5G Enables Immersive Shopping Experience

Standalone 5G network and edge compute brings Barcelona's La Boqueria market to remote customers

Traditional retailers are facing intense competition from online commerce. But extended reality services enabled by 5G could provide a way for boutique shops and market stalls to reach a much broader customer base.

In April 2022, this concept was piloted at La Boqueria market in Barcelona using a private standalone 5G network to provide a remote customer with an immersive experience equivalent to face-to-face shopping. The pilot was led by Parlem Telecom, a mobile virtual network operator in Catalonia, together with Cellnex Telecom, Lenovo and Red.es (an entity attached to the Spanish Ministry of Economic Affairs and Digital Transformation), while MasMovil provided the spectrum for the trial.

The partners used the low latency and high bandwidth of 5G, supported by edge compute capacity, to demonstrate how a live video stream, superimposed with digital information, can be transmitted from the market to a remote shopper. For the pilot, the video was captured by a "personal shopper" wearing augmented reality (AR) glasses connected to a 5G base station and edge server. These edge nodes can process the captured images in real-time, and insert information on top of the video baseline.

On a visit to the Olives Francesc stall in La Boqueria Market, the personal shopper's AR glasses displayed information about the olives on the shelves, such as their origin and producer (see image). The information is sourced using image recognition software underpinned by machine learning. Via an app developed by the i2CAT Foundation on behalf of Parlem Telecom, the remote shopper could send messages to the personal shopper, providing instructions on what to look at next or what to buy.

The partners in the pilot are now exploring how to commercialise this concept, potentially employing fixed cameras, which could help improve the scalability of a personal shopper solution. "We have made an agreement with the Mercat de la Boqueria and the local market association to continue exploring additional use cases with MasMovil," says Jose Antonio Aranda Legazpe, Product Strategy and Innovation Director at Cellnex Telecom.

The partners are also expanding the image recognition system to recognise a wide range of market products. "The idea is to automate everything and train the artificial intelligence that runs at the edge about all the potential products that the person could be looking at," adds Jose Antonio Aranda Legazpe. "The lack of remote purchasing technologies that can replicate the

value of physically attending less controlled environments, such as municipal markets, affects both the end-users and the commerce. This solution aims to mitigate these effects by improving the costumer experience, and consequently stimulating the volume of purchases."

Testing standalone 5G across urban use cases

The pilot in La Boqueria Market is one of seven urban use cases being tested through a €5.4 million 5G Cataluña Pilot project supported by Red.es. The other use cases encompass automated transportation, distance learning, manufacturing applications, HD audio-visual transmission, security and emergency management and robust connectivity in tourist areas that see large numbers of seasonal visitors.

The 5G Cataluña Pilot involves a consortium of eight companies led by Cellnex Telecom and the Masmovil Group. Parlem Telecom, Aumenta Solutions, the engineering company Atos, the consultancy Nae, the technology company Lenovo and the start-up Nearby Computing, a spin-off of the Barcelona Supercomputing Center, are also supporting the project, which is co-financed by the European Regional Development Fund.

The advanced standalone 5G network being used for the project was designed and deployed by Cellnex, and is supported by Lenovo's edge computing solutions. The 5G standalone core enables the partners to harness the low latency and high throughput of a pure 5G architecture. Delivering highly immersive multimedia services requires very responsive and very reliable connectivity, as well as high-speed throughput in both the uplink and downlink. In urban areas, these challenges are compounded by the need to support large numbers of connections simultaneously.

For La Boqueria pilot, Cellnex deployed a 5G base station in the market, which received the signal and transmitted it via a fibre-optic cable to a data server located nearby. Cellnex is using the open RAN (radio access network) architecture in the seven base stations it has deployed in different locations across Barcelona to test different use cases (see graphic). Each of the base stations is supported by an edge data centre that is located close to the antenna to reduce latency.

By proving the viability of a wide range of use cases, Cellnex is aiming to help mobile operators to make a return on their 5G investments. "5G pushes for a technology ramp up with high complexity and scale, which requires mobile operators to make high capex investments in new infrastructure," notes Jose Antonio Aranda Legazpe. "Over the last few years, the ARPU (average revenue per user) has been decreasing, which aggravates mobile operators' pressure to find monetizing solutions."

5G Cataluña
Open Innovation Ecosystem – Barcelona

Source: Cellnex Telecom

One way to improve the economics of 5G is for multiple mobile operators to share infrastructure. Through a neutral host model, supporting infrastructure sharing of both active and passive infrastructure, Cellnex is looking to give operators the flexibility and scalability they need to support a wide range of 5G use cases.

Jose Antonio Aranda Legazpe says the consortium is in discussions with Barcelona City Council about deploying a standalone 5G network that would support municipal services. "We will continue to work with the Boqueria Market to add new infrastructure that will enable new use-cases based on edge computing and AI," he adds.

In a speech in April 2022, Alberto Martínez Lacambra,

General Director of Red.es, described 5G as "a technology with a transformative power that will mark a revolution and is an essential vector in the digitalisation drive envisaged in the Spanish Government's Recovery, Transformation and Resilience Plan and is one of the pillars of the Digital Spain 2025 strategy"

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Jose Antonio Aranda Legazp - Product Strategy and Innovation Director at Cellnex Telecom

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About Cellnex Telecom

The efficient deployment of next-generation connectivity is essential to drive technological innovation and accelerate inclusive economic growth. Cellnex Telecom is the independent wireless telecommunications and broadcasting infrastructures operator that enables operators to access Europe's most extensive network of advanced telecommunications infrastructures on a shared-use basis, helping to reduce access barriers for new operators and to improve services in the most remote areas.

Cellnex manages a portfolio than 138,000 sites –including forecast roll-outs up to 2030– in Spain, Italy, the Netherlands, France, Switzerland, the United Kingdom, Ireland, Portugal, Austria, Denmark, Sweden and Poland. Cellnex's business is structured in four major areas: telecommunications infrastructure services; audiovisual broadcasting networks, security and emergency service networks and solutions for smart urban infrastructure and services management (Smart cities and the "Internet of Things" (IoT)).

The company is listed on the continuous market of the Spanish stock exchange and is part of the selective IBEX 35 and EuroStoxx 100 indices. It is also present in the main sustainability indices, such as Carbon Disclosure Project (CDP), Sustainalytics, FTSE4Good and MSCI. Cellnex's reference shareholders include Edizione, GIC, TCI, BlackRock, CPP Investments, CriteriaCaixa and Norges Bank.

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