Success in Private Networks Through Multi-Vendor Open Infrastructure

By leveraging each other's unique value propositions, leading vendors find an opportunity to drive forward the rapidly-innovating private network market.

Airspan + Druid

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Introduction

There is a rapidly-approaching change in how enterprises adopt innovation and streamline their processes. More complex procedures and the use of machinery to replace human factors have put the focus on high-demand applications like Artificial Intelligence (AI), Machine Learning (ML), Augmented Reality (AR), video monitoring and surveillance, creating the need for a new wireless technology to overcome the gaps from legacy networks, such as WiFi or cabled.

Although WiFi is a great technology for many enterprise use cases, it misses some key features to meet the requirements of this new Industry 4.0 market. Therefore, Private Cellular Networks (PCN) are at the center of the spotlight to overcome these challenges. They provide mobility, capacity, low latency, scalability, security and reliability, many of the factors required for this new industrial application.

PCN is not a new concept. They have been present for more than a decade using 4G technology, but they were not adopted massively since a couple of years ago. The reason for this interest on PCN is related to two main factors:

1. 5G is the latest cellular generation and the first one designed to meet the industry requirements based on three pillars: High Speeds (EMBB), Low Latencies (URLLC) and Scalability (mMTC). This brings a disruptive foundation of new features, which creates a flourishing market for new resource-hungry apps to streamline the industry processes. It is important to note that 4G is still a valid technology for many use cases in this new industrial era, together with the maturity of the solution and the strong ecosystem of devices and solutions

2. Spectrum is the main factor when talking about wireless infrastructure. Traditionally operators running commercial cellular networks where the main owners of spectrum licenses providing cellular coverage to the public and private domain. Since 2019 this changed with governments offering dedicated or shared spectrum to enterprises. Some examples are Germany, UK, Japan, France and USA. These countries have seen a fast-increased of PCN demand thanks to the spectrum availability for enterprise use cases and subsequently, a leadership position on 5G attracting innovation through various suppliers involved in the deployment of these networks.

As 5G and shared-spectrum propel PCN demand forward, vendors are vying for their place in the new ecosystem. Far from serving to choke the market, the competitive landscape has in fact promoted business philosophies centered on partnership, ease-of-access, and service. Vendors that achieve remarkable innovation in their own domains often find common interest with their counterparts, enabling them to pool their resources towards winning joint customers, and delivering above and beyond on their value propositions. The network core and the radio unit, two essential components of any PCN, lend themselves particularly well to close collaboration among vendors, allowing for combined momentum towards innovative and competitive solutions for more end users than ever.

Airspan Networks and Druid Software are a clear example of a multi-vendor partnership succeeding on the private network market. Airspan provides the RAN (Radio Access Network) solution and Druid the 5GC (5G Core). Both companies have joined forces to accelerate and commercialize the introduction of new features and services aligned with the needs of this high demanding market. This whitepaper dives into the details of why a multi-vendor PCN is the right choice to keep up with a fast-transforming technology and ecosystem. It also confronts the main concerns from the industry, specifically regarding integration and customer support, by bringing new processes and services to provide peace of mind and lasting simplicity.
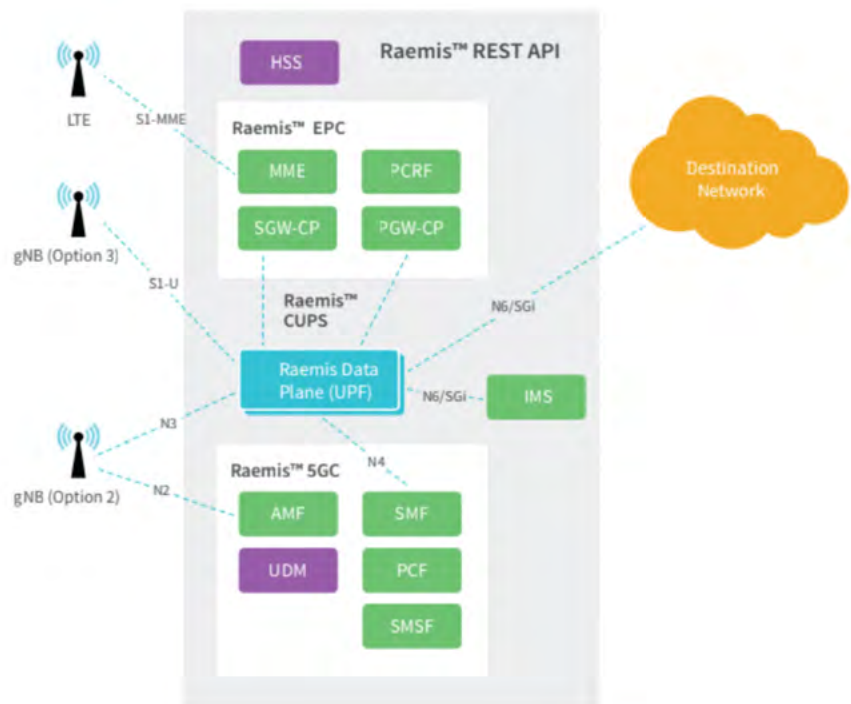
Architecture

There are several types of private network deployment architecture. The flexibly to provide these networks in different configurations depending on the customer's need is an important advantage of the technology. Initially businesses tend to start with their first 5G "stand alone" private network to trial the latest security, low latency and higher data throughput use cases.

