

Case study

# Building the future of entertainment with 5G

A collaborative approach to immersive VR experiences using 5G and edge technology



**ERICSSON**

# Unleashing the power of 5G for entertainment

**Case study:**  
Immersive VR experiences

**Industry:**  
Telecommunications

## Executive summary

While research confirms that consumers are ready for more immersive experiences, the technology to take them there has been on a slower than expected trajectory – until now. This proof of concept outlines the collaborative approach Ericsson took to bring together key industry players AT&T, Dreamscape Immersive, NVIDIA,

Qualcomm, and Wevr to create a leading example for the future of VR experiences. Using 5G and edge technology, Ericsson and its collaborators are now leading the way to transform entertainment and open up new opportunities for industries and enterprises.

## What is XR?

XR means 'extended reality' – technology that lets you experience and interact beyond your physical space and the reality of what you can see, hear or feel. It is the umbrella term for augmented reality, mixed, merged and virtual reality – all of which describe different technologies that add to or change our experience of reality.

## The challenge

When it comes to the expected commercial boom of immersive experiences using extended reality (XR), consumer expectations are high. Even a few years back, our research revealed that half of the world's smartphone users expected us all to be wearing AR glasses by 2025. In a more recent Ericsson ConsumerLab 10 Hot Consumer Trends 2030 report, 55 percent of consumers claimed they wanted to visit a museum which uses advanced AR/VR technology to recreate historic events, making them feel as though they were there in person. It's not surprising that consumers have high expectations given the constant hype about the 'next big thing' in XR technology.

One of the major barriers of fully immersive VR experiences today is a

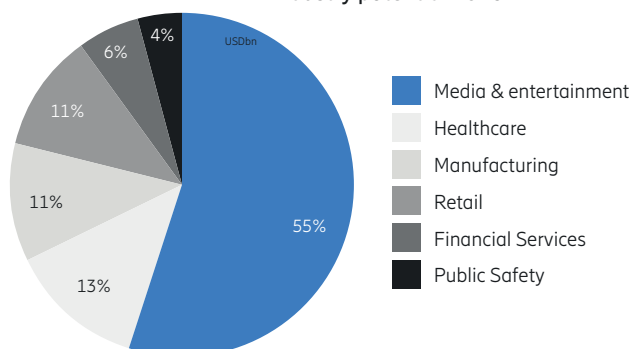
lack of mobility. Due to the amount of computational and graphical processing, VR experiences are typically tethered by cables from the headset to a desktop computer. So far, the industry has been responding to this barrier through two approaches. The first involves shifting all the computing power to the headsets, which have become known as all-in-one devices. However, this option limits the amount of computing power available. To increase computing power, the second approach has been used, which shifts computing power to a backpack worn by the participant. But there are disadvantages here, too. Weighing between 3 and 4.5 kilograms, the backpacks can become hot, uncomfortable to wear and have an extremely low battery life, limiting the VR

experience to between 15 and 20 minutes.

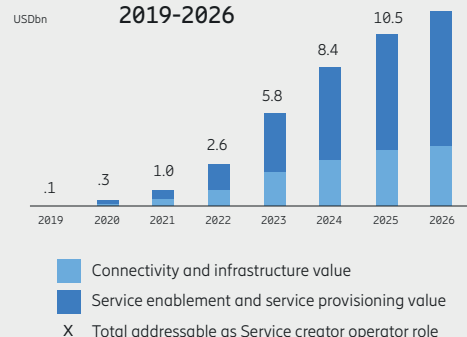
An approach used for fully untethered, mobile experiences has been to use WiFi. However, one key limitation is that in a multi-user environment, unlicensed spectrum such as WiFi is susceptible to interference.

In light of these industry challenges, Ericsson, AT&T, Dreamscape Immersive, NVIDIA, Qualcomm, and Wevr saw an opportunity to explore what untethered, multi-user experiences could look like using 5G and edge computing. In collaboration with Warner Bros., the companies worked on creating a tailored VR experience as a proof of concept for Harry Potter, Chaos at Hogwarts, which would allow fans to immerse themselves even further into a virtual world of wizardry.

Industry potential 2026



Market growth 2019-2026



**Industry potential**  
Outlined by Ericsson and ADL in 2019, the B2B virtual reality communication service provider business potential is set to be up to USD 12 billion in 2026. VR is already delivering value to enterprises across healthcare, manufacturing and the public sector.



