



ETNO-GSMA contribution to BEREC Report on Cloud and Edge Computing Services

ETNO and the GSMA welcome this opportunity to provide input to the BEREC Draft Report on Cloud and Edge Computing Services.

Cloud and edge services are at the core of the transformation that our sector is undergoing: telecoms operators are turning their networks into platforms for innovation by embracing disaggregated and cloud native architectures, high automation (e.g. based on AI/ML), programmability, and the development of new network as a service (NaaS) applications. As ETNO and the GSMA, we have outlined our vision for telecom transformation in our contribution to the European Commission's consultation on the future of the electronic communications sector and its infrastructure, which is clearly reflected in the Commission's White Paper *"How to master Europe's digital infrastructure needs?"*¹.

As outlined in the draft BEREC report, the provision, on the one hand, of cloud and edge services, and on the other hand, of electronic communication networks (ECN) and services (ECS), is increasingly interlinked. The markets exhibit interdependence and intertwining, with major players in the cloud market expanding their influence into traditional ECN/S markets. These trends carry significant implications not only at a technical and market level, but also from a regulatory standpoint.

One of the overarching principles of the EU regulatory framework is technology neutrality, which consists in remaining agnostic to underlying technologies and ensuring a level playing field for all market players. Regulation cannot be separated from the concrete provision of services in the value chain and must be consistently applied across sectors and stakeholders.

As indicated in the report, cloud services are provided in a highly concentrated market, where hyperscalers play a central role, thanks not only to their size, but also to the existence of network and ecosystem effects. These effects can potentially lead them to leveraging market power from adjacent markets, and also into the ECN/S market. This, in turn, has sovereignty implications as these cloud providers enjoy a bargaining position that is very difficult to challenge, with the potential ability to impose strict or unfair terms on a vertical market such as telecom.

In this contribution, we would like to offer some complementary observations regarding the cloud and edge markets from the telecom perspective, to then focus specifically on the section of the draft report related to network cloudification regulatory considerations (Chapter 7).

Cloud and Edge Market

Cloud computing has revolutionised the digital processes of many consumers and enterprises, which can use third-party compute and storage facilities instead of investing in their own servers, and can pay for their usage on a pay-as-you-go basis. The cloud has also had a significant impact on telecom operators' businesses. Many have migrated IT and back office systems to the cloud, and some have

¹ An executive summary of the joint response is available [here](#).

started to implement network functions, including the 5G core and even the RAN baseband, on cloud infrastructure. Some operators also offer cloud processing and storage services to their customers.

The rising use of the cloud by operators is driving increased spending on cloud computing and other IT functions such as data analytics, all of which support increased virtualisation and complexity of networks. As many operators shift their cloud spending from inhouse resources to public cloud providers, there will be a consequent shift of spending, away from CapEx and inhouse operations, and towards OpEx directed to external providers. Hyperscalers will be in a prime position to establish themselves as key stakeholders by leveraging their leading cloud offerings and strong capabilities.

Some operators are working with hyperscalers to deploy edge computing in their networks. Some expect to lease their edge infrastructure to partners including public cloud providers, and to use the sites for their own purposes, such as launching low-latency connectivity services for enterprises or consumers, or hosting network functions for a highly distributed vRAN. The telecom industry acknowledges the potential presented by the ambitious EU targets to deploy 10.000 climate-neutral and highly secure edge nodes, by 2030.

However, there are currently still few active cases of edge nodes or use of edge technology. This is due to the limited number of cases in which the industry currently necessitates, or is willing to pay for, edge technology. In fact, existing hyperscaler cloud solutions can adequately support these use cases without the need to rearchitect applications to operate at the edge. Additionally, achieving truly low latency and high Quality of Service (QoS) outcomes requires additional configuration on the access network. As a result, the limited presence of compelling use cases for edge technology restricts the development of a viable business case, which in turn leads operators to allocate resources to other areas instead. This underscores the importance of identifying and promoting use cases that can demonstrate the tangible benefits of edge computing, thereby encouraging greater adoption and investment in this technology, including through sensible policy and regulatory actions.

