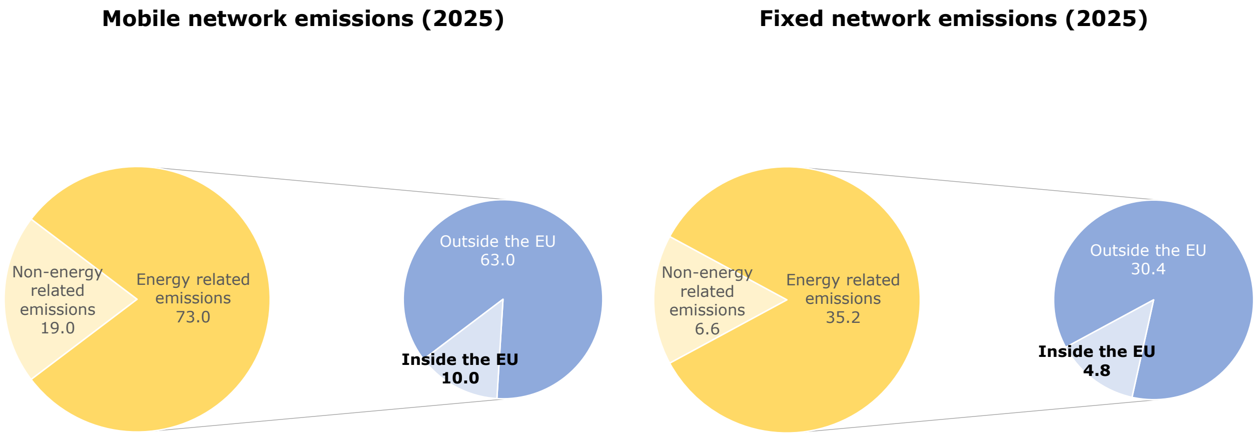

Exhibit 3.8: Breakdown of forecasted mobile and fixed network emissions in 2025 [Source: Axon based on data from ITU]

However, not all electricity needs of European telcos will be carbon-emitting. Actually, operators in the EU right now secure around 75% of their current power needs through renewable energy sources. This is equivalent, currently, to a renewable capacity of 10.1 TWh for fixed networks and 17.5 TWh for mobile networks.

Assuming operators were to maintain the current share of renewables by 2025, we observe that a total consumption of 9.2 TWh of non-renewable energy would be required:

Energy capabilities from European telcos *(without OTTs participation)*	Expected energy consumption in 2025 [TWh]	Renewable capacity [TWh]	Non-renewable capacity [TWh]
Mobile networks	23.3	17.5	5.8
Fixed networks	13.5	10.1	3.4
Total	**36.8**	**27.6**	**9.2**

Exhibit 3.9: Expected energy consumption, and renewable and non-renewable capacities of mobile and fixed networks in the EU by 2025 [Source: Axon]

As seen in the previous section, if OTTs were to contribute €20 billion per year to the costs of usage of 5G and FTTH, we could expect the energy consumption of mobile and fixed networks to be reduced. In turn, this situation would allow for a higher portion of telcos' energy needs to be covered by their existing renewable capacities.

Energy capabilities from European telcos *(with OTTs participation)*	Expected energy consumption in 2025 [TWh]	Renewable capacity [TWh]	Non-renewable capacity [TWh]
Mobile networks	15.9	17.5	-
Fixed networks	10.7	10.1	0.6
Total	**26.6**	**27.6**	**0.6**

Exhibit 3.10: Expected energy consumption, and renewable and non-renewable capacities of mobile and fixed networks in the EU with additional investments from telcos by 2025 [Source: Axon]

While this analysis already projects a 94% reduction in carbon emissions, it is likely that even a small increase in the share of renewables by 2025 – which is expected by most network operators – could result in a 100% transition to renewable energies by 2025.

Conclusion

We may thus conclude that a yearly participation of €20 billion from the OTTs to the costs of usage of telecom networks in the EU (+UK) could reduce alone the energy consumption from non-renewable sources by up to 22.9%. In other words, this could mean a reduction of 13.8 Mt CO_2, representing a circa 93.8% reduction in total carbon emissions in 2025.

Assessing environmental impact of network evolution is a complex challenge. While many factors have been quantified to assess a faster migration to more energy efficient networks (5G and FTTH), two highly relevant drivers are more difficult to assess:

- By setting a price signal for data traffic, agents will have an incentive to generate traffic more efficiently with the potential impact of reducing expected traffic growth; this potential lower traffic growth has not been considered in the current environmental impact analysis.
- The most relevant environmental impact of the innovations taking place in the telecom sector is not going to come from the improvement in the energy efficiency of network equipment, but rather from its role as enabler of the green economy. Telecom networks are the backbone of major CO2 reductions enabled by digitalization, across different sectors of the economy and society. As this impact is not the objective of this study, the environmental impact across sectors of the economy and society due to the acceleration in 5G and FTTH network deployment resulting from OTTs contribution to network operational and deployment costs has not been analysed.

