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MARKET PULSE REPORT

INDUSTRIAL WIRELESS

BY JAMES BLACKMAN, EXECUTIVE EDITOR

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Contents

Introduction

Developments in spectrum access, simplified models and edge convergence are reshaping private 5G from a niche option to core infrastructure.

In the past few months, certain developments has underscored that private 5G is no longer about speculative pilots: instead, it is increasingly shaping up as core infrastructure for industrial and enterprise transformation. Where once private networks were dismissed as a "niche" – implying slow, complex, and commercially marginal – recent actions and innovations signal a shift in both ambition and capability.

Much of this change pivots on converging forces. On one hand, regulatory progress on spectrum access in multiple regions is lowering barriers to deployment: mid-band and shared-spectrum frameworks are allowing enterprises to plan repeatable, multi-site private networks outside tightly controlled zones.

On the other, advances in software, radio design, and edge compute – alongside a maturing ecosystem of devices – are giving rise to more manageable network architectures. Some vendors are even promising "plug-and-play" private 5G solutions that enterprises can deploy in minutes rather than weeks.

But the true engine behind the momentum is the growing overlap between private 5G, edge compute, and AI.

As enterprises adopt robotics, automation, real-time telemetry, and on-site AI workloads, the demand for deterministic, secure, high-capacity connectivity becomes acute. Private 5G is being reframed as a foundational part of the infrastructure for next-gen industrial transformation – powering everything from automated warehouses and mines to smart manufacturing, logistics, and resilient IoT deployments.

And so the debate has moved on, as per the panels and discussions at Industrial Wireless Forum last month (November). Private 5G is no longer just 'nice-to-have'. It is shaping up as a critical pillar for enterprises that intend to scale digital, intelligent, and data-driven operations at scale, and take full advantage of AI, edge compute, and real-time automation.

– James Blackman, Editor, RCR Wireless News

Top *RCR* takeaways

Private 5G is more than a niche industrial play

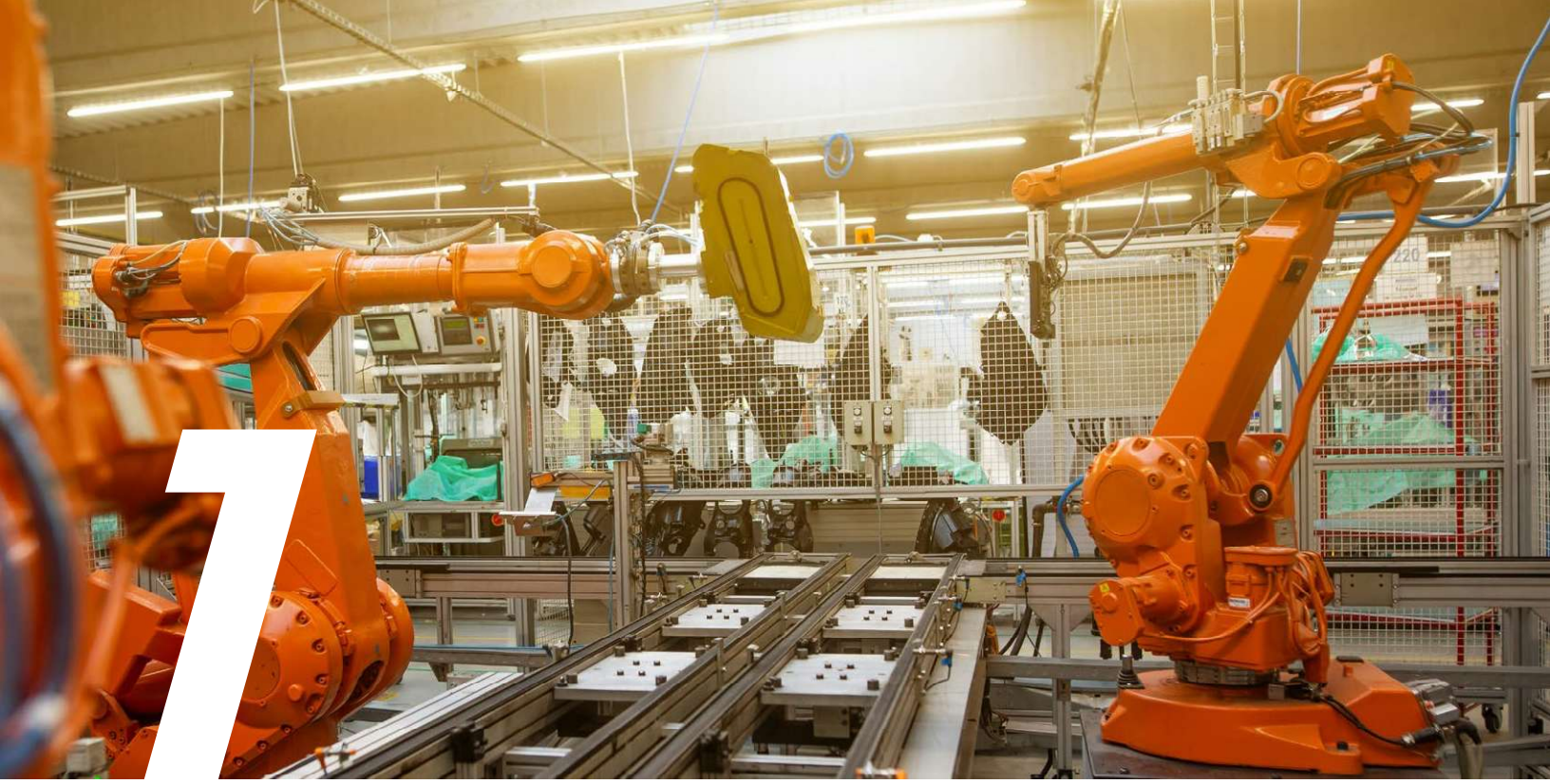
Private 5G isn't just a marginal play – it's proving its value in critical industries, and growth is measurable. It is set to be a foundational component of enterprise infrastructure.

Barriers to adoption are getting lower

The industry is converging on repeatable architectures and blueprints; some setups can go live in minutes, using integrated COTS solutions, rather than bespoke builds.

Convergence of 5G, edge compute, and AI

Private 5G is increasingly a foundational layer in the "intelligent" stack, integrated into federated cloud-edge infra capable of orchestrating multi-network deployments.



1

The analyst view – is private industrial 5G "just a niche"?

Private 5G is often dismissed as a niche – slow, complex, and commercially uncertain – but this view misses the point. As analysts argue, its real value lies in transforming mission-critical industries, aligning with emerging AI-driven automation, and delivering genuine growth in a flat telecoms market.

Here is a replay of a recent conversation. So someone said to me that private 5G is "just a niche" market. *And no, it wasn't Justin Hotard, although it might as well have been; and Nokia's restructure last month – which has seen the Finnish vendor place its prize private 5G unit on the chopping block – casts a new shadow on this article.* But they said it like it was a bad thing – like it doesn't make any money, or not enough money anyway. They might have added that it's really complex, really difficult, and frankly too much like hard work. And the response was, 'well, yes, it is a niche market; but every market is a niche market'. *Right?*

Because private 5G sits inside the bigger 5G market, which sits inside the broader cellular market, which sits inside wireless, which sits inside the entire comms industry. And at the same time, it's also part of the IoT story, and part of enterprise networking – which in turn is part of the great big universe of enterprise tech. You get the point: everything is a niche. Industrial AI, generative AI, agentic AI – all niches. And private 5G, within its own niche, contains multitudes: edge, hybrid, and cloud models; network slices and neutral hosts; local-area and wide-area networks; campus-bound and cloud-connected systems; IT, OT, and IoT; off-the-shelf, fully bespoke.

And potentially – eventually, via versions of it – every enterprise in every vertical under the sun. (Someone else said there are 11 million more enterprise venues to connect.) Which is why it is complex and difficult. But that's the point. Like IoT, like OT, and like every serious enterprise venture, it has to reflect the real work it's deployed to do – and the realities of the industries doing that work. But more importantly, it's fascinating and valuable – arguably the most interesting part of the telecoms landscape right now. Like we said in response to Nokia's new scorch-the-earth policy, as it clears everything except its big mobile and fibre divisions, private 5G punches above its weight.

Private 5G isn't just about telcos building a few networks to push a few billion handsets every five years. It's about changing the real economy – the factories, ports, mines, and warehouses that make and move physical things; the schools, hospitals, and offices that create ideas, solutions, and businesses. It's also the one part of the telecoms world that's genuinely looking outwards – at how connectivity can transform industries, not just itself. It's where 5G is being tested, pushed, and proved. In a way, it's why 5G exists at all: to support the kind of high-end, mission-critical applications that enterprises demand.

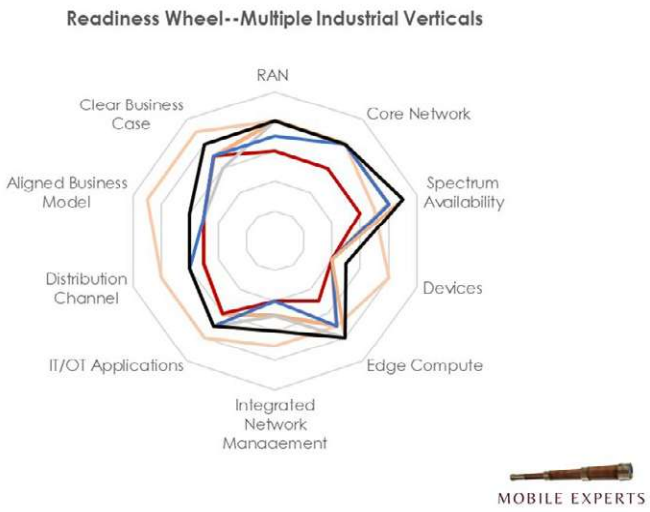
Consumers don't need critical IoT or industrial AI or performant TSN – but businesses do. And the most demanding ones need it to run on private networks. So no, it's not just a niche. It's a deep seam of innovation – with crossover impact across every layer of the economy. It's also, for what it's worth, the one part of the 5G market that's actually growing. Dell'Oro calls the market "very large and mostly untapped". SNS calls it "one of the few bright spots in a gloomy telco industry". But yeah, it's about enterprises – and so it is complicated and it is going to take time.

All of which is a rather emotional response to a familiar grumble about a difficult sector, which informed the intro address at Industrial Wireless Forum in November. And so, in light of the tone, and any accusations that it is somehow polemical or partisan – and also just because the Nokia mothership appears to have put a kaibosh on its smartest side-hustle – *RCR Wireless* phoned around, asking the same question: is private 5G just a niche market? And here are the reasoned responses from impartial market watchers with a proper grasp about what on earth is going on in private 5G right now...

Joe Madden, principal analyst, Mobile Experts:

"It is tempting to agree with this dismissive comment because private LTE/5G has been slow to grow. But I believe that the negative view that people have is a reaction to overhype in the 2019 timeframe – so many companies were promoting the idea that the 5G standard was going to release a huge latent market for private communications, and that didn't happen. The expectation was that private 5G was the only thing needed for the market to grow. The reality is that private 5G is one piece of the puzzle, and edge computing, devices, software integration, and business model maturity are all needed for this new business to grow.

"We've created a diagram to illustrate this concept. In the diagram, all of the spokes of the 'readiness wheel' need to be in place for the market to roll. Today, many private 5G markets have a 'flat tire' because devices are not ready, or because software for IT/OT integration is not developed. Multiple solutions will compete in the market, ranging from local dedicated radios to network slicing. As with any complex market, one size does not fit all opportunities. Mobile Experts splits the market into 13 different vertical sectors, and we find that network slicing will be ideal for some (such as drones, public safety, transportation) but dedicated radios will be ideal for others (manufacturing, logistics, oil & gas).



