



Four communications industry trailblazers accelerate monetization of 5G and Edge

Four startups, beneficiaries of the Oracle for Startups program, unlock value in the 5G and Edge domain in four different ways. Accelerating 5G rollouts, optimizing networks, speed-to-market, and opportunity access for the under-served.



Aarna
NETWORKS

B-YOND

JG
GDC
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About this report

The theme for this month is around startups in the 5G communications sector and how they are innovating and changing the competitive landscape. This report highlights the innovation each of the four startups supported by the [Oracle for Startups](#) program brings to the 5G and edge computing arena. The four startups are:

- Aarna Networks – delivering orchestration, management, and automation of 5G networks and edge computing applications in large B2B enterprises
- B-Yond - providing AI-powered network intelligence and automation solutions to some of the largest telcos in the world.
- Jala Group Global Digital Communications – bringing 5G-in-a-box for SMBs
- SiteSee – helping cell tower owners audit their infrastructure remotely and accelerating 5G rollouts for network operators

Each has harnessed Oracle Cloud Infrastructure (OCI) to provide scalable computing power demanded by the enormous workloads required. And each benefits from Oracle's customer and partner ecosystems and access to business and technical mentoring, as well as go-to-market resources through Oracle for Startups.

CX-Create is an independent IT industry analyst and advisory firm, and this report is sponsored by [Oracle for Startups](#).

5G and Edge Computing will dramatically transform our world.

The race is on. 5G network operators, CSPs, cell tower owners, device and chip manufacturers, cloud and software vendors, consultants, and systems integrators are all vying to capture as big a slice as possible of the 5G and edge computing market. And it's no wonder. In 2019, IHS Markit, in a report commissioned by Qualcomm, estimated that by 2035, 5G would add \$13.2 trillion to global GDP, based on an analysis of 21 different use cases. This may well prove to be a conservative estimate. Also joining the race will be millions of businesses, corporations, and tens of millions of small entrepreneurial businesses worldwide. A few have already started, and numbers will continue to grow as 5G is rolled out and new solutions are developed to solve specific industry challenges. At the same time, many more will participate as access becomes ubiquitous and the potential is better understood or proven.

Covid-19 has deepened the appetite for transformative technologies

The Covid-19 pandemic has been a catalyst for accelerated digital transformation, forcing businesses to rethink how they operate and serve their customers. It has brought home the vital necessity of digital capability and inspired a hunger for transformative technologies that reduce operational costs, boost revenues, and unleash innovation.

5G is not just 4G with a go-faster stripe. It has come at a time when companies of every hue are digitally transforming to optimize operations, make it easier for customers to interact with them across any channel, or adapting their business models to capture new growth opportunities. Edge brings immediacy, security, and near-zero latency.

Already large industrial manufacturers and automotive companies have placed big bets on the fourth industrial revolution (Industry 4.0) is the automation of traditional manufacturing and industrial practices, using modern AI-assisted technology. Many have adopted private 5G networks creating

smart factories enabling autonomous or semi-autonomous manufacturing to minimize downtime and boost productivity. Uses include monitoring conditions, robotic automation, VR inspections by remote maintenance engineers, additive manufacturing, asset tracking, and industrial IoT, among others.

Manufacturing provides one example of the role of 5G and edge computing. 5G and edge will impact every industry and sector, from agriculture to transportation. Enabling smart agriculture, holographic conferencing and gaming, connected healthcare, smart cities, and countless other transformative possibilities that will impact all our lives as citizens and consumers. But to view 5G and edge computing in isolation would be a mistake.

5G and edge must be viewed as part of a broader technology ecosystem involving multiple vendors and services providers

A fundamental difference between 5G networks and their predecessors is that the former is mainly software-defined. Beyond its obvious leap in connectivity speed, it is truly transformative. It will become an essential enabler combined with a range of rapidly evolving technologies, notably cloud native applications and microservices, edge devices, and services where near-zero latency and data security dictate. It will generate even more data than exists today. AI will interpret oceans of streaming data triggering real-time context-aware responses to optimize operations or provide insights to fine-tune products and services for consumption. Sometimes in the cloud, at others onsite in the edge networks where immediacy matters.

5G and edge combined with cloud native architectures enables businesses to spin up new capabilities and adapt rapidly, without the constraints imposed by 4G connectivity.

The rise of dynamic ecosystems will accelerate innovation

It won't be just enterprises competing for customers, but entire ecosystems competing with other ecosystems. And while each member of an ecosystem will be rewarded, profits and the largest slice of revenue will not be evenly distributed.

