

A photograph of a young man with light brown hair and a slight beard, smiling and looking down at a black smartphone he is holding in his right hand. He is wearing a light blue denim jacket over a white and yellow horizontally striped t-shirt. The background is a blurred city street scene with buildings and trees.

A crucial step toward 6G infrastructure for immersive, interoperable, and human-centered communication

Extended Reality (XR) services face limitations from today's networks. To address this, a research consortium that includes Capgemini launched the 6G-XR project to orchestrate network resources and harness 6G enablers

Laying the foundation for adoption of 6G

Applications such as XR telepresence (being virtually present in another location) and holographic communications require significant resources: high bandwidth, low latency, and fast processing. Despite recent advances, challenges such as network congestion when users send large volumes of data or a lack of compatibility across platforms still limit the technology.

This calls for smarter networks that automatically adapt to the requirements of each application. This need gave birth to the 6G-XR project: a European initiative that has laid the foundations for the computing and connectivity continuum that will define 6G.

Client: European research consortium

Region: Europe

Industry: Telecommunications

Client challenge:

Holographic communications require extremely demanding network specifications, especially in terms of data rates and ultra-low latency, beyond what 5G can deliver.

Solution:

Advanced AI-driven predictive edge computing solutions, evolving from 5G toward 6G, that automate service deployment allocation to the optimal edge node based on the end user's location.

Benefits:

- Improved quality for extended reality applications and holographic communications
- Democratized access to advanced network capabilities through open APIs
- Acceleration of 6G technology through advanced Edge and network AI techniques



Funded by the Smart Networks and Services Joint Undertaking (SNS JU) under the Horizon Europe research and innovation program, the 6G-XR project has developed a multi-site European testbed platform that supports real-time holographic communication, distributed XR collaboration, dynamic edge resource allocation, and network energy optimization.

Key milestones include:

- A unified and modular test architecture federating infrastructures in Finland and Spain.
- A web-based controller that enables end-to-end experiments from a single interface.
- Two complete holographic communication channels, including augmented reality calls.

6G will not arrive as a single leap but as the convergence of networks, computing, intelligence, and data governance into an interoperable continuum. The demonstrations developed for the 6G-XR project have shown that this foundation is already real: immersive communication, real-time network intelligence, and coordinated cloud-edge computing are reaching maturity for deployment.

Throughout this project, the consortium has engaged Capgemini, giving us the chance to contribute to the development of features that will play a key role in making 6G a reality.

Improving holographic communication in congested networks

Holographic video calls generate massive amounts of data that saturate the network, especially on the uplink, causing interruptions and poor quality.

To address this, project partners created a network congestion function that activates a system to automatically adjust data traffic priorities. As part of this effort, we developed a complimentary predictive algorithm to anticipate such issues.

As a result, XR experiences always remain smooth because an intelligent, real-time adaptive network

delivers immersive experiences even under challenging conditions.

Automatic selection of the best nearby server

Successful XR experiences require low latency because the experience degrades if processing occurs on a distant server.

Capgemini worked with other members of the consortium to create a demonstrator that automatically selects the closest and most optimal server based on user location and network status. This enables even low-powered devices to participate in demanding XR experiences without compromising quality.

This development demonstrates that distributing processing across nearby servers (cloud-edge) is key for 6G. Intelligent function migration keeps latency low, even in complex networks.

Preparing for further innovation

In partnership with various members of the research consortium, Capgemini has led the development of components that enable multi-access edge computing. In one such case, we deployed our Intelligence Edge Application Platform (IEAP), which orchestrates applications on nearby servers and exposes network functions through open APIs, at the Madrid node. This made it easier for external developers to work.

In addition, Capgemini played a key role in connecting the Madrid and Barcelona nodes while following the GSMA Open Gateway standard. As a result, XR services can now select the best server in real time, regardless of domain or provider.

These developments not only drive the adoption of 6G technology in Europe but also open new business opportunities by expanding scalability, interoperability, sustainability through resource optimization and lower energy consumption, and monetization through new business models.

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