"A few of these sectors have already become fairly mature, and the software/devices/business model are in place, allowing for significant growth. Other sectors are still waiting for maturity in devices or software and remain in the proof-of-concept stage today. Mobile Experts has just published a technical study on how AI/ML will drive requirements for Private 5G. AI models started with language models to assist with information search, which led to large centralized models. But the AI models are quickly moving into smartphones with small language models (SLMs) and into drones/cars/robots where AI inferences are done locally. There's a massive movement in AI to support physical automation, not just information automation.

"Of course, physical devices have new constraints related to size, weight, and battery life. Increasingly, the AI models running on end devices like smartphones, robots, drones, cars, and other devices will need to access data from other sources, or access a data-lake that's bigger than on-device storage can hold. This means that low-latency, high-reliability wireless communications will become indispensable over the next 10 years. It won't be immediate, and it won't happen in all sectors of the economy right away. But a few leading applications (like AI agents on phones, AGVs in warehouses, and drones) will drive a combination of AI and private 5G.

"By 2040, we project that the private cellular market will grow to the range of $30 billion in equipment every year and hundreds of billions of dollars in annual service revenue. Getting there is not a straight road, but a collection of winding trails that will converge over time."

Pablo Tomasi, principal analyst, Omdia:

"Overly-hyped expectations and a wrong assumption about the existence of a single global market has been hurting the development of private networks. While there are challenges, one way to appreciate the long-term value of this market is by looking at the wide set of critical and high-demanding verticals that are embracing this technology.

These include mining, oil and gas, public safety, ports, and defense.

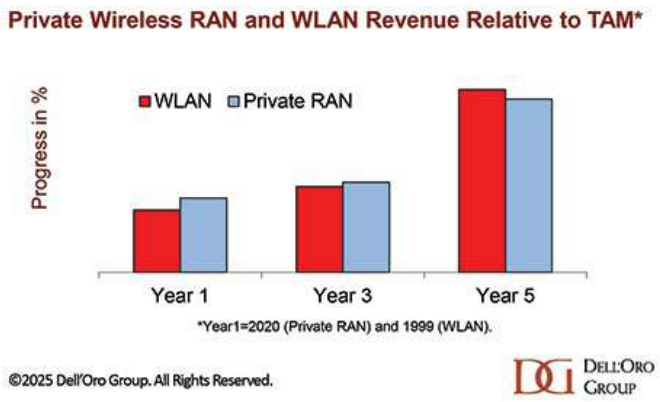
"The fact that some of the most demanding verticals are choosing private networks shows that this technology brings unique benefits well beyond what is delivered by other connectivity options. From there, a process is underway to learn lessons and tailor products to bring those benefits into similar opportunities."

Stefan Pongratz, vice president, Dell'Oro Group

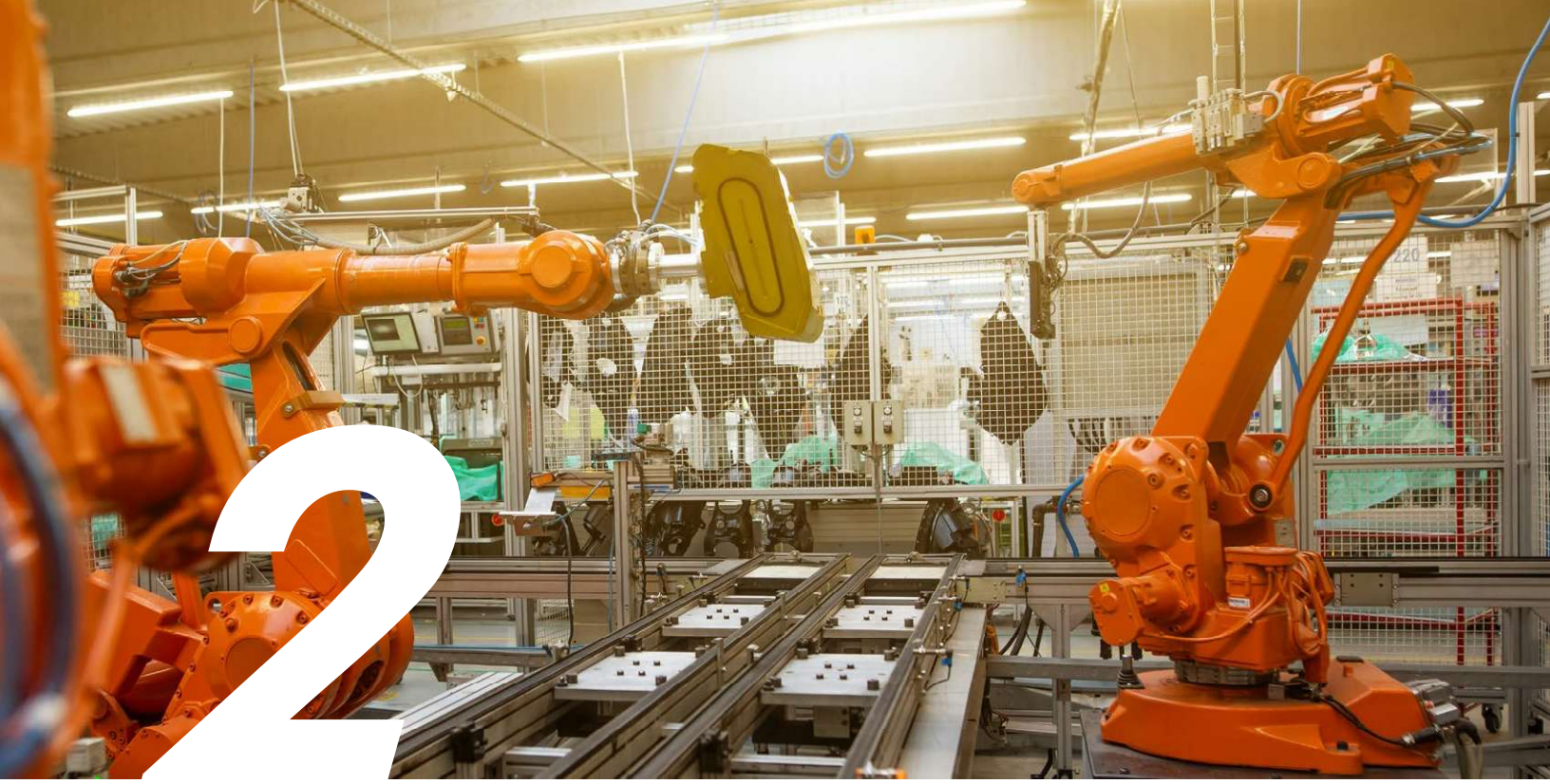
"We agree, partially. Our take is that the opportunity for private 5G/6G is large – in the $20 billion range just for the RAN, and even larger when including services and other parts of the network. Opportunity is not the same as a forecast. Adoption varies significantly across the verticals, and it will take some time for private RAN to move the broader public RAN needle. So, it will be a niche technology in some verticals, while adoption will be high in others. Reviewing the current state, it is clear that private wireless is on a very different trajectory than the broader public RAN market.

"Preliminary findings from our recently updated private wireless report suggest that the positive momentum driving the roughly 40 percent increase in 2024 extended into the first half of 25, with worldwide private wireless RAN revenues accelerating rapidly in the first half. Although private 5G adoption is still in its early stages and will take time to materially impact the overall RAN market, we estimate that private RAN accounted for a mid-single-digit share of total RAN revenues in the first half of 2025, up from a low single-digit share in 2022.

"Overall adoption is mostly in line with expectations when we include both local and wide-area networks. While it is true that this is partly because expectations, especially with the campus segment, have been muted in this initial 5G phase, it is encouraging that private wireless as a share of the TAM is tracking closely with the trajectory of enterprise Wi-Fi adoption in its first five years.



"At the same time, the industry has pivoted. Clearly, the success with WiFi in the carpeted enterprise is constraining the upside with private cellular as a Wi-Fi-plus alternative. But when it comes to wide-area mission-critical networks, public safety, power utilities, railways, mines, ports, or 5G adoption in large industrial Chinese enterprises, private cellular is already moving above the noise. In other words, the upside is limited in areas where Wi-Fi performs well. However, the opportunity for private cellular networks remains significant in environments where Wi-Fi cannot meet performance requirements. This segment is already driving market growth, and the outlook remains healthy."



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Scaling private 5G – navigating spectrum, blueprints, and ecosys-

Private 5G is becoming a key pillar of industrial digitalisation, and yet it still presents problems for global enterprises in terms of spectrum regulation, radio design, and ecosystem partners. Deploy-ment blueprints are hard to come by, but not out of reach – reckon China Mobile, XCOM RAN, Moso Networks, and the GSA, which joined a panel at Industrial Wireless Forum to discuss a playbook to take private 5G from pilot sites to global fleets.

Private 5G networks are no longer just a niche experiment in just a few high-tech sectors – they are rapidly becoming a global patchwork of infrastructure for new Industry 4.0 pyrotechnics in ports, factories, mines, and warehouses. A panel discussion with China Mobile, XCOM RAN ('by Globalstar'), Moso Networks, and the Global Mobile Suppliers Association (GSA) at Industrial Wireless Forum in November considered how enterprises and operators can navigate spectrum access, deployment models, and broader ecosystem challenges to scale private 5G networks effectively.

Spectrum availability remains the single most critical enabler for private 5G adoption. Speaking during the session, Joe Barrett, president at GSA, highlights the geographic trends around private 5G deployments. At the end of September, GSA calculated there were 1,800 private 5G (or 4G) deployments in total – only including fair-sized projects (over €50,000), only counted per enterprise, only covering standalone / hybrid deployments (no slicing), only considering geographies outside of China, and only based on members' data (from Nokia and Ericsson, plus others).

Which is a long disclaimer, of sorts, acknowledging the GSA stats are not definitive; but as a tightly managed data set, they are valuable as a fair reflection of the rate of growth in the market, and also of the provenance of the growth. Barrett suggests most of the growth can be traced to "the countries that have made spectrum available for private mobile networks". He says: "Europe is the big driver; around 36 percent of all the networks we are tracking are in Europe. North America [is] around 33 percent… and Asia Pacific [is] 16 percent."

Spectrum gateway

Enterprises are adopting private 5G because they need their operational (OT) network infrastructure to deliver better performance, reliability, and security than they get from best-effort enterprise wireless systems or general-purpose public cellular networks. They want both total control and supreme flexibility, as well as proper service guarantees. The proof that private 5G is delivering on these demands is that enterprises are starting to deploy private 5G across multiple sites, says Barrett – to bring greater consistency as well as better performance.

"Some of those networks are across multiple sites, which makes it a lot easier for users to move between sites and maintain the same level of control, performance, and security," he says. Deployment models, as an extension of the discussion, vary by region, of course, and are typically shaped by spectrum licensing policies. Mid-band spectrum has been the focus of regulatory efforts in certain markets to make spectrum available directly to enterprises. Barrett highlights a chunk of the so-called C-band at 3.3-3.8 GHz, which has been the sweet spot for regulatory efforts.

This incorporates the shared CBRS band in the US, of course, plus the seminal 3.7 GHz provision in Germany, and extends

in the retelling to the 3.8-4.2 GHz band, as well, as boldly offered in the UK – which is the mooted model for Europe-wide standardisation. Barrett also notes interest in higher frequency bands, such as 26-28 GHz, and even legacy LTE bands. "Half of the networks that we are tracking are actually 4G LTE networks," he says. Which will be the case until late in the decade, when 5G deployments tilt the balance.

Stephen Leotis, president and co-founder at CBRS specialist Moso Networks, highlights lessons from the 'innovation band' in the US. "CBRS has been a wild success," he says. "There's been tremendous growth in enterprise networks due to its adoption… It has been a catalyst for both private LTE and now private 5G [in] manufacturing, logistics, transport, education, and healthcare. Enterprises can… take advantage of these cellular capabilities without… costly licensing or deployment models… [which has] really democratized access to cellular connectivity."