3.4. Conclusions

As shown in the previous subsections, an illustrative €20 billion yearly participation from OTTs in the costs of usage of the telecommunications infrastructure in the EU would bring positive economic, social and environmental benefits to the European ecosystem. The exhibit that follows provides a summary of the impacts observed and an overview of the implications on each of these pillars of different participation scenarios from the OTTs, ranging from €10 billion up to €30 billion (along the cost levels discussed in section 2.3).

Impact area	Impact of different scenarios of OTTs' participation		
	€10 billion	€20 billion	€30 billion
Economic impact			
Gross Domestic Product	+€27-37 billion	+€52-72 billion	+€77-106 billion
Employment	+420,000	+840,000	+1.26 million
Social impact			
Quality of service	Improved QoS levels for fixed and mobile broadband (the higher the contribution, the higher the impact on QoS).		
Innovation	Indirect improvement of the innovation capabilities of EU countries		
Environmental impact			
Energy consumption	-15%	-28%	-38%
Carbon footprint[71]	-61%	-94%	Zero emissions

Exhibit 3.11: Summary of the impact of different participation levels from OTTs [Source: Axon]

71 Refers to Scope 1 and Scope 2 CO_2e emissions of EU telcos.

4. Potential regulatory and policy measures to create positive impact

We now propose to discuss, at a high level, the type of regulatory and policy measures that could help unlock the positive economic, social and environmental benefits uncovered in the previous section. This discussion takes into consideration, in particular:

- The relevant regulatory and policy backdrop, and the sources of the problem we discussed in Section 2;
- The distribution of the OTT traffic impact across different telecoms network levels and different types of wholesale services benefitting OTTs today, in order to be able to assess the relative merits of each of the solutions we examine;
- Any additional pros and cons of these solutions, e.g., in terms of their adoption process, complexity, stakeholders involved, etc.

Briefly, for the reasons discussed below, a direct implementation tool to ensure OTTs contribute fairly and proportionately to the costs of their use of telecom operators' networks would appear to be a more efficient and appropriate answer to the issues at stake, compared to any possible indirect implementation tools. The latter, such as the creation of a fund or a new taxation scheme, would seem too complex to set up and implement, and could risk being misdirected to unrelated objectives.

4.1. Implications of OTT traffic at different network levels

The impact of OTT traffic is felt at various levels of a typical telco network and affects different types of wholesale services provided to the OTTs benefit, (directly or indirectly), by the network operator.

At the highest network level, OTT traffic impacts IP peering, disrupting the principle of a relative traffic symmetry which is supposed to underpin this type of traffic exchange between ISPs. However, while this asymmetry might provide a justification for alternative fee arrangements, e.g., through IP transit agreements, as mentioned already, the actual cost impact of additional OTT traffic at that level is likely to be only a small part of the overall problem.

On the other hand, direct IP peering or transit agreements between OTTs and telcos, where available, also offer a potential direct OTT/telco contractual interface for a fair compensation, whose scope could, in theory at least, (e.g., in a more balanced negotiation relationship and/or as a result of possible future regulatory obligations) extend beyond IP peering/transit services and cover the OTT/telco commercial relationship more holistically. IP peering/transit is also essentially unregulated, which means that policy options for that level of traffic could be adopted with no need to amend existing EU legislation.[72]

As illustrated in Frontier's report, the bulk of OTT-driven costs is concentrated in the national **backbone networks (for fixed & mobile) and access networks (for mobile[73])**. This is a fact that should be reflected in any fair compensation solution, regardless of the level of traffic handover to which it (at least nominally) refers, and regardless of the specific mechanism to be put in place.

4.2. Possible tools for a direct compensation

4.2.1. The OTTs concerned

A fair solution for a direct compensation would most probably be more credible, practicable and likely to find acceptance if its mandatory scope were **limited to OTT players of a certain size**, based on a targeted approach, e.g., their volume of traffic, turnover threshold, number of users or other criteria, as those bigger players are those that create the need for additional capacity investment into networks.

As discussed earlier in this report, the impact of OTT traffic on European telecommunications networks is very asymmetric: it is just a handful of OTTs that generates the lion's share of OTT traffic. Hence extending a direct compensation solution to all OTTs would be inherently more difficult to implement and monitor. Moreover, larger OTTs can benefit from a much stronger negotiating power, economies of scale, and vast resources. Therefore, they would also be more likely to find ways to circumvent solutions applying to all OTTs, regardless of market power, while smaller OTTs may have no means to do so.

