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In-depth analysis of WLan, cellular and broadband wireless markets

MWC 2023: addressing challenges in 5G outweighed 6G visions

- Establishing ROI for large-scale adoption of 5G Standalone
- Can virtualized RAN deliver the same performance as traditional RAN?
- Driving traction for multivendor Open RAN
- Unlikely to see pre-integrated RAN satisfying demands of large operators

The Mobile World Congress (MWC) experience tends to go in waves, as Wireless Watch has observed over two decades of attendance (starting with 3GSM in Cannes, France).

There are the visionary MWCs, in which the hottest discussions and demonstrations are future-looking. These set out agendas and stir up hype for a coming technology, as in the shows preceding 5G deployment, when all the talk was of holographic interactions and remote surgery. There are shows that are dominated by a particular product launch or piece of news.

Then come the shows that focus on practical challenges of implementation and monetisation. These are more sober and perhaps less fun, but address the real issues for operators and vendors.

At MWC 2023, we might have expected a hype-laden, blue sky event with plenty of talk of 6G and metaverse. Of course there was some of that, but the dominant mood was realistic and practical, in the context of several downbeat trends – the slow adoption of 5G Standalone or 'true 5G'; disappointment with the slow progress of Open RAN in disrupting the supply chain; plus wider issues such as the tribulations of the hyperscalers (which often create much of the excitement about new directions), and of course macroeconomic pressures.

So after an MWC 2022 that was reduced in size, but had a celebratory mood of reunion, this one reflected an industry that needs to get down to business and solve some difficult problems if it is even to progress to 6G in any meaningful way. Many of the launches and demonstrations, then, were focused on the difficult problems of deploying next-generation 5G networks and achieving a strong (or even just acceptable) ROI case.

The three that, in our view, dominated conversations the most were: **Establishing an ROI model for large-scale adoption of 5G Standalone and the 5G core**, outside of enterprise networks. Equipment providers and

core specialists have been hit hard by the slow pace of SA adoption, as have those industries that do see a real need to implement the kind of services that are enabled by 5G slicing and ultra-low latency. There was far less talk of slicing and capabilities than in previous years (see separate story this week), and more about how to simplify deployment, increase automation and derisk 5G SA even for operators that have not yet identified a firm monetization model, or demand level, for the advanced services. Fully automated cloud-native implementations are at the heart of this discussion, and Oracle, Nokia and others were vocal on the subject.

Convincing operators that virtualized RAN could deliver the same performance as traditional RAN in challenging environments such as dense urban macrocells, without incurring massive trade-offs in equipment and infrastructure cost and power consumption. This is a problem on which many companies are now focusing their efforts, so we expect interesting breakthroughs in the year ahead, particularly in one of the most important enablers of a high performance vRAN, the accelerator chips (see separate item below). All the major processor makers that are seeking to power the edge cloud infrastructure for vRAN unveiled their particular designs for chips that can offload demanding Layer 1 tasks, such as beamforming, from the central processor and accelerate them. Intel is integrating acceleration tightly with its CPU; Marvell and Qualcomm showed their latest offerings; Nokia decoupled its own accelerator from its base stations and servers and announced a deal with Dell. This will enable the Nokia accelerator to work in Dell servers that are underpinning a vRAN (though at this stage, only if that vRAN software and radios are from Nokia).

Related to the above are the **challenges of driving traction for multivendor Open RAN.** We have commented many times on the likelihood that operators will opt for a 'middle way', at least in their first generations of vRAN/Open RAN – insisting on open interfaces to ensure future-proofing and potential swap-outs, but relying on a single-vendor solution from a supplier with proven ability to deploy RANs at scale. At MWC, the obvious beneficiaries of this potential trend – large vendors that offer the option of Open RAN interfaces, such as Nokia and Samsung – were talking it up. Samsung's view was validated by its recent success in Dish's Open RAN, and Dish's open

acknowledgement that it couldn't hit its roll-out deadlines if it relied on multiple small vendors at this early stage in vRAN evolution. Meanwhile, via its Dell alliance, Nokia was defining multivendor Open RAN as a network in which the cloud infrastructure came from a different supplier to the RAN (but the radios and basebands were from the same provider). This may well be the way the market goes in the early years, but it is certainly a far cry from the vision of multivendor Open RAN as a way to break the lock-in to particular radio suppliers, in particular.

There were other efforts to drive new momentum into the big disruptions of 5G SA and Open RAN. Many of these, in keeping with the tone of the show, were pragmatic rather than advanced engineering innovations. Individual vendors and industry alliances were focused on outlining practical steps and blueprints to make the new architectures easier to integrate, test and automate. Without these three boxes ticked, the economics of vRAN will be impossible to make work, and so there was intense interest in activities such as simplified testing processes for multivendor networks from organizations such as Telecom Infra Project and Spirent; or to provide pre-integrated, simplified networks as Rakuten Symphony is seeking to do.

However, it is unlikely that a pre-integrated RAN will satisfy the demands of a large operator's public macro network in the foreseeable future. The blueprint approach is far better suited to the smaller, more specialized networks of the enterprise market, and in reality, this is where many of the innovations were pointed. If 5G can be proven to be useful and deployable in many enterprise scenarios, it will unlock new revenue streams that operators have been chasing, in order to justify 5G build-out.

But there is risk in this strategy, for traditional operators and vendors. Enterprise Open RAN, like the small cell market before it, does not necessarily require the same network vendors and operators as the public RANs do. There were many relatively small suppliers of RAN hardware and software that would be challenged to support a national macro roll-out, but could build a good business within a parallel ecosystem tuned to the very different needs of businesses. By next year's MWC, we can expect to see that ecosystem maturing, and to understand how far it will limit the opportunity for the traditional players.

Battle of the accelerators breaks out as chip giants target vRAN

Cost and complexity of systems integration comes up yet again

Time and again at MWC 2023, in conversations about open virtualized RAN, the same mighty barriers to adoption were cited by operators and vendors. These were the cost and complexity of systems integration, and the performance trade-offs incurred when deploying high-performance base stations, especially those with Massive MIMO antenna arrays.

Many organizations with an interest in pushing an open, multivendor version of vRAN have turned their attention and innovation to at least one of these huge issues of cost/performance. The new solutions for the latter challenge were particularly prominent in Barcelona, creating a battle of the accelerators on the show floors.

One of the most demanding workloads known to the cloud world is the 5G RAN, particularly the processing of Layer 1 network functions such as beamforming. The functional split adopted in a vRAN decides what proportion of these Layer 1 processes run on the radio unit or on the virtualized baseband (in an Open RAN architecture, the virtualized distributed unit or vDU). The O-RAN Alliance favors split 7.2, which places the majority of these L1 functions on the vDU. However, this creates a very high processing burden for the servers and chips that underpin the vDU.