But private networks are hooked up to all kinds of spectrum, strategically and opportunistically. Globalstar-owned XCOM RAN, also on the panel (and also covered separately) uses its parent's satellite licences in the S-band, including an 11.5 MHz chunk at 2.4 GHz, designated in 3GPP (for LTE/5G) as Band 53 (or n53 for 5G-NR). "The MSS spectrum has an ancillary terrestrial component… for terrestrial services," says Murat Erkam, senior director of product management at XCOM RAN. "We [can] provide this to enterprises and [industries] for private 5G networks."

It is worth considering that this is a mostly-western non-telco view. China Mobile International (CMI), also on the panel, argues that the carrier-led spectrum model works well – as per its record in its home country. (CMI's account is covered in a write-up of another session.) Of course, one might point to other explanations for China's success, too, and CMI's whole import/export strategy – to help Chinese firms with private 5G abroad, and overseas firms with private 5G at home – relies in part on navigating fragmented global spectrum regulation and supply ecosystems.

Blueprints to scale

Which carries the discussion, well-managed at Industrial Wireless Forum by host Leo Gergs from ABI Research, neatly into one about how to scale private 5G deployments to new venues, applications, and geographies. Sam Bao, deputy head and director of technical services for CMI in the UK, explains his firm's pitch to Chinese enterprises going into foreign markets. "We serve many Chinese clients in international markets. Many of them, especially those with manufacturing bases, or ports and mines, [want] private 5G networks, and we provide a turnkey solution."

He says: "There are different regulatory environments, and so it depends where they are. But we work with local carriers, as well as with application vendors in all industries…. We have lots of [experience and partnerships] to meet the end goal – which is the application on the network, which enhances the enterprise's efficiency, safety, security. The client wants to focus on their core business [rather than navigate the local ecosystem], and so they want a turnkey solution. And we can [provide that] because we've been doing it in China for many different industries."

CMI's turnkey solution is described as a unified private 5G service platform, which application vendors can plug into and enterprises can select and manage services from. "We create an overall solution for enterprises," says Bao. Next to him, Erkam agrees. "Enterprises are focused on what they can do with the private network – [which is about] the application [on top]. But [the network] is the highway to connect everything," he says, noting as well that a part of the discipline when commissioning new private 5G systems is to decide which workloads go where.

"It is not a one-size-fits-all situation," he says, suggesting that enterprises are increasingly putting critical operational traffic onto private 5G, and routing standard administrative back-office IT functions over old Wi-Fi systems. "In industrial settings, private 5G has emerged as a leading connectivity option for a lot of these businesses. Which doesn't mean they won't use Wi-Fi for other purposes." But that decision, about private 5G for whatever ends, quickly cascades into questions about spectrum, architecture, ecosystems, applications – as per the Bao's comments.

It is also about money, of course. Erkam says: "Once the spectrum is clarified, [enterprises] have to look at their finances and ROI analysis – about how much business [private 5G] will bring to them, how long it will take to break even, and

"You can design or architect once, and then deploy everywhere... You can have an architecture stack – comprising the core, RAN, SIM management, security, even the IT/OT integration – and build a blueprint... [so] once you get it deployed, you [have] the ability to manage it everywhere."
– Stephen Leotis, Moso Networks

how much growth [their initial investment] will support. So there is a lot to consider, and it is not an easy answer. But it is doable; many enterprises have done it many, many times – and if you do it the right way, then there is light at the end of the tunnel." But rather like Bao's 'turnkey solution', Leotis reckons there is an easy framework.

He emphasizes the importance of creating repeatable technical blueprints and deliberate operational procedures. "We are creating this idea that you can design or architect once, and then deploy everywhere… You can have an architecture stack – comprising the core, RAN, SIM management, security, even the IT/OT integration – and build a blueprint… [so] once you get it deployed, you [have] the ability to manage it everywhere."

He zooms out: it typically takes a couple of pilot sites, he says, to scope a custom problem and devise a bespoke solution, which is then mapped into the radio requirements and architectural cues from local spectrum provisions, and then checked and scaled nationally, or reworked and scaled internationally – and then managed consistently across multiple sites from a single operations centre, whether by internal or external teams. In the end, the discipline with such deployment blueprints is to standardise what you know, and allow flexibility for what you don't know.

The solution, says Leotis, is a "standard network architecture" that flexes around spectrum provisions and radio design, and which can be wrapped up post-deployment in a simple management platform. The finer details are invariably worked with system integrator (SI) partners, he says. "We are creating the technical templates and operational procedures with our integration partners so they can take these pilot systems and really scale them across all their business locations. And once you get it deployed, you need the ability to manage it everywhere."

The AI incentive

But complexities with spectrum and design won't just vanish. Even as they become more familiar, new challenges will emerge – sometimes dictated by enterprise requirements, sometimes governed by regulatory or technical headwinds, mostly solved collaboratively. Bao says: "It's a collective effort from the regulator, the operators, and from industry ecosystems." Barrett at GSA raises the issue of spectrum again, and Bao chimes in about discussions around new wireless allocations at 6 GHz – which could go one way in China (5G) and another in the US (Wi-Fi).

Barrett also talks about reduced-capability 5G (5G RedCap) and non-terrestrial satellite network (NTN) comms; Bao talks about the availability and cost of industrial-grade 5G chipsets, modems, and devices. And then the discussion switches to AI, of course, and then draws to a close. But the AI discussing is worth hearing, again, just in relation to the opening dialogue about growth and scale. Erkam says: "AI is going to drive the implementation of private networks, especially where physical manifestation of AI becomes critical." Meaning industrial robots, in other words.

He says: "That will require on-prem capabilities – inference at the edge, processing at the edge, applications at the edge… [It will require] dedicated connectivity [and] also compute,… [and enable] more private networks across different industries globally."

3

"Very affordable and very quick" – plug-and-play private 5G

Private 5G has long promised Wi-Fi-like simplicity for industrial networks. At Industrial Wireless Forum, Moso Networks and partners Druid Software and X2nSat argued that promise has finally arrived: plug-and-play blueprints, three-minute deployments, and easily scalable 5G for enterprises of any size.

How long has this market been trying to devise a definitive set of design blueprints to facilitate the easy deployment and scale of private 5G systems in Industry 4.0? For ages, right? Well, maybe it is getting somewhere, finally. This was the subject of another good session at Industrial Wireless Forum a couple of weeks back, and the response from US-based Moso Networks to a final question, about whether some kind of mythical plug-and-play of-the-shelf industrial-grade private 5G blueprint is really out there, sought to conclude the whole matter. Yes – was the answer.

Let's replay the conversation. So for the record, cut to the chase, because this industry has talked about an 80/20 rule for modularity versus bespoke design and integration for years: is the idea that you can copy and paste 5G across enterprises and industries a promise or an ambition? Is this a 1.0 version or a final blueprint? Stephen Leotis, president and co-founder at Moso Networks, responds: "We are beyond 1.0; version 1.0 is let's-try-it-out-at-a-site, kind of just-past beta. We're delivering these networks with the partners to many different verticals."

He goes on: "It is a real thing today; copy-paste blueprints. [And] an opportunity for any company of any size that wants to test or scale private 5G. We can help enterprises get started – as a managed service provider delivering networks to enterprises. In turn, enterprises can get access to this technology very, very quickly. We want enterprises to get past that barrier. They can get started with this technology to solve these problems, and it doesn't have to take millions of dollars to do it. It can be very affordable and very quick."

All-in-one access points

US-based Moso Networks offers all-in-one RAN access points that pair with sundry core network solutions for "Wi-Fi-like" private 5G deployments. It works mostly in the CBRS market in the US, and claims 'mission-critical' deployments with large and small enterprises – including campus deployments at critical grid chokepoints for unnamed utilities on the US east and west coasts, as discussed during the session. These utility projects have been undertaken with Ireland-based core network provider Druid Software and US satellite and cellular integrator X2nSat.

"The market needs vendors to simplify the configuration of the RAN, and also the core – so it is something enterprises can use. We've done that at Druid over the years... We've seen how fast you can stand-up the Moso RAN in comparison to other vendors that we've worked with over the years."
– Fergal Concannon, Druid Software

Both Druid Software and X2nSat are on the panel with Leotis at Industrial Wireless Forum – in the forms of Fergal Concannon, vertical business development manager at the former, and Garrett Hill, chief executive at the latter. Together, they make the case. Concannon says: "The market needs vendors to simplify the configuration of the RAN, and also the core – so it is something enterprises can use. We've done that at Druid over the years… We've seen how fast you can stand-up the Moso RAN in comparison to other vendors that we've worked with over the years."

As a point of reference, RCR Wireless is about to host another session at Industrial Wireless Forum with Druid Software, to talk about time-sensitive networking (TSN) on private 5G – about complexity, rather than simplicity, in the core network. So what gives? Concannon responds: "Yes, but even with that, it has to be [usable] by OT staff. It's complex under the hood, but quite straightforward on top. We are supporting all the features through the backend of the core, but we are presenting it so the end users are not lost in 3GPP terminology when they look at a screen."

Leotis says the same. "We have been focused on building a solution that is as simple as possible – which is as plug-and-play as possible. Which means removing the complexity of cellular deployments – so extracting all of the 3GPP jargon-items – and getting networks up in a matter of hours, and not weeks or months. We've been working on this idea of repeatable networks… [in order] to eliminate those barriers from day-zero installation through to day-two management." He has an anecdote to illustrate this new 5G simplicity – shorn of jargon, pre-integrated for set-up.

"We have some customers doing pop-up networks for broadcasting and other on-demand scenarios, which have had networks that take 40 minutes to come up, and they fire up our system in three minutes – which is the time from powering-on to connecting devices. We've had this incredible a-ha [response], where you walk into meetings, put an AP on a desk, and fire it up… We are simplifying the architecture with partners like Druid – going from large backend servers and complex LAN integrations to just an access point, or an access point plus a small compute [function]."

Boots on the ground

Hill at X2nSat is the boots-on-the-ground in Industry 4.0, effectively – and for this trio, and this panel. How does the Moso/Druid set-up compare with every other system in the market? "The legacy vendors [traditionally] provide large and complicated software and hardware… [But] enterprises are focused on compatibility, predictability, security… Moso and Druid know this space… An enterprise might not have a team of 400 people managing the RAN, right? It could be a part-time job for one IT person… The expectation is the technology is similar to what they already use.

"[So] there are really two different types of [private 5G] products, which come from different perspectives, and you can start very small with [this system]. It doesn't have to be a multi-million dollar initial-buy; you don't have to think about every aspect of cellular from the start. You can just jump in and start doing things, and then evolve as you go. I think when we talk about simplicity, it is more about flexibility – in that you don't have to [decide everything on] day-one, and then get trapped a year into your deployment [because you need a] major forklift upgrade."

So what about those utility projects with Moso and Druid, split across both coasts? Hill explains: "We are dealing with a number of utilities on both sides. They have remote areas with cellular assets with no cellular coverage. We've put in LEO satellite systems for backhaul, attached to outdoor cellular; think of a lake or a powerhouse, or a dam – for security cameras or voltage regulation, or door and gate access. And it is a nice solution, covering a service area of [anywhere between] a few acres and a few kilometres, beyond what they can serve with Wi-Fi."

Leotis chimes in. "These industries – energy, oil and gas, utilities – traditionally need large-scale coverage. But… [they also have] assets in different locales, and don't historically have any cellular expertise. So we're deploying a mission-critical redundant system for connectivity over the X2nSat satellite connection. It is simple, but it also doesn't strip away all of those mission critical functions – redundancy, data security, sovereignty; all this stuff you're getting with these networks."

