

BEREC Report on the outcome of the public consultation on the draft BEREC Report on Virtual Worlds and Web 4

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Executive Summary

At its 66th Plenary Meeting held on 12 March 2026, BEREC approved the draft BEREC Report on Virtual World and Web 4 for public consultation. The consultation aimed to gather feedback from stakeholders, in order to improve BEREC's work and increase transparency.

In line with BEREC's public consultation policy, this report summarises how stakeholders' input has been taken into account. It is published alongside the final version of the Report, which incorporates feedback received during the consultation period. Individual contributions are published on BEREC's website, subject to confidentiality requests. The consultation was open from 17 March to 20 April 2026.

The responses were submitted by different stakeholder groups, including two electronic communications providers, requesting confidentiality of their responses, and two individual responses by EU citizens. This document summarises the responses received and outlines BEREC's position on the suggestions and proposals submitted.

Overall, responses were supportive of the draft Report on Virtual Worlds and Web 4 (VW/Web4). At the same time, electronic communications respondents provided targeted suggestions for clarification and further development, particularly in relation to the evolving market structure, investment incentives and regulatory certainty, while contributions from EU citizens placed relatively greater emphasis on user-related aspects, including accessibility, inclusion and potential societal impacts.

Key issues raised by stakeholders included:

- The need to ensure (mandatory) interoperability and openness across the ecosystem;
- Investment incentives and business models for advanced connectivity;
- Demand and investment in digital infrastructures;
- Net neutrality;
- Spectrum;
- Transition to IPv6 as part of ECN developments required for VW/Web4;
- The protection of postmortem data and digital identity.

BEREC thanks all contributors for their valuable input.

1. Market structure

The two ECN/S providers agreed with BEREC's assessment that the market structures and business models for VW/Web4 are currently uncertain and highly complex.

One ECN/S provider stressed the need for telecommunications operators to evolve from simple connectivity providers to orchestrators of 3C resources. The operator also highlighted that the market positioning of hyperscalers and content and access providers (CAPs), which operate as ecosystems, as described in the Report, may "*implement self-preference practices*" due to their simultaneous control of strategic assets – such as data centres, edge nodes and large user basis - and of operating systems, content platforms, hardware (e.g. VR/AR headsets).

Both the ECN/S called for regulatory measures to prevent cloud giants from dominating the edge computing layer through their pre-existing market strength. In particular, they called for:

- mandatory full interoperability standards to avoid user lock-in and non-discriminatory access to the underlying infrastructure; and
- decoupling cloud/edge providers from the services they host.

BEREC's response

BEREC acknowledges the stakeholder's view regarding the evolving role of telecommunications operators and the increasing integration of communication, computing and caching resources in future network architectures, as reflected in the Report's discussion on integrated "3C" networks. BEREC recognizes that the development of open and harmonized standards is essential not only to prevent user lock-in but also to create the economies of scale needed to reduce costs and support widespread demand across the EU. BEREC also recognises the concerns raised regarding the potential for large platforms and hyperscalers to leverage their existing assets and ecosystem positioning to strengthen their role across multiple layers of the value chain, including cloud and edge computing. As outlined in the Report, such developments may give rise to risks related to market concentration, vertical integration and exclusionary practices.

BEREC will continue to contribute its expertise on connectivity and market developments, particularly regarding the interplay between network infrastructure, cloud and edge computing, and digital platforms, as well as their possible impact on digital networks. Given that these issues need to be assessed within the broader existing regulatory framework to ensure the consistent implementation of the Digital Rulebook, BEREC will contribute within the scope of its current and future mandate.

2. Demand and investment in digital infrastructures

One ECN/S provider highlighted the evolving role of telecom operators beyond connectivity provision and the insufficient progress towards the Digital Decade objective for edge nodes

deployment. It underlined the importance of a clear business case for operators for edge computing and, in general, for the infrastructure required for Web4, calling for regulatory frameworks that:

- Promote technological neutrality: encouraging the deployment of diverse edge architectures;
- Incentivize local infrastructure: providing specific regulatory incentives for operators who invest in local physical edge nodes, which are essential for reducing physical latency and ensuring data residency; and
- Address the investment gap: acknowledging that the shift to Web4 requires a shared responsibility. The "Fair Contribution" debate should be viewed through the lens of ensuring that those who generate the most traffic and benefit most from the network also contribute to the sustainability of the infrastructure that enables their services.

