

Fujitsu on: Private 5G

Overview

- 5G is the fifth-generation technology standard for broadband cellular networks, which operators began deploying worldwide in 2019. 5G networks have higher download speeds, eventually up to 10 gigabits per second, and low latency.
- Private 5G refers to dedicated 5G networks built specifically for a single enterprise, such as a business, factory, or campus. While Public 5G rollout continues, interest is rapidly growing in Private 5G networks for digital transformation (DX) initiatives involving automation, robotics, and drones. It allows enterprises to take advantage of these capabilities without relying on public mobile operators.

Industry Trends in Brief

- 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.
- Businesses are exploring how private 5G can underpin their DX agendas in environments such as customer premises, factories, warehouses and hospitals. In manufacturing, for example, 5G creates agility. Currently, production lines are constrained — literally tied into inflexible positions by cabling to robots and other equipment. The cost and time needed to change a factory layout are often unfeasible, but a private 5G communications infrastructure transforms the time and money equation.
- More enterprise use cases are emerging across manufacturing, logistics, utilities, construction and other industries. Drones and robotics are expected to see dramatic new applications unlocked by private 5G.
- Spectrum availability has been a key roadblock for Private 5G until recently, but regulators worldwide are now allocating spectrum specifically for private 5G networks. This is significantly accelerating adoption.
- New millimeter wave (mmWave) 5G spectrum and equipment being released in 2024 will provide huge bandwidth and effectively zero latency. 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 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. Higher bandwidth also means data packets are delivered much more rapidly, resulting in latency of just 1-3 milliseconds, eliminating it as a concern for most practical purposes. mmWave will further expand private 5G use cases requiring precision control like drones, robotics, and even potential future applications like telesurgery.

5G and open standards

- With higher frequencies and shorter signal propagation than 4G/LTE, 5G typically involves a larger number of smaller-cell deployments. This pattern could drive up infrastructure and maintenance costs if proprietary protocols and technologies resulted in vendor lock-in. To mitigate this risk, the [O-RAN Alliance](#) — with Fujitsu as a member — has instigated an open Radio Access Network standard called Open RAN (O-RAN) — a set of standards that specifies open interfaces, nodes, profiles and services.
- Powerful protocols in O-RAN 5G have been designed to enable end-to-end security. These include comprehensive security tests and procedures to cover the most conceivable scenarios.

5G, vRAN and sustainability

- [Recent advances in software-defined base station virtualization \(vRAN\)](#), based on general-purpose servers that don't require the costly development of specialized hardware, are drawing attention because they overcome performance efficiency and power consumption issues in previous generations of equipment.
- Fujitsu has successfully developed new vRAN technology that delivers high performance with low energy consumption. Fujitsu estimates that this approach can reduce overall system CO2 emissions by 50% or more compared to conventional vRAN technology, while offering users high-quality, stable communications.

Fujitsu and 5G networks

- Fujitsu offers full-stack Private 5G solutions, from planning and design through deployment and ongoing management. Networks can flexibly scale from small to massive. It has built up an eco-system of partners to deliver either highly integrated solutions from well-established vendors or open (O-RAN) solutions.
- Fujitsu's managed network-as-a-service model requires no in-house Private 5G expertise. Fujitsu handles the complexity remotely. Cybersecurity is built-in end-to-end via Fujitsu's Edge Compute and IT Security offerings to provide secure connectivity in an OT environment.
- Fujitsu has enabled a manufacturer to deploy high-resolution video cameras on its production line to provide AI-driven quality control. The 5G-enabled system elevates the manufacturer's quality control dramatically above competitors, reducing rework costs, increasing capacity and eliminating the reputational damage that comes with returned or faulty goods.
- Existing customer deployments are future-proofed for mmWave. Fujitsu partners like Ericsson are set to release mmWave-compatible equipment in 2024 to maximize emerging use cases.

Fujitsu's own use of 5G

- In February 2020, Fujitsu obtained Japan's first Private 5G license and built an NSA (non-standalone) network within its Shin-Kawasaki Technology Square.
- In March 2021, Fujitsu began commercial operation of a private 5G system at its Oyama Plant to automate on-site operations and provide remote support. A security system, the first commercial operation of a private 5G network in Japan, realizes high-capacity/high-speed transmission of high-definition image data collected by multiple cameras, as well as the operation of a security system for the early detection of suspicious behavior based on video analysis.

Fujitsu quotes on Networks

- Carlos Manuel Cordero, CTO, Fujitsu Technology Solutions, comments:
"Many organizations now understand the potential of Private 5G-led, sustainable transformation. From my own experience, I know that demand is incredibly high, and many suitable use cases are now coming through."

"For factory and warehouse automation, robotics, drones and telesurgery, mmWave Private 5G is a must, and I firmly expect to see the technology rollout accelerate markedly in 2024."

Reference customers and partners

- DISH
- Deutsche Telecom
- KDDI
- Ericsson
- NEC
- Dell
- TrendMicro
- Neutron

Relevant Fujitsu Products/ Milestones

- Fujitsu first supplied RAN infrastructure in 1995 (PDC system)
- [Fujitsu and Ericsson Team Up on 5G Partnership](#) (2018)
- [Fujitsu and NEC to develop lab technologies for interoperability testing between 5G base station equipment](#) (2021)
- Fujitsu and NEC Corporation are [developing technologies for interoperability testing between 5G base station equipment conforming to O-RAN specifications](#)
- [Small, Efficient 5G Multisector Antenna Indoor Base Station Achieves World's First Demonstration using 28GHz](#) (2023)

Further reading

- [Transformative 5G in the IoT Era: how to realize its potential, from verification to implementation](#)
- [A Brief Look at O-RAN Security](#)
- [Fujitsu Virtualized CU/DU \(vCU/DU\)](#)

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