He adds: "Hopefully the market starts to understand that it doesn't need these heavy-lift macro-derivative products; that they can deploy these all-in-one radio access points, maybe with some minimal compute on site."

"You can start very small. It doesn't have to be a multi-million buy; you don't have to think about every aspect from the start. You can jump in and start doing things, and then evolve. When we talk about simplicity, it is more about flexibility. You don't have to [decide everything on] day-one."
– Garret Hill, X2nSat

4

Orchestrating multi-network industrial deployments at scale

Europe's digital sovereignty ambitions extend beyond cloud and data policy into the nuts and bolts of Industry 4.0 network orchestration. Through initiatives like IPCEI-CIS and 8RA, organisations including Reply Adeptic are building a federated cloud-edge continuum that can orchestrate multi-vendor, multi-network deployments at scale, embedding AI, automation, and interoperability to power next-generation industrial applications.

Europe's push toward digital sovereignty is often framed around cloud infrastructure, data protection, and geopolitical autonomy. But beneath the headlines, a more technical – and maybe more transformative – shift is underway: the creation of a federated cloud-edge continuum capable of orchestrating complex multi-technology networks for the most demanding industrial environments.

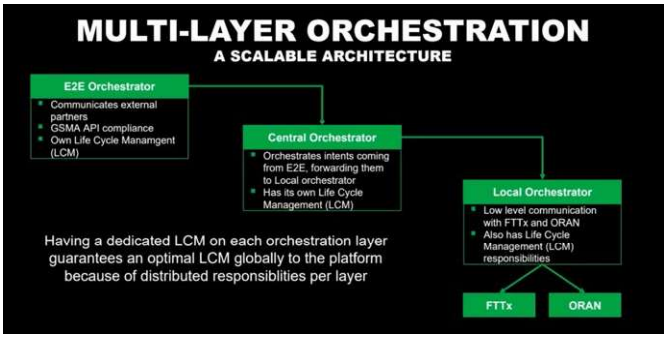
This is the ambition of the IPCEI-CIS (Important Project of Common European Interest for next-generation Cloud Infrastructure & Services) and 8RA initiatives, two linked programmes involving more than 100 organisations reshaping how Europe deploys and operates distributed compute, connectivity and data services. Among the contributors is Italian outfit Adeptic Reply, part of Turin-headquartered consulting and integration firm Reply.

Adeptic Reply's work focuses on a foundational challenge in this new ecosystem: how enterprises monitor and orchestrate multi-vendor, multi-cloud, and multi-network deployments at scale. At Industrial Wireless Forum in November, Gabriele Losposto, lead architect at Adeptic Reply, set out the architecture and rationale behind its contribution to the 8RA project – and provided a view from inside one of Europe's most ambitious cloud-edge programmes, and a glimpse of how industrial connectivity will evolve over the next decade.

Why multi-network orchestration matters

But it is probably worth understanding why network orchestration is even part of a cloud-sovereignty project, first – before getting into the bones of the 8RA initiative. Modern industrial environments do not rely on a single connectivity domain, of course. They variously combine private 5G for deterministic latency and mobility, Wi-Fi for best-effort indoor coverage, LoRaWAN and other private IoT technologies for sensor comms, and non-terrestrial (NTN; satellite) systems for out-of-reach operations and fallback.

Throw in Ethernet and FTTx for LAN access and fixed backhaul (or midhaul where software control is possible) – plus a bustling stable of local compute nodes and infrastructure componentry, tightly coupled to the network to raise security, control, and performance, including for incoming AI workloads – and industrial enterprises have a veritable spaghetti-junction of networking technologies at the edge, connecting to the cloud, and back again into another networking mish-mash at another site, multiplied across their global footprints.



Europe's cloud-edge AI future – left, multi-network orchestration for Industry 4.0 sovereignty; right, multi-network orchestration for Industry 4.0 sovereignty

Of course, these networks are often owned or managed by different providers, as well. As enterprises seek control and visibility over their systems, in order to load them with performant AI tasks, and as Europe pushes a federated cloud-edge agenda, interoperability is the only game in town – the table stakes just to play; to make a sovereign cloud-edge continuum function transparently and efficiently at scale. Interoperability is a prerequisite, and not an optional extra; so are observability, automation, and orchestration.

This is where Reply Adeptic's work fits into the broader European agenda. As Losposto explains, the goal of 8RA and IPCEI-CIS

is to enable "a sovereign and competitive European cloud ecosystem… [that is] able to ensure interoperability and portability". (Note, his quotes have been smoothed for clarity.) Network orchestration is part of that portability, to be able to move applications, workloads, or services from one environment to another with minimal friction, without having to rewrite, reconfigure, or otherwise heavily adapt them.

A three-tiered orchestration model

Reply Adeptic's contribution is centred on an orchestration platform built to manage distributed resources across cloud and (network and on-prem) edge environments – with an equal focus on deployment and observability. At Industrial Wireless Forum, Losposto explained the platform in three layers, as below (see slide graphic also).

1 | End-to-end orchestrator – the federation layer

At the top sits the end-to-end orchestrator, responsible for interfacing with external organisations, enabling cross-domain federation and handling the first stages of application lifecycle management. "It's based mainly on standard interfaces like GSMA APIs," Losposto notes. At this layer, applications are defined, deployment intents created, and the system decides which sites or resources will be involved.

2 | Central orchestrator – the coordination layer

Below that sits a central orchestrator, an intermediate coordination tier responsible for translating high-level application requests into actions executed across multiple local domains. This layer is where Reply Adeptic manages service-level requests and ensures they are routed to the appropriate local orchestrators across private 5G setups, Wi-Fi domains, industrial gateways, and sundry edge clusters.

3 | Local orchestrator – the infrastructure layer

At the lowest level is the local orchestrator, responsible for communicating directly with the underlying network and compute infrastructure. This includes interacting with FTTx systems, O-RAN components, Kubernetes clusters, and virtualised network functions. "This is… where we directly interact with the infrastructure," says Losposto. Each layer includes a dedicated lifecycle manager to enable the system "to be very optimal when deploying applications on different sites" – which is a key requirement when dealing with distributed industrial networks.

Dual-flow deployment and observability

The architecture uses intent-based orchestration, a concept borrowed from cloud automation and increasingly applied to networking. Enterprises express what they want (not how to do it) through a structured intent file (expressing their high-level goals), and the system reads the file and figures out which sites, networks, and compute resources are needed to satisfy the intent. It then automatically deploys the workloads onto Kubernetes-based edge clusters using GitOps practices, which track changes and ensure repeatable deployments.

Central to the architecture is a data model that defines a shared representation of applications, resources, and configuration. In a multi-vendor system, these shared models act like a Rosetta Stone, allowing different software components and network elements to interpret the same instructions consistently, even if they come from different vendors. This combination – intent-based deployment, shared data models, open-source orchestration – means the system can autonomously deploy and manage applications across diverse sites and networks.

In the end, a federated cloud-edge ecosystem is not possible if every industrial site or network vendor implements orchestration differently. Which is why IPCEI-CIS places so much emphasis on interoperability – and open interfaces and standardisation. And while application and network configuration flow downward through the orchestration stack, observability

flows upward. Metrics and logs from edge clusters, network controllers, and radio units move from the local orchestrator up through central and end-to-end layers, enabling cross-domain visibility.

Losposto explains: "Once the application has been deployed… monitoring capabilities send relevant information back to the orchestration layer." This allows each layer to make informed decisions — not just on performance, but also on SLA compliance and predictive maintenance. This dual flow – intent down, telemetry up – creates the conditions for closed-loop automation, a core aspiration of both telecom and cloud-native architectures.

Where AI fits into the orchestration loop

Artificial intelligence (AI) is embedded throughout the lifecycle of Reply Adeptic's orchestration platform, acting as a continuous enabler across planning, deployment, runtime management, and monitoring. At the planning stage, AI supports site selection. "AI supports site prediction when choosing the right location," Losposto says. The system evaluates the characteristics of potential sites, network conditions, and infrastructure capabilities to recommend optimal deployment locations for workloads, a task too complex for manual evaluation across multiple sites.

Once applications are deployed, AI continues to influence operations in real time. Runtime network adaptation, for example, allows the platform to dynamically reconfigure network parameters to meet service requirements or perform automated failovers in response to outages. Predictive analytics generate alerts to prevent service interruptions; AI-driven workload distribution ensures tasks are allocated optimally across clusters. So AI doesn't just automate tasks, but actively maintains performance and resilience across a sprawling, heterogeneous network footprint.

In multi-network, multi-site environments – such as manufacturing plants, transport hubs, or autonomous systems – this intelligence becomes essential. Variables such as network conditions, mobility of devices, latency demands, and compute resource availability fluctuate constantly. Hands-on manual management does not keep up. AI allows orchestration to scale and adapt automatically, ensuring that applications have the network and compute resources to perform reliably. All of which is particularly valuable in critical industrial use cases.

Losposto highlights sectors where these architectures are most applicable: autonomous vehicles, manufacturing, and transportation. Here, applications cannot function in isolation – they must constantly interact with the network. A robot on a shop floor might require seamless handovers between private 5G and Wi-Fi networks, for example. A logistics hub may combine LoRaWAN sensors with satellite redundancy to maintain oversight in remote areas. Rail systems might deploy low-latency edge compute nodes across stations to support signaling and information services.

Each case presents heterogeneous networks that must operate in a coordinated manner – which is the whole orchestration challenge that Reply Adeptic is looking to address.

Cultural barriers and commercial roadmaps

And yet, the greatest barrier is not technical, observes Losposto. "The biggest challenge is to create a basis for interoperability," he says. Diverse vendors, competing priorities, and inconsistent interpretations generate friction. The company's role in the IPCEI-CIS / 8RA project is to align stakeholders – to "share needs, requirements, and goals [and] find a common way of working". By bringing together vendors, integrators, operators, and cloud providers, the project is intended to enforce consensus around data models, interfaces, and lifecycle management – to ensure that AI-driven orchestration can operate seamlessly across Europe's federated cloud-edge environment.

Reply's work is currently in a research and development phase, expected to last around three years. After that comes industrialisation, and ultimately a deployment phase stretching "more than 10 years across Europe". For a project spanning multiple countries, network domains and industry verticals, this timeline is unsurprising. The cloud-edge continuum is not merely a technology stack; it is a new operating model for European digital infrastructure.

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Deploying agentic AI for industrial networks and operations

At Industrial Wireless Forum, industry leaders explored how agentic AI running on private 5G is transforming factories and plants. The discussion highlighted not just the technology, but the architectural, connectivity, and data governance foundations that are essential to turn AI potential into real operational value on the shop floor.

There was a good panel discussion at Industrial Wireless Forum a couple of weeks back about agentic AI on private 5G in Industry 4.0 – to bundle together a bunch of tech buzzwords, but also describe what is being put to work in factories and plants in the name of digital transformation. Jason Wallin, in charge of industrial networking at US machinery maker John Deere, summed it up very well, when asked about the technological pre-requisites to solve Industry 4.0 chokepoints and force-multipliers. "There's three layers," said Wallin. "The first is the quality of the data, right? If you start [any AI] journey with questionable data, you're going to get questionable results, and no better."

Really, the whole discussion could stop there; there is enough work to do in the industrial realm just to get the data right, it seems. Also on the panel, Mike Carroll, formerly with Georgia Pacific, now a research fellow at LNS Research, said: "Most industrial data is not in great shape. Predictive analytics is not reliably predictive. And when you get a prediction, the capability to do something with it is not effective… You get something that's about a quarter effective. So how do you solve that? And it turns out agentic AI is one of the ways." This was the setup on the panel; a response to the first question from host Rosalyn Craven, leading private networks research at STL Partners.