The greatest rewards will go to those who create the most value as judged by each customer or control access to that value as ecosystem orchestrators. The least rewarded will be those whose value has been commoditized with little differentiation or understanding of the end customer.

Speed matters in this new and dynamic environment. To reap the rewards from this superfast connectivity and collaboration, legacy thinking and development approaches must be replaced with modern practices such as DevOps and CI/CD. As 5G and edge are largely software-defined, controlled, and virtualized, 5G network providers and CSPs will have to adopt the same development disciplines as their peers in the software and cloud industry or risk relegation within the ecosystems they occupy. Leading CSPs already know this, while others have yet to make the transition.

Startups play a crucial role in 5G and Edge digital transformation ecosystems

In our recent report [Oracle for Startups program fuels continuous innovation the open way](#), we highlighted the growing role of entrepreneurial startups as inventive participants in a wide range of ecosystems, many focused on specific industries. Those supported by [Oracle for Startups](#) have access to massive computing power and modern development tools, enabling them to develop their businesses without the need for substantial investment.

Figure 1. outlines the four startups' current positions and who they serve.

Startups	Beneficiaries	Value provided	Stage of development
	Aerospace, automotive, industrial, healthcare providers, precision farming.	Multi Cluster Orchestration Platform delivers orchestration, lifecycle management, and automation – faster 5G/edge deployment	Has run four successful proofs of concept. Anticipated launch in the first half of 2022
	Communications services providers, media and digital content providers	AI-powered automation solutions that enable CSPs to optimize and monetize their networks	Growing at over 50% a year includes several tier 1 CSPs as customers
	Small and medium enterprises in any industry to begin with, larger as the company grows	5G First Impressions, a 5G-in-a-box platform providing flexibility at a lower cost	Solution in development. Has run a successful prototype supporting GP practices in the UK. Launching in 2022
	Cell tower infrastructure owners and 5G network operators	AI Digital Twin for Infrastructure enables businesses to make informed decisions based on accurate and accessible data	Has cell tower infrastructure owners and 5G network operators as customers in Australia, India, the UK, and the USA

FIGURE 1: THE FOUR STARTUPS

Aarna Networks eliminates the complexity associated with the management of 5G and Edge networks

Aarna Networks was co-founded by Amar Kapadia and Sriram Rupanagunta in 2018. The startup is headquartered in San Jose, USA, and has a development team in Bangalore, India. This was Kapadia and Rupanagunta's second startup, the first being an ethernet company in 2001, sold to Emulex in 2006, which Broadcom acquired and is now a leading ethernet provider. Kapadia is steeped in connectivity, and from his time at Mirantis, an OpenStack company, he honed his skills in network virtualization.

In recognition of the need for real-time zero latency, the initial aim of Aarna Networks was to connect end devices to edge applications via 5G. Critical use cases envisaged included:

- Industrial assembly lines with robotic edge devices and augmented reality plant maintenance
- Diagnostic equipment and pain management in hospitals
- Farming - optimizing planting by connecting onboard devices in tractors or combine harvesters with real-time information to improve crop yields
- Multiple real-time camera angles to augment the experience for fans to see the intricacies of play at sports stadiums.
- Compliance – where sensitive data must be secured and remain on-site behind the firewalls of a company's own data center.

The co-founders realized that 5G and Edge bring exponential complexity to the communications network and edge computing application environment. To address this, they have developed a cloud native Multi Cluster Orchestration Platform (AMCOP). Its purpose is to orchestrate, manage the lifecycle and provide control loop automation for 5G network services and edge computing applications in B2B settings. The startup uses Oracle Cloud Infrastructure (OCI) to expand and scale its services.

'We exist to eliminate this complexity, improving the reliability of 5G Edge networks and reducing costs.'

Amar Kapadia Co-founder and CEO Aarna Networks

To give some idea on the degree of complexity in an industrial assembly plant or even a hospital, the number of manual steps could easily reach a staggering 200 million. Here's how: configuring the service mesh, firewall, network address translation (NAT), load balancer, Kubernetes network policies, and cluster-specific configuration would involve around 20 steps. Multiplied by 10,000 edge locations and interactions with around 1,000 applications, not unlikely in a factory or hospital, the manual steps soon add up: $20 \times 10,000 \times 1000 = 200$ million. It is impractical and would be a waste of resources.

This is why a multi-domain orchestration solution is required to hide this complexity, enabling businesses to reap the rewards of 5G and Edge computing and evolve their networks without interruption when adding new functional capabilities.