Single Instance Networks

Customers often start with trial or proofs of concepts to address the need to explore digital transformation and look to drive efficiencies in their use cases. This is where a single instance private network can provide the full 5G experience with all the bells and whistles and enterprises can start to unlock the ultra-reliable low latency communications.

A private network also has other key characteristics in that it does not need any public mobile spectrum or infrastructure to be deployed. It can be deployed on the customer site on their LAN or in their cloud, with the flexibility to run on bare metal COTS hardware or on a virtualized environment of their preference. With all the private network infrastructure deployed locally this configuration is ideal for supporting low latency Industrial real-time applications for example.

The figure to the right depicts at a high-level the elements of Druids Raemis 5G core. The Raemis EPC assists in providing the 5G Non-Stand-Alone support. The Raemis EPC follows the Control and User Plane Separation (CUPS) architectural model, and hence the Raemis Data Plane Function is a common Network Element shared across all generations of cellular technology. It provides the UPF function of the 5G SA core but also provides the data plane function for the 4G SGW and PGW. This shared Data Plane element makes migration from 4G to 5G quite simple.


The Raemis platform architecture is built on a REST based service-oriented architecture, motivated by the business-oriented use cases that the Raemis platform was created to address. As 3GPP's 5G core service-oriented architecture is now anchored in REST methodology, it is well aligned with pre-existing Raemis platform architecture.

The Raemis platform supports Option 2, Option 3, Option 4 and Option 7 of the 5G architectural models described by 3GPP. Option 2, commonly referred to as 5G Stand Alone (SA), is the deployment model where 5G RAN is connected to the new 5G core model. While this is a more disruptive model for upgrading existing LTE networks, it is much cleaner for new 5G-only operators

and most importantly from a Raemis perspective, the enhanced 5G air interface capabilities including ultra-low latency and RAN slicing becomes available.

Distributed Networks

We have seen how customers with multiple private networks naturally need a single point of control and management of these networks where monitoring of remote sites and the critical communications the private network is supporting become essential and drive further efficiencies. This saves a lot of time and cost traveling to these locations where can often be remote on and offshore. This single point of control can easily maintain all types of private networks like a complete campus or in-building network, or mobile patrol or vehicular based private networks that have become popular for first responders.
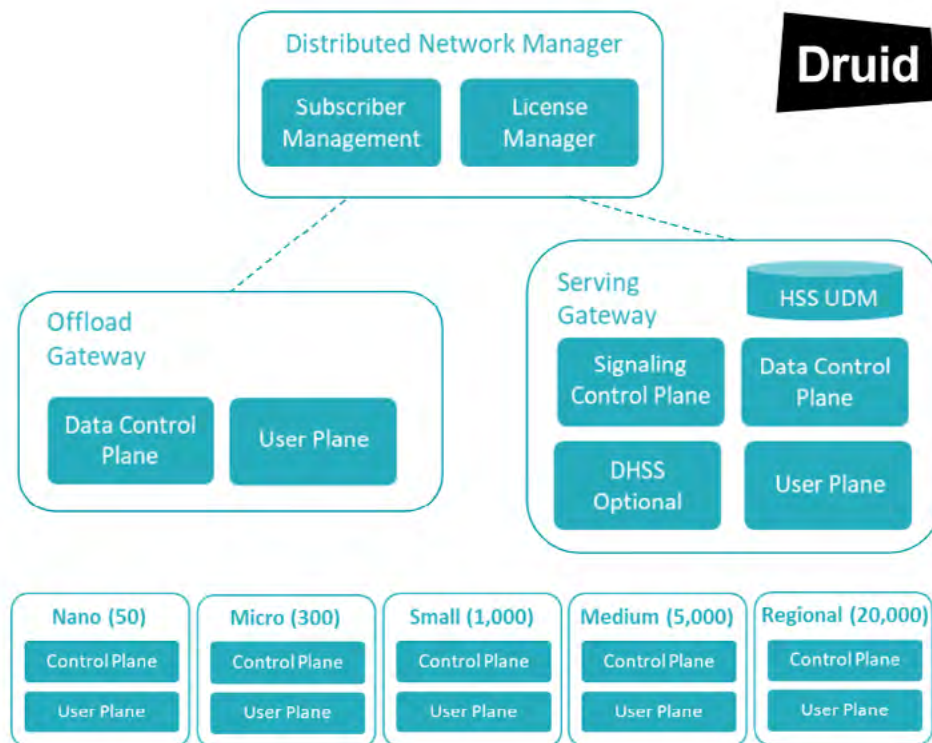

These distributed networks combine the advantages of natural redundancy at the "edge" where the private network is located at the customer site, with remote management. Having all these private networks where the customer needs them makes ultra-low latency Industrial use cases possible.