## The solution

### Bringing together two ecosystems

There were two ecosystems that came together for this project. The first came from the field of technology: AT&T, NVIDIA, Qualcomm and Ericsson. The second came from the field of entertainment and contributed the creativity to the project: Wevr and Dreamscape Immersive. This second ecosystem had already been collaborating on a location-based VR experience with Warner Bros. using backpack computing power. But Ericsson D-15 orchestrated the collaboration of these two ecosystems as a proof of concept to demonstrate how VR experiences could be improved by moving the creative content to

the edge of a 5G network, removing the need for both backpacks and cables.

To give users a realistic interactive experience, the teams traded the corded headset and created a unique networking environment using AT&T 5G mmWave spectrum with Ericsson's private 5G network equipment to stream the immersive experience to Qualcomm XR2 VR headsets. This allowed participants to use haptic devices and move freely on a stage, both of which were provided by Dreamscape Immersive.

Radio optimizations allowed six simultaneous VR users to participate in a single Ericsson 5G private network cell, with high-fidelity content by Wevr being streamed on AT&T's 5G mmWave licensed spectrum. The graphics were remotely rendered, then streamed with NVIDIA CloudXR™ to the Qualcomm XR2 VR headset, while the high-fidelity content by Wevr was streamed on AT&T's 5G mmWave spectrum.

This efficient communication optimized the quality of the graphics and allowed VR players to immerse themselves into the content. The high-fidelity virtual experience ran remotely with NVIDIA CloudXR, which enabled the creative teams to design much more photorealistic details and full-fidelity models for the VR experience.

“ Qualcomm’s boundless XR 5G on-device optimizations were essential in delivering the Harry Potter experience with a lightweight Snapdragon XR2 headset without the need for a heavy backpack. These optimizations include all the latency sensitive on-device XR processing, including controller and hand tracking in addition to the 5G latency and coverage optimizations.”

— Sajith Balraj, Director, XR Product Management, Qualcomm Technologies Inc.

“ NVIDIA’s Cloud XR is our XR streaming technology that both minimizes latency and maximizes image quality. It does this by adjusting to dynamic network conditions. Additionally, moving the graphics processing out to the edge in the Ericsson network also helps in minimizing latency, giving a great XR experience.”

— Greg Jones, Director of XR Business Development, NVIDIA



## The results

### Storytelling unleashed

What was achieved was a 5G-enabled, multiuser, location-based VR experience that allowed players to fully immerse themselves using only a lightweight 5G VR headset – without the need for backpacks and cables – giving participants an even more immersive experience.

Ericsson teamed with AT&T to combine AT&T's expertise in immersive 5G use case development and robust 5G+ network. Together, we built a unique networking environment for the pilot, combining AT&T 5G+, based on mmWave spectrum, with Ericsson's private networking equipment.

In collaboration with these five companies, the Ericsson private 5G network – optimized to support VR by the Ericsson D15 team – helped validate three important building blocks for future applications:

- **Increased computing power:** moving computing power from a backpack laptop to a 5G network edge provided more computing power for remotely rendering photorealistic graphics while achieving ultra-low latency.

- **Unrestricted movement:** eliminating the wires between the headset and a computing source provided participants with unrestricted movement.
- **Multi-user capability:** the enablement of a multi-user immersive experience by streaming high-fidelity, real-time interactive graphics to a team of participants for an extended period.

A good VR experience requires a latency of less than 50ms to keep a participant from becoming dizzy or nauseated. The entire ecosystem produced a roundtrip time of 35ms with the 5G network only contributing 4 to 5ms of that time. With this low network latency, 5G made more time available for rendering (encoding and decoding) content while maintaining a superior VR experience.

In addition, the participants could move freely across the stage without wires connected to a heavy laptop inside a backpack. And since the 5G network produced no noticeable lag time, the immersive experience was extremely realistic.

“// The Ericsson 5G infrastructure provided industry-leading characteristics for VR, and the performance of the e2e solution was superior compared to the previous backpack experience. This was enabled by the close cooperation with AT&T, Qualcomm, Nvidia, Wevr and Dreamscape Immersive.”

– **Jonas Ericsson, Director, Device Technical Engagement Lead, Ericsson D15**

“// By using the high throughput and low latency of 5G paired with edge cloud, we can transform experiences to be more comfortable for fans, more productive for venue operators and give more freedom to creators.”