Industrial Wireless Forum panel – from left: Craven, Wallin, Carroll, Shetty, and Cestari

But we interrupt Wallin, somewhere between layer one and two; here is the rest of his explanation about how it all fits together, in service of new agentic AI applications (which are, according to Carroll, the mechanism to solve issues with data quality, as well). Wallin said: "[The point is to have] clean data and an accessible data lake to make that RAG request… The other part that can be problematic is the compute layer above, where you run your inferencing models and the LLMs… There are lots of [inferencing] cases you can use the public cloud for, but when the tolerance is tight, and the tuning is constant and changeable, then the processing needs to move very close to the edge."

He went on: "Many use cases are compute-bound, [which throws the] process time to run through the RAG models… The other piece is the network. Deterministic cellular connectivity… is a key for those tight tolerance cases, and to be able to deliver that AI value immediately back to stakeholders on the shop floor." But there is a bigger challenge, first, noted Wallin, who was also representing the 5G OT Alliance ("a bunch of discrete manufacturers that build things and use private networks to support their manufacturing operations") on the panel. "Technology for the sake of technology is cool, but understanding the business value you want to extract from a process [is the key]," he said.

But for our purposes, in this article, that initial use-case focus is a given; the panel was convened to talk about the digital nuts-and-bolts of running agentic AI on private 5G in factories and plants. Carroll suggested the discipline is as much a cultural one, but also echoed Wallin. He said: "The most important thing is not the technology, because that exists. The most important thing is us – and how we apply it relative to the problem. If you take a position that reasoning at the edge is going to happen – which it will – then the question is how to make it work at the edge. [It] requires connectivity to drive decision-velocity. Latency is the biggest tax that never shows on the balance sheet."

And he went further to explain how AI software agents, if trusted to do the work, can help enterprises smash old data silos. "Information goes up, decisions come down… The problem is the walls are transparent, but the information is opaque – because it's trapped behind the organisational structure. To get at it, you need the architecture… to trust the agent, which is trying to shape the workflow." As it stands, people have to approve every step, which slows decisions. Agentic AI and private 5G fix this by creating an architecture where machines can safely make routine decisions on their own, using

deterministic connectivity at the edge.

Carroll said: "That's the architecture that matters. Instead of gating every permission, because you only trust a human to make a decision… [you deploy software] that's built to do it, with guardrails for intent. That is the problem we're solving – where the connectivity allows the reasoning at the edge, based on an architecture of trust to manage how the reasoning actually functions." The network lets the data flow, the compute draws the insights, and the AI makes the decisions. US private 5G vendor Celona, also on the panel, flipped the discussion the other way, momentarily, to put focus on AI for networking, rather than just networking for AI.

Puneet Shetty, head of product and field engineering at the firm, said: "[Our] Celona Orion [product] is an agentic AI platform… to make private 5G operations as autonomous as possible. The goal is to continuously monitor how devices are doing, what the experience is, and how the devices are interacting with applications – and then to look at all of these KPIs, learn from the patterns, and act on the data. So if a new device comes on the network and the workload shifts, Orion can allocate spectrum, adjust the quality-of-service, and isolate issues that could impact performance." But Celona knows very well about the challenges on the floor side, too, which 5G can help with.

Shetty said: "[The network is often] an afterthought. We have had customers assume that the right connectivity is already there… And then when they actually start to deploy [AI applications], they can't take advantage of them… The only way to upload data has been to go back to the office where there is connectivity. Where they needed it, they did not have it. [The same where] a manufacturing customer had these AI applications that required a certain level of [performance] that their current networks could not deliver – because they were oversubscribed or just not designed for it. So connectivity is often an afterthought. For AI to work, deterministic connectivity is non-negotiable."

He added: "Agentic systems need these real-time observe/act/learn loops [and] private 5G networks are going to be foundational to this. The other critical part, often an afterthought, is how to get data from these legacy systems on which they are deploying AI applications – so data integration with OT systems and IoT sensors, and digital twins. Because situational awareness will be very important for AI. So those are two key things that come to my mind. Connectivity and the ability for data integration with these legacy systems."

Also on the panel, Italian firm Adeptic Reply, part of Turin-headquartered consulting and integration firm Reply, proposed that agentic AI in Industry 4.0 is moving toward a self-optimising architecture, where intelligence is dynamically positioned across the network. Raffaele Cestari, AI specialist at the company, said: "AI can be used in a recursive way… [to] design algorithms that can help to understand the optimal place to deploy [AI] algorithms." In other words, AI doesn't just execute tasks, but helps to determine where other AI agents should reside and run – based on latency, data availability, compute resources, and task criticality.

This creates a layered system where "each layer is optimized… and the output of a layer is itself an optimal solution" – producing an architecture that continuously reinforces its own performance. Adeptic Reply is engaged in a couple of linked

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– Mike Carroll, LNS Research

"Customers assume the right connectivity is already there... And when they start to deploy [AI], they can't take advantage... So connectivity is often an afterthought. For AI to work, deterministic connectivity is non-negotiable."
– Puneet Shetty, Celona

EU projects IPCEI-CIS and 8RA, to orchestrate complex multi-technology networks for the most demanding industrial environments (more here). This idea of recursive intelligence only works if the underlying connectivity is equally flexible and deterministic. Multi-network orchestration – spanning private 5G, Wi-Fi, wired infrastructure, plus edge compute infrastructure – becomes the fabric that agentic systems rely on.

Agents need to access data across machines and locations without hitting silos or bottlenecks. Decisions must be taken closer to the action, with minimal delay – as per the comments from Wallin, Carroll, and Shetty on the panel. European telcos – with embedded urban infrastructure, following European rules about data sovereignty, privacy, security – should be tapped for distributed edge data centres, orchestrated with campus edge sites, as part of a federated approach where data remains protected, but models and insights can still be shared. The tension is between centralisation and distribution of the storage and compute functions.

Cestari said: "If data is managed in a centralized manner, we have to protect just one place… but if we have issues with that place, then we might lose our data." Federation mitigates this risk, but introduces challenges with the data transfer, where encryption and protection are non-negotiable. "Without these standards, we cannot have any solution that is based on AI… everything else becomes useless," he said. The point is that agentic AI requires not just intelligent algorithms, but a trusted, compliant architectural foundation that lets reasoning happen at the edge while keeping data secure, sovereign, and under strict governance.

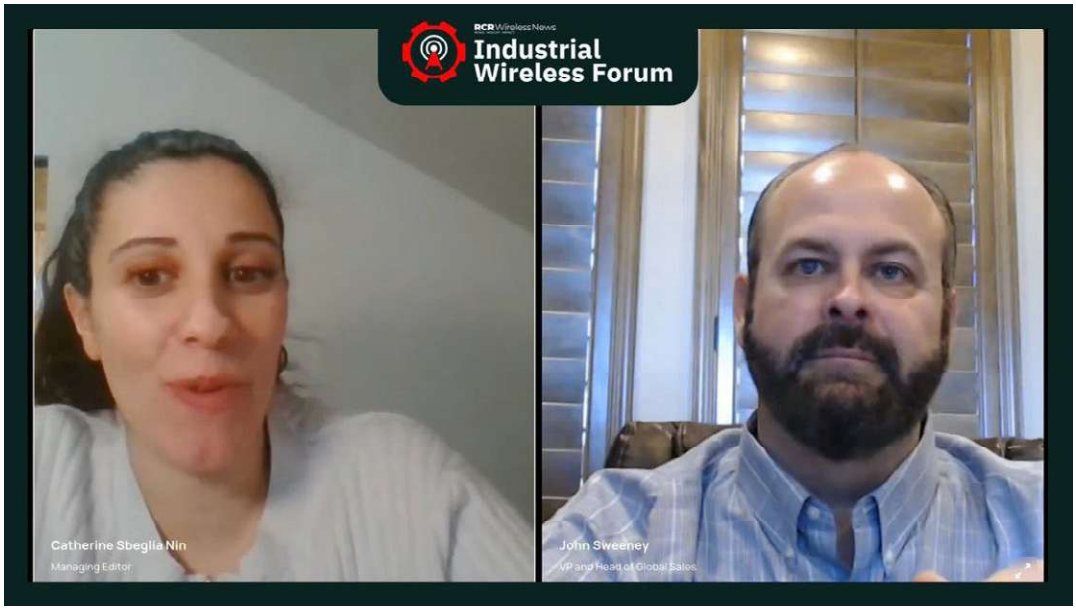
Software-defined private 5G – bridging IT/OT for Industry 4.0

At Industrial Wireless Forum, industry leaders explored how agentic AI running on private 5G is transforming factories and plants. The discussion highlighted not just the technology, but the architectural, connectivity, and data governance foundations that are essential to turn AI potential into real operational value on the shop floor.

If Industry 4.0 – as a broad term to describe tech-geared digital change in industrial sectors – is to work, then the line between IT and OT has to blur, neatly and effectively; old data silos have to be smashed, and distributed hybrid architectures have to be engaged. With private 5G, some of this work is being done, necessarily, as IT and OT collaborate more closely to scope workloads and applications, and integrate new specialist operational (OT) connectivity into general corporate (IT) frameworks.

XCOM RAN, part of US satellite network operator Globalstar, has a twist on the standard private 5G fare, it reckons, insofar as it transposes parts of the radio access network (RAN) intelligence and control to the software, and packages it up as an easily programmable and scalable solution to make mission-critical Industry 4.0 smarter, faster. "We believe [it] is a superior private 5G solution," says John Sweeney, vice president and head of global sales at the firm, speaking at Industrial Wireless Forum in November.

Parent company Globalstar, offering satellite comms in 120 countries, brings complementary assets into the bargain, as well. The firm has been operating a low-Earth orbit LEO constellation since the late 1990s. Sweeney recounts some of the XCOM RAN creation story – about its parent's acquisition of mobile-satellite-service (MSS) licences in the S-band, including an 11.5 MHz chunk at 2.4 GHz (2483.5-2495 MHz), designed in 3GPP (for LTE/5G) as Band 53 (or n53 for 5G-NR) for Time-Division-Duplex (TDD) operations.



In 2023, Globalstar entered into an exclusive licensing deal with edge 5G startup XCOM Labs, led by former Qualcomm execs Paul Jacobs, Derek Aberle, and Matt Grob. Sweeney picks up: "They brought to the table revolutionary and innovative wireless technology for a next generation private 5G solution. So what we ended up with is a very powerful and unique combination… The XCOM RAN solution… is a spectrum agnostic solution, but comes with access to dedicated and licensed spectrum… backed with satellite assets."

The pitch is that its satellite / terrestrial Band 5G spectrum combines with its private software-defined network (SDN) system, based on open RAN architecture, to create a differentiated proposition in the Industry 4.0 market. Sweeney says: "We chose open RAN because we wanted to make this software-defined. We wanted to do the software / hardware disaggregation and put the majority of the intelligence in the software." By abstracting intelligence from the hardware layer, its private 5G solution gains agility and resilience, he argues.

"We took the intelligence – including some from the radios themselves – and put it in the distributed unit (DU). We use a

coordinated multi-point radio system which centralizes the scheduling across different radios, which dramatically improves uplink and downlink performance – even in harsh or dense RF environments." This coordinated architecture enables spatial massive MIMO with "advanced" beamforming, he says, delivering "higher spectral efficiency, extended coverage, higher availability, and improved mobility handoff".

The "so-what" of all this, as Sweeney puts it, is about real industrial transformation. "It is about empowering industrial automation and robotics," he says, citing the case of autonomous drones in various out-of-reach industrial climes – in "ports, inspecting hazardous cargo, you name it", he says. In industrial environments, reliable (predictable, deterministic) performance on the uplink is as important as on downlink – and more important in most scenarios. "Something like 90 percent of data that's collected in IoT sensors goes unused."

