

STUDY 13 · ENTERPRISE DIGITALISATION WITH 5G

Using 5G and other electronic communications networks for enterprise digitalisation

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AT A GLANCE

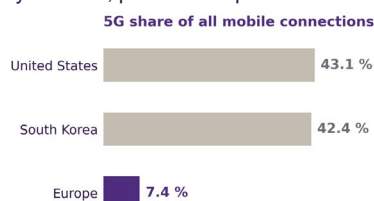
Study 13 examines how 5G — and private 5G networks above all — can be put to work digitalising enterprises. It reviews the EU initiatives open to companies, sets the German and Czech models for local spectrum side by side, measures private 5G against Wi-Fi on capability and cost, catalogues 43 use cases across four verticals, and offers an OKR-based method for turning them into a strategy. It closes with the four barriers holding adoption back and the steps the study proposes to remove them.

What the study covers

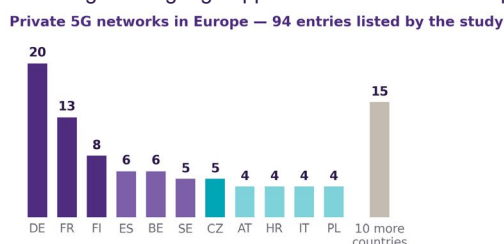
The scope is deliberately narrow: 5G for the digitalisation of enterprises, not digitalisation in general. On one side sit the technical, commercial and regulatory aspects of 5G that matter to a company; on the other, the use cases for which 5G makes sense technically and commercially. The findings rest on an analysis of the regulatory environment and on in-depth interviews across the ecosystem — manufacturers, suppliers, system integrators, service providers, operators and potential customers.

Why it matters

Europe is not setting the pace. Enterprise digital transformation is one of the four Digital Decade targets, and the money is on the table: at least 20 % of every national recovery plan is earmarked for digital, and CEF Digital carries EUR 1.6 billion for 2021–2027, of which EUR 142 million goes to “5G for Smart Communities” — open to consortia that include private-network providers, not only traditional mobile operators. The study's warning is about take-up rather than availability: Czech participation in Smart Communities is described as practically nil and the opportunity as “so far entirely wasted”, put down to poor awareness, the effort of an English-language application and fear of the reporting that follows.



Median 5G speeds stay below 200 Mbps in most European countries; US 5G availability leads at 56 %.



Source: study annex 2, compiled by the European 5G Observatory from public sources — explicitly not exhaustive.

GERMANY · DEDICATED LOCAL SPECTRUM

Since November 2019 BNetzA has set aside 100 MHz at 3.7–3.8 GHz specifically for industrial, agricultural and similar private networks. Applicants can request up to 100 MHz in 10 MHz TDD blocks for a defined coverage area; licences may be granted for up to ten years, extendable no later than December 2040, with annual fees scaled to bandwidth, the size and location of the area, and licence duration. On 2023 figures more than 200 applications had been filed, among them Bosch, Siemens, BMW and Lufthansa. Fraunhofer IIS operates an open Industry 4.0 5G testbed in Nuremberg. BNetzA has signalled willingness to discuss harmonising 3.8–4.2 GHz or other bands for private networks across Europe — a shared band, it argues, could give the market a good stimulus.

CZECHIA · LEASED SPECTRUM, WITH STRINGS

There is no dedicated band. Companies lease from the operators obliged to sublease under the 2020 auction — now O2 and T-Mobile — at 3400–3480 or 3640–3700 MHz. The price is negligible: CZK 50,000 once, plus an annual formula yielding CZK 600 in the study's worked example — and the site must be land the applicant owns or may use, never public space. Three limitations do the damage: use is confined to Industry 4.0; only machine-to-machine communication is permitted, expressly not interpersonal services or internet access; and the spectrum is not dedicated, so private and public networks will interfere at urban sites. The verdict is blunt — no commercial private 5G network in the country is operated under this regime.

EVIDENCE FROM THE FIELD · FOUR EXAMPLES FROM THE STUDY

BringAuto

An autonomous delivery robot carries four to six cameras and halts automatically above 150 ms of latency. A partner's private-network test in Greece gave 20 ms; collision avoidance run in the public cloud takes 100–500 ms.

AYES

Streaming advanced 3D CAD models to AR glasses needs 20–50 Mbps and under 100 ms. Most headsets still lack a built-in 5G modem, so a dongle or Wi-Fi tethering fills the gap.