In current technology, a central processing unit (CPU) based on Intel x86 or on ARM cores cannot support L1 processing to the same performance as dedicated chips in a traditional RAN, without huge trade-offs in cost and power efficiency. Most chip and systems vendors rely on accelerators – chips dedicated to a specific task, which offload that task from the CPU, boosting both performance and efficiency. All the major processor makers that are

targeting their offerings at vRAN servers have piled into the market with accelerators – notable examples at MWC this year came from Intel, Marvell, Nvidia and Qualcomm.

Each of these companies has different advantages to bolster its proposition.

Qualcomm has deep roots in the mobile industry and understands the radio, and is the only one of the majors that also has radio unit and RF chips.

Marvell has adapted technology initially used for its high performance datacenter processors and built a full suite of 5G chips around this, scoring real-world, at-scale experience through its key base station partnerships with Samsung and Nokia.

Nvidia's graphical processing unit (GPU) technology powers many of the world's supercomputers, so RAN performance is not daunting, though it acknowledges the great challenges of power efficiency and of compactness (especially if operators choose a very distributed architecture with small—footprint edge nodes near the cell site). Nvidia also benefits from a multiyear R&D co-investment with Ericsson, focused on vRAN acceleration based on GPUs.

Meanwhile, Intel is the incumbent in the early phases of vRAN, with its CPUs and its FlexRAN reference platform claiming well over 90% of early vRAN and Open RAN deployments. However, it has relied, until recently, on an approach to acceleration called 'lookaside', which has been surpassed, in performance and power efficiency terms, by a more modern alternative called 'inline', favored by the ARM-based processor makers such as Marvell, Nvidia and Qualcomm. However, at MWC, it was showing off its new generation of technology, with fully integrated acceleration, something it claims will eventually leapfrog inline in terms of efficiency (though for now it is only claiming

parity). This approach is part of Intel's upcoming, though delayed, new Xeon Scalable processor, Sapphire Rapids, which will include support for vRAN signal processing and acceleration, and claims to deliver "up to two times capacity gains" for vRAN with Massive MIMO up to 64T64R.

"Both inline and lookaside require a separate card," said Sachin Katti, CTO of the company's network and edge group, on a call with analysts and reporters before MWC. "With integrated, it is on the SoC and you're not having to buy a separate piece of hardware. That adds a lot of cost and power cost to the solution and by integrating you are taking that away."

> "Part of the industry are skeptical of these acceleration claims and one telco said there was no need for an Intel CPU in the baseband"

But parts of the industry are skeptical. One telco source, requesting anonymity, said offloading workloads and using ARM-based silicon for inline acceleration would eliminate the need for a powerful Intel CPU on the baseband side. This might not only produce direct savings, but also spur competition, which is supposedly an Open RAN objective.

However, the integrated approach recently gained the approval of Rakuten Symphony, whose CEO, Tareq Amin, told analysts: "What I envision is the CPUs must get reduced, not increased. The right thing is to get the likes of Intel, AMD, maybe Nvidia, to start thinking about a totally new architecture in which the CPU and the acceleration blocks are totally integrated into the same die."

He added: "So we looked at we looked at Marvell, Qualcomm, we looked at Nvidia. And the reason that we stuck the course so far with Intel is primarily driven by the software ecosystem that they have built and their commitment to the future."

This is not just a battle between the familiar competitors of the processor world. There are also proprietary silicon offerings from the large equipment vendors. Nokia and Ericsson initially based their base stations, whether virtualized or not, on their own processors and accelerators. Now, in vRAN, they are modifying their strategy, perhaps acknowledging the scale and R&D budgets that accompany the merchant solutions in the cloud world. Ericsson, which has adopted the 'Ericsson Silicon' brand to highlight the differentiation it claims for its own chips, does use Intel-based hardware for some of its vRAN basebands, as does Nokia.

However, both giants have their own acceleration technologies, drawing on their deep understanding of how their own radios, including Massive MIMO, work and can be optimized. Ahead of MWC, Nokia announced a partnership with Dell which saw the server maker adopting Nokia's own vRAN accelerator card to run with its edge servers. Dell aims to build a vRAN/Open RAN ecosystem around those servers, though like Nokia, it was noticeably less vocal than it was at last year's MWC about multivendor Open RAN. Instead, both partners were focusing on 'openness' in the sense of deploying a single-vendor vRAN (baseband software and radio units) on cloud infrastructure from a different supplier – which is the only definition of open RAN that fundamentally matters to Dell.

Nokia's accelerator will now work with third party cloud servers then, initially with Dell's but likely with others to come. However, it will only work with Nokia vRAN software and radios, and though the company's executives did not rule out the possibility of supporting third party RAN elements, this was clearly not on the roadmap as yet.

The large network vendors may have to adopt merchant processors in at least some of their vRAN designs to satisfy certain operators' requirements, but they are aware

that this removes their role in the baseband hardware. Fredrik Jejdling, head of Ericsson's Business Area Networks, claims the accelerator makers are narrowing the performance gap with proprietary silicon, but insists this will "never completely close".

Naturally Intel disagrees – Katti said recently: "General-purpose technology will eventually have so much investment in it that it will outpace custom silicon. Every chip is a pretty large investment of nine figures, and the RAN market is not big enough for someone to spend that amount every year keeping up with the process node improvements."

That point about the investment required, versus the size of the market, suggests that only a couple of companies will succeed in building sufficient scale in vRAN acceleration to justify continued efforts in the market. And while Open RAN supporters, notably Vodafone, are working hard to foster an open chip ecosystem rather than an Intel monopoly or a proprietary layer, they will not want fragmentation either. That would result in several competing software ecosystems and potentially in barriers to combining basebands from different vendors in one network, a goal of Open RAN.

For now, though, the large chip vendors are vying to be among the survivors. These are the highlights of their launches:

Intel

Intel launched its 4th Generation Intel Xeon Scalable processors (Sapphire Rapids) with vRAN Boost and boasted support from 14 vendors and operators including Verizon, Dell and Ericsson.

Intel claimed its integrated vRAN acceleration, into the Xeon system-on-chip, doubles capacity and reduces power by 20% compared to the previous generation, because

there is no separate custom accelerator card. The platform can deliver 1Tbps in 5G user plane workload performance, Katti said.

Samsung

Samsung demonstrated a vRAN solution in which 2G, 3G, 4G and 5G networks were consolidated on a single Xeon-based server, a level of integration that Intel said was enabled by the integrated acceleration. Katti added that the Xeon SoCs have "accelerators packed in for different workloads…with a common, containerized software foundation. You as a developer don't have to worry about heterogeneity and you access it through standard open source."

Qualcomm

Qualcomm was showing off its previously announced X100 5G RAN Accelerator Card, which featured in NEC's latest vDU solution, among others. The 5G vDU runs on an HPE ProLiant DL110 Platform server with Red Hat Enterprise Linux.

