National Narrowband Network Co.

Australia's Narrowband Network

Building IoT networks for utilities

Energy utilities need to change

In a rapidly changing and increasingly pressured environment, energy utilities need to adapt to remain relevant.

Technology is disrupting the energy retail market. Customers have increasing choice over which energy sources they use, and have access to more information about what those energy source choices cost. They want greater control over their usage costs, flexible pricing and more relevant, timely and accurate information.

Government/Energy Market reforms are driving a requirement to network millions of electricity meters cost effectively. The growing trend to 'off-the-grid' and 'return-to-grid' power exacerbates this need, requiring far more accurate and timely information to better manage large-scale power usage and distribution.

Utilities also need to monitor and manage infrastructure assets better to defer capital expenditure while, at the same time, running networks more efficiently to meet the demands of national and state regulatory bodies. Finally, energy suppliers, under considerable pressure due to public perceptions of gouging and customer dissatisfaction, need good news stories.

The Internet of Things (IoT), specifically frequent metering and the ability to control endpoints centrally, is critical to success in this future. Automated meters simplify and reduce the costs of meter reading, make usage information available to the consumer, and support better management of peak loads and scarce resources.

… and have critical requirements for an IoT network

A broad based secure shared network is key for IoT to operate reliably and cost effectively across multiple geographies and conditions. Incumbent network providers have limitations in this respect:

- They have difficulty signing up to long term service level agreements which are in alignment with the lifecycle of the devices being deployed in the field.

- They do not support the transmission of small amounts of data at a low annual cost.

- Their design focuses on scale and speed, not necessarily accuracy and uptime per customer.

- They don't always differentiate between basic security requirements and the high standards the government and regulators set for utilities.

- Their wireless access networks are not always sufficiently reliable in many environments including tall buildings and basements - and even in some cases in suburban areas; and

- Their equipment is expensive to install in remote locations.

Utilities require a network provider who understands and is focused on their specific needs and use cases.

NNNCo meets this need

NNNCo is an Australian company building and operating an end-to-end scalable narrowband network for the Internet of Things (IoT) focusing on partnerships with the Energy and Water Utilities sectors. We're working with some of the world's leading energy and water utilities, technology providers and innovators to roll out large-scale, shared, carrier-grade networks and solutions.

The core focus of our network operation is assisting utilities to support their customers with more timely and accurate usage information and with an ability to better manage loads within the energy network in the event of an emergency.

Low endpoint devices (the "Things" in the Internet of Things) and operating costs address the need to make the business case for automated billing and device management work. Transparent, timely, targeted internal and customer measure/feedback loops also support early problem identification and resolution and guaranteed service levels.

... using proven global standard technology

NNNCo has taken a lead in Australia and implemented the LoRaWAN global standard. LoRaWAN standards are mature across most functions with strong, relevant capabilities including:

- Low lifetime and installation cost for endpoint devices - we can provide services at very low annual costs per device, consistent with global market expectations.

- Standards based products ensure greater relevance, longevity and certainty around installed solutions.

- LoRaWAN global standards based solution provides significant flexibility and choice, with over 400 different endpoint solutions, increasing customer choice both now and over time.

- Ongoing standards convergence means solutions will continue to improve with costs of endpoints and other components reducing over time (already happening).

- Ability to align solutions to market segments and to address different geographies and installation challenges (base stations and supporting technology work well in remote locations as well as very tall buildings and deep basements and are less expensive to install than current alternatives).

- Lower power means lower intensity of transmission and therefore less intrusive signals.

- We are further enabling the device community by providing ultra low cost modules that are pre-certified to operate over the network.

As 'Things' consume ultra low energy and can operate on a small battery for years (important for Smart Gas applications), and the network operates across large distances, the LoRaWAN solution is ideal for applications in both cities and remote areas of Australia. Rapid convergence of LoRa standards provides a way to safely speed implementation, with reduced risk of rework.

NNNCo's network server provider (Actility) is internationally recognised and works with organisations such as KPN and Orange (national carriers in Netherlands and France). Because our team has a strong combination of technical skills with innovation experience, we are providing input to Actility and the LoRa Alliance on specific needs for energy utilities in Australia, which are then built back into the standard solution. We have worked with Actility to not only implement but prove out and even expand the technology under a range of conditions.

The case for LoRaWAN

The LoRaWAN standards for low cost, low power networks give LoRaWAN immediate advantages for utilities over other communications methods.

A key requirement of utilities is the ability to read and control electricity meters and load control devices en masse. This can save significant infrastructure costs for utilities and also provide granular control of high impact loads at every home and business in addition providing a better service for their customers.

To achieve this capability requires a cost effective 'last mile' communication network service with a technology layer that can support a number of key requirements essential to a reliable and resilient service.

Multicasting to many devices in pre-defined groups is a critical requirement that LoRaWAN can support over and above any other cellular based technology. Multicast has been proven and demonstrated by NNNCo for energy utility applications.

Below is a list of other important factors required for the Energy Metering use case, including how LoRaWAN and the NNNCo service meet the requirement.

- Meters can be grouped together in bulk areas where cellular provides poor coverage - especially in basements. In this case, a LoRaWAN Pico Gateway can provide the necessary access and can backhaul to the network by cellular, Ethernet, etc. - a much more effective connection approach.

- Guarantee of coverage is important because we believe that Every Bit Counts. The coverage guarantee comes from the ability to put Macro (high level), Micro (medium level) and Pico (in building) Gateways into the right locations, ensuring that none are overloaded, while properly managing the network.

- Electrical meters in the consumer environment have no need