Traffic Separation

Network Slicing is a much-vaunted concept of 5G networks, but the Raemis platform has been supporting the concept for LTE networks. Its purpose is the separation of multiple logical networks which can operate on a common set of virtualized infrastructure. The Raemis platform supports this concept by design but goes a step further in bringing the slicing concept directly to Enterprise and Edge Private Networks. It enables management of these "enterprise slices" with an intuitive web

interface that can be operated by any qualified IT technician. With Raemis Enterprise Slicing, the Enterprise can define its own dedicated network slices that ensure a specific level of QoS and security for individual groups of enterprise users.
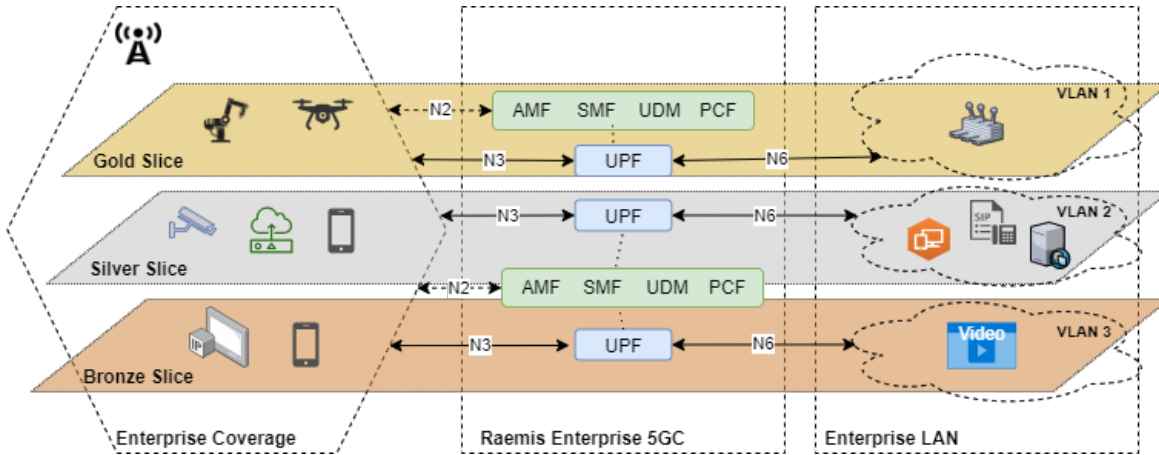
The Raemis platform allows slice membership to be managed easily using Raemis user groups. The IT administrator creates the various user groups and places the users within these groups. The groups may then be assigned to one or more network slices to define their capabilities. This is managed in the same way for 4G private networks, and this enables a slicing capability for 5G NSA private networks as well as standalone 4G networks.

Raemis 5G slicing relies on a good implementation of RAN slicing to be implemented in the 5G gNBs. This RAN slicing capability allows QoS and separation of users to be implemented on the 5G air interface. Short Video showing how easy it is to create a network slice.

Traditional vs multi-vendor deployment

Cellular technology has been dominated by a handful of vendors, such as Ericsson, Nokia and Huawei, which were the preferred vendors for most of the Tier1 operators. Prior to governments offering dedicated spectrum to enterprises, all spectrum was owned by Operators which could offer part of their public spectrum to enterprises, without being a fully owned Private Network by the end customer.

With governments opening dedicated spectrum to enterprises, there has been a shift of interest looking for new vendors, which offer more tailored solutions for PCN. We could see two types of approaches related to the selection of the network supplier: Traditional vs Multi-vendor.

As traditional deployment we refer as a single vendor providing the full network solution. Main advantage is that integration between different elements of the network is provided by the same vendor, simplifying the entire process, , together with a single pane of glass management platform.

The main disadvantage from traditional deployments is the lack of flexibility. The main agenda from these vendors is their original customers, tier 1 Operators, which translates in a reuse of the same hardware and software they provide for public networks to be applied for Private ones. This creates a gap in the market for small and medium sized private networks, since it is hard for traditional suppliers to scale down.

Unlike traditional deployments, a multi-vendor approach let the end-customers decide the players they want to team up with to meet their requirements. These vendors offer products and services aligned with the private network market need, capable to scale down or up, depending on the size of the network.