– **Christopher Wood, Director, 5G Product & Innovation, AT&T**



## Industry impact: a gamechanger for entertainment

The potential gains for the entertainment and VR experience industries following 5G and edge implementation are significant. First, for a venue operator like Dreamscape Immersive, which operates location-based VR experiences, we estimate an OPEX reduction of approximately 11 percent. By removing the backpacks completely, labor costs related to the battery replacement the backpacks after every session are removed. In addition, multiple sessions can run without the need for battery replacement on the headset.

Second, the removal of VR backpacks allows venue operators to reduce the age limit of participants, currently in place today due to the weight of the backpacks. Not only will this allow businesses to increase the throughput of customers per hour, but they'll also be able to increase the number of participants in a single VR session thanks to 5G connectivity. Both these outcomes are estimated to increase topline revenue by around 20 percent.

Finally, the VR backpacks had previously limited the creativity of content producers due to their lack of power and battery life. The use of 5G, however, allowed Wevr to produce content for a longer period of time, meaning participants could immerse

themselves into the VR experience for many hours – up from the previously tethered experiences which usually lasted 15-20 minutes.

### Unleashing creative freedom

A particular challenge with the evolution of VR has been the availability of creators and the lack of understanding in how to use the technology alongside their creativity. Often, it's the technology that's put on a pedestal, but without storytellers making engaging experiences, we only have half the product.

Designing a VR experience to run on 5G means artists and creatives can put more high-fidelity 3D art into scenes. It could allow directors and actors to shoot entire scenes with motion capture data completely untethered, bringing a level of realism to animation never achieved before.

Ultimately, the improved creative freedom of storytellers to captivate their audience significantly improves the player's experience by removing cords and backpacks.

This important collaboration has opened up a new era of VR experiences that delivers something for everyone, from creators to venue operators. It allows for increased team sizes, streamlines the venue owner's operations, reduces the investment needed in laptops, and unleashes a level of creativity not seen in the industry before.

“ In designing a VR experience to run on 5G and edge computing, a much higher budget of polygons is available, freeing our artists and creatives to put more high-fidelity 3D art into the scene. 5G and edge computing gives us a real-life element in a virtual world which is liberating, inspiring and will unlock storytellers all over the world”.

– Anthony Batt, Co-Founder of Wevr





## 5G XR: the gateway to the metaverse

While XR merges virtual worlds and physical worlds together creating a new reality, the metaverse promises a new era in how we could interact with technology itself. Instead of viewing the internet as we do today, the metaverse could allow us to virtually immerse ourselves within it through headsets or other wearable technology. It has the potential to truly transform how we connect and is set to open up vast opportunities in how we learn, play, work and communicate.

With ultra-low latency 5G, high-powered edge computing, advances in creative, life-like graphics and devices with processors capable of fully immersing the viewer, the metaverse is closer than one might think.

But it's not just gaming and entertainment-based experiences that will be affected by this new digital realm. Imagine how learning can change. From reading a book or watching a video, those in the metaverse might be able to experience a walk through the Egyptian pyramids as they were being built. In the healthcare sector, the metaverse could allow doctors to practice for future transplants in a secure digital space. Training could be fully immersive

for everyone from first responders to the military – and even athletes could be able to experience the physical rush of adrenaline they might feel in the physical world, but without the risk of physical injury. 5G will have a huge part to play in providing precise positioning and ultra-low latency, ensuring that any actions and reactions are realistic.

The growth of the metaverse will unlock new ways for creators, educators and experience makers to develop games and content, while allowing people to connect and interact in ways we're currently not able to. Today, we largely engage online through video, messaging platforms, scrolling through web pages or playing video games, for example – most of which are in a 2D format. But as we enter the metaverse, we'll have all that, plus the ability to digitally immerse ourselves within the internet through VR or XR headsets. It could transform the way we tell stories and play games. But it will also open up new opportunities to learn and communicate for millions of people.

In this proof of concept, we're glad to be demonstrating the early and exciting days of this new era of immersive experiences.

“ I think the opportunities that this unlocks for creators, educators and experience makers around the world is just incredible. It's the equivalent of a technological, industrial revolution, and we're thrilled to be welcoming it.”

– Aaron Grosky, President & Chief Operating Officer, Dreamscape Immersive

## About Ericsson

Ericsson enables communications service providers to capture the full value of connectivity. The company's portfolio spans Networks, Digital Services, Managed Services, and Emerging Business and is designed to help our customers go digital, increase efficiency and find new revenue streams. Ericsson's investments in innovation have delivered the benefits of telephony and mobile broadband to billions of people around the world. The Ericsson stock is listed on Nasdaq Stockholm and on Nasdaq New York.

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