He goes on: "It's this data that [will] allow for intelligent edge analysis and closed loop automation… We're focused on mission-critical operations… We're not talking about [connectivity for] downloading TV shows in the airport lounge. This is about ensuring there is no downtime. Because if a production line or a distribution center shuts down or boats line up at a port because the communications are down, [then] you're costing the enterprise tens of thousands if not hundreds of thousands of dollars in lost productivity per hour."

Let's break it down: the implications of private SDN-based systems in licensed spectrum in terms of flexibility and scale, IT/OT convergence, and future AI workloads. "[We] replace your rigid, static hardware-centric cellular system with a software-defined system where the radio, the core, and the edge functions all are [in] software… It lets enterprises and operators evolve and scale [the network] – just like any other IT application; pushing new capabilities, security updates, and performance tuning without actually having to touch the hardware itself."

He adds: "It turns the RAN into something that is agile, programmable, and living – and constantly evolving and improving – rather than a fixed asset that is someday going to be forklift-upgraded." The software shift effectively bridges the IT/OT divide, by making a private OT system compatible with general IT functions in the back office. "We've lived in a world of stovepipes for years. Software-defined private 5G creates a single fabric that connects all the systems, machines, devices, sensors, and people with deterministic performance and low latency."

Because it is architecturally-private, still – as prescribed in the design, as deployed on the shop floor – the network's original OT remit is satisfied. "All that [IoT] telemetry data stays on premise; which means OT maintains ownership, security, data sovereignty – all of which is critical. And then IT gains a standards based system that is perfect for automation, analytics, and AI." Sweeney describes it as a new IT/OT "convergence layer" that "OT trusts for reliability and safety" and "IT trusts for integration, security, and scalability".

He says: "Because the baseband sits on a COTS (commercial off-the-shelf) server, scaling the network is really like scaling a data center application. All you do is add compute, deploy coverage, or push features into the applications – just like anything else via software." The model "eliminates proprietary hardware lock-in, and makes the lifecycle management into more of a continuous development, and continuous delivery engine," he says. The result is both "a lower cost of ownership" and the ability to "innovate at the speed of software".

Plus, by virtue of Globalstar's Band 53 holdings (also let to third-party private 5G vendors), all the deterministic 5G goodness, made effective in an IT-friendly and OT-optimised network system, is reinforced in licensed spectrum. Spectrum remains a critical differentiator, he says. "We are spectrum agnostic; we can do CBRS, we can do pretty much any TDD spectrum – and we prefer TDD because it helps with the uplink and the downlink flexibility…. [But] CBRS is shared, and Wi-Fi is unlicensed, so [performance depends on] who else is swimming in the same lane."

Enterprises have their "own private lanes", he says. "Band 53 gives enterprises or operators licensed interference-free spectrum… Performance is completely predictable, service is assured – even in the noisiest RF environments." The XCOM RAN system is proven, he suggests. Real-world tests and deployments have shown the biggest challenges aren't always technical. "Because the technology works, the surprise isn't so much for us, but for the users – and it really is cultural," says Sweeney.

> "When OT and IT get on the same page, on the same 5G network, then they start solving problems that were impossible with Wi-Fi or siloed systems... You see the cultural shift to embrace, adopt, accelerate IoT and physical AI at a much more rapid pace."
> **– John Sweeney, XCOM RAN (Globalstar)**

He explains: "When OT and IT, and all the automation vendors, get on the same page, on the same private 5G network, then they start solving problems together that were impossible to do with Wi-Fi or siloed systems. And the moment they see deterministic wireless replacing cables, [and to deploy] autonomous forklifts, real-time computer vision, and data analytics at the edge, then you see the cultural shift to embrace, adopt, accelerate IoT and physical AI at a much more rapid pace." And so where does this end up?

Looking ahead, Sweeney foresees "multiple [private 5G] super cells" covering millions of square feet, supporting "AI orchestrations", supported by "satellite backhaul" – all available to enterprises as a simple software upgrade rather than a complex labour intensive "forklift rebuild" of hardware-heavy network systems. He says: "The future for autonomous networks is the ability to self-tune for latency, mobility, energy, and interference. We're no longer talking about five robots or 10 robots at a plant; we're now talking about hundreds if not thousands of them."

The global economy is entering a new AI era, he suggests. "We're looking at an inflection point that will surpass the internet [revolution] at the turn of the century. It is a seismic shift, not just in how factories and ports operate, but how all of society lives, works, and plays." But this AI revolution needs to be connected in private workplaces and public venues of all kinds – in a way that is reliable and trusted. Sweeney says: "It all falls apart if you don't have reliable and secure comms to tie it all together, and to keep up with the speed of innovation."

Cross-border scale for private 5G as industrial demand accelerates

China Mobile International is positioning itself as an enabler of cross-border private 5G deployments, helping Chinese enterprises build advanced industrial networks overseas while supporting global manufacturers entering China. The firm explains how China's operator-led model, vast ecosystem, and turnkey delivery approach are reshaping private 5G adoption across global supply chains.

China's private 5G market is the world's largest and most advanced, yet much of its progress remains obscured (or else just missed in the trade press) from view outside the country. That makes the perspective of China Mobile International (CMI) – the global arm of China Mobile, the world's biggest mobile operator and China's leading private 5G provider – particularly significant as industrial enterprises seek to deploy private networks across borders.

CMI essentially operates as a global systems integration business, hooked into its big parent group in China – much like the business divisions of any tier-one operator. Speaking at Industrial Wireless Forum last week, Sam Bao, deputy head and director of technical services for the firm in the UK (also representing its work in mainland Europe), explains: "We are responsible for all the international business, including support for Chinese businesses settling abroad as well as for international businesses going into China."

As such, he has a unique global view of this market. China's scale is unmatched, of course, driven by tight alignment between policymakers, major mobile operators, and an increasingly mature industrial ecosystem. "China leads the private 5G [market for] deployments… There are about 64,000 private 5G networks [in the country], which is the result of a combination of regulatory and industry efforts," he explains.

"The regulatory support [has] created the ecosystem… and [the industry support] has seen a big effort to push [the solution]. We have worked closely with ecosystem partners, including application partners and equipment vendors, to build the whole ecosystem together. That has been key." The structure of the domestic market is also important, skewing influence towards the carrier community in a way that it, perhaps, doesn't in certain western markets.

Lessons from the China experience

It is operator-led, of course; enterprises do not have any regulatory recourse to access their own private industrial spectrum licences – as happens in the US, via the shared CBRS band, and in Germany, the UK, and certain other European Union member states via regulatory interventions to liberalise various chunks of mid-band spectrum for big domestic industrial operations. In China, mobile operators hold all the cards so far as spectrum goes.

The prime deployment models for private 5G are either network slicing, as a light-touch system where the enterprise gets a dedicated 'slice' of the operator's public 5G network to run their more-critical data flows, or a hybrid or mixed private 5G set-up, where some key functions (especially the user-plane) are deployed locally, on the enterprise site or at the network edge, sometimes with dedicated RAN, while other parts remain shared on the public 5G network.

The so-called 'hybrid' model, the dominant design for private 5G in China, can be pulled any number of ways, essentially, and is engaged variously in global markets where private/shared enterprise spectrum is not available, and also in markets where it is – notably, where operators are starting to roll out public 5G Advanced infrastructure, also with more sophisticated slicing mechanism. (See T-Mobile's recent announcements in the US.)

Bao argues that, contrary to assumptions (press reporting) in Europe or North America, a hybrid-style operator approach can scale internationally. "Carriers lead the private 5G market in China because of the spectrum licensing… Not many countries have industrial spectrum; most rely on carriers to enable the deployment. The model can be mimicked in many countries – even where industrial spectrum is available, and the carriers steer the play."

The argument goes that there is enough autonomy, control, and reliability in a hybrid setup, even for mission-critical Industry 4.0 operations, plus service and integration around spectrum, SIM, device, and backhaul management. The whole ecosystem in China is "turnkey", and standardized, argues Bao – and there are lessons for the global market, as it engages with the model in China, and increasingly replicates it abroad.

Exporting and importing industrial 5G

For Chinese firms looking to build or equip their industrial operations abroad, private 5G has effectively become standard

infrastructure, reckons Bao. For many, CMI is the natural partner, he argues. "It is a big trend; when they set up plants or ports or mining facilities [outside China], they will typically require private 5G…. We have a relationship with them in China already [so] we are a trusted partner when they want to enable private 5G abroad."

In the context of a highly fragmented industrial supply market, he presents the idea of a "turnkey solution". The logic is plain; enterprises setting up in new regions would prefer to avoid the complexity of building unfamiliar local supply chains from scratch in new markets – "which will potentially delay things", he says. "In many cases, we would work with the local carriers, and bring our ecosystem partners together to supply and build the 5G applications for them."

CMI caters for the opposite industrial workflow, as well. International firms looking to modernise operations in China need local partners, too – possibly even more so, given regulatory, cultural, even language barriers. "[In those scenarios] we are more than happy to work with their existing partners in the 5G space – the telcos and integrators they already work with. Actually, we prefer to work with them in China to help the enterprises to build their facilities."

He adds: "It is a similar model to the other way; these enterprises have relationships with operators and integrators already, and they should utilize them. We have relationships with the big telcos as well. So the model works well." It is about collaboration and teamwork, as the Industry 4.0 market likes to preach suddenly. But its open-handedness comes from its confidence, as well, that China Mobile is a primary conduit for enterprises on the ground in China.

Asked why an enterprise would choose CMI instead of a global system integrator or multinational telecoms operator, Bao is direct. "China Mobile has deployed more private 5G networks in China than anyone. So we have the best experience, and we have close relationships with the big (non-China based) telcos and integrators as well. And so we [are well positioned] to help their business expansion [into China]."

Vendor-neutral and application-driven

Despite perceptions that China's private 5G ecosystem is dominated by Chinese vendors, Bao emphasizes that CMI runs an open procurement model, which is ultimately governed by enterprises' own preferences and biases. "We are vendor agnostic. When we procure equipment in China, we have all the major telco equipment vendors – so Huawei obviously, but Ericsson and Nokia, as well. They are all on the plate… when we deploy private 5G in China."

He goes on: "The enterprise may already work with a particular vendor in Europe, say, and prefer to keep the same vendor in China. We've seen that a lot, and we are happy to do that. That is what we do: we support the enterprises requirements and preferences." What about smaller specialist vendors – which are numerous in the private 5G space, if not the public 5G space?

Bao responds: "There are plenty of smaller vendors in China, which often specialize in certain areas only – where the others put the whole solution together. We are open to those vendors in the international market, certainly; maybe less so in China, where they need to be on our short list, so to speak." More important, perhaps, is the application ecosystem layered on top of the network. "The network alone is not [the whole story] for the end customer," he says.

"The application is the key. That is what the customer sees. We work with partners to develop applications for different verticals." Indeed, China Mobile International has a private 5G platform to link horizontal network functions and vertical system applications as a unified service and management model – and as the basis for its broader turnkey proposition. But even as CMI works to standardize the network architecture, every deployment is different.

Bao says: "We are trying to standardize it in terms of the network architecture… [but] all the industries are different, and all their requirements are different… The applications are highly customized because different enterprises in different industries have their different requirements – even different enterprises in the same industry may choose different applications with different features from different vendors."

For CMI, the scalability comes in the modularity at the platform level and the flexibility at the application layer. "For Chinese enterprises going abroad, we are trying to do a turnkey solution. And we are working with telco ecosystem vendors for international businesses going to China, and open our local ecosystem to them so they have more and better choices," he says.

"We are trying to standardize in terms of the network architecture... [but] applications are customized because different enterprises in different industries have different requirements – even different enterprises in the same industry may choose different applications with different features."
– Sam Bao, China Mobile International

8

Purpose-built FWA as a practical alternative to private 5G

Mimosa Networks is offering either an alternative or a complement to private 5G – using unlicensed Wi-Fi spectrum to deliver simple, scalable, and cost-effective FWA broadband for enterprises worldwide.

