Low power wide area networks (LPWAN) are currently one of the fastest growing communication technologies in the world, with several companies experiencing double digit growth. Kerlink, a France-based provider of end-to-end network solutions for the Internet of Things (IoT), has been among the most active within this space where it has built a strong track record of LPWAN deployments in several market segments and regions. Eugenio Pasqua, the principal analyst at IoT Analytics, spoke to Stéphane Dejean, the chief marketing officer at Kerlink, to discuss the company's view of the LPWAN market and the current momentum of private networks deployments

Low power connectivity powers up across IoT

Eugenio Pasqua: The topic of LPWANs is becoming increasingly complex. To start, can we give a simple explanation of what LPWANs such as LoRa/Sigfox are?

Stéphane Dejean: LPWANs cover a new generation of unlicensed, wireless long-range connectivity solutions, specifically designed for IoT applications. These technologies operate in licence-free industrial, scientific and medical (ISM) sub-1GHz spectrum bands. LoRaWAN, based on Semtech's LoRa wireless radio technology, is the leading LPWAN protocol, with many field deployments in various verticals around the world. The LoRaWAN ecosystem promotes both public and private network business models, whereas Sigfox opted for a mobile network operator model. We also see increasing coordination on the LoRaWAN protocol by European standardisation bodies – like CEPT and ETSI – assuring future-proof investment for customers.

LoRaWAN technology provides long-range communication and deep indoor penetration, making it possible to reach meters and sensors located in basements, elevators shafts and underground. It also offers higher robustness than narrowband cellular schemes in noisy channel conditions and is better at mitigating interference. In addition, the technology was designed for energy efficient communication. Its asynchronous communication pattern wakes up devices only when they have data to send, and then puts them back into a power-saving sleep mode directly, or once their transmission is acknowledged. The network's Adaptive Data Rate feature also adjusts data rates according to the distance between sensors and gateways, which reduces time on-air and optimises power consumption. This capability increases networks' scalability and capacity to support thousands of end-devices and millions of messages.

Moreover, LoRaWANs enable fully bidirectional communication for use cases requiring both uplinks and downlinks, and they offer native, energy-efficient, cost-effective and secure network-based geolocation for any type of LoRa-connected assets. These are two key differentiators with Sigfox. Finally, LoRaWANs offer two native layers of end-to-end security: first, through the mutual authentication between the device and the network during the network join procedure, and second through an encryption layer for the application payload.

EP: With the market entrance of licensed 3GPP standards (NB-IoT, LTE-M), discussions about which LPWAN technology is better suited to address the needs of IoT applications have soared. Could you share your view on the matter?

SD: We believe existing solutions are complementary, and we expect future solutions to be, as well. But there are noteworthy differences between the technologies. LoRa's unique spread-spectrum modulation makes the deployment of LoRa networks globally two to three times less expensive than traditionally operated cellular-based LPWA alternatives, and with superior coverage. This brings more ▶

accurate anticipation of total cost of ownership (TCO) and return on investment (ROI) for customers, along with faster and simpler deployments. In addition, the LoRa Alliance, through its open protocol approach, ensures that the protocol is royalty free. Contrast that with cellular-based technologies that operate in costly licensed spectrum and incur intellectual property (IP) royalties, thus increasing network equipment and module costs, while encouraging connectivity plans that do not fit the emerging diversity of IoT business models.

Asynchronous communication and Adaptative Data Rate are a direct benefit compared to licensed LPWAN technologies that use a constant data rate regardless of the environment and transmission conditions. This makes it quite challenging to ensure a battery lifetime of up to and beyond ten years. LoRaWANs are also one of the few IoT networks implementing built-in, end-to-end encryption for application payloads exchanged between the end devices and application servers. In short, Kerlink expects technology segmentation will progressively crystalize around customer use cases and business requirements.

EP: Some end users I spoke to in the past felt that discussions about LPWAN technologies were focusing too much on their capabilities rather than on the business benefits they could deliver to customers. Do you think this is still the case today?

SD: Clearly demonstrating the benefits of our solutions is an ongoing challenge. You hear a lot about technological bells and whistles, which is sometimes confusing to end-users. Successful LPWAN companies will focus on their customers' business needs and pain points and note how an IoT network designed for them specifically will address those challenges. The IoT companies then must work jointly with customers to identify how all this new data can be used to streamline operations, improve efficiency, differentiate from competitors and generate additional revenue.

As a co-founder and board member of the LoRa Alliance, we are contributing to several initiatives to better target our communications. We co-brand use cases with some of our partners to demonstrate the benefits of our combined LoRaWAN building blocks. We also work with application providers on white papers and demos to articulate the key benefits of our solutions from the customer's operational perspective. In each vertical segment, we want to work with recognised value-added partners to jointly build relevant turnkey solutions that make sense for customers.

