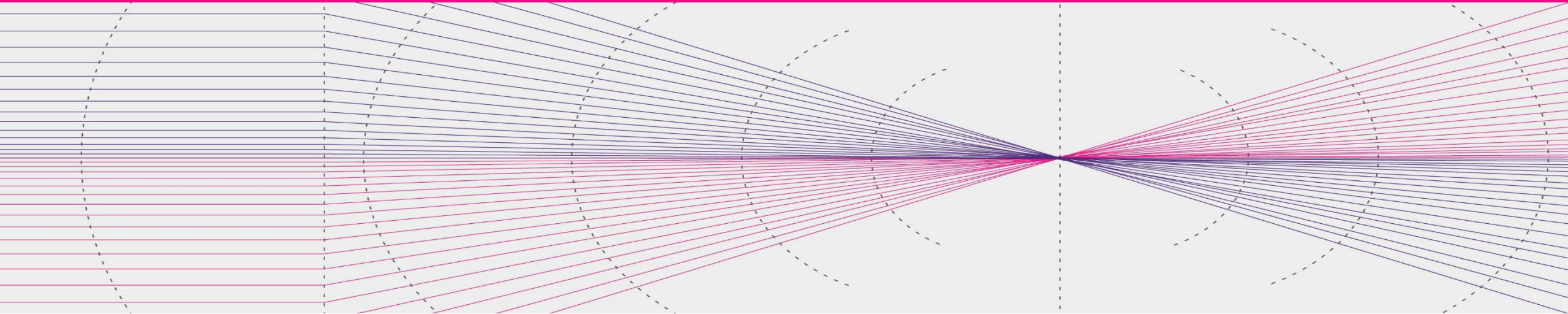# Cloudification, virtualization and softwarization of telecommunications

A project for BEREC

BEREC WORKSHOP ON DIGITAL NETWORKS DEVELOPMENTS : PLAYERS AND STRATEGIES, March 2024

Presentation by Aude Schoentgen (Plum) and Rudolf Van Der Berg (Stratix)

Project overview

- **Objective of the study.** In the provisioning of ECN/S stemming from cloudification, virtualization and softwarization in the ECS value chain:

  - Describe the current technical evolution and market trends, including competitive dynamics along the value chain,

  - Examine new business models and competitive impact,

  - Identify possible regulatory and policy challenges arising therefrom. In this context, cybersecurity and sustainability issues have been taken into consideration as well.

Main findings – technology evolution

- Cloudification, virtualization and softwarization are established concepts in electronic communications

- Deployment takes many forms and is continuously evolving in each layer of the ECN/S value chain. These deployments are not generic, there are differences between operators and networks

- Open interfaces and APIs are important in these ecosystems

- Open RAN development is pushing these concepts deeper into the access layer

- Operators, vendors and regulators regard network and data security as key in technology evolution and they will not compromise this. Policy makers are active in minimising and mitigating risk (e.g., EU toolbox of 5G cybersecurity mitigating measures)

- Environmental sustainability is a challenge for the industry. Stakeholders are confident that technology can deliver good environmental outcomes. Concrete and proven cases are not yet available

Use case studies

- Our research and analysis included 3 case studies:

  - **5G private networks:** There are opportunities for organisations to deploy high performance private networks. Adoption is currently slow with organisations taking a cautious approach which may accelerate as pilots are completed, solutions become more readily available and use cases crystalise

  - **Mission critical mobile public voice:** New service delivery models are possible which can benefit from flexibility and cost efficiencies. There are still questions to be addressed on integration and security

  - **Cloudification and MVNOs:** There is potential to reduce costs, differentiate services and lower market entry barriers

Main findings - market dynamics

- CSPs have embarked on a digital transformation driven by technical evolution

- CSPs are adopting a cautious "wait and see" approach in some cases

- CSPs are exploring new business models but face uncertainty

- Hyperscalers have an increasing and multifaceted role

- The vendor landscape has become more diversified

- Open systems and APIs are important to integration and diversified business models

Main findings – impacts on regulation

- Broad impact of cloudification, virtualization and softwarization on CSPs : ECN/S value chain, but also related markets

- Regulation evolving to safeguard consumers and competition in digital markets

- Dynamic trends identified - Continued analysis by regulators is appropriate

- Collaboration between regulators with jurisdiction in overlapping markets - To study, monitor and, if necessary, intervene to address risks in digital markets affected by cloudification, virtualization and softwarization, including in :

    - Upstream vendor markets

    - Competition in cloud markets and adjacent markets, including the influence of hyperscalers

    - The impact of global scale on smaller markets and operators

    - Risks to capital investment arising from uncertainty in the technology landscape (e.g. the need for rapid standardisation)

    - Risks of digital exclusion

    - Network and data security

    - The environmental impact of technology evolution

Q&A

Annex 1: stakeholders interviewed for the study

- AWS
- Cisco
- Colt
- Deutsche Telekom
- Ericsson
- European Advanced Network Testing Centre (EANTC)
- European Union Agency for Cybersecurity (ENISA)
- French Competition Authority (Autorité de la Concurrence)
- Google Cloud
- Juniper
- Mavenir

- Microsoft
- Nokia
- Open Fiber
- Orange
- Qualcomm
- Rakuten
- Telecom Italia
- Turkcell
- Vodafone
- 1&1