# Public consultation on the draft BEREC Report on Cloud and Edge Computing Services

## Public consultation on the draft BEREC Report on Cloud and Edge Computing Services

### General information

During the 58th BEREC plenary meeting (7 March 2024), the Board of Regulators has approved for public consultation the draft BEREC Report on Cloud and Edge Computing Services.
Cloud computing underpins most of the developments taking place in the digital sector. Its importance is meant to growth even more in the coming years. Electronic Communication Network and Services are particularly impacted, both from the technical and market dynamics perspectives, and evolving thanks to cloudification. This draft report aims at shedding further light in the impact of these developments with a particular focus on the electronic communication sector, including the regulatory implications of the trends identified.

### Your details

* First Name and Surname

[redacted]

* Email

[redacted]@disruptive-analysis.com

* Company/organization (in case you are replying on behalf of your organization)

Disruptive Analysis

* Country of origin

UK

## Practical details of the public consultation

All interested parties are kindly requested to submit their contributions here **by 24 April 2024 COB**. We strongly encourage all stakeholders to submit their contributions as early as possible. After submitting the contribution, an acknowledgment email will be sent to you.
Contributions should preferably be sent in English.
In accordance with the BEREC policy on public consultations, BEREC will publish all contributions and a summary of the contributions, respecting confidentiality requests. Any such requests should clearly indicate which information is considered confidential and be accompanied by a non-confidential version.
Any comments, suggestions, clarifications or further information related to the subject matter are welcomed. Nonetheless, without limiting the scope of the public consultation contributions, BEREC is particularly interested in the stakeholders' views and collaboration regarding a number of specific questions.
Therefore, the public consultation is structured in two parts.

**In the first part BEREC invites the stakeholder to comment and provide their views on the different parts of the draft report as follows:**

Executive Summary
Chapter 1. Introduction: Recent evolution of cloud and electronic communications services and scope and objectives of the Report
Chapter 2. Cloud and edge services: definitions and taxonomies
Chapter 3. Cloud and edge services in the EU: Challenges and EU Policies and regulations.
Chapter 4. Cloud Market characteristics
Chapter 5.1 Interoperability and standards
Chapter 5.2 Switching
Chapter 6 Cloud and electronic communications interplay: general comments
Chapter 6.1 Cloud and electronic communications interplay: Connectivity to cloud and edge
Chapter 6.2 Cloud and electronic communications interplay: migration to the cloud
Chapter 6.3 Cloud and electronic communications interplay: Provision of cloud-based network services
Chapter 6.4 Cloud and electronic communications interplay: Bundled and integrated ECS and IT services with cloud
Chapter 7.1 Network cloudification in the EU Regulatory framework
Chapter 7.2 Potential Regulatory Implications: general comments
Chapter 7.2. Potential Regulatory Implications: i. Scope of sectoral regulation
Chapter 7.2. Potential Regulatory Implications: ii. Competition implications on the ECN/S markets
Chapter 7.2. Potential Regulatory Implications: iii. Chapter 7.2. Potential Regulatory Implications: ii. Competition implications on cloud markets
Chapter 7.2. Potential Regulatory Implications: iv. Competition implications of partnerships between ECN/S and cloud providers
Chapter 7.2. Potential Regulatory Implications: v. Other competition issues related to ecosystem effects.
Chapter 7.2. Potential Regulatory Implications: vi. APIs openness and API exposure
Chapter 7.2. Potential Regulatory Implications: vii. Fostering investment in cloud-based networks

Chapter 7.2. Potential Regulatory Implications: viii. Fostering connectivity investment to enable edge computing.
Chapter 7.2. Potential Regulatory Implications: ix. Interplay amongst the different EU legislations impacting cloud and ECN/S
Chapter 7.2. Potential Regulatory Implications: x. Digital regulatory enforcement
Chapter 7.2. Potential Regulatory Implications: xi. European digital sovereignty
Chapter 7.2. Potential Regulatory Implications: xii. Sustainability
Chapter 7.2. Potential Regulatory Implications: xiii. Digital divide
Chapter 8 Future Trends