Network cloudification regulatory considerations

Cloud and edge represent distinct concepts from network cloudification. The latter involves leveraging cloud technology to enhance networks, a practice increasingly common as telcom operators transition towards cloud-native network architecture. As the connectivity value chain is going through a transformation and hyperscalers are increasingly tapping into such value chain, we agree that there should be a proactive evaluation at the potentially positive impact of developments in cloud edge cloud and of traffic delivery through proprietary national networks on the traditional telecom and adjacent markets.

ETNO-GSMA would like to expand on specific regulatory considerations raised in the draft Report that are particularly important to ensure that Europe can invest and scale up capacities in edge cloud computing and cloud-based infrastructure, establishing a degree of strategic autonomy that has not existed in traditional, centralised cloud markets, which are still largely dominated by non-European hyperscalers.

Scope of sectoral regulation

Virtualisation and cloudification are transforming the telecom value chain. BEREC rightly asserts that regulation should remain agnostic on the underlying technology used, allowing providers the freedom to choose the technology they consider most suitable. Policymakers should explore which technology-neutral and horizontal rules should be used to ensure consumers and business customers are provided with equal benefits and protection regardless of who is providing the underlying connectivity services. This implies that they must carefully define the scope of regulation to ensure that it remains neutral and does not unduly favor or disadvantage any particular technology or provider.

In addition to new potential legislative instruments, it is also crucial to ensure the proper implementation of already approved regulations covering edge and cloud services, such as the Data Act (DA) and the Digital Markets Act (DMA), making them applicable to specific cases.

Competition implications on the ECN/S markets

There exist dependencies and close relations between ECN/S and cloud providers, as the latter offer inputs crucial for network evolution. Cloudification emerges as the sole avenue for operators to efficiently manage the growing demands – such as increased data traffic and low latency – that their fixed and mobile networks encounter, enabling them to continue to compete effectively.

Therefore, a lack of competition in the cloud markets can indirectly impact ECN/S markets. In general terms, the unbalanced bargaining power in favor of cloud providers allows them to impose unfair conditions in agreements with ECNs. Consequently, the competition in ECN markets could be distorted.

Competition implications on cloud markets

The dependency on very few cloud giants that dominate the global cloud market raises concerns about vendor lock-in, bargaining power, privacy, and transparency. We encourage policymakers to stimulate interoperability, once again adopting an agnostic approach. Interoperability among all types of providers, regardless of the technology used, will foster competition and innovation while preventing vendor lock-in.

Although ECN and cloud services are mutually dependent, the disparity in size, footprint, market capitalization and negotiating power between hyperscalers and European telecom operators is evident. No European operator can negotiate on equal footing with giants like Amazon, Google, or Microsoft. While new European regulations such as the DA or the DMA aim to curtail their significant market power, a crucial aspect to clarify is how these general rules will be applied in specific cases by regulators, especially when behaviors could have a substantial impact on other markets or the economy as a whole.

Operators, regardless of their size, struggle to secure advantageous conditions from big cloud providers in contracts to fulfill their commitments for virtualized telecommunications networks. As a consequence, operators cannot guarantee the future functionality of their networks or the successful launch of anticipated new services, such as self-driving cars, remote surgery, or any other use case reliant on 5G capabilities.

Under current circumstances, the power wielded by hyperscalers in the cloud and adjacent markets could determine the success or failure of telecommunications operators. This vertical concentration has the potential to significantly impact competition in connectivity markets.

The DA provisions regarding switching and interoperability of data processing services have the potential to facilitate a more open and competitive cloud market in Europe. This is also the case for telco cloud, provided they do not fall under the exception for customized cloud services. Notice and transition periods that allow for more flexible, complex and customised arrangements will benefit all contracting parties. We encourage policymakers to have an open dialogue with the industry, for example through existing expert groups, when developing guidelines on interoperability requirements and provisions: they should strike a balance between regulation and confidence in the ability of markets to function adequately.