According to Kapadia, an ideal 5G and Edge implementation has three key attributes:

1. Zero-touch – autonomous management of 5G network services and edge computing applications
2. An extensive app catalog – of cloud native network functions (CNF) and cloud native applications (CNA) to solve industry-specific problems
3. Private and public connectivity – for interactions between private and public networks, e.g., spectrum reuse, slice peering, public slice, roaming, and anchoring

Put simply, the Aarna Networks solution, once configured for a client and supported by some administrative training, ensures that whatever the underlying complexity, the 5G network and edge computing environment runs flawlessly without needing an army of specialist engineers.

Faster rollout massively reduced operational costs and greater customer satisfaction

By eliminating the manual provisioning and management burden, 5G and Edge networks can be rolled out fast at much lower costs. This allows organizations to evolve their networks more quickly and add new workloads to boost operational capabilities and accelerate innovation.

For a more detailed analysis of Aarna Networks and the AMCOP platform and architecture, read the [full report](#).

B-Yond: delivering AI-powered automation solutions to CSPs that optimize and monetize their networks

Co-founder Nabil Nadim 'Ned' Taleb (CEO) founded B-Yond in 2017. Rikard Kjellberg was hired as Chief Product Officer (CPO) to develop the product and platform and was promoted to COO in early 2020.

It seems obvious now, but in 2017, advances in the commercial use of AI and automation were in a nascent state. With a long track record in the communications industry, Taleb made a massive bet on the evolution of AI networks and automation software, confident that it could accelerate the development of 5G services.

Taleb and Kjellberg felt well equipped to fill the solution gap.

Taleb had previously co-founded several communications industry companies, one of which, Nexius provided a book of existing business carved out as the foundation of B-Yond. B-Yond became the ninth member of a family of companies. Its specialist remit is a focus on the challenges of communications digital transformation and specifically 5G and edge services and applications development.

AGILITY - accelerating the delivery of 5G Network services to drive value faster

The focus is on value realization rather than operational cost reduction, as the biggest challenge is accelerating the delivery of services. This includes those developed with ecosystem partners to drive value for end customers and generate profitable revenue streams for the business.

AGILITY, B-Yond's solution, automates the entire CI/CD development lifecycle, providing continuous testing and delivery and validation and assurance in the production network.

AGILITY provides a five-stage automated process flow across the test lifecycle

The AI-enabled end-to-end test cycle consists of five stages:

1. Integration and data collection – Agility retrieves data from the customer's data sets through an automated process or, if required, manual input via the UI.
2. Data extraction and transformation – B-Yond's subject matter experts (SME) identify specific attributes to be used by the ML model to classify patterns and predict the root cause of failure if it occurs.
3. The RPA-based assisted labeling supports the SME to assign labels for model training data.
4. AGILITY's pattern recognition and classification models assign a prediction for each new test and identifies root cause based on specific signatures identified by the data transformation process.
5. Validation/reinforcement – the SME validates and reinforces the prediction of the model. This continuous learning process improves the accuracy of the model over time.

B-Yond is growing at over 50% year-on-year and has tier 1 CSP customers throughout the world

Headquartered in San Jose, CA, USA, B-Yond is growing at over 50% year on year and has gained a healthy roster of major customers worldwide, including three leading CSPs in the USA. Using Oracle Cloud Infrastructure (OCI), B-Yond is being used to provide testing and root cause analysis in the critical areas of emergency services and public safety. It has been used to test:

- Oracle 5G Core policy control function (PCF) and simulate call flow variations resulting in tuned ML models, in advance of actual testing generating 1300 test templates.

'Our mission is to help transform industries and businesses, using our group leadership, knowledge, and experience to both guide and challenge.'

Nabil Nadim 'Ned' Taleb, Co-founder and CEO, B-Yond

- Emergency 911 testing automation – covering SIP and location call flows, multiple systems tests, and accelerated RCA validation and data analysis with automated extractions.
- Mission-critical push-to-talk (MCPTT) quadrupling testing capacity with over 90% accuracy. MCPTT is vital during times of significant calamities, providing communications support for emergency services in the face of hurricanes, forest fires, earthquakes, or terrorist outrages.
- Voice over LTE (VoLTE) – drastically reducing service updates and upgrades.

A selection of customers includes AT&T, T-Mobile and Verizon. The company has over two hundred employees, of which sixty are dedicated to product development.

For a more detailed analysis of B-Yond and AGILITY, [read the full report](#).