The different vendors partner together to bring fully tested features with the required ecosystem to meet the customer demands.

Customers' main concern is the integration of all the different elements. This is a fact that Airspan and Druid have taken very seriously to reduce this complexity and create a plug and play solution.
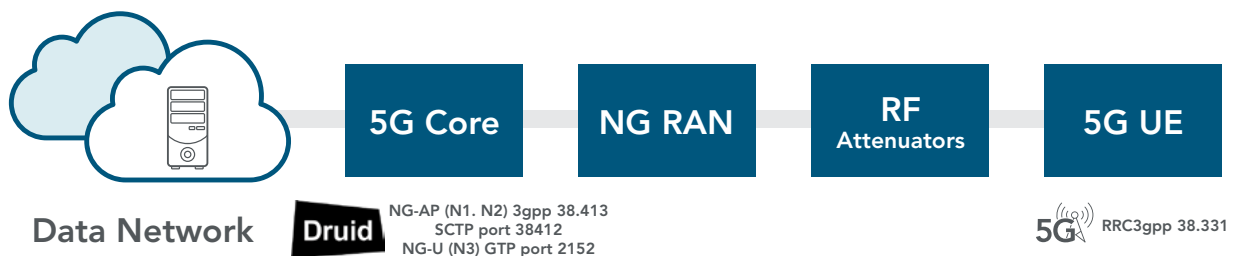
Multi-Vendor Deployment Process

A one-time setup process serves to verify the match between vendors. By streamlining this onboarding action, a compatible pair can be up-and-running within a few weeks, fully capable of delivering a partnered plug-and-play solution. Once this has been done, the customer can go directly into commercial deployment with minimal friction.

Interoperability Testing (IOT)/ Core

As the 3rd Generation Partnership Project (3GPP) is migrating to 5G – the fifth and latest generation of mobile networks, there is an increasing demand to support more advanced technologies leveraged by the industry such as the Internet of Things (IoT), Machine Learning (ML), Artificial Intelligence (AI), and much more. This has led to the enhancement of software-ization and virtualization that can be adopted across all segments of the mobile network architecture to deliver a single-shot solution to businesses looking for private networks.

To find balance between integrating these emergent technologies and deploying 5G based on customized private network requirements, there is a growing need for various agile, scalable, and smart solutions that share a common communication protocol – especially considering that more components are well on their way to maturity, having now garnered more bug-fixes as well as wider protocol recognitions. Virtualizing such solutions towards technology-integration can be achieved through interoperability, allowing private networks to be managed and deployed with ease.

The Interoperability Testing (IOT) of Airspan 5G-NR gNodeB and RUs is available with various 5G Cores in 5G-NR SA and the procedures are performed in accordance with the NG-AP protocol 3gpp 38.413 technical specifications. In a nutshell, Airspan establishes interoperability by connecting to customer 5G Core remotely, performing interoperability, running tests and analysis of the NG-AP procedures, and generating an official and comprehensive summarizing report.

| Data Network | 5G Core | NG RAN | RF Attenuators | 5G UE |

Druid — NG-AP (N1. N2) 3gpp 38.413 / SCTP port 38412 / NG-U (N3) GTP port 2152

5G — RRC3gpp 38.331

Druid and Airspan do not restrict themselves by providing interoperability just as a service; it goes above and beyond. That is, they both offer the flexibility of opting between different RAN and Core vendors (existing and new). In addition to selecting the Core or RAN solution to best address the customer's need, Airspan and Druid are also flexible to extend support by securely collaborating with any of the customer-preferred vendors. Having said that, they have been widely deployed together on over 160 private networks globally to date.

Contrary to the usual 'vendor-lock' approach, Airspan and Druid operate in a multi-vendor environment with dedicated IOT resources offering great flexibility, reliability, affordability, security, and stability. With a vendor-free approach, both companies can help customers optimize their preferred platform by selecting prime vendors who demonstrate excellence. Some of the common parameters that need to be considered like in selecting the right vendor include the network type (FWA/ Mobile network), network scale, supported features (IMS), network slicing, single-platform support for both LTE and 5G subscribers, deployment methods such as:

Centralized Core - Hub architecture with standard IT deployment requirements, supporting S1 interface via carrier Ethernet backhaul, owned and operated by the service provider.

Cloud-hosted Core – Similar to the centralized Core, but owned and operated by the host, leading to lower CAPEX.

Hybrid Edge Core – Flexibility in deployment options, supporting low-latency applications, and S1 and S-GI interfaces via carrier Ethernet.

Extreme Edge Core – For ultra-low latency applications with no single point of failure, supporting unlicensed wireless backhaul, optimizing radio and network bandwidth resources.