**In the second part, BEREC seeks more concrete information regarding the following issues:**

- Chapter 2 develops on electronic communication networks migration to the cloud. One of the preliminary considerations pointed out in this section regards to the scalability constraints that face ECN that might hinder taking fully advantage of network cloudification benefits. It is also argued that mobile networks may face less limitations than fixed networks. Do you agree with these preliminary findings? Please, explain your answer. Are there other scalability constraints to be considered?
- Is there a risk that investments in cloud-based networks crowd out private investments in network coverage and network capillarity? Are investments in network innovation and network coverage substitutes or complements?
- What are your expectations on the evolution of competition in the electronic communication markets given network cloudification? Can market failures in the cloud market affect competition and investment in the provision of electronic communication networks and services? To which extent?
- Are all operators and service providers equally equipped to take advantage of network ‘cloudification? What would be needed to ensure that the transition to cloud networks does not create an uneven playing field in electronic communication markets?
- Chapter 7 develops on regulatory considerations related to the different trends described along the report (e.g. the characteristics of the cloud markets, cloud and ECN/S convergence, synergies and dependencies among players and technologies, etc.). Do you agree that those are potential relevant regulatory matters in the coming years? Is there any other potential risk (or opportunities) that regulators should consider?
- What is your opinion on the different hypothetical situations mentioned in Chapter 2.2, point vi. “APIs openness and APIs exposure” in which potential issues related to API exposure may arise? Are these hypothetical situations relevant and if so, in what timeframe?
- Technical developments allow for increased connectivity specialization tailored to specific services. From a forward-looking perspective, is there a risk that network capabilities enabled by cloudification, in the context of the observed digital market trends (ecosystems, concentration, network effects, potential for leveraging market power into adjacent markets, etc), could lead to a reconfiguration of the Internet towards separated, proprietary and non-interoperable, environments?

It is not necessary to react to all sections and questions proposed to submit the contributions.

A document can be also uploaded as a part of the contribution. **In order to facilitate processing of the responses and the introduction of possible changes in the report, the comments provided should clearly refer to certain sections/subsections/paragraphs of the document.**

# Public consultation - Part I Comments on the Report

Executive summary: General comments on the report

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Report content is quite mixed. Some areas appear to be confused or factually incorrect, eg the list of major BSS vendors has many important omissions. There is a large amount of basic background about networks which has limited relevance - and is mostly oriented to mobile networks rather than fixed / fibre environment. It should be noted that "telco cloud" is largely a mobile-only term, and that disaggregation and virtualisation in fixed networks is taking a very different path.

The report does not consider suggesting that the Digital Decade targets themselves are poorly thought-out, unconnected to the way the real-world evolution of telecoms and cloud, and should be reconsidered, especially around edge computing. In particular, the target of 10000 edge-nodes is arbitrary and appears to have no connection to the real world of developer needs. See this article for more information: https://www.linkedin.com/posts/deanbubley_edgecomputing-edgewash-mwc24-activity-7174373286850494464-1KOR?utm_source=share&utm_medium=member_desktop

The report confuses APIs and standardised interfaces between network elements, eg in OpenRAN. Not all interfaces are APIs.

It also overemphasises the role of standardisation and interoperability - standard APIs are only useful if developers actually want them, and they fulfill the roles and expectations and support required. Many developers are comfortable with proprietary APIs (notably on devices, or for cloud platforms). There are also strong path-dependency effects in play here.

There is very limited discussion of the role of cloud in enabling new forms of network infrastructure-sharing or virtualised providers, such as the role of neutral hosts. There are multiple possible architectures, including those where one provider owns a "whitebox" server, hosting multiple MNOs as tenants with virtualised vCUs and vDUs for OpenRAN. This can apply for both wide-area RANs or indoor systems.

There is no link to the relevance of cloud-based solutions for enabling more flexible & innovative MVNOs. In particular, the use of cloud-based mobile core networks and BSS/charging solutions is enabling a variety of new competitors in the telecoms marketplace, which may not own their own RANs or spectrum. There is a similarly important role of cloud-based solutions for fibre open-access providers which is not explored.

There is no proper mention of the role of cloud/edge based solutions for indoor and on-site networks, which are critical for the economic benefits of 5G and other advanced wireless solutions such as Wi-Fi and broader network-as-a-service plaftorms. Indeed, word "indoor" does not appear at all, which is a significant omission

Lastly, there is no mention of collection of proper data and metrics on virtualised networks, or the use of cloud-based approaches such as crowdsourcing to help regulators obtain better and more detailed KPIs. We should consider whether it would be more possible to collect new data types (eg location of data traffic use, indoor vs outdoor or urban vs. rural) which less effort by telcos

Chapter 1. Introduction: Recent evolution of cloud and electronic communications services and scope and objectives of the Report

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Chapter 2. Cloud and edge services: definitions and taxonomies

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Chapter 4. Cloud Market characteristics

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Chapter 5.1 Interoperability and standards

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Chapter 5.2 Switching

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Chapter 6 Cloud and electronic communications interplay: general comments

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Chapter 6.1 Cloud and electronic communications interplay: Connectivity to cloud and edge

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Chapter 6.2 Cloud and electronic communications interplay: migration to the cloud

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The characterisation of private networks being closely linked to edge computing & especially MEC is hugely overstated. Most private 4G/5G networks (eg for ports or factories) are dedicated networks, not involving either MNOs or hyperscalers. There is an absence of mention of the role of vendors, systems integrators, OT (operational tech) suppliers etc.