If we step back momentarily from the minutiae of how to scale private 5G for Industry 4.0, and the cut-and-thrust of integrating complex cellular systems into entrenched IT and OT set-ups, then US-based Mimosa Networks would like a word. Away from all the noise about private 5G at Industrial Wireless Forum, and the existential crisis the market faces following Nokia's move to de-prioritise campus-sized 5G systems, there is another story to tell – about cheap and easy carrier-grade fixed-wireless broadband access (FWA) for enterprise environments.

This is where Mimosa plays, and is what it wants to talk about. Jim Nevelle, president and chief executive at the firm, says: "We're never going to be as complex as a private network. And, actually, some of those companies are struggling big time right now because of challenges with spectrum regulation and systems integration, and just that private cellular is a heavy lift. And we are serving a different need, anyway – to deliver simple connectivity to operators and enterprises, now, whether as a temporary fix, a back-up solution, or as permanent connectivity."

The point is Mimosa Networks offers simplicity, flexibility, and scalability – out of the gate, it reckons. Acquired by Indian operator Reliance Jio for around $60 million in 2023, via its US-based Radisys subsidiary, it offers "fibre-like" FWA broadband in the expanded 5 GHz and newer 6 GHz spectrum bands. Its portfolio spans point-to-point backhaul radios and point-to-multipoint (PTMP) access solutions, and is used by wireless ISPs and operators to extend high-speed connectivity to areas where fibre deployment is too slow, expensive, or impractical.

India is a captive market for FWA offload, notes Nevelle. "In India, your normal 4G/5G phone is your hotspot when you go home at night," he says. The strategy at Reliance Jio, with 500 million mobile subscribers, is to unburden its mobile network with FWA in unlicensed spectrum. Mimosa's flagship PTMP platform – which twins its A6 Wi-Fi 6E access point with C6x radios – operates in the 5 GHz and 6 GHz bands, using the wide channel bandwidths (in 6 GHz) alongside advanced modulation, MU-MIMO and beamforming to boost capacity and reduce interference.

The name is a portmanteau of MIMO, per its use of multiple antennas at transmitter and receiver level (multiple-input, multiple-output), and spectrum access / analysis (SA), per its channel optimisation software. It claims AP-level capacity up to 6 Gbps, and downlink access approaching gigabit speeds (depending on conditions). The architecture underpins Reliance Jio's AirFiber programme, being rolled out at scale to offload household cellular traffic in India. "It is deploying us in the millions," says Nevelle. "We are the largest purpose-built FWA architecture on the planet."

By covering the 5 GHz and 6 GHz bands, the system gives service providers spectrum flexibility and the ability to serve large subscriber volumes from a single tower – as a scalable alternative to fibre for last-mile broadband. Alongside its access portfolio, its point-to-point radios provide high-reliability links for tower-to-tower backhaul or remote-site connectivity. Recent additions – such as 6 GHz support, automated frequency coordination services, and new non-line-of-sight radios – are designed to improve range, throughput and deployment flexibility.

The India story, about the lack of non-urban fibre infrastructure, is repeated everywhere, practically. Nevelle sums up: "There's a big push on fibre in the US, but the stats say it can only be deployed cost-effectively to 60 percent of homes; 35 percent require some sort of FWA technology, because the fibre cost would be three-to-five times higher, and the rest is rural America, probably better served by LEO satellites. Latin America is in the same boat; there's just not much fibre outside of the cities. Africa is the same, just more so. Africa, also, is a good spot for us."

Meanwhile, Europe has been on a "high fibre diet" for years, he says, and offers mostly "pocket opportunities" for FWA providers like Mimosa; Asia is a "mixed bag", he says, between and the ex-urban fibre spread in countries like South Korea and Japan, and this everywhere-tale about out-of-reach rural communities – or power plants or water stations, or oil and gas refineries, or other industrial plants or factories. He says: "An oil field, say, can either lease rights from a carrier, which they don't generally want to do, or they can utilize our unlicensed technology."

Point is for remote outdoor operations, unlicensed spectrum is plentiful, and generally reliable. "Rural Scotland, it's not very congested – right? Downtown London; yes, okay, you're going to run into a lot of things." But the late SA appendage to its original MIMO branding is about its experience with spectrum management, even in chatty locales. Nevelle says: "In our

"Put the devices anywhere in the world, fire up the system, and, bam, you have a network. What might take weeks or months, you can do in 15 minutes. We were recently asked by a major US carrier to help out, and we showed up to a planning meeting... and our guy just goes out and turns it on."
– Jim Nevelle, Mimosa Networks

world, you expect some sort of interference. That is how Wi-Fi works; there's a lot of stuff flying around." For enterprise comms, predictability and reliability are as important as performance and simplicity, clearly.

They are measures that Wi-Fi tends to be beaten with, as well – often by the cellular-side of the Industry 4.0 vendor market, mob-handed at Industrial Wireless Forum. He goes on: "We're deployed in heavy urban environments, like Mumbai – right? We are dealing with thousands of these units in very dense urban environments – so we do that very well. We expect to see garbage, if you will, in terms of interference, and our job is to find a path through it. We're constantly scanning all the different channels, and, if there's congestion, we switch between. Hence the name."

But comparisons break down, anyway, because Mimosa is pitching between the lines. "We're not building a blanket Wi-Fi network to cover everything," says Nevelle. "Our focus is on tight, focused beams to specific endpoints. We're not an alternative to private cellular in heavy-use factories with lots of robots. Instead, we concentrate on point-to-point or point-to-multipoint connectivity to relieve pressure points in urban areas, and to support outdoor access and backhaul in non-urban environments, including enterprise sites with lots of moving parts."

It is not trying to sell an entire smart-city Wi-Fi infrastructure – in other words. Instead, it is offering a neat point (or multi-point) solution, which is good for a range of enterprise scenarios. "A city can deploy an antenna on a water tower to reach city hall, post office, libraries – without paying for fibre, or CBRS licenses, or negotiating with carriers. It's a simpler, lower-cost way to build a network you fully control – free spectrum, minimal permitting, and equipment that's purpose-built for outdoor connectivity rather than blanket coverage."

Such multi-point opportunities are everywhere, he says – the example, above, about the post office and library is a real reference; the firm has a FWA system at base camp on Mount Everest; it has supplied the same for a weekend pop-up music event for 50,000 people in a city park somewhere in the US; it stands up a WI-Fi system at Fleet Week in Seattle, where navy ships and aircraft carriers moor along the bay (and where "CBRS isn't going to work because of radar"); it has an access point atop a race car on a test track somewhere in Eastern Europe.

"You put the devices anywhere in the world, fire up the system, and, bam, you have a network. What might take weeks or months, and long negotiation cycles, you can put up a network in 15 minutes," he says. Sometimes enterprises just need a quicker connectivity fix, and service providers bring Mimosa to the table alongside them. "We were recently asked by a major US carrier to help out – to deliver immediately. And we showed up to a planning meeting, where they were listing off all these requirements – around permitting, licences, integration.

"And our guy just goes out and turns it on; and comes back in, and says, 'there you go: multiple gigabit Ethernet connectivity'. And they were like, 'but we haven't even finished the planning meeting'. And enterprises have an option to build a network in an economical and robust way. What we're doing today for carriers is no different to what enterprise environments can do on their own. And we've proven that time and time again. So when we start hearing about private wireless, and all the complexities enterprises go through – it doesn't need to be that way."

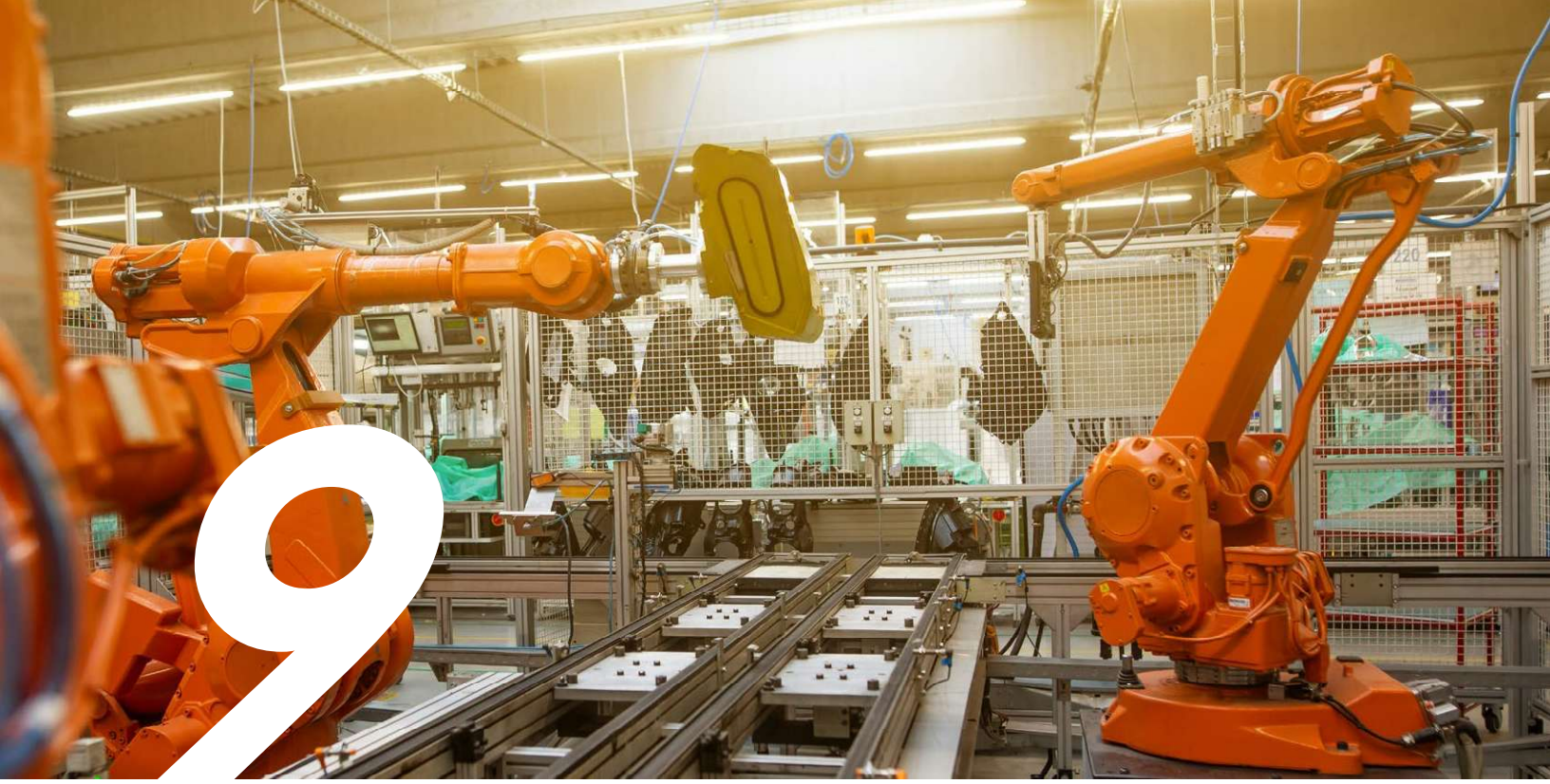
Does it make you chuckle or shake your head, when the private networks industry talks all the time about how to simplify, and how to make it cheaper and more intuitive? "You're not far off; I'm not going to lie. We have a solution that is easy to deploy. Granted, there are nuances in certain environments. But I don't know how many times I've walked into an enterprise, and it asks: what core, what spectrum, how many radios? And it's like, 'just stop all of that; none of that matters. We can put this up in hours, and you'll have connectivity to the whole campus."