Selecting a highly capable vendor with a strong core remains a critical aspect that Airspan has prioritized the most. Thus, the strong partnership with Druid and their industry-leading core capabilities. The 5G Core is set up either directly from our Airspan IOT lab or by remote connection to the customer's lab/Core vendor lab.

Following successful IOT, the solution is deployed in Airspan's SVG (system verification group) lab, verified for performance in an all-in-one environment, and finally connected to the network. Airspan closely aligns with Druid in monitoring every software upgrade and update. A dedicated customer portal, AirShare, is maintained for sharing information and granting the customers anytime-and-anywhere access to comprehensive details and reports of each software release rolled out. Every time software is tested, qualified, and released, an all-inclusive summary of files detailing the release information, SVG test report, Method of Procedures (MOPs), and other relevant materials is made available and notified to the customers.

Yes **Airspan** + **Druid**

Airspan Receives Customer Request	→	Partner Qualified?

No → Interoperability Testing of 5G Core as per NG-AP protocol 3gpp 38.413 technical specification → Solution deployed in Airspan lab → SVG team tests product in our all-in-one environment → Airspan connects to the network from its ACS lab → Commercial Deployment
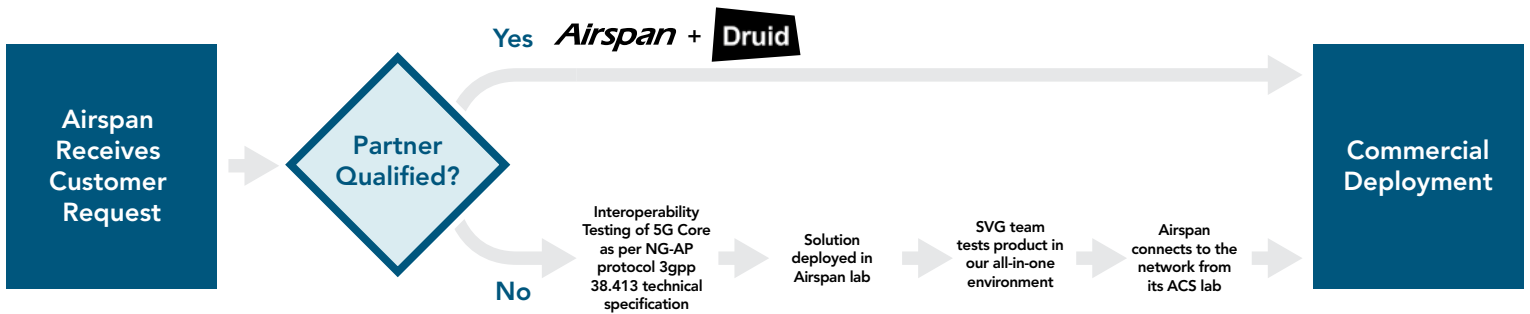
One of the key complexities involved in setting up private networks in a multi-vendor environment is integration, which consumes most of the cost and time for the customers. Staying committed to addressing each customer requirement, Airspan has simplified and streamlined the end-to-end integration process for its customers by delivering pre-integrated and ready-to-use 5G starter kits; thereby, saving much of the customers' cost and time that would otherwise be spent on integration.

5G Starter Kit to speed up integration process

With almost 80 deployments worldwide as of Q3 2022, accelerating the adoption of 5G technology and private network use cases and applications, Airspan's and Druids 5G network-in-a-box solution allows customers to experience the fullest potential of 5G. Following the success of Airspan OpenRAN Indoor 5G Starter with Druids 5G core, Airspan are now able to offer All-In-One gNB/ OpenRAN, indoor/ outdoor — in any unique fusion with Druids 5G core to address the global market demands.

Airspan's 5G network-in-a-box is a simplified network architecture that comes in a small-size package comprising of a 5G Core, and All-In-One gNB/ OpenRAN RUs with pre-installed software, a switch, 5G CPEs, and servers to host the OpenRAN software with automated indoor/outdoor plug-and-play setup.

By identifying the globally rising interest in private network adoption, incorporating several highly effective solutions, executing faster deployments, and implementing strategic partnerships like Druid's, Airspan has positioned itself as a game changer, driving innovation and leading the industry.