Chapter 6.3 Cloud and electronic communications interplay: Provision of cloud-based network services

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Chapter 6.4 Cloud and electronic communications interplay: Bundled and integrated ECS and IT services with cloud

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Chapter 7.1 Network cloudification in the EU Regulatory framework

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Chapter 7.2 Potential Regulatory Implications: general comments

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Chapter 7.2. Potential Regulatory Implications: i. Scope of sectoral regulation

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Chapter 7.2. Potential Regulatory Implications: ii. Competition implications on the ECN/S markets

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Chapter 7.2. Potential Regulatory Implications: v. Other competition issues related to ecosystem effects

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Chapter 7.2. Potential Regulatory Implications: vi. APIs openness and API exposure

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This section is rather muddled. CPaaS has limited relevance to network APIs or overlap with it, despite Ericsson's acquisition of Vonage. The developer communities & use-cases for CPaaS (mostly voice, messaging & video comms) are completely different to the needs and realities of network APIs and NaaS. It is also important to recognise that APIs such as CAMARA do not typically cover all relevant networks (eg legacy 4G networks, WiFi networks used for 80%+ of traffic, satellite etc). There will need to be extra aggregation / simplification roles to connect applications to a wide range of both public and private networks - 5G will likely have only a secondary role, at least at first. This is particularly relevant to for applications / devices used indoors or on enterprise sites, especially industrial locations.

Chapter 7.2. Potential Regulatory Implications: vii. Fostering investment in cloud-based networks

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Chapter 7.2. Potential Regulatory Implications: viii. Fostering connectivity investment to enable edge computing

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Chapter 7.2. Potential Regulatory Implications: ix. Interplay amongst the different EU legislations impacting cloud and ECN/S

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Chapter 7.2. Potential Regulatory Implications: x. Digital regulatory enforcement

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Chapter 7.2. Potential Regulatory Implications: xi. European digital sovereignty

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Chapter 7.2. Potential Regulatory Implications: xii. Sustainability

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Chapter 7.2. Potential Regulatory Implications: xiii. Digital divide

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Chapter 8 Future Trends

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## Public consultation - Part 2 Specific Questions

Chapter 6.2 develops on electronic communication networks migration to the cloud. One of the preliminary considerations pointed out in this section regards to the scalability constraints that face ECN that might hinder taking fully advantage of network cloudification benefits. It is also argued that mobile networks may face less limitations than fixed networks. Do you agree with these preliminary findings? Please, explain your answer. Are there other scalability constraints to be considered?

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Is there a risk that investments in cloud-based networks crowd out private investments in network coverage and network capillarity? Are investments in network innovation and network coverage substitutes or complements?

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What are your expectations on the evolution of competition in the electronic communication markets given network cloudification? Can market failures in the cloud market affect competition and investment in the provision of electronic communication networks and services? To which extent?

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Are all operators and service providers equally equipped to take advantage of network ‘cloudification? What would be needed to ensure that the transition to cloud networks does not create an uneven playing field in electronic communication markets?

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Chapter 7 develops on regulatory considerations related to the different trends described along the report (e.g. the characteristics of the cloud markets, cloud and ECN/S convergence, synergies and dependencies among players and technologies, etc.). Do you agree that those are potential relevant regulatory matters in the coming years? Is there any other potential risk (or opportunities) that regulators should consider?

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What is your opinion on the different hypothetical situations mentioned in Chapter 2.2, point vi. “APIs openness and APIs exposure” in which potential issues related to API exposure may arise? Are these hypothetical situations relevant and if so, in what timeframe?

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Technical developments allow for increased connectivity specialization tailored to specific services. From a forward-looking perspective, is there a risk that network capabilities enabled by cloudification, in the context of the observed digital market trends (ecosystems, concentration, network effects, potential for leveraging market power into adjacent markets, etc), could lead to a reconfiguration of the Internet towards separated, proprietary and non-interoperable, environments?

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Please upload your file(s) (max file size is 1MB)

Please specify which part of your response should be treated as confidential, if any:

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THANK YOU FOR YOUR CONTRIBUTION

## Contact

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