"A benefit of Open RAN is the capability to introduce technology advancements by combining strengths of multiple companies," said Sadayuki Abeta, global head of Open RAN Solutions at Japanese operator NTT Docomo. "We expect to achieve high capacity and power efficient vDU together with NEC and Qualcomm Technologies."

Nvidia

Nvidia unveiled a GPU-accelerated design that was co-developed with Docomo and fellow Japanese firm Fujitsu. Described as an 'accelerated AI-on-5G system for edge AI, 5G and omniverse', the system showcased Nvidia's claims that GPUs will achieve greater performance and power efficiency than other types of chips that can power accelerators, such as field programmable gate arrays (FPGAs) or CPUs. The solution was demonstrated by Fujitsu in its

5G Open RAN product suite, which was developed as part of the 5G Open RAN ecosystem experience (OREX) project led by Docomo. It uses GPUs to accelerate the software-defined 5G vRAN, as well as the edge AI and graphics, without bespoke hardware accelerators nor a specific telecom CPU.

Fujitsu

"Fujitsu is delivering a fully virtualized 5G vRAN together with multi-access edge computing on the same high-performance, energy-efficient, versatile and scalable computing infrastructure," said Masaki Taniguchi, head of mobile systems at Fujitsu. "This combination, powered by AI and XR applications, enables telcos to deliver ultra-low latency services, highly optimized TCO and energy-efficient performance."

Marvell

Marvell launched the new generation of its Octeon 10 Fusion family of 5G baseband processors, implemented in 5-nanometer process technology, and including a wide range of hardware accelerators, including for Layer 1 RAN, security, and an inline AI/ML engine that enables edge inferencing for RAN applications such as AI-enhanced Massive MIMO beamforming. Among the users of the Marvell accelerator cards is Dell, which has adopted Marvell Octeon 10 Fusion for its Dell 5G Open RAN card.

"As carriers deploy more complex radio features to enhance 5G coverage and capacity, optimized silicon with comprehensive hardware acceleration and 5nm technology are critical to scale system performance, power, and cost efficiency beyond the capabilities of existing solutions based on general-purpose CPU or FPGA technologies," said Raghib Hussain, president of products and technologies at Marvell.

> "As carriers deploy more complex radio features… optimized silicon for acceleration are critical to scale performance, power, and cost beyond existing solutions Raghib Hussain, president of products and technologies at Marvell."

Huawei rebranding 5G Advanced as 5.5G muddies the waters

Too many operators and vendors have been fiddling around with G labels for various reasons, either to paper over cracks in their products and services, or to stake a claim to a technology that is not strictly their own. We have been there before in the 4G era, when for example Nokia launched what it called 4.9G technology at the end of 2017, boasting then of over the air download speeds up to 3 Gbps.

That was at least based on some genuine technological advancements, even if they were not exclusively Nokia's, primarily first use of larger antenna arrays that could be called "massive MIMO" enabled by higher frequencies at 2.5 GHz. This then exploited beamforming to direct RF energy more precisely, and also required carrier aggregation straddling two or more bands to reach that capacity. It was still though an abuse of labelling and would have been better marketed for what it exactly was.

Even less commendable was AT&T's later adoption of the term 5G+ to describe a service that was in reality the carrier's first to be worthy of the label 5G at all in terms of speed and capacity. What AT&T had previously billed as its first 5G service generally offered lower performance than its 4G offering, having been deployed across low band 700 MHz spectrum. This enabled wide coverage, reaching 285 m people as AT&T proclaimed, but could not be called 5G by any stretch, other than that it conformed to 3GPP standards.

Then the operator made the mistake of calling its follow up 5G+, offered initially just over high-band mmWave spectrum and then over mid band spectrum as well to expand coverage, making it at last more worthy of the 5G moniker. But the shenanigans over naming had already played into the hands of rival T-Mobile US, which had been highly critical of AT&T's original low band offering

and argued then that it would only gain any appeal when offered over mid band spectrum.

Roll forward to MWC 2023 and we observe Huawei continuing to plug the label 5.5G to dress up its emerging technologies and products. What Huawei brands as 5.5G corresponds quite closely to 5G Advanced, a term set out by the 3GPP for capabilities coming along with Releases 18 from late 2023 onwards, followed by releases 19 and 20. So we do not need another label, which Huawei seems to be adopting to claim 5G Advanced as its own just because there are a few proprietary tweaks or additions, as well as conflation with automotive C-V2X.

This is not to criticism the technologies, but more the associated confusion. Huawei is adding capabilities in energy efficiency beyond the 3GPP standard, as we have discussed in previous issues, but then all vendors aim to stand out for the value they add.

Here is how Huawei summed up this offering at MWC. “3D applications, such as 3D online malls, 24K VR gaming, and glasses-free 3D video, will become mainstream. Services with immersive experiences emerged in the 5G era, but in the 5.5G era, services with both immersive and interactive experiences will become commonplace. With continuous breakthroughs in device technologies and a boom in content, the number of online users of immersive and interactive services in the 5.5G era is expected to exceed 1 bn.”

The company added that Level 4 autonomous would be enabled by 5.5G, although that requires other developments and components in the vehicle that exploit the connectivity. Level 4 driving is a stage where human drivers can switch off completely and take a nap. Under the preceding Level 3 they can hover control temporarily to the autonomous system but have to be ready to hand take

over at short notice in the event of any exception or emergency, so it is little more effective than assisted driving. Level 4 autonomous driving will require V2X (Vehicle to Everything) technology for local communication with other vehicles and roadside equipment before being widely permitted on public road networks, with the cellular version C-V2X gaining most currency. C-V2X requires sidelink communications over frequencies around 5.9 GHz for the local V2X connectivity out of the public cellular band, and is not reliant on 5G Advanced. Indeed, it can run over 4G LTE.

Huawei then is doing a disservice to clarity, even if the technologies themselves are right up to scratch.

Key Issues: Network Slicing low key at MWC

The best we can say is that progress is still being made

Industry events such as MWC turn up losers as well winners, and network slicing was one technology that looked more like the former. Yet closer inspection revealed that progress is still being made but just much more slowly and erratically than had been predicted or hoped by its vendors. It could also be argued that network slicing will be driven by two strong and related trends that were evident at MWC, private enterprises networks and edge compute. It was hard to get away from them both on the floor and at social events.

Certainly, network slicing did not generate many headlines at the event, nor did it feature that much in seminars and presentations. But two major vendors were pushing it quite hard, Ericsson and ZTE, while virtualization pioneer VMWare was among those showing software designed to smooth the path to network slicing.