Jala Group Global Digital Communications becomes a virtual mobile network operator (MVNO)

Large companies with deep pockets will probably look to 5G communications services providers or established consultancies and major systems integrators for help. Businesses with fewer resources in wealth and technical know-how and those in countries with underdeveloped communications infrastructure may miss out on these emerging opportunities.

Against this background, Jala Group Global Digital Communications (JG GDC) was founded by Andrew Ojwang Blackburn. With the vision and ambition to tilt 5G advantage towards the technologically under-represented and disadvantaged.

The company was officially incorporated in November 2020, although the initial development of the business started in July the same year.

Blackburn's expertise in communications comes from two decades of employment in major telecommunications companies.

Most commercial organizations rely heavily on proprietary technologies and advice from major providers whose recommendations were not always in the customer's interest. Blackburn felt that the Open Source Initiative (OSI) allied to cloud-based communications offers customers choice and the ability to combine applications and technologies to provide a more tailored solution for their needs.

Twin-track approach to development with a guiding philosophy

Since its foundation, Jala Group has followed a twin-track path, offering its expertise to clients while simultaneously evolving into an MVNO, developing its 5G-in-a-box platform, due for launch in the UK towards the end of 2021.

As well as providing tailored advice based on the individual needs of each business, Jala Group's distinctive philosophy is both altruistic and ambitious: to make the world a better place to live, now and in the future. It is a philosophy in tune with a growing movement of people who share aspirations to make a positive difference in their lives and communities.

'We have the goal of disrupting the telecoms industry, being diverse through and through, using our company to benefit everyone, not just the shareholders and leadership team.'

Andrew Ojwang Blackburn, CEO, Jala Group

From a communications perspective, Blackburn's view is that in a digital-first world, businesses can no longer rely solely on the existing skills of their people and must consider the underlying technology to support their business goals. Nor, if they operate internationally, do they have the time or ability to negotiate rafts of contracts with multiple vendors in each country.

Blackburn aims to make communications simple, effective, and effortless.

Jala Group is putting its communications expertise to good use, creating a highly configurable 5G platform for businesses with its 5G-in-a-box.

Having opted to develop the 5G communications platform in a cloud-native and open-source environment, Jala Group uses Oracle Cloud Infrastructure and the vendor's 5G core in combination with critical communications infrastructure from Transatel, Ribbon, RingCentral, 8x8, SDWAN Solutions, and numerous other vendors.

Twilio provides a programmable platform addition to enable feature-rich telephony and IoT support. The initial platform will be optimized for gaming and farming, but eventually, options will be added to support other industry use-cases. Later this year, the main goal at launch will be to provide feature-rich telephony across all communications channels, internally and externally, in a modern and future-proof environment. It will also offer programmable and flexible customer engagement and collaboration tools easily configured to meet customers' needs.

Collaboration tools [SOC2, HIPAA and GDPR compliant] comparable to Zoom/Teams will be offered using an open-source approach to avoid proprietary technology entrapment and allow for continuous innovation. It will provide sovereignty over data and communications and reduce expenditure estimated by JG GDC at over 50% compared with other solutions in the marketplace.

For a more detailed analysis of Jala Group and the 5G-in-a-box platform, read the [full report](#).

SiteSee - AI Digital Twin for Infrastructure inspection and auditing enables businesses to make informed decisions based on accurate and accessible data. Without the need for onsite human inspection.

In the context of the communications sector, two major constituents stand out, though with differing needs – cell tower owners and 5G operators.

Cell tower owners need accurate billing to avoid revenue loss.

Cell tower owners are responsible for building and maintaining the infrastructure as a platform for 5G communications equipment. The average number of cell towers in their infrastructure portfolios varies from around 100 in the US and Europe to over 300 in some parts of Asia. While cell tower technology has continued to evolve, most cell tower owners who have poor inventory records are losing out on millions of unbilled revenues. They need accurate audits of all installed equipment and which operator to charge. The traditional approach is to send out engineers infrequently due to costs and rely on manually produced site audits.

5G network operators are vying for cell tower space as they roll out 5G

5G network operators want to rollout 5G infrastructure and optimize coverage as fast as possible. Deploying new 5G equipment and replacing a vast inventory of 4G kit across thousands of cell towers is a Herculean planning task. Even more demanding and time-consuming if relying on manually produced and often inaccurate records.

They are also competing for available space on cell towers with other 5G network operators, and the positioning of their equipment has a significant impact on the efficiency of the cellular network. Considerable effort goes into designing, planning, and optimizing 5G equipment to deliver the network, involving hundreds of cell towers. Without the support of remote audits, 5G rollouts could take years.

