Private 5G: expect dramatic drone developments in 2024 (thanks to millimeter wave technology)

Carlos Manuel Cordero, CTO, Fujitsu Technology Solutions

The drones are coming in 2024 thanks to important new headway in Private 5G, according to Carlos Manuel Cordero, CTO, Fujitsu Technology Solutions. He predicts that the abolition of latency and the incredibly fast data speeds that come with new millimeter wave (mmWave) bandwidth and technology will open significant new use cases for drones, robots and telesurgery.

Private 5G

5G technology has already penetrated the consumer mobile market, driven by investment in public networks. According to the GSMA, 229 operators had launched 5G mobile services in 87 markets as of January 2023, with another 30 new markets slated for launch by year-end, taking the total number of global connections to 1.5 billion.

Private 5G uses the same protocols to deliver enhanced capacity, lower latency, and greater reliability for enterprise digital transformation programs. Examples include automation of manufacturing assembly lines in factories, robotics and automated guided vehicles for warehouse logistics, and drones for site surveying and security. Airbus is probably the poster child for Private 5G. The aerospace giant uses the technology to transfer data between onsite engineering teams and connected devices within Airbus plants and sites across Europe.

mmWave 5G

Until now, Private 5G has been built on top of public mobile 5G services, which typically use microwave wavebands at 3.6 GHz, where the wavelength is about 100 mm.

“Millimeter wave” refers to the band above microwaves, called EHF (Extremely High Frequency). These have wavelengths between 1mm and 10mm, corresponding to 30 GHz to 300 GHz. Because there is so much more space at these levels compared to the cramped microwave conditions, bandwidth can be increased dramatically. That’s not the only upside. Higher bandwidth means data packets are delivered much more rapidly, resulting in lower latency. In fact, at just 1-3 milliseconds, millimeter wave latency ceases to exist for most practical purposes.

There are compromises, too. Propagation – the distance a signal travels reliably – is lower at higher frequencies. At 1mm wavelength, propagation is about 1km. But this is not an issue in a private enterprise environment and can even be an advantage.

Uptake is accelerating

The EU has already harmonized the use of millimeter waves for Private 5G, but until now, uptake by operators has been slow. A 2023 report by Ookla notes that only two auctions took place in 2022: in India and Spain.

That indifference is changing rapidly where Private 5G is concerned. Australia, Denmark, Finland, Germany, Greece, Hong Kong, Japan, South Korea, Sweden, and the UK have all set aside mmWave spectrum for Private 5G. Fujitsu has deployed a Private 5G network in Japan, including the 28 GHz frequency. And more countries are now moving to offer mmWave, including Hungary and Austria.

Is the kit there?

Spectrum is important, but so is technology. And here, we expect to see a rapid catch-up in mmWave equipment in 2024. Fujitsu's partner Ericsson is set to release new radios and antennae in Q1, certified by national authorities.

Planning ahead, all Private 5G deployments put in place by Fujitsu are already future-proofed for mmWave integration as soon as the new technology is available.

What's the business case?

The benefits of mmWave are clear, but they are not relevant for all use cases. Where the technology scores highly is where ultrafast data and real-time responses are vital.

This points towards the ability to control and monitor drones and other kinds of robots, where imprecision as a result of latency could cause damage or worse.

Drone use cases are starting to take off (sorry, I couldn't resist the pun). In the consumer space, drone logistics services are starting to become mainstream, with Amazon and UPS expanding their capabilities.

In the B2B arena, drone inspections are being increasingly used in industries such as oil and gas, utilities, and construction. Drones provide a safer and more efficient way to inspect infrastructure and equipment. Being faster and low-cost, they enable automated monitoring several times a day rather than a few times a week with today's manual systems.

In factories and warehouses, robots are becoming more prevalent and require the precision control promised by mmWave.

Another use case, although much further away, is telesurgery. The drivers here are the rapid expansion of surgical robots, a market expected to reach $14.4 billion by 2026, and a decrease in hospital budgets worldwide. Telesurgery potentially brings these two contradictory factors together to create a new model of surgical provision.

For all these use cases, mmWave is a must, and I firmly expect to see the technology rollout accelerate markedly in 2024. Expect to see more drones in commercial use soon.

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Carlos Cordero is CTO at Fujitsu Technology Solutions based in Spain. He is a business professional with more than 30 years of experience at management level on Information Technology, with a solid background on emerging technologies (Cloud, Internet of Things, Analytics, AI, Cybersecurity and Quantum technologies) and a deep and wide vision of the offering and roadmap of the major global technology players. He has held various positions including Corporate Alliances Director of Indra, Vice President and CTO Iberia at Capgemini, where he built a very strong team of Product Managers each one building and owning a different solution practice, and as Consulting Director Europe West of Veritas Software. Carlos has a B.S. in Business Administration from the Babson College, Boston, MA, and a M.S. in International Business Administration from IMD (International Institute for Management Development), Paris, France.