Ericsson had two bites of the network slicing cherry with an interoperability development featuring multiple slices on laptops, and then through its edge compute subsidiary

Cradlepoint a demonstration of how a slice can protect high definition video from congestion with guaranteed QoS (Quality of Service). The two were connected in so far that laptops could well be used for viewing video and would therefore want the capability of switching to a slice able to guarantee the required quality.
The Ericsson lab demonstration in Sweden showed that multiple network slices could be accessed and switched on cellular-connected laptops for both consumer use cases like mobile gaming and enterprise applications such as collaboration.

This trial exploited the standardized User Equipment Route Selection Policy (URSP), which enables devices to select automatically between different slices according to which application they are using. It then used Ericsson's Dynamic Network Slicing Selection operating across its dual-mode 5G Core and RAN.

The video demonstration also used Ericsson's 5G SA core and RAN, but this time combined with Cradlepoint's NetCloud Exchange Service Gateway and E3000 Series Enterprise Routers, to steer the stream across a reliable low latency slice. The company went on to show that such a high-priority slice could also sustain optimal quality of experience for other applications requiring low latency as well as guaranteed high bit rate.

ZTE placed more emphasis on discussing implementation issues around network slicing than on demonstrations, highlighting the need to integrate RAN with core and wireline slicing to enable end to end implementation from the cloud. Indeed, the company's General Manager of Wireline Marketing Hu Junjie underscored the company's established expertise in fixed slicing over Ethernet and WAN connections.

This is called hard slicing because it breaks down the capacity into granular chunks of 10 Mbps, without involving

> "The video demonstration used Ericsson's 5G SA core and RAN combined with Cradlepoint's Netcloud Exchange Service Gateway"

any software, using a technology developed for Ethernet called FGU (Fine Granularity Unit). ZTE has deployed this with China Mobile for pilot trials of private lines in power grids for differentiated transport services isolated from each other for performance and security.

The benefit of this FGU technology from the 5G context is that it enables much smaller more granular slices to be deployed at the transport level for backhauling the RAN to the operator's core, enabling end to end slicing. The transport will often involve Ethernet connections over fixed lines, such as fiber.

Many applications that would be a target for network slicing only call for bandwidth in chunks of 10 Mbps or even less, and yet existing cellular slicing technologies only support much wider slices. This would mean a lot of bandwidth being wasted deploying such applications, which would abnegate the promised efficiency benefits of slicing. Indeed, this may be one reason network slicing is gaining traction more slowly than many had hoped.

ZTE's larger Chinese rival Huawei also supports FGU functionality for granular slicing, but did not seem to be talking much about it at MWC 2023, despite having the largest presence of all in footprint at least, occupying 9,000 sq. meters prominently near the entrance, 50% up on last year. This was a statement to emphasize that Huawei was very much back at the forefront of the mobile field by focusing on core areas such as cloud operations less affected by US led sanctions.

Unfortunately for Huawei this great marketing effort was undermined by allegations that the company was tracking visitors to its booth. This arose because like some other vendors Huawei only allowed stand access to those issued with security badges, which it appeared had tracking devices installed in them.

Huawei argued that the pass was only required within its booth and was supposed to be returned afterwards, in which case it could not be used to track visitors outside. But naturally some visitors forgot to remove their badges and so in theory could have been tracked, at least according to allegations. Although there was no evidence of tracking being done, the incident does suggest Huawei was careless given the sensitivities of its position. The GSMA, organizer of MWC, was investigating the accusations at the time of writing.

For network slicing, VMWare demonstrated higher level capabilities over its NSX network virtualization platform. This allows virtual networks to be created for individual enterprise clients, or "tenants" over a single physical network, offering a foundation for providing enterprises with a dedicated slice for their operations, perhaps as an alternative to a private network. This would help mobile operators design and manage their overall network as a set of logical major slices networks on top of a shared infrastructure. These slices in turn could then be partitioned by the enterprise to support individual use access with different requirements for QoS.

Aalto and Stratospheric showings at MWC 2023

With this year's Barcelona Mobile World Congress focused more than previous events on the future of mobile networks generally, non-terrestrial networks (NTNs) came higher up the agenda. High Altitude Platform Systems (HAPS) fill the gap between Low Earth Orbit (LEO) satellites starting above 160km, and terrestrial networks.

UK-based Stratospheric Platforms (SPL) and Airbus subsidiary Aalto were two HAPS companies at MWC, with Aalto stealing the show as it suspended its Zephyr fixed-wing craft from the convention center ceiling in Hall 4. NTNs in general received prominent attention in a Deutsche Telekom announcement on direct-to-IoT device

satellite connectivity in partnership with Intelsat and Skylo, a satellite connectivity provider. Also present was Barcelona-based IoT LEO constellation specialist Sateliot, recently featured in Wireless Watch's coverage here.

While satellite constellations have been dominating the NTN conversation recently, HAPS are emerging as a new class of NTN with first commercial activity commencing by the end of 2023 before accelerating in late 2024. HAPS are aircraft operating in the earth's stratosphere, whose base ranges from as low as 30,000 feet above the poles to 70.000 feet over the tropics (9-21km) above sea level, which usually also above terrestrial weather. They are designed to keep their payload airborne and operational essentially indefinitely, earning them the alternative designation of High-Altitude Pseudo Satellites. Use cases for HAPS depend on the craft's payload and usually center around connectivity provision and monitoring.

HAPS have been in the conversation for a long time, with Wireless Watch reporting on early developments as far back as 2015. Work focused on early-stage proof of concept (PoC) trials, notably Facebook's Project Aquila solar-powered HAPS and Google's Project Loon stratospheric balloon venture. Both these projects were eventually wound down, Aquila in 2018, and Loon in 2021.

The HAPS Alliance is the most important industry association for HAPS companies and was founded in April 2020 by Alphabet and SoftBank subsidiaries Loon and Softbank subsidiary HAPSMobile, aerospace company Airbus, satellite platform operator Intelsat, infrastructure vendors Ericsson and Nokia, along with telcos Bharti Airtel, China Telecom, Deutsche Telekom, and Telefonica. Since then, notable additions include Capgemini, Tonomus NEOM, and Aerovironment, alongside the host of smaller HAPS companies vying with each other for future market share and/or favorable acquisition terms.

HAPS aircraft fall into two broad camps, heavier-than-air, and lighter-than-air. Heavier-than-air crafts follow a fixed-wing glider design philosophy, though methods of propulsion may vary. Lighter-than-air crafts on the other hand are designed around light gases such as helium to provide lift and bear a striking similarity to the blimps of yesteryear.

Both SPL and Aalto entered MWC on the back of partnership announcements that could point towards the future role of HAPS in telecommunications, or at

least show the way to an early market niche these platforms could occupy. Aalto netted a cooperation agreement with Saudi Arabian operator stc on bringing broadband to the Middle Eastern country, focusing especially on rural and remote deployments.