Continental

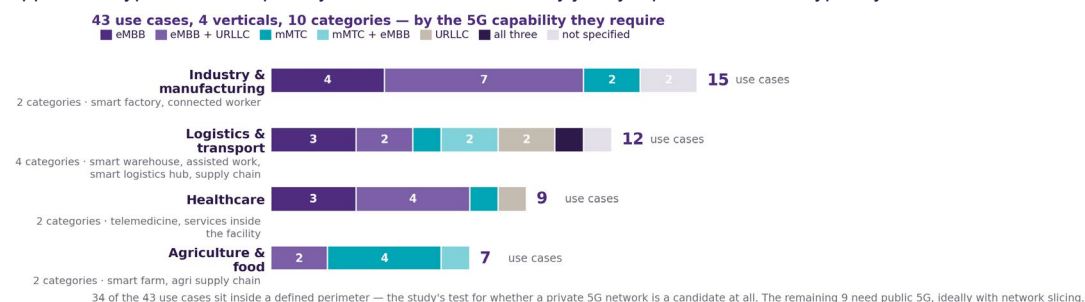
A private 5G network has run at the Brandýs plant since August 2023: eight access points over 5,000 m², with more than 1,000 devices and sensors planned.

twinfo

A forklift digital twin is modelled to lift utilisation from 63 % to 75 %, saving two forklifts and four FTE; payback on EUR 80k is projected at four months — but it runs on Wi-Fi too.

A portfolio, not a single project

The study catalogues 43 use cases in four verticals and ten categories, classified along five dimensions: vertical, shared purpose, perimeter, application type and 5G capability. One use case will rarely justify a private network; typically a series of them is needed.



Choosing the connectivity

Private 5G measured against Wi-Fi 6/6E

	Wi-Fi 6 / 6E	Private 5G
Devices per cell	fewer than 50	more than 250
Air latency	2 – 4 ms	1 ms (URLLC)
Reliability	99.9 %	99.999 % (URLLC)
Positioning accuracy	approx. 5 m	1 – 3 m
Spectrum	unlicensed	licensed
Mobility / handover	limited	native

The two are complementary, not substitutes: Wi-Fi stays suitable for non-critical use cases, while a private 5G network “will practically always be more expensive than a comparable Wi-Fi network” — indicative five-year TCO CZK 5–10 million for a smaller site. Deployment splits three ways: core and RAN both on site (the “island” network — dearest, most flexible); control plane in the cloud with user plane and RAN local (low latency via edge); or core in the cloud with only the RAN on site (cheapest, worst latency).

Start with the objective, not the technology

The study frames digitalisation with OKR. Its smart-factory example sets the objective “turn our production operation into a fully functioning smart factory within two years”, with key results of 40 % less downtime and 30 % better output per hour, and four initiatives — automation, predictive maintenance, real-time monitoring and connectivity. The point is that “a private 5G network on its own will deliver none of the required results”: it supports the use cases that do. Each initiative then runs as an innovation project — five discovery steps ending in a proof of concept, then three delivery steps.

Four barriers, and what the study proposes

01 REGULATION

Restrictions deter users and push them to the operators, whose oligopoly narrows the technical and cost options. The study asks for a clear, liberal reading of the existing C-band conditions, and for 100 MHz to be set aside in the coming 3.8–4.2 GHz discussions — across all verticals, with no use-case restrictions, on the German model.

02 COST

Private 5G costs more than comparable Wi-Fi, and the benefits are hard to quantify while many use cases still run acceptably on Wi-Fi — the study flags even its own five-year TCO figure as potentially misleading. Remedies: a genuinely plural provider ecosystem instead of an operator oligopoly, and R&D in 5G technology, open-source software above all.

03 KNOW-HOW

Two gaps: understanding what 5G can actually do for a business process, and the expertise to innovate those processes and build the applications. Five remedies — training programmes, government and industry partnerships, demonstration projects others can learn from, advisory services, trade-fair support.

04 ECOSYSTEM

Devices are expensive and the choice thin — marginal for an industrial router, a real problem for IoT, and no AR glasses on the market combine the required functionality with native 5G. Standardised network functions remain barely available — positioning, URLLC, RedCap — and slicing is absent. Remedies: local and joint device development.

KEY TAKEAWAY

5G is not the project — enterprise digitalisation is, and 5G is the connectivity layer that a portfolio of use cases has to justify. Where regulation dedicates spectrum, keeps it open across verticals and leaves use cases unrestricted, that portfolio becomes buildable; where it does not, the business case rarely closes. A lesson for every member state.