Limiting the scope of the policy and/or regulatory solution to larger OTTs based on certain easily verifiable criteria would also echo the current precedent of the regulation of

72 As a reminder, BEREC also accepts that IP interconnection falls outside the scope of the Open Internet Regulation's Article 3(3) on net neutrality: see paragraph 50 of the BEREC Guidelines on the Implementation of the Open Internet Regulation, BoR (20) 112. More generally, this applies to all of the scenarios we discuss in this Section, as they concern solely the commercial interface between OTTs and ISP/telcos, and not the one between ISPs and consumers.

73 Fixed access networks are commonly accepted to be non-traffic sensitive

"gatekeepers" under the proposed Digital Markets Act, and the additional obligations for "very large online platforms" under the proposed Digital Services Act.

4.2.2. Substantive elements of the policy/regulatory tool

To achieve its goal, the relevant tool should define a clear obligation for the OTTs concerned (i.e., only the largest among them) to negotiate the conclusion of a direct agreement with ISPs/telcos upon request, and to accept to pay a fair and proportionate contribution to network usage costs, and other conditions in such an agreement.

The conclusion of these agreements should be based on procedures and substantive principles that should be described in this tool, with a relevant supervisory and enforcement body, and they should support an overall balanced approach, and otherwise ensure consistency with the general objectives of EU law and policy.

4.2.3. Procedure and dispute resolution

While the procedure for the negotiation of any such agreements should be subject to basic procedural guarantees (e.g., good faith and a prescribed timeline for the conclusion of an agreement), perhaps the most important condition for the instrument's success in practice will be an effective and compulsory dispute resolution mechanism, as the two sides' interests are unlikely to be aligned at the start of the overall process.

Effective dispute resolution, while not necessarily excluding other fora, should preferably focus on a special arbitration/mediation body described in the proposed instrument, with its own, effective and timely, procedure and the power to adopt a binding decision. Moreover, to avoid a "cacophony" of parallel procedures and a bottleneck of cases by a multitude of ISPs and several OTTs before the same body, one of the available options could be to vest this body's decisions with a legally binding effect *erga omnes.* Thus, for instance, any principles set out in their decisions as to what constitutes a "fair and reasonable compensation" should also apply to any parallel disputes on similar issues between the same or other OTTs, and other ISPs in the EU.

Apart from the many examples of arbitration and mediation found in international practice, EU legislation already includes precedents that could serve as a model here. For example:

- The **European Electronic Communications Code (EECC**) refers in its article 26 to a dispute resolution between undertakings for disputes in connection with obligations enshrined in the Code; the national regulatory authorities in the various Member

States are empowered to adopt binding decisions within a maximum of 4 months (except in exceptional circumstances);

- The **Broadband Cost Reduction Directive** (2014/61/EU) refers to a "competent national dispute settlement body" (DSB) for the resolution of disputes on access to existing infrastructure – in most cases, this is the NRA for electronic communications. Interestingly for present purposes, BEREC remarks, in its 2021 Opinion on the Revision of the Broadband Cost Reduction Directive, that "[t]*he mere effect that there is a mandatory dispute settlement process can apparently solve problems, even without a formal decision of DSB*." Further, "*other parties may settle their disputes in cases similar to those where the DSB already issued a decision. In these constellations, the binding decision of the DSB provides guidance to market participants beyond the specific case (better defined as 'regulation by litigation') by setting references for fair and reasonable terms and conditions (e.g., on prices and on the technical suitability of the physical infrastructure to which access has been requested). Therefore, under the assumption that the cases being brought to a DSB are the rather difficult and complex ones, a decision of the DSB can create a kind of guardrails and hereby help to facilitate a high number of future successful negotiations*."
- The **Copyright Directive's**[74] Article 21 refers to a possible voluntary, alternative dispute resolution procedure.
- In its 2017 Communication "**Setting out the EU approach to Standard Essential Patents**", the European Commission highlighted the advantages of alternative dispute resolution (ADR) mechanisms such as mediation and arbitration for a swifter and less costly dispute resolution. More recently, in February 2022, the Commission has launched a public consultation on standard-essential patents, as a preparatory step towards the adoption of specific EU legislation, and an effective alternative dispute resolution is set to be one of the key outcomes of this process.

Relevant examples on an international level include, e.g., Australia, which has recently adopted a "**News Media and Digital Platforms Mandatory Bargaining Code**",[75] to address bargaining power imbalances between digital platforms (such as Google and Facebook) and Australian news businesses. The Code makes it possible for news businesses to bargain with digital platforms, individually or collectively, over payment for the inclusion of their news on the platforms concerned. The Australian Communications and Media Authority is empowered to appoint mediators and, in some cases, arbitrators

74 Directive (EU) 2019/790 of the European Parliament and of the Council of 17 April 2019 on copyright and related rights in the Digital Single Market and amending Directives 96/9/EC and 2001/29/EC.