SPL CEO Richard Deakin, who met Wireless Watch on the sidelines of MWC Barcelona, on the other hand saw his company buoyed by recent announcements involving UK-based BT earlier in the year, and a strategic partnership with Indonesian tower company Protelindo.

The partnership with BT was covered in Wireless Watch here, and centers around the antenna technology that SPL plans to equip its hydrogen-powered, 56m wingspan, fixed-wing Stratocraft aircraft with. Measuring around three meters by three meters, the antenna, an array of 2048 T/R elements, will have 500 steerable beams and able to cover an area of 15.000 square kilometers, around the same coverage as provided by 450 terrestrial cell towers. Within that area, it will be able to service 500 000 users at peak speeds of 200Mbps.

Two deals in quick succession strengthen the company's outlook ahead of crucial spring and summer months, in which Deakin will attempt to drum up support for his venture. While Deutsche Telekom has been a long-time partner of SPL, investing around €75m since 2016, the company announced a €58m write-down on the investment last year. Even though DT has stated it remains supportive, Deakin is certainly under pressure to find alternative sources of funding. He identifies the Summer of 2023 as a good time to be on the lookout for Series B funding agreements to the tune of €135m.

This is an ambitious target for the company, especially, or perhaps precisely because, SPL finds itself, as of now, without a working, flying prototype. While this will be the company's most pressing concern, the first flights with the prototype are only expected at the end of 2024, a little under two years from now.

Acknowledging SPL is far from commercial readiness, Deakin did point to the maturity of its liquefied hydrogen storage tank technology as a source of confidence for the company. The success of its propulsion technology is intimately tied to the success of the wider platform, with the flight characteristics in second, if not third place behind the antenna.

This is because SPL's Stratocraft does not follow the same lightweight design philosophy necessary for the entirely solar-powered craft pursued by its fixed-wing rivals. Where Aalto's Zephyr currently clocks in at 75kg with five to eight kilograms of payload, Stratocraft is expected to weigh "no more than a medium-sized van."

While Zephyr's payload and weight are expected to increase by 2024, the weight differences are representative of the different needs, with Zephyr expected to stay airborne indefinitely, while Stratocraft will return to the surface around once a week to refuel.

Less constrained by weight limits, its telecommunications equipment, therefore, packs a heftier punch than the competition. Aalto's antenna, which was on display at MWC Barcelona, operates in a different ballpark, both in size and capabilities. Coming in at around half a meter by half a meter, it is capable of sixteen steerable beams covering a total surface area of 7500 square kilometers.

It stands to reason the Zephyr would beat Stratocraft on a per-unit cost basis, especially considering the hydrogen storing tank and resulting fuel costs compared to unlimited, free, and reliable solar power high above the tropospheric weather patterns which so-often limit solar power generation on the surface. In turn, SPL's greater coverage and higher capacity will require smaller fleet sizes, though this will be offset somewhat by a certain number of grounded craft. The economics of the two models are difficult to assess now, especially given the commercial launch times of late 2024 for Zephyr, and 2027 for SPL's Stratocraft.

Important to those calculations will be the development of the Hydrogen economy, based on the increasingly popular idea of generating the gas from renewable sources as the primary energy for industry and consumers. To get a sense for the scale, Deakin pointed to a trial of SPL's ability to target individual Scottish postcodes with broadband beams, which would have required 19 wind turbines to generate enough hydrogen to keep that fleet operational.

While the Aalto and SPL projects differ in their craft design philosophy, they target very similar use cases, customers, and applications. Core to both propositions are the steerable beams that can provide broadband connectivity to well-defined areas, respecting national or regulatory boundaries.

Both are envisioned to operate in difficult-to-provision regions, especially those where fiber deployment costs prove prohibitive. Examples include the Scottish Highlands in the UK, or the mountainous, jungle-covered, and archipelagic terrain of Indonesia. Aalto representatives pointed towards use cases that would see its platform plug coverage gaps between urban centers, especially for precision agriculture.

Deakin also mentioned Saudi Arabia as a market SPL is looking to enter. Not only could Saudi Arabia become a major player in the emerging Hydrogen economy, but it also consists of vast stretches of sparsely populated and undeveloped desert regions. At the same time, broadband consumption patterns skew heavily in favor of mobile, with an average monthly data use of 56GB compared to 6GB in the UK. The popularity of mobile broadband coupled with poor land area infrastructure coverage could make Saudi Arabia a prime market for HAPS operators.

Indeed, Tonomus NEOM, subsidiary of Saudi Crown Prince Mohamed Bin Salman's NEOM megaproject to construct a futuristic, technology-driven city on the country's Red Sea coast, is a member of the HAPS Alliance, and Saudi authorities are interested in HAPS. SPL itself conducted trials with the Saudi communications commission (CST), and the Saudi Space Commission (SSC) on delivering broadband from HAPS in February 2022.

Competition is fierce, however. Just last week during MWC, Aalto signed a memorandum of understanding to enter a strategic partnership with the Saudi STC group and provide the mobile service provider with connectivity from its HAPS craft once the Zephyr project begins commercial operation in 2024.

It remains to be seen what consequences this move will have for SPL, and whether it will be able to secure Saudi money for its Summer Series B round. Wireless Watch will continue to follow these developments closely. Airbus' Zephyr project was recently covered in a September issue of Wireless Watch here.

Key Issues

Both eSIM and iSIM feature at MWC

Both embedded SIM (eSIM) and its logical successor integrated SIM (iSIM) featured at MWC 2023 in discussions and product announcements, attracting greater interest than ever before for IoT devices as well as smart phones. The primary motivation for both is reduction in size, saving precious device footprint, followed by flexibility in the case of iSIM especially.

But the need for space saving varies with device size, being acute for some small IoT sensors but less so for handsets and almost nonexistent for some large IoT systems such as vehicles. The two follow a progression, eSIM eliminating the need for a removable SIM at the edge of the device, driven primarily by the increasing desirability of saving onboard space in the smart phone era. This reduces the footprint about three-fold to 6mm x 5mm from the nano-SIM at 12.3 mm x 8.8mm, which itself had evolved to be smaller than the micro-SIM and original SIM that preceded it. For smart phones there is not so much pressure to reduce SIM footprint further, as there is room for an eSIM.

That is not the case though for some small IoT devices lacking space even for an eSIM. iSIM is then the answer, with all SIM functions integrated into device SoCs (System on Chips). That is already gaining traction in the IoT realm for such small devices.

The iSIM also scores for flexibility, and the ability to integrate it into SoCs at relatively low cost makes it ideal for devices such as tablets and laptops whose users may at some stage want cellular connectivity even if they just used WiFi at first. As long as the incremental cost comes down to just a few dollars, then being able to pitch all such devices as mobile-ready makes complete marketing sense.