Competition implications of partnerships between ECN/S and cloud providers

An increasingly larger segment of the business market and the new demand arising from digitization require more specialized services. In the past, business services primarily consisted of voice and basic connectivity, but in recent years, they have evolved to include high-speed connectivity combined with a variety of IT services. These IT services encompass cloud storage, collaborative solutions such as Microsoft Teams or WebEx, security services, hosting, Infrastructure as a Service (IaaS), Software as a Service (SaaS), and more.

The significance of IP products in the provision of business services has grown considerably, with integrators increasingly relying on IP services and WAN as inputs. Over the Top (OTT) and IP services are reshaping market boundaries, expanding them, and altering competitive constraints on traditional high-quality dedicated connectivity services. Furthermore, many high-quality business services no longer need specialized network infrastructure or bespoke hardware-based solutions. Instead, they are increasingly being built on software solutions that can use plain broadband IP networks to deliver high-quality virtual private network services tailored for business users. These software-based solutions, built on broadband IP products, are replacing traditional offerings, with OTT-based solutions gaining significant traction and playing a major role in service provision.

APIs openness and API exposure

Currently, the industry is working on the standardization of network APIs. Initiatives such as CAMARA or the GSMA Open Gateway aim to accelerate the development and adoption of global standards through collaboration. A key success factor in both initiatives is to provide harmonised interfaces to as many telcos as possible to foster global uptake by operators, hyperscalers and software developers. The mechanism through which these APIs are made available is also key. Open Gateway will allow telcos to offer API solutions in a common framework.

For network APIs and NaaS to unleash their full potential, it is important to stimulate demand. Customers could be encouraged to use network APIs (e.g. through funding programmes). Additionally, demand could be further stimulated if there were greater flexibility to develop optimized services.

Moreover, industry collaborations for development and implementation of related frameworks should be actively encouraged from a policy perspective.

Fostering investment in cloud-based networks

The evolution of telecom networks will require deploying new network technologies. Seven key technologies will drive telecom transformation: 5G standalone, FTTH and FTTx roll out, Open RAN, network virtualization and softwarisation, edge computing, quantum encryption and integration of low earth orbit satellite communications². Most of these technology trends are interdependent and require coordinated research, planning, deployment, and operations. For instance, 5G standalone, network virtualization, and edge computing are mutually reinforcing and they need to work together to materialize the NaaS vision.

The investment necessary to deliver on these developments is high; in particular infrastructure technology will represent the most significant investment area for European telecom operators until 2030. 5G standalone will require a new, cloud-native 5G core, which will unlock new services and user experiences through network slicing. Standalone deployment is still relatively low. Edge computing will likely require smaller investment requirements, in comparison –depending to a large extent on the specific rollout scenario. However, this still pales compared to the annual investments made into cloud capacities by the largest providers, which are estimated at around EUR 150 billion³.

An important consideration that BEREC should highlight is that investing in network transformation technologies is not a choice for telecom operators, but a necessity. Surge of network traffic and data driven use cases will drive the redesign of network operations: we expect Europe's mobile data consumption per user to continue growing at an annual rate of 25% by 2030; 20% for fixed traffic. This is due to a 'metaversification' across use cases, Virtual Reality and immersive technologies becoming increasingly common, a massive shift from SD video to HD, and an acceleration of AI-generated content.⁴

Lack of economies of scale and scope pose significant obstacles to European telcos, contrary to hyperscalers who leverage their global footprint and increasingly move into traditional telco value chains. Cooperation among operators and approaches centered on commons platform or federation models are vital to counterbalance these disadvantages in Europe.