All-In-One gNB

OpenRAN

- Strategic partnerships that demonstrate holistic commitment and share similar long-term goals are a winning formula, and Airspan and Druid are no exceptions, as shown by their recent award-record: Small Cell Forum Awards 2022 for Excellence in commercial deployment by a private network operator for accelerating 5G private networks adoption, addressing complex integration challenges, and minimizing time to market with Druid Software. Thereby, demonstrating a phenomenal finest-breed partnership, celebrating success together with pride over short-term accomplishments and responsibility for the future. [1, 2]

- Fierce Innovation Awards 2021 for its 5G Starter Kit — Network-in-a-Box that powered up Airspan's vision of expanding 5G solutions and market-leading competencies to an awe-inspiring level, leveraging automation with plug-and-play functionality for enterprise private networks. [3, 4]

- Druid was recognized as #1 for core product and market position and #3 overall with Nokia and Ericsson in the Juniper Research private network leader board. [5, 6]

Selecting highly reliable and capable vendors remains a critical process involved in private network deployments. Airspan and Druid seek to manage that process with the utmost care by rigorously analyzing the vendor's place in the market, their ability to address our customers' needs, their references, their stability, and their quality of solution offered by experimenting with their solutions in our labs. Upon selecting the most apt vendor through rigorous lab testing, a collaborative decision to determine the project's target market is made.

When paired with a well-reputed core network function provider like Druid, the opportunity to offer Airspan's RAN to deliver a fully managed wireless service turns into an even greater boon to customers. Just as the old saying goes, 'Too many cooks spoil the broth,' so is the case here that 'too many contacts mislead the focus.' A single point of contact for any technical glitch can help customers to focus resources for support and maintenance rather than dealing with multiple vendors individually. Any core is provided by optimizing solutions based on project requirements.

Cooperation and GTM

Business is often a matter of striking the right balance to capitalize on surging interest for private network adoption worldwide and to establish strategic partnerships.

Every private network project is derived from a different set of requirements. Industry-leading vendors such as IBM, Intel, Dell, HPE, CISCO, etc. that comply with project needs are chosen to optimize the designed solution. Our server-agnostic strategy implies that its private network services are always compatible across any hardware, server, and environment, ensuring that customers get the maximum benefit.

Similarly, to the varied operational platforms/ systems, the potential use cases of private 5G network are also expanding over a wide range of verticals that include manufacturing, healthcare, education, logistics, power plants, retails, agriculture, construction, mining, and more, powering the digital economy with well-connect, digitized, and smart private 5G network solutions.

Recent statistics state that a rapid increase in demand for 5G private networks has resulted in a significant increase in revenue across various industries and is expected to boost segment-wide growth within each industry tremendously between 2022-2030, addressing various needs of each segment.

	Autonomous Robotics	Real-time Automation	Enhanced Video Services	Monitoring and Tracking	Augmented Reality	Hazard and Maintenance Sensing	Remote Operations	Smart Surveillance	Connected Vehicle
Manufacturing	✓	✓	✓	✓	✓	✓	✓	✗	✗
Energy & Utilities	✗	✓	✗	✗	✗	✓	✓	✗	✗
Media & Entertainment	✗	✗	✓	✗	✓	✗	✗	✗	✗
Public Transport	✗	✗	✗	✓	✗	✗	✗	✓	✓
Automotive	✗	✗	✗	✗	✗	✗	✗	✗	✓
Healthcare	✓	✓	✓	✗	✓	✓	✓	✗	✗
Public Safety	✗	✗	✓	✗	✗	✗	✗	✓	✓
Retail	✗	✗	✗	✓	✗	✗	✗	✗	✗

With a diversified range of applications, delivery as well as management, maintenance, and network activation can develop into a tedious process. System integrators therefore play a critical function that helps reduce complexities arising at various stages of the network lifecycle. Airspan and Druid work with system integrators for the private network market worldwide.

System integrators across geographies who lead the execution of projects are very familiar with the vendors across Airspan's and Druid's solutions. By working with systems integrators rather than end-customers alone, they can leverage local support, onsite services, effective network maintenance, and more.

- The solution that best suits the customer's requirement is designed.

- The vendor who is aptly capable is selected to optimize the solution.

- The system integrators are approached with the project requirements.

- It could also be vice versa, where the system integrators approach project requirements.

A Single Focal Point

Region-wide support teams are available onsite and remotely around the world. Effective training and onboarding throughout project implementation based on the need and size of the enterprise is ensured. A new user is created for every new customer and the tickets logged are actively resolved in coordination with Airspan's R&D experts.

Despite thorough investigation and resolution activities, there could be instances requiring the vendor's intervention. In such cases, necessary arrangements are made to fix the gaps with resolution support from the vendor. In offering private network services in a multi-vendor architectural environment, Airspan still holds itself responsible for addressing any and all customer concerns to ensure a stress-free experience.

The RESTAPI in Druids Raemis application

The RESTAPI in Raemis enables easy integration with 3rd party monitoring tools. Alarms and faults are visible in the EMS (Enterprise Management System) and can be forwarded as HTTP events to registered applications like the one Airspan is planning and will make this single pane of glass easy to realize.

Raemis will report on the operational state of the radio and some in-service parameters, like number of attached users, idle and connected mode. RF disconnects for users and data throughput. Some additional alarms and counters are available through the TR069 interface if the eNodeB supports it.