The main drawback of iSIM likely to retard its implementation over the next 10 years is also a potential strength—security. On the one hand, by being directly incorporated in the device SoC, iSIM makes it harder for hackers to gain access to it, while allowing all the same protections of other SIMs. Furthermore, as with eSIM, iSIMs support over the air provisioning, which means security can be updated and vulnerabilities patched, while with physical SIMs the only way this can be done is by swapping the component.

The downside though follows from the combining of SIM and other functions on a single chip, which makes insertion of trusted credentials logistically more complex. SIM security begins at the point of manufacture, which means that factories must deploy measures to protect against breaches and have these certified. This was more straightforward when the chips, whether for physical SIMs or eSIMs, were manufactured in one factory and then shipped straight to device makers for incorporation in their circuit boards.

But with iSIM, the SIM functionality is incorporated in the SoC that also houses other functions with no physical insulation between them. Typically, the iSIM logic, sometimes called operating system, will be incorporated in a small part of the SoC and be developed by a specialist vendor, so there are two parties involved. This makes it harder to install credentials into the chip in a tamper-resistant way, given that this would be part of a larger design and fabrication process. Anxiety over this process has hampered the advance of iSIMs, but the problem now appears to have been fixed through a two-step personalization process based on standards approved by the GSMA.

This splits the personalization process of the iSIM between the SoC maker and iSIM unit provider. The two establish a trusted relationship through which they prepare separately the SoC and the internal iSIM using the GSMA approved processes called Perso SC and Perso UICC respectively. The ultimate device maker then incorporates the SoC knowing that the iSIM inside will be activated with the required credentials at the point the SoC firmware is loaded. The iSIM provider then activates the iSIM securely to make it a fully functional SIM, from then on operating exactly like an eSIM, even though it is inside the SoC.

While the iSIM personalization problem has been fixed, even iSIM advocates admit that the friction imposed will hold back implementation over the next decade, even though it will start appearing in some phones and IoT devices even this year. For this reason, eSIM still loomed larger than iSIM at MWC 2023. In any case, especially for smartphones, eSIMs offer all the benefits of iSIMs, including inbuilt cellular capability with remote provisioning.

The biggest buzz on this front at MWC 2013 was generated by Google with the launch there of its eSIM transfer feature that will roll out to all Android phones later in 2023, we presume with release 14 of the operating system. At MWC Deutsche Telekom was revealed as the first carrier to support it.

The key benefit is that it will make migration to new phones almost transparent, after previously requiring both insertion of the SIM and management of migration for apps and data. Now it will require little more than placing the new phone near the old one so that the eSIM profile can be transferred over WiFi according to the GSMA TS.43 standards.

DT was already supporting eSIMs, with 40% of its new customers electing for this option over physical SIMs. But migration to new phones was still cumbersome, even though there was no need to swap the SIM itself.

On the iSIM front, Qualcomm and French electronics and security group Thales stole the thunder with launch of the first GSMA-compliant iSIM technology compatible with the former's Snapdragon 8 Gen 2 mobile platform. This could be seen as stealing Apple's clothes and making them smarter. MWC 2023 is essentially an Android show with Apple absent, but in any case eSIM has been supported in some iPhones for a few years, although at first also with a physical SIM as well so that the footprint saving was not obtained. Then just in September 2022 Apple launched its first eSIM-only iPhone.

Now Qualcomm has gone a step further on the Android side with the iSIM chipset, promising to save more money and likely to feature in a few handsets, such as the Xiaomi smartphones. These already use the Snapdragon 8 Gen 2 including the iSIM.

The iSIM is compliant with the GSMA Remote SIM Provisioning standard and will be functionally identical to standalone SIMs or eSIMs as far as users are concerned.

"Alongside the increasingly popular eSIM, the Thales 5G iSIM gives device makers and mobile operators even greater freedom to offer their customers effortless over-the-air connectivity, and more exciting and accessible product designs," said Guillaume Lafaix, Vice President of embedded products, Thales Mobile and Connectivity Solutions.

Qualcomm had predicted there will be 300 m global shipments of iSIMs by 2027, which would then represent almost 20% of the total on board SIM market, including eSIMs. Despite appearing in some smartphones, the main appeal of iSIMs initially will be more space-constrained IoT devices.

MWC 2023

Telcos hoist flag for IoT at MWC 2023

IoT has struggled to emerge as a coherent sector and this was still evident at Mobile World Congress (MWC) 2023, with numerous successful deployments and products on show, but still not much harmony between the multiple vertical sectors on parade. Telcos seemed notably more strident and confident than many major vendors, with Vodafone, Deutsche Telekom and SingTel among more bullish tier 1s on the subject. A number of major IoT technology or platform vendors were forced into rearguard defensive mode over IoT, after having divested or shrunk operations in the sector, examples being Ericsson and French electronics and defense conglomerate Thales.

IoT is too big a sector for any single vendor, platform or technology to be relevant for all cases, having being defined largely by what it is not, that is a conventional computer or mobile handset. Otherwise it can be anything requiring or possessing internet connectivity, whether fixed or wireless, including cars, robots, drones, refrigerators, watches, health monitors and remote weather stations. The idea of universal connectivity and interoperability across such diverse applications and diverse is meaningless, but there is great utility to be had through convergence and standardization within some of the vertical domains, including manufacturing, automotive and the smart home.

There were signs of progress here at MWC 2023, with 5G itself being increasingly positioned alongside edge-compute as the unifying and essential communications platform. The majority of emerging IoT applications, drones, robotics and remote sensing to name three, are not conducive for fixed communications, which are either too expensive for remote deployment, or incapable of enabling sufficient mobility.

This partly explains why telcos were bubbling at the fount of IoT demonstrations and presentations at MWC 2023. There is a growing conviction they have a compelling story to tell and potential for that elusive monetization by underpinning IoT services with faster and more reliable 5G connectivity and where relevant edge-compute capabilities. For the considerable number of use cases, such as smart metering and environmental monitoring, that do not require full 5G speed and capacity, there are the two cellular Low Power WAN (LPWAN) options of NB IoT and LTE-M.

Both these are gaining overall market share against non-cellular variants, primarily Sigfox and LoRa, although there is still room for them all to grow in volume terms.

Currently LTE-M tends to serve IoT applications requiring higher bit rates above say 500 Kbps with peak capacity up to 4 Mbps down and 7 Mbps up in some variants. By contrast NB-IoT is pitched at low bit rate applications in contention with LoRa, especially, in smart metering. However, in the current 3GPP Release 17, provisional support has been introduced for RedCap UE (User Equipment), a converged IoT service use case in addition to eMBB, URLCC and mMTC, bringing together NB IoT and LTE-M inside this new broader standard.

In this first take, RedCap UE matches the bit rate of LTE-M but reduces both complexity and power consumption, while also cutting latency and preparing the ground for future operation across all the 5G NR (New Radio) bands.