On the other hand, the significant financial pressure that European operators face reduces their ability to address investment in new network technologies. Future investment decisions in cloud-based technologies will depend on the financial health of the industry and on its ability to monetize new services.

² [Future of Electronic Communications Networks in Europe](#), Deloitte, September 2023

³ [European Cloud Providers Continue to Grow but Still Lose Market Share](#), Synergy Research Group, 2022

⁴ [The Evolution of Data Growth in Europe](#), ADLittle, 2023

Fostering connectivity investment to enable edge computing

Telecom operators' investment in edge fits into the Commission's target to deploy at least 10,000 climate neutral highly secure edge nodes across the EU by 2030, but it is just an element of the much broader enterprise, which needs to involve an ecosystem of parties from different sectors. Furthermore, it is crucial to address the limited use cases that currently hamper the business viability of large scale-edge computing investment.

The common edge cloud federation pursued by IPCEI CIS is an important step to boost large scale investment in edge, strengthen a European edge cloud ecosystem, enhance EU leadership in the development of edge computing, and achieve progress against the EU 2030 edge nodes targets. However, it is not enough to make up for the massive gap between the European investment in cloud and that of hyperscales. Also, IPCEI funding is not sufficient to attain a truly scalable and federated investment in edge cloud across Europe, so that we can meet the Digital Decade target of 10,000 edge nodes. IPCEI CIS funding should be enhanced with additional EU resources; the approval of additional projects should be expedited; and implementation should be closely coordinated at EU level.

Interplay amongst the different EU legislations impacting cloud and ECN/S

Telecom operators are providers of critical infrastructure with specific needs, such as SLAs and network redundancy. It is crucial for cloud providers to respond to these needs. Without their cooperation, the deployment of many services considered essential for advancing European digital development is at risk.

Advanced connectivity relies on the configuration of NaaS functions and low latencies, necessitating significant efforts and advances in interoperability and orchestration for edge computing. Progress in this direction is crucial in the coming years. Similarly, when offering network services with NaaS, it is essential to maintain consistent competition rules across the entire value chain, end-to-end, rather than only in parts of it. Therefore, monitoring cloud infrastructures used by telecommunication operators for interoperability and portability is critical.

To ensure resilience against cyberattacks, it is imperative to have full redundancy and backup systems on alternative platforms, which is only achievable through interoperability.

In this complex and interconnected environment, there is an urgent need for a simplified and streamlined regulatory framework. Such a framework is essential to ensure coherence and consistency among the various legislative pieces already in place.

European digital sovereignty

The BEREC report primarily emphasizes the economic and technical aspects of cloudification, yet European sovereignty holds equal significance in this context. We encourage policymakers to collaborate closely with the industry to identify and prioritize specific key technologies among the seven mentioned in the report. By focusing efforts on selected technologies, policymakers can stimulate innovation and investment to propel Europe to a global leadership position in those areas. A

prime example is the Commission's recent recommendation on a coordinated implementation roadmap for the transition to post-quantum cryptography.

Sustainability

ETNO and GSMA members support the objective of climate-neutrality and the majority of them committed to reducing carbon emissions by setting net-zero targets for Scope 1 and 2, for some as early as 2025 and often well-ahead of the EU targets. In addition, when looking at Scope 1 and Scope 2, the overall energy consumption for Europe's main telecom operators has continued decreasing between 2018 and 2022. More in specific, the share of consumption from renewable sources increased from 71% to 96% of the total in 2022⁵.

Telecom operators are working closely with the data centre industry, whose contribution is essential if we are to achieve GHG reduction targets. When defining sustainability indicators and requirements for data centres, however, there is no one-size-fits-all solution. A marginalization of smaller data centres for the benefit of scale should be avoided to allow for innovation and distributed modes of data processing. Edge computing brings about efficiencies that might not be easily measured with traditional KPIs, as they were originally designed for centralised data processing (e.g. PUE).

⁵ [The State of Digital Communications](#), ETNO, 2024