Both cell tower owners and 5G operators have a massive stake in speed, cost reduction, and safety – SiteSee solves the challenge

Faster rollout of 5G infrastructure and equipment is in the interests of cell tower companies and 5G network operators. Many of the tens of thousands of cell towers are sited in extreme environments, deserts, the tropics, or in countries with arctic winter conditions. This makes them difficult to reach and hazardous to inspect.

It is these challenges that SiteSee exists to solve through its integrated SaaS applications covering remote drone-based inspection planning, advanced 3D modeling, and AI-supported analysis—creating a digital twin of the complex infrastructure and all it contains.

SiteSee, headquartered in Brisbane, Australia, was founded in 2016 by the CEO, Lucio Piccoli, and David and Lachlan Crane. David Crane, a former radio frequency (RF) engineer, came up with the idea of predicting RF emissions as a viable use-case for a new business. Piccoli, a 3D programmer, offered his help and developed the initial solution. Public concern about the potential health risks of 4G emissions was amplified by even more significant concerns over 5G, which was exponentially more powerful.

Using Oracle Cloud Infrastructure (OCI), SiteSee's solution manages the complete workflow from planning inspections via drones to capturing detailed audits of any equipment such as panels, antennas, microwave dishes, and remote radio units. The level of detail goes right down to the elevation, tilt, and manufacturer's serial number. A complete digital twin of all assets is provided, including their current state or need for replacement or maintenance. It also helps resolve any invoicing issues between the cell tower owner and the 5G mobile network operator.

SiteSee has several major cell tower companies as customers in the US. Other customers include Nokia (Australia), Indus and JIO (India), Arqiva, and WHP Telecoms (UK).

For a more detailed analysis of SiteSee and its solution, read the [full report](#).

'Our solution leads to the identification of lost revenue and the discovery of more revenue potential on the tower, and this is done without having anyone climb the tower '

Lucio Piccoli, CEO, SiteSee

CX-Create's viewpoint

Each of the startups highlighted in this report solves some of the critical barriers to 5G and edge rollout and adoption. B-Yond and SiteSee are tackling areas of strategic importance that, if not addressed, will hamper both the 5G rollout and the ability of CSPs to monetize their services. Aarna Networks is helping major industrial, healthcare, and agricultural companies manage complex networks of 5G and edge services. Jala Group offers considerable hope to smaller businesses that they too can take full advantage of 5G.

Each of the startups expressed considerable support for [Oracle for Startups](#). They have all benefitted, not just from discounted access to OCI and associated development tools but also from the supportive nature of business and technical advisors in the programs' team and, more broadly, in Oracle.

There is no doubt that 5G and edge will have a massive impact across all sectors, particularly as part of the many existing ecosystems and those under development. Our focus at CX-Create is to understand what it takes to remain relevant to customers, and a key driver of relevance is the ability to innovate continuously. Startups have an incredible role to play in this, and with the help of major vendors like Oracle, their future looks bright.

Appendix

About CX-Create

Jeremy Cox founded CX-Create Limited in January 2021, a former principal analyst at Omdia (formerly Ovum) focused on customer engagement strategies and platforms.

He is recognized by major CX vendors, clients, and former colleagues as a leading thinker in customer experience and engagement. Formative experiences in the 1990s at IBM convinced him of the critical importance of understanding the business world from the outside-in. These insights were put to practical use in his former roles as a principal CRM consultant at KPMG Consulting and as an independent consultant supporting public and private sector organizations.

Our mission

CX-Create's mission is to help enterprises and the vendors that serve them remain relevant. The company's primary focus is to track and understand the constantly evolving customer experience world and share those insights with clients. Continuous innovation is also an essential component of persistent customer relevance, directly and indirectly, which is why we are enthusiastic about startups and the Oracle for Startups program.

Further reading

- [Aarna Networks - Zero Touch Cloud Native 5G and Edge Computing for B2B Use Cases – Accelerate rollouts, reduce OPEX](#)
- [B-Yond - Delivering AI-powered automation solutions to CSPs that optimize and monetize their networks](#)
- [JALA GROUP 5G First Impressions, 5G-in-a-box](#)
- [SiteSee - AI Digital Twin for Infrastructure inspection and auditing enables businesses to make informed decisions based on accurate and accessible data. Without the need for onsite human inspection](#)
- [Oracle gives startups a big lift and a boost for continuous innovation](#)

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