Then under Release 18, likely to start rolling out during 2024, will come further additions to RedCap under the banner of 5G Advanced, including higher maximum data rates, positioning, and support for sidelink communications directly between devices. The latter is a key part of automotive cellular C-V2X for communication among vehicles themselves and with any other relevant device within local reach around the roadside. Under RedCap, sidelink would also enable direct connectivity in the cellular domain between local devices as an alternative to Bluetooth, with potentially greater robustness and range. There will also be support for unlicensed spectrum.

RedCap then will intersect with the other three uses cases as a subset of each but able to provide a standalone wireless stack covering a range of IoT requirements. Not surprisingly given its promise, RedCap was lurking behind a number of announcements and demonstrations at MWC 2023.

For telcos though the focus was on demonstrating what they can bring to the IoT party now, with Vodafone one of the most expansive, highlighting synergies between deployments across Europe and in its home UK market. The latter include remotely piloted drone deliveries in Scotland, use of IoT sensors for monitoring the condition of forests, and use of Open RAN to improve 4G signals in rural Cornwall.

For the drone deliveries, Vodafone partnered with consulting group Deloitte and Skyports, which describes itself as a provider of advanced air mobile services. This was to transport medical supplies in remote areas of Scotland to support the UK's response to Covid-19.

In the case of Cornwall, Vodafone promoted the benefits of OpenRAN for improving signal coverage. More generally Vodafone stood out as one of the more evangelical operators for OpenRAN, which otherwise featured less prominently at MWC 2023 than some observers expected.

The forest application was extended for detection of fires in areas where that is a greater threat than in the UK, such as Sardinia. Then the drone applications resulted in demonstrations around Barcelona of drones being controlled from over 1000 km away, using VR headsets to view the surrounding airspace.

The use of Open RAN to improve 4G signals was then demonstrated with Orange as another tier 1 championing that cause.

There was also strong advocacy for the IoT as a coherent whole from the industry community known as IoT Stars, whose involvement with MWC dates back well before the hiatus occasioned by Covid-19. At a panel staged by IoT Stars at MWC 2023, Nicolas Lesconnec, strategic partnerships manager at IoT platform provider Soracom, argued that the lack of apparent proven use cases in the enterprise sector was partly a simply result of their not being described as IoT applications at all. He contended that IoT was advancing now on many fronts beneath the radar of recognition. Many users quite reasonably regarded IoT components as just a small part of an overall application or department.

That certainly seemed to be the case for Deutsche Telekom, which hardly mentioned the IoT acronym with the notable exception of its satellite announcement, and yet presented a number of developments or deployments that could be regarded as IoT centric. DT was keener to underline its sustainability and human centric qualities as a touchy feely operator under the motto to "Giving technology a heartbeat," as Claudia Nemat, Board Member for Technology and Innovation, explained.

"We want technology with a heartbeat, technology as a lever for a better world. We want to use technology to overcome common challenges. For our customers, the ecosystem and society," said Nemat.

DT did cite the IoT in the global context of its most notable announcement at MWC 2023, its recruitment of satellite constellations to provide global wireless coverage. The company is collaborating with Intelsat and IoT device maker Skylo to combine satellite with its existing terrestrial IoT networks, including NB-IoT and LTE-M besides 4G and 5G.

“With integrating satellite connectivity into our T IoT offering we are reshaping the future of global IoT networking,” said Dennis Nikles, CEO of Deutsche Telekom IoT (T IoT). “Our customers now have a ‘network of networks’ with ubiquitous connectivity which enables completely new possibilities.”

Such possibilities outlined at MWC 2023 included networking remote wind turbines, providing ubiquitous broadband at sea, and recording weather data from remote stations.

Some over excitable commentators suggested this was a foretaste of 6G, when in reality convergence between satellite and terrestrial networks is an ongoing project rooted even in the 4G era. 6G more even than previous generations faces the challenge of avoiding being seen as an evolution into higher frequencies and greater network synergies.

It is certainly true though that ubiquitous global coverage will be a boon for certain IoT sectors.

There was one other big IoT related announcement at MWC 2023, the launch of the first commercial iSIM (Integrated SIM) package from Qualcomm, which we cover in a separate story in this issue.

New Modulation Schemes

Cohere ties with Lockheed to push OTFS waveform modulation

Cohere Technologies used the big stage at MWC Barcelona to announce a new partnership with defense and aerospace company Lockheed Martin. Cohere and Lockheed's respective CEOs Ray Dolan and James Taiclet outlined their vision to create a unified communications platform for the defense community in a joint keynote "The Evolution of Innovation".

Cohere's orthogonal frequency time space (OTFS) waveform was at the center of the proposition, at the core of Cohere's products for the past decade.

Compared to other modulation techniques such as Time Division Duplexing (TDD), or Frequency Division Duplexing (FDD), OTFS is based on the delay-doppler rather than the time-frequency domain. This domain is typically in use in radar systems and affords superior wireless channel efficiency by exploiting both the varying velocity and delays across the domain. This allows the OTFS waveform to couple to the channel in such a way as to leave the transmission highly resistant to signal delay and doppler effect-induced frequency shifting. Delays in signal arrival times and frequency shifting are major sources of signal degradation for TDD and FDD signals respectively.

Lockheed Martin has long advocated for increased integration of US weapons platforms with sensors and information from other aircraft, drones, satellites, and radar installations. Its latest flagship product, the F35 multirole fighter aircraft, was designed to be at the focal point of this information and sensor network. With the first F35s delivered, it now seeks to build this platform.

Resilient, high-throughput, and secure communications are central to this vision, and Cohere is confident OTFS can deliver them. Its value proposition for Lockheed to connect a network of fast-moving satellites, fighter aircraft, drones, and ships was summed up by Cohere CEO Ray Dolan with the words "This waveform [OTFS] eats velocity for lunch".

Dolan and Taiclet then went on to launch further appeals for partners to join their respective and joint endeavors. Taiclet called on partners in the telco space to help construct a defense industry-wide, "open architecture standards-based network" to help "protect aircraft carriers in the South China Sea from hypersonic missile attacks".

Beyond the defense industry, Dolan believes the hosting of communications platforms for entire verticals is the future of the cellular space, and an important route to successful monetization for telcos in the 5G era.

Furthermore, he advocated against monolithic and generational views of mobile networks, arguing that the increased cloudification in the telco space should lead to a rethink of traditional models in favor of converged, multi-G networks and platforms, and the death of 5G and 6G labels.

There is merit to this idea. Operators have struggled significantly to capitalize on their investments and could require a radically new business model as traditional revenues decline in real terms. With enterprise customers expected to become a major source of revenue for operators starting in 2023 and accelerating into 2024, a holistic focus on entire verticals' connectivity needs may be in order.