Event, Alarm and KPI forwarding

The platform permits external systems to subscribe to an interest in 1 or more event types that occur in the system. In this case any update to the objects in the system will result in an event being sent to the application listening on the URL. This feature is widely used for fault, performance, and external system integration.

Forward-Looking Statement related to Single Pane of Glass

Vendors' performance metrics are king when it comes to predicting the customer experience that contributes to the business's bottom line. Tier-1 operators take the lead by establishing a comprehensive picture of network monitoring and maintenance for any real-time alerts concerning any equipment or service from any global location with dedicated control centers.

Delivering end-to-end commitment to customer satisfaction in a digitally transforming world amidst smart and connected multi-sector applications, Airspan indeed has broad future enhancement plans in the pipeline for private networks. There is an essential necessity for a centralized real-time monitoring and maintenance service to gain precise control over network operations round the clock when dealing with multiple vendors.

One of the key complexities inherent in collaborating with multiple vendors is to monitor and manage every network element and equipment under a single roof. Airspan is now exploring options to overcome this complexity by developing a smart, real-time, and centralized vendor management platform for private networks – a single dashboard to interface and monitor the performance of all vendor solutions in a single system. Similarly, to our ACP (Airspan Control Platform), this platform would offer an intuitive interface to simplify even the most complex and critical networks for Airspan's RAN, EMS, and Backhaul solutions.

The management platform would include a dynamic dashboard for all alerts and notifications as well as predictive monitoring for possible defects pertaining to any vendor's equipment, from servers to switches, core to CPE, and more. This way, monitoring, tracking, and maintaining each vendor network element/ equipment in real-time is made easy, thus enabling delivery of prompt and precise network management in multi-faceted private network setup for small and medium-sized enterprises that lack sufficient expertise in wireless networks.

Our primary approach is to make this dashboard more intuitive and simpler to use, allowing the support team to monitor and manage configurations, equipment functioning, software, and more network elements through a single window instead of working on each network element separately.

Faster Innovation

The innovative cultures at Druid and Airspan prioritize features based on customer demand, which complements their partnership. Utilizing the many years of experience at the forefront of private networks supporting early adopters in Oil and Gas, Transport and Logistics, leverage the benefits of dedicated data and low latency technology to drive efficiencies in Enterprise business cases for competitive advantage.

5G Neutral Host

A neutral-host solution is a single wireless network that can support or 'host' users from multiple wireless carriers so that any carrier customer can have reliable connectivity and a quality online experience at that venue. We've seen in the hospitality and casino industry how in-house Wi-Fi networks struggle with congestion and capacity issues to provide guest and hotel workers with connectivity. Expensive indoor DAS (Distributed Anteanna Systems) supporting a single carrier for cellular coverage in select areas are being replaced, with these Neutral host small cell MORN (Multi Operator Core Network) solutions, where we have provided indoor coverage at these expansive convention centers and resorts that work to augment and complement the existing Wi-Fi footprint. The two networks operate as one hybrid wireless network.

Today, these Neutral host solutions are being used at large-capacity venues like hotels, sports arenas, commercial office spaces, hospitals, transportation hubs and universities. In the US, shared spectrum (CBRS/OnGo) based neutral host models allow the cellular industry to go from being exclusively carrier-led to becoming more enterprise-driven. This enables these customer domains to securely serve staff operations, and even connect large numbers of wireless devices and sensors to automate their in-house building management systems and operations.

Location Services (LMF)

The tracking of key assets and location-based services has always been very important to business. Druid delivered LMF (Location Management Function) support in their Raemis Platform in Q3 2021. The Druid LMF implementation provides interrogation functions, requesting measurement reports from the NG-RAN and/or UE and logging these reports as measurement records, to enable the granular positioning and tracking of key business assets in the customer domain. For example, in a healthcare environment they could track the location of wheelchairs, beds or mobile medical devices.

Success Stories

Druid and Airspan have been deployed in over 160 private networks together so far, all over the world by their many partners. Both companies have been at the forefront of the early adoption of private network technology to help solve business and mission critical connectivity in key industry sectors.