75 Australian Government, "News Media and Digital Platforms Mandatory Bargaining Code", 2021; Available at: https://www.legislation.gov.au/Details/C2021A00021

for the resolution of disputes if news media and digital platforms cannot reach an agreement.

In the present regulatory environment, the role of a mediation/arbitration body could be given to each Member State's NRA or to a separate competent body at the national or EU level. Under both scenarios, the legal instrument setting out the relevant rules should also anticipate and address potential cases of the involvement of multiple jurisdictions, a factor that might speak against entrusting such dispute resolution to the NRA or other body of a single EU Member State, unless a mechanism for the allocation of the case to a "lead" NRA/other national body can be also included. **Article 27 of the EECC** provides an example of such a cross border dispute resolution mechanism in EU law, which could serve as a model.

Overall, dispute resolution through a mediation/arbitration body would offer a relatively swift and simple solution to address the current imbalance of negotiation power between OTTs and ISP/telcos. Furthermore, while the first of such dispute resolution cases would need to start from scratch (or almost), precedent-setting could lead to consistent price-setting standards and a more stable commercial relationship for the parties concerned.

4.2.4. Ex post vs ex ante solutions

An instrument addressing the problems identified in this report could apply ex post (i.e., through targeted regulatory intervention, ex officio or upon request, once a dispute has arisen), ex ante or perhaps as a combination of both. An ex ante mechanism could mimic price regulation under the existing electronic communications legislation. Arguments in favour of such an ex ante solution would include the existence of regulatory high-level precedents and mechanisms to rely on, at least as a source of inspiration, and a relative ease of implementation, (once decided), instead of prolonged discussions and disputes in each case. The disadvantage of an ex ante tool would be that it would be more intrusive, by nature, and could risk causing inefficiencies by prescribing solutions that would be more static and less efficient than commercially negotiated outcomes.

As an alternative, ex post solutions could grant more commercial flexibility to market players. As a downside, they could lead to uncertainty on the appropriate criteria for the resolution of disputes and, in particular, a prolonged phase of appeals and other litigation.

Finally, an intermediary solution could combine "soft law" (e.g., in the form of guidance from the European Commission and other bodies, for a broader representation of the industry), a few high-level legal principles, and an arbitration mechanism along the lines described above, as a solution of last resort.

4.3. Other options

The solutions described above would all involve a form of direct negotiation and, hopefully, an agreement between ISP/telcos on the one hand and OTTs on the other, acting individually or perhaps even collectively (subject to compliance with competition law safeguards).

Other solutions could include a form of indirect compensation, e.g., through a special fund or a form of digital taxation. However, while seemingly more neutral, such a solution would likely also raise serious concerns. For example, a new fund would be difficult to set up, inherently controversial, and could risk being misdirected to other, unrelated, objectives. Similarly, any solution involving a new tax on digital services could create negative public perceptions about its purpose, at both the European and international level.

As a complementary solution (even if it is not sufficient to fully address, by itself, the problem at hand), traffic optimisation offers an obvious area for improvement. Recent experience at the outset of the Covid pandemic has shown that OTTs are technically in a position to limit their traffic volume substantially, without any noticeable impact on the quality of their service. Nevertheless, the effects of such voluntary solutions are bound to be short-lived, especially as long as OTTs have limited financial or other incentives to extend them, because traffic reductions are likely to be outpaced, sooner or later, by the intrinsic growth in demand for OTT data traffic.

It can be reasonably assumed that, if any of the direct compensation mechanisms discussed is adopted, that should already give OTTs a financial incentive to optimise their traffic management. In addition, however, such mechanisms could be reinforced through regulatory requirements for OTTs to manage their traffic in a way that minimizes unnecessary volume increase, with reporting and associated obligations.

The main advantage of such a solution is that, if the willingness to act is there, OTTs are in pole position to optimize their own traffic volume. At the same time, however, they are far more likely to do so with a commercial incentive rather than without one, which is why such traffic management obligations would be more effective as a complementary rather than as a stand-alone obligation.

Annex A. Glossary

Term	Definition
BEREC	Body of European Regulators for Electronic Communications
DMA	Digital Markets Act
EC	European Commission
ETNO	European Telecommunications Network Operators' Association
EU	European Union. Unless otherwise stated, it is assumed to include the UK as well.
FANG	Facebook, Amazon, Netflix, Google
FTE	Full Time Equivalent
FTTH	Fibre To The Home
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GII	Global Innovation Index
IP	Internet Protocol
ISP	Internet Service Provider
ITU	International Telecommunication Union
NGA	Next Generation Access
OECD	Organisation for Economic Co-operation and Development
OTTs	Over The Top content providers
QoS	Quality of Service
VHCN	Very High Capacity Networks