Projects of this magnitude would further benefit the traditional operators, which have been facing increasing competition from specialists in the private networks and enterprise space and have seen unfavorable industrial spectrum policies in large parts of the world further erode their incumbent advantage and the value of their spectrum holdings. It would finally provide them with an opportunity to leverage their financial, manpower, and experience more effectively.

The death of the 5G or at least the 6G label may seem outlandish to marketing departments but clearly matches the reality. Monolithic generational views deny the reality of gradual evolution, rather than revolution, of mobile networks, though there are the beginnings of radically new shapes, as virtualization and cloudification spread. As more and more networks are truly cloud-native and functions fully virtualized, there will be little sense in the generational view, in fact, it could even hamper the integration of new features to exploit new use cases.

Dolan ended his time on stage looking at the platform-based business model with the words: "Let's not wait another 30 years as an industry looking for ways to host entire communications architectures … This is how the industry should look at it, but it doesn't operate that way, because we go "That's 6G". and "It is the revenue opportunity of 5G, but unfortunately were looking at it at a monolithic level, and frankly, some things work well on 5G, some don't."

Despite all the talk of the telco space's aversion to disruption, future business models, and platforms, Dolan never strayed too far from the cellular sun either, which is where the majority of its business will come from in the near term.

The company has failed to deliver sustained commercial success for around a decade now. During that time, two earlier business models saw Cohere being an OTFS hardware provider and dabbling in Fixed Wireless Access. In 2018, it underwent what it may hope is its final strategic shift under new CEO Ray Dolan.

Those shifts were caused in large part by the operator community's rejection of OTFS as the standard air interface for 5G in the early-to-mid 2010s. Despite backing for OTFS from AT&T, China Mobile, Deutsche Telekom, Telefónica , and Telstra, in the end, the 3GPP RAN 1 group played it safe and stuck with extensions of OFDMA, which led the then VP of business at Cohere, Anton Monk, to describe Release 15 as "LTE with Massive MIMO and beamforming — nothing really new except for including Huawei's polar codes in the control channel and using LDPC (low density parity check) everywhere else".

In its latest iteration, then, Cohere offers software products, most notably its OTFS-based Universal Spectrum Multiplier (USM) and the soon-to-be-released Dynamic Network Alignment (DNA) automated MIMO antenna management solution.

The USM exploits OTFS' channel estimation capabilities to increase signal resilience and therefore spectral efficiency. Despite being OTFS-based, it is compatible with both 4G and 5G TDD and FDD networks. Trials with Vodafone in 2021 revealed its potential to double the performance of a given network.

Currently, the DNA tool is available as a bolt-on to USM, but it could potentially be deployed as an xApp in the O-RAN near-real-time RAN Intelligent Controller (RIC) platform, so that it could work with third-party solutions. USM is also available as an xApp for the RIC and has been tested by Deutsche Telekom. DT noted a doubling of the throughput on its test network and a resulting reduction in operating costs: "In total the overall cost can be lower than in the case of using a traditional platform because of the improvement in radio performance".

Open RAN represented another prong in Dolan's strategy when he took the helm. Like many start-ups, Cohere jumped on the Open RAN bandwagon to try to attract operator and partner attention and get involved in a more open environment for trials and sales.

Now, aside from USM's availability in the VMWare ecosystem, this drive bore fruit in the form of a partnership with Open RAN specialist Mavenir to boost each other's products and combine to "enable a Multi-G software platform". Effectively, this will boost Cohere's standing in the Open RAN community through the inclusion of the USM in some Open RAN Mavenir deployments.

Originally providing open network management software, Mavenir has recently sought to improve its Open RAN product portfolio. It expanded its portfolio last year with its own Open RAN radio suite, OpenBeam. In early February, two weeks before MWC, Mavenir announced its own RAN Intelligent Controller (RIC) to add to its lineup, which now sits at the core of the combined Cohere-Mavenir partnership.

Despite this renewed foray into Open RAN, and its prestigious and perhaps lucrative Lockheed partnership, it is clear Cohere must make its case first and foremost to the operator community. That community was well represented in Cohere's most recent round of funding last year, its fourth overall, which saw the likes of Bell Canada, Intel, Juniper, Lightspeed Venture Partners, Telstra, Koch Industries and VMware take another $46m slice of the company, out of a total of $100m.

There are signs of success with the operators here. Bell Canada and Cohere recently announced a trial and strategic partnership. In addition to its USM trial, Bell Canada plans to "evaluate" OTFS as a potential element of its 6G roadmap. Cohere CEO Ray Dolan said: "Bell's interest, collaboration, and support is also intended to accelerate OTFS as a candidate for 6G that has unique benefits to the global defense industry as well as satellite connectivity."

Cohere gave itself the target of 2023 for commercial maturity and viability. It also stated its $46m injection would keep the lights on at least through 2024. It seems set for success, though some bigger fish, preferably Tier 1s, will have to bite, as the dream of industry-wide platforms is more likely to materialize in the long term, and eking out an existence on small-scale Open RAN deployments is clearly below the ambitions of the company.

Worth Noting

EU clears path to secure satellite service

The European Union's council of member states has approved regulations clearing the way for launch of a secure satellite communications service by 2027. The plan is for this be one of the first such services to use quantum key distribution (QKD), involving transmission of secure encryption keys over the network with guaranteed detection of tampering so that the keys can be resent in the event of eavesdropping. Called IRIS2 and with a €2.4 bn budget, the proposed LEO (Low Earth Orbiting) satellite constellation would also enable low-latency communications for applications including protection of critical infrastructure and surveillance.

Wireless Logic adds Blue Wireless to recent acquisitions

UK IoT firm Wireless Logic has picked up Singaporean Blue Wireless for an undisclosed fee, resuming the company's buying spree of 2022. The latest deal increases the firm's presence in Asia Pacific and the United States, while expanding its portfolio to include fixed wireless access (FWA) services.

Wireless Logic acquired industrial IoT platform enabler IoThink Solutions, IoT MVNO Mobius Networks, and provider of IoT data SIMs Jola during 2022.The latest buy brings its total number of acquisitions over the last two years to nine, amassing over 10 million IoT subscriptions in 165 countries, and direct partnerships with 50 MNOs.

Huawei's UK research campus in doubt

Huawei appears close to abandoning its £1 bn ($1.2 bn) project to build a research center in Cambridge, UK, as part of its overall scaling down of operations in the country. This comes almost three years after receipt of planning permission in June 2020. The plan was to invest £1 billion in a first phase, involving construction of a 50,000 square meters building on land bought in 2018 for £37.5 million.

Germany seeking ban on ZTE and Huawei components

The German government is on the verge of banning its mobile operators from incorporating specified components from Huawei and ZTE in their 5G networks, according to Zeit Online, citing government sources. The ban would also impact components already installed by the operators, potentially forcing a retrofit of their networks, according to the report.

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