Where private cellular is needed for higher-grade mission-critical applications, then the Mimosa system can exist as a short-term fix, and a longer-term off-load for non-critical applications. "If you want to put mission critical services on top, we can take the other items. You can build a network with us for your point-of-sale machines, traditional IoT devices, some camera traffic – and use private cellular for all the business-critical or public safety stuff. Take everything else off, and free up your other mission-critical systems."

Times have changed, says Nevelle; Wi-Fi-based FWA systems in unlicensed bands are a crucial component of the broader carrier and enterprise solution. "Five years ago, if I walked into one of the major operators, they probably wouldn't let me past the lobby – like we were completely not trusted, and were going to bring our filth into the building. We were the uncleansed," he says, with a laugh. "But the WISP market in the US has exploded, and you have these regional and rural carriers that have built entire networks using unlicensed spectrum.

"They are connecting rural America, and the carriers are paying attention. And where we weren't allowed into the lobby, we're now at the table with them, talking about how our technology augments networks. The problem is these 5G FWA solutions have been deployed at scale, and they realise they can only support a certain amount of FWA connections per cell before the network falls down. Because the networks weren't built for a router in a house to suck down Netflix all day; they were built to be mobile. And so they want purpose-built networks instead – like ours."

And so unlicensed spectrum comes to the rescue – enabling purpose-built FWA point solutions that are quick and cost-effective to deploy, and optimized for high-volume traffic. By focusing connectivity where it's needed – building to building, campus to campus, or tower to multiple endpoints – Mimosa's approach offloads non-critical traffic from licensed networks, keeps capacity predictable, and delivers reliable broadband without the complexity or expense of traditional cellular infrastructure. That's the story, then.



Making private 5G real for the AI-powered enterprise – the Celona way

Private 5G has long carried a reputation for being heavy, complex, and slow to deploy. But it can be a lightweight and scalable foundation for AI in mission-critical industrial operations, as well – provided it is designed properly. As enterprises race ahead with AI investments, the company says the missing ingredient is often the connectivity layer itself – and that private 5G, done right, is ready to fill the gap.

In sum – what to know:
Heavy investment – industrial firms are investing in AI, robotics, and vision systems – but many discover too late that legacy connectivity can't deliver the control or determinism these applications demand.

Cloud orchestration – Celona's AerFlex architecture aims to strip private 5G of its complexity, enabling multi-site deployments with on-premise access points with local breakout and cloud-based control-plane functions.

New partnerships – new partnerships around AI orchestration, modular edge compute, and managed services mean Celona is positioning private 5G as an integrated infrastructure layer for physical AI.

The predominant picture of private 5G, perhaps, is one of complex technical deployments at sprawling industrial venues – with heavy gear, deep integration, and long ramp-up cycles. But US-based specialist Celona thinks private 5G can be perfectly lightweight, flexible, and accessible, given the right architecture in the right environment – and become the new connectivity substrate for AI, edge computing, and mission-critical operations. But too often, the message has not got through, the company says.

It has plenty of examples where clients have only been in touch after investing in AI infrastructure – in compute systems, camera installations, and IoT sensors. "Customers assume the right connectivity is already there… And then when they actually start to deploy [AI applications], they can't take advantage of them… The only way to upload data has been to go back to the office where there is connectivity. Where they needed it, they did not have it," says Puneet Shetty, vice president of product at Celona, speaking during a session at Industrial Wireless Forum

On the phone, a week later, he goes further. "A lot of the investments are happening in AI but one of the things that gets forgotten is the connectivity layer." Many industrial players find that "their Wi-Fi is built for their IT functions, rather than OT functions." For AI, robotics, IoT or video analytics, that kind of legacy connectivity "does not support" the flexibility, reliability, or determinism those applications need, he says. In Shetty's view – and increasingly in the view of the wider industry – private 5G is emerging as the optimal connectivity layer for "physical AI".

But there is a perceived trade-off, he suggests, between high performance and easy usability.

Missing layer

Wi-Fi is easy and familiar, the story goes, but lacks the ultra reliability, deterministic latency, high security, and seamless mobility that mission-critical operations demand. Public cellular networks, on the other hand, offer scale, but no control, and often no guarantees on latency or performance. As companies embed AI-geared automation and robotics, the limitations of legacy networks are clear. As above, many organisations are rushing to buy compute and camera systems only to discover their old networks can't handle the load, or deliver the control.

Private 5G is the answer, says Shetty. Where it has gained traction, its adoption has not been driven by flashy generative or agentic AI use cases, but by more prosaic – yet transformative – "physical AI" deployments: camera vision systems, coordinated robotics, connected-worker tools. For many industrial enterprises, just the move from paper forms to digital workflows over a robust wireless network already represents a meaningful transformation. But early private 5G solutions have been cumbersome to deploy and manage, and enterprises have struggled.

Early generations of private networks were complex and costly to deploy – typically requiring on-site servers, dedicated controllers, and significant technical effort. Shetty says: "Three years ago, we were still in POC hell – where only a few trials expanded into commercial deployments, and the discussion was mostly a technical one. Whereas projects are now very focused on specific paint points, and, mostly, land on a couple of options: Nokia, Ericsson, and us."

Celona's anticipated rollout in 2025 fell some way short of its expectations, he acknowledges. "We anticipated a certain level of growth, and accelerated our go-to-market. But there has been uncertainty in the market, especially in the industrial space, and so our rollout plans have not necessarily panned out. Where we expected customers to scale to 20, 30, 50 sites during the year, more commonly, they only deployed at 20 to 25 percent of their targets. A lot of it has moved to next year."

Market realities

All through, Celona's approach has never changed, he says – to make private 5G as simple as possible for enterprises, without losing any of the technology's unique capabilities. In August, the company launched AerFlex, a cloud-controlled single-unit private 5G solution, which splits the core network software between the access point (AP) hardware and the cloud, and eliminates the need for on-site servers or complex integrations. The idea is to unlock easy multi-site scalability in the private 5G market.

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Enterprises need to only deploy access points, like they do with Wi-Fi; orchestration, control and management live in the cloud. Rollouts that once took weeks – involving racks, cabling, controllers – can be completed in hours, even across multiple sites. The burden on IT/OT teams is reduced, lowering the barrier to expansion. Thanks to Celona's unified software stack and intelligent splitting of functions (radio, core, orchestration) between APs and cloud, the solution supports high-end physical AI for Industry 4.0 without compromising data compliance or performance SLAs.

Shetty says: "Ours is already an enterprise-friendly solution, versus some of the bigger vendors, and we own the whole stack, versus some of the Frankenstein solutions from some of smaller companies. So others are offering the radio or core, or the orchestration; but that is not how enterprises consume connectivity. For Wi-Fi, they are a Cisco or a Juniper shop. They will consume private 5G in the same way. We are bringing the whole puzzle. And Aerflex goes on top of our existing portfolio – so enterprises can deploy private 5G with just a radio."

He adds: "The idea of moving components to the cloud is not new. What is unique, again, is that we own the stack, and can split it as we want. Some have moved the entire core to the cloud, which is a broken concept because industrial enterprises will not accept that the data plane is in the cloud; it needs to run on-premise. But we can choose what goes where – so the data plane is instantiated on an access point, which allows us to do local traffic breakout on certain sites, while the data plane can reside on an edge appliance at bigger campuses."

He adds: "That flexibility is unique to Celona versus a lot of these other vendors."

Integrated design

Celona isn't doing it alone. In 2025, the firm has forged various strategic partnerships that signal a shift – where private 5G is not just about radio equipment and orchestration software, but a part of an integrated infrastructure proposition to drive AI automation and operations at the edge. It has just announced an integration with Sutherland, combining Sutherland's AI orchestration and management stack with Celona's private 5G system. The result is a "self-managing, intent-based network", it says, to reduce human intervention while boosting uptime and resilience.

Celona also has a new collaboration with Armada to deliver "digital oases" – modular edge-compute sites integrating private 5G, satellite backhaul, and pre-configured AI models. The aim is to deploy autonomous AI infrastructure "anywhere in the world" in as little as 48 hours. The solution is geared for harsh or remote environments, out of the way of easily cabled cloud access. Celona has a new channel deal with Hughes Network Systems, as well, to offer a 'turnkey' managed private 5G service; they are targeting enterprises without in-house cellular or network expertise.

The offering spans site design, deployment, 24/7 monitoring, and support – switching private 5G from a high-maintenance DIY project into a managed service. Again, these moves reflect the broader shift – that private 5G is no longer a stand-alone connectivity play, but a core layer in the advancing enterprise stack. The strategy reflects larger structural shifts in the private wireless market. Market watchers are bullish on enterprise demand for superior connectivity – especially where AI and IoT are

geared for real-time automation projects.

But industrial enterprises are cautious and pragmatic, by their nature – even if geo-politics and macro-economics are removed from the equation. Shetty says: "They are very pragmatic, of course, and probably a little suspicious of what AI will do for them. But it is a mixed bag; some manufacturing customers and many industrial automation vendors have gone all-in on AI." He cites Celona's work with US process manufacturing giant Cargill, a business with around 160,00 employees and $165 billion in turnover, and a presence in 70 countries.

Long tail

Either way, the vendor market is required to simplify private 5G deployments – both for early adopters, and the long tail, including small and medium-sized firms (SMEs). AP-only cloud-controlled architectures, of the type Celona is popularising with its AerFlex system, are a step in that direction; so too is its work with partners to enable managed services and build integrated edge systems. And its holistic take, especially for a start-up, is rather unique – core, radio, and orchestration, like only Nokia and Ericsson, of the big Western players, properly do.

As such, Celona is doing as much as anyone to shift the perception of private 5G – from optional infrastructure to something more: a fundamental enabler of modern enterprise digital transformation. For companies investing in AI-driven automation and robotics across distributed edge setups, such an integrated and managed service offer, rather than a patched-up cut-and-shut, appears like a good thing. Its vision resonates especially well in industrial contexts, says Shetty – in factories, ports, warehouses, mines, energy infrastructure.

He sums up:

"Generative and agentic AI are not big drivers for private 5G, yet, but private 5G will be the foundation for these things, as enterprises stack use cases on top."
– Puneet Shetty, Celona

Conclusion

With regulatory progress, maturing ecosystems and the rise of AI automation, private 5G is entering a new phase of scale. While challenges remain, the direction of travel is clear.

The presentations and discussions at Industrial Wireless Forum, reported in here, suggest that private 5G is transitioning from early promise to industrial infrastructure. The arrival of simplified, repeatable deployment blueprints – and even plug-and-play systems – helps unlock the technology for a broader range of enterprises beyond large multinationals with deep integration teams.

Equally important, the link between private 5G and edge / AI infrastructure is rapidly strengthening. As on-prem AI workloads become more common – for tasks like predictive maintenance, real-time video analytics, robotics, digital twins, and autonomous operations – the demand for reliable, low-latency, high-capacity private connectivity will only grow. In that sense, private 5G is now as much about enabling compute and automation as it is about connectivity.

At the same time, the variability across verticals and regions remains significant. Where Wi-Fi or traditional enterprise networking suffices (e.g. typical office settings or static sensor networks), private 5G may remain overkill. But in industrial, logistics, mobility-heavy, or mission-critical environments – ports, mines, factories, warehouses, energy supply – the performance, control, and reliability that private 5G offers look increasingly indispensable.

Ultimately, rather than a side-project for telcos and vendors, private 5G is emerging as one of the few genuinely growing and future-proof segments in a broadly flat telecoms market. For enterprises aiming at Industry 4.0, operational resilience or AI-enabled automation, it is fast becoming a foundational – not optional – platform. And while challenges remain (from spectrum and regulation to ecosystem maturity), the momentum suggests that private 5G's potential to reshape sectors and drive industrial digitalization is no longer speculative: it is underway.

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