EP: Customers who want to deploy solutions based on LPWAN technologies are also faced with the choice between public and private network deployments. What are the main criteria they should consider when making such a decision?

SD: Unlicensed LPWAN solutions, and especially LoRaWAN, are bringing to market a brand new and exciting alternative to businesses and government administrations by offering them the ability to deploy, operate and monetise a carrier-grade IoT network, simply and efficiently, on their own. This corresponds to an expanding demand from end-users that are willing to consider these networks as key assets that they need to control, financially and/or operationally, and that they can use to respond to their increasing and various needs. Key supports for such a choice potentially include the desire for increased autonomy/independence in the way connectivity solutions are implemented and operated, a better trade-off between financial conditions and business models over time, and a more reactive indoor and outdoor coverage optimisation for demanding use cases.

Customers also may consider more flexible and scalable tailored network capabilities and capacities, or the ability to rely on a partner that can quickly and easily adapt to evolving collaboration models between several parties. The customers' choice essentially depends on their strategic objectives and business plans. LPWANs are an alternative to consider as it ▶

Successful LPWAN companies will focus on their customers' business needs and pain points and note how an IoT network designed for them specifically will address those challenges

Stéphane Dejean,
Kerlink

answers both technical benefits for the business and financial advantages, while bringing the openness and richness of a thriving ecosystem. The LoRa Alliance includes more than 500 members with expertise in the entire IoT value chain and has many validated use cases that can be easily replicated and scaled.

EP: Private networks are currently experiencing a great momentum. What are the main models for deploying a private network and for which application scenarios is each best suited?

SD: LoRaWANs are clearly the right technology at the right time to unlock many vertical applications with innovative business models for private network deployments. Kerlink is recognised by market analysts as the market-leading, one-stop-shop provider of LoRaWAN end-to-end IoT networks, worldwide. The company built strong experience in robust network design-and-operation integration, through a proven track record of large deployments. Our partners include tier-one, world-leading operators of public networks, and service providers, integrators and enterprises for private deployments.

Kerlink also developed a complete portfolio of IoT network turnkey and packaged solutions, proposed through fully flexible financial models, mixing opex, capex and hybrid modes. Here again, the model can fit customer requirements depending on its financial targets, operational budgets and organisational structure. We industrialise most of our network-solution building blocks to ensure that our customers benefit from ongoing capabilities enrichment, while granting the flexibility they require to implement and integrate these components in their unique operational environments. LPWAN cost-efficient solutions, compared to some alternatives, offer more flexibility for companies and cities, for example, to decide to invest in a private IoT network, and enjoy faster returns on investment.

EP: What are the top challenges that IoT end-users are facing when deploying private networks?

SD: Deploying a private IoT network will immerse users in the key features of network design, deployment, operations and security management. The good news is that we already anticipated these challenges and can quickly empower and help our customers to successfully complete these steps.

During the build phase, we deliver network design – to select gateway locations and finetune configuration, using operator-grade network planning solutions, like the Siradel S_IoT suite. We can provide guidance for gateway installation, provisioning and backhauling, including remote management. The overall network architecture design, including network server and management-tools location, is also part of the project management proposed.

During the run phase, the challenge will be to constantly monitor and optimise service performance to ensure QoS and continuous network integrity and sustainability, and to plan evolutive maintenance. At the same time, private network users must select the best-designed end-devices to ensure end-to-end performance. All of these steps will be smoothly orchestrated in our solutions and with our close support, through web interfaces or standardised application programme interfaces (APIs). Private network owners also will be responsible for security management. Kerlink has designed comprehensive and secure key-and-certificate routines, secure-boot and secure storage capabilities on the gateways, factory-burned architecture and highly secured maintenance procedures to ease the process, especially for non-telecom professionals. And when end-device remote management is required, an additional set of user-friendly features will enrich the management suite, with no impact on existing integration and operational processes.

EP: What kind of solutions does Kerlink offer for private network deployments and how do they help overcome these challenges?

SD: Kerlink brought to market the first commercial LoRaWAN gateway worldwide in 2014. The company has since built its legitimacy and a strong expertise in network design, management and integration to expand its portfolio beyond gateways. Since last year, our solutions portfolio covers the entire IoT LoRaWAN connectivity value chain, from end-device reference design to secure data management and distribution, thanks to our preferred partnership with Microshare.