Along the same lines, another ECN/S provider indicated the need to promote regulatory support for investing in advanced networks (i.e. 5G SA, 6G, FTTH/FTTR or edge computing).

As building the necessary infrastructure is capital-intensive, this provider highlighted two major economic barriers:

- Demand uncertainty: there is currently no guarantee regarding user demand or the willingness of platforms to pay for the "premium connectivity" required to support these environments. To address this issue, EU funding is suggested.
- Promotion of sustainable remuneration models for the provision of network advanced features (e.g. slicing, QoS or specialized services): this provider argued that the current trend towards an increasingly high-performing single Internet Access Service (IAS) is not sustainable and proposed rethinking net neutrality rules (see also next chapter in relation to net neutrality).

BEREC's response

BEREC acknowledges the stakeholder views regarding the evolving role of electronic communications providers as orchestrators of integrated 3C resources and the significant capital investment required to meet the Digital Decade objectives, particularly for edge node deployment. The Body recognizes that regulatory predictability, anchored in the EECC, is a key enabler for long-term investment in advanced networks like 5G SA and FTTH, especially while demand trajectories remain uncertain.

BEREC supports a technology-neutral approach that encourages the deployment of diverse edge architectures – ensuring that it does not inadvertently favour specific technical implementations over others, thereby fostering a competitive and innovative multi-vendor environment – and takes note of the suggestions regarding targeted incentives for local infrastructure to ensure low latency and data residency. Furthermore, the potential role of

EU funding and public policy instruments, where the market does not deliver a socially desirable outcome, is recognized as a complementary tool to mitigate economic barriers and support innovative pilots where market-led investment faces significant risks.

Regarding the call for sustainable remuneration models, BEREC underscores that the existing Open Internet Regulation (OIR) already provides a flexible, technology-neutral framework that allows for the provision of specialized services and advanced network features, such as network slicing, provided they do not undermine the general quality of the IAS.

BEREC remains committed to monitoring market developments and ensuring that any evolution of the regulatory framework continues to promote effective competition, innovation, and the protection of end-user rights within a multi-stakeholder environment.

3. Net neutrality

As mentioned in the previous chapter, one respondent developed on the need to rethink net neutrality rules to enable the promotion of sustainable remuneration models for the provision of network advanced features.

The other contributor supported the consideration made in the draft report that certain VW/Web4 services could fall under specialized services. In this context, suggestions are made to increase legal certainty in relation to the treatment of these services. Key points include:

- Tiered Quality of Service (QoS): Operators should be allowed to commercialize different "quality tiers" and guaranteed Service Level Agreements (SLAs) for specialized services with critical requirements. These specialized tiers should coexist with standard IAS without degrading general internet quality or violating non-discrimination principles.
- Horizontal non-discrimination: While offering premium tiers, operators must treat all users of the *same* specialized service equally to maintain a competitive market.

BEREC's response

As outlined in the draft report, BEREC agrees that open internet is a relevant element in relation to advanced connectivity and innovative digital services.

The Body reiterates that the OIR is a technology-neutral instrument capable of accommodating services with critical requirements for jitter, latency, and packet loss. BEREC is currently working on "Further Guidance on 5G Network Slicing" analysing how 5G slicing complies with the provision for internet access services and specialized services

under the Open Internet Regulation¹. We refer to this specific work for more detailed views on this matter.

4. Spectrum

The two ECN/S respondents developed on spectrum availability for operators to support VW/Web 4 requirements. One of them argued that spectrum management should remain centralized with telecom operators rather than being assigned to specific industries (verticals) whose need would be more efficiently met by means of network slicing and Network-as-a-service (NaaS) solutions. The contributor further argued that the operators centralized management ensures better technological evolution, service continuity, and lower lifecycle costs ultimately ensuring higher levels of reliability and continuity.

BEREC's response

On the feedback provided on the relationship between specialised services and dedicated spectrum allocation, BEREC takes note of the stakeholder's view regarding the potential of advanced network capabilities, such as network slicing and application-level access to quality parameters, to support the delivery of services with specific performance requirements. BEREC acknowledges that, in certain cases, such developments may reduce the need for dedicated spectrum by enabling electronic communications networks to provide differentiated quality of service tailored to the requirements of specialised services or tariffs with different application-agnostic QoS levels (BoR (22) 81, paras 34c/d, 35).² However, at the same time, BEREC considers that dedicated spectrum continues to play an important role for use cases requiring a high degree of control over network resources, guaranteed performance under all conditions, or specific deployment configurations (e.g. local or private networks).