Ports

The port of Rotterdam has been an excellent example of how shipping companies have been quick to embrace new technologies to gain competitive advantage. Real time positioning applications and control of unmanned vehicles are a must have for modern ports. Real time data transfer requires

dedicated data and very low latency. Druids Raemis Private LTE application, in combination with Airspan's carrier grade base stations, provides very low latency and reliable quality of service. It also gives easy control and management of the network to the network managers. These private networks help logistic companies achieve greater efficiency. At the same time delivering a safer working environment for their employees. [7]

Energy Providers

Due to the highly critical nature of Oil & Gas exploration and production, there is an essential need for dedicated data networks off/on shore to provide live video streaming from fixed point & body worn cameras, MCPTT, AR/VR, man down, lone worker emergency alarms. Druid and Airspan have deployed cutting edge private networks for two of the world's top four energy providers thus far. In each case there was a clear need to improve health and safety and deliver efficiencies through the latest mobile technology innovations for smart and predictive maintenance applications. [8]

Manufacturing

MxD, the Digital Manufacturing Institute and the National Center for Cyber-security in Manufacturing, has deployed Druid's industry leading Raemis 5G SA core platform in combination with Airspan Networks new 5G radio access network. Druid and Airspan's partners Betacom, provide MxD's Chicago headquarters and Factory Floor Lab with a private 5G network. The network, one of the first in the US of its kind for indoor private 5G, serves as the foundation to develop and enable technologies that power Industry 4.0 across the United States. [9, 10]

At the Technical University of Kaiserslautern with DFKI Druid and Airspan partners Mugler have launched the "5G OpenRAN for Automation" project. They have created a powerful 5G network that can draw on years of theoretical and practical experience to expand the fundamental basis of 5G OpenRAN Technology. The implementation of this 5G infrastructure from Druid and Airspan is playing a decisive role in the development of competencies for German manufacturing. [11]

5G-ENCODE is part of the UK government's 5G Testbeds and Trials Program and is one of its biggest investments in 5G for manufacturing to date. The goal of the project is to prove the performance and business case for private industrial grade 5G, against a variety of manufacturing use cases. Zeetta Networks and the University of Bristol have switched on a Druid 5G private core with Airspan new 5G radio access network at the UK's National Composites Centre as part of the government-backed 5G-ENCODE project, which seeks to investigate private 5G as a springboard for Industry 4.0 and new economic growth in the country. [12, 13]

Addressing the Digital Divide

Druid and Airspan have been widely deployed in the US using CBRS and OnGo spectrum for FWA deployments to provide rapid broadband connectivity roll out to address this critical, which only became more acute during the covid pandemic. Multiple school districts across the US have deployed this FWA (fixed wireless access) solution with unique features designed specifically for the easy management of the Public Schools data broadband.

Millbrook. CAV

Millbrook UK provides vehicle test and validation services and systems in the automotive, transport, petrochemical and defense industries. The Auto Air network was migrated to Airspan's commercial grade Open RAN, disaggregated RAN, and Druids cloud native 5GC standalone technologies to bring URLLC, Massive Machine Type Communications (mMTC) and network slicing capabilities into a real-world test arena for the first time in the UK. [14, 15]

5G Hilton Gale Hotel

The Gale South Beach, a Curio Collection by Hilton hotel wanted to improve the hotel guest experience by providing excellent indoor and outdoor high-speed voice and data coverage and hotspot capabilities on property. The Private Network solution provided by Druid and Airspan will help to improve the hotel guest experience by providing excellent indoor and outdoor high-speed voice and data coverage and hotspot capabilities on the property. With the exponential growth of video conferencing, 5G eliminates the typical problems related to virtual meetings. Additionally, hotel operators can streamline operations with rapid communication between different systems. [16]

[1]   "Druid Recognized For Innovation Awards"

[2]   "Airspan Networks Named Winner of Three Small Cell Forum Innovation Awards"

[3]   Druid Software LinkedIn Post

[4]   "Airspan Networks Wins Two 2021 Fierce Telecom Innovation Award"

[5]   "Ranked #1 Product & Position"

[6]   "Juniper Research: Nokia, Ericsson & Druid Software Top Juniper Research Private Networks Competitor Leaderboard"

[7]   "Major Rotterdam Port Automation Expansion"

[8]   "Skytic Telecom - LTE & IoT Offshore Network"

[9]   "5G Networks Accelerate Manufacturing at Digital Manufacturing & Cyber-Security Institute (MxD)"

[10] "Betacom Selected to Deliver One of US' First Indoor Private 5G Networks to Accelerate Manufacturing Innovation at The Digital Manufacturing and Cybersecurity Institute (MxD)"

[11] "TU Kaiserslautern, MUGLER AG and Druid Tackle 5G Use Cases for Smart Factories"

[12] "UK government project 5G-ENCODE claims new breakthrough in industrial 5G"

[13] "5G ENCODE Smart Factory Update from Zeetta Networks"

[14] "Dense Air and Millbrook Partner on the Sustainability of the 5G AutoAir Network"

[15] "Cenex Low Carbon Vehicle Event and Cenex Connected Automated Mobility Event"

[16] "GFO Investments and Airspan Networks Partner to Help Transform the Hospitality Industry at The Gale South Beach, One of the First US Hotels to Offer a High-Speed 5G CBRS Private Network to its Guest"

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