Kerlink's connectivity value proposition relies on two pillars. The first one groups connectivity solutions for the infrastructure – the Wirnet indoor and outdoor gateways range – associated with the core server and management suite, available either for stand-alone small private networks – the Wanesy Small Private Network – or for larger public or private networks, the carrier-grade Wanesy Management Center. The second pillar covers value-added services like Low Power IoT Reference Design, network-based Wanesy Geolocation and Wanesy Device Management application to remotely configure end-devices. Kerlink combines these building blocks in turnkey solutions and delivers them in the most appropriate format to the customer – SaaS, cloud or on premises configurations, while providing a full range of supporting professional services to simplify network deployment, optimise customer onboarding and empower customers to operate their own networks as a Network-as-a-Service solution.

EP: How do you see the LPWAN market evolving over the next few years? Do you think private networks will continue experiencing their current momentum, or will most customers go with public networks once networks are deployed on a more global scale? ▶

LoRaWANs are clearly the right technology at the right time to unlock many vertical applications with innovative business models

SD: I see a strong growth opportunity for unlicensed LPWAN solutions since they bring a dynamic, new option to cellular-based connectivity. This is the first time that IoT market requirements and customer expectations connect, so that customers can operate their devices on a large scale and benefit from a comprehensive end-to-end alternative that can not only deliver optimised and efficient technical solutions, but also adapt to challenging business models and cost structures to make them cost-efficient and sustainable.

This is a highly complementary alternative to licensed solutions that will progressively find their markets and reveal their benefits in multiple applications. Digitisation is bringing deep, radical, disruptive – and difficult to anticipate – changes. Cloud connectivity, robotics, AI, machine learning and blockchain are key trends that will combine to challenge the way we are currently interacting, working, moving, contracting and doing business. And all those fields require reliable and increasingly high-performance public and private networks to ensure a continuous, secure and appropriate flow of data from sensors to fuel intelligent application platforms and bring their instructions back to actuators or local servers. Networks are not a commodity, they still are the spine of the entire IoT architecture, and this is exactly where Kerlink's expertise excels. ■

CASE STUDY: Fast and easy deployment of smart city building management

The challenge
From rural towns to bustling metropolises, building management systems are being installed around the world. But beyond the cost efficiencies, increased personal comfort, energy savings or even light-and-heating management, municipalities require reliable tools to continuously monitor key metrics. Anticipating this market, the French start-up Sensing Vision designed an innovative smart building management platform based on Kerlink Wirnet LoRaWAN gateways.

The solution
In early 2018, Sensing Vision deployed its EnergyView solution in real operating conditions for one of the world's smallest smart cities, Chevaigné, a seven-square-kilometre village of 2,100 people in Brittany, France. The Internet of Things network connects seven public buildings outfitted with 31 sensors: environmental sensors (temperature, humidity, light, people presence), meter-reading sensors (gas, electricity and water) and submetering sensors. The goal is to meet city officials' targets for monitoring real-time status of public buildings' energy and water consumption, as well as performance of the city's solar panels and submetering grid.

EnergyView enables the rapid identification of anomalies in the expected level of service. For example, it quickly reported the overheating of a school building by nearly 3°C. By only improving temperature regulation in Chevaigné's public buildings, energy costs are expected to be cut by 20%.

Kerlink's LoRaWAN Wirnet Stations allowed a quick and easy one-day deployment, creating a reliable and secure network in hours, thanks to their simple and streamlined architecture. The network then made supervision easier, enabling Chevaigné and its technicians to operate and monitor the infrastructure autonomously.

"The reliability of Kerlink's products allows us to offer the maximum quality of service in smart city solutions for critical needs in terms of energy efficiency," said Benoit Vagneur, the co-founder and president of Sensing Vision.

The benefits
This complete smart city solution delivers an answer to all of the city's building management needs. From temperature monitoring, to presence detection, gateways offer long-range network coverage to support multiple use cases, while hosting applications enable easy monitoring of the entire system. In addition, the city is able to operate its own small private networks, dramatically decreasing its costs compared to operated networks.

"EnergyView is a software-as-a-solution system bringing quick installation and personalisation to fit the city's needs," says Olivier Seznec, the co-founder and technical director of Sensing Vision. "We will enrich it to provide increasing amounts of data and additional services for a complete experience and for monitoring buildings' metrics. The future model of smart cities will cover every part of the city from agent to teachers going through the associations. Sensing Vision is ready to guide this transition."

AI at work
The differentiating features of Sensing Vision's solution are supported by embedded artificial intelligence, which computes data collected from in-building sensors, official meteorological data and metadata from city officials (e.g. public holidays or city-department opening hours) to create a thermal dynamic model that is applied to each building monitored.

This quickly provides an in-depth understanding of buildings' thermal performance, while enabling non-specialists to quickly correct deviations from expected performance and ensure comfortable conditions for building occupants.

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