To sum up, BEREC takes note of the arguments favouring centralized management by electronic communications providers to ensure service continuity and technological evolution. While acknowledging the emergence of local 5G licensing frameworks for specific industrial use cases, BEREC considers that advanced network capabilities, such as network slicing and Network-as-a-Service (NaaS) solutions, may offer efficient alternatives for meeting the needs of industry verticals. The Body supports a balanced spectrum policy that ensures the timely availability of harmonized bands while allowing for the coexistence of public and private network configurations tailored to specific use cases.

¹ See BoR 26 84 "Further Guidance on 5G Network Slicing- an Annex to the Berec Guidelines on the Implementation of the Open Internet Regulation", submitted to public consultation up to 6 August 2026 in https://www.berec.europa.eu/en/public-consultations-calls-for-inputs/public-consultation-on-the-draft-berec-further-guidance-on-5g-network-slicing?language_content_entity=en (update 20/08/26)

² See BoR 22 81, "Berec Guidelines on the implementation of the Open Internet Regulation" <https://www.berec.europa.eu/en/document-categories/berec/regulatory-best-practices/guidelines/berec-guidelines-on-the-implementation-of-the-open-internet-regulation-0>

5. Transition to IPv6

One EU-27 citizen suggested standard IPv6 to be considered in the draft Report as part of ECN developments required for VW/Web4 as IPv6 reduces latency and is required for solving the address shortages.

BEREC's response

BEREC agrees that a (full) transition to IPv6 entails desirable efficiencies for the functioning of the digital services and that IPv6 is a critical enabler for the Virtual World ecosystem, particularly in supporting the massive device density and low-latency requirements inherent in Web4 environments, while also addressing IPv4 address exhaustion. Along these lines, a mention to the contribution of IPv6 has been included in the report.

6. Postmortem data and digital identity protection

An EU 27 Citizen argues that the rise of VW/Web4 has created a significant regulatory gap regarding "post-mortem data" - the digital remains and persistent identities of deceased individuals.

- The regulatory gap: Current frameworks, specifically the **GDPR**, exclude deceased persons from their scope (Recital 27). However, the author contends this is now inadequate because AI and data profiling can now create **persistent digital identities** that outlive biological death.
- Emerging risks: The extension of digital life beyond death introduces several critical challenges: i) User protection & dignity³; ii) Sustainability⁴; and iii) Enforcement⁵.
- The need for harmonization.

The contributor adds that the borderless nature of virtual environments complicates legal accountability. To protect user rights and ensure social inclusion (as referenced in the BEREC report), the EU needs harmonized, high-level principles to manage post-mortem data and ensure legal certainty across Member States.

BEREC's response

BEREC recognises that in environments such as VW/Web4, the issue of end user protection becomes more complex when avatars, biometric profiles, voice clones, or AI replicas persist after death. Within its mandate, BEREC stays committed to raise attention to such a topic.

³ Risks of biometric misuse, harassment, and the unethical AI-driven reconstruction of individuals.

⁴ The massive computational power required to maintain these immersive, "immortal" digital simulations raises significant environmental concerns.

⁵ In decentralized or interoperable systems, protecting these identities becomes increasingly difficult.

ANNEX I. Acronyms

Technical & Network Acronyms

- **3C:** Communication, Computing, and Caching
- **5G SA:** 5G Standalone
- **6G:** Sixth Generation Wireless
- **AR:** Augmented Reality
- **ECN/S:** Electronic Communications Networks and Services
- **FTTH:** Fiber to the Home
- **FTTR:** Fiber to the Room
- **IAS:** Internet Access Service
- **IPv6:** Internet Protocol version 6
- **NaaS:** Network-as-a-Service
- **OTT:** Over-the-Top
- **QoS:** Quality of Service
- **SLA:** Service Level Agreement
- **VHCN:** Very High-Capacity Networks
- **VR:** Virtual Reality
- **VW:** Virtual Worlds

Regulatory & Organizational Acronyms

- **BEREC:** Body of European Regulators for Electronic Communications
- **CAPs:** Content and Application Providers
- **EECC:** European Electronic Communications Code
- **EU:** European Union
- **GDPR:** General Data Protection Regulation
- **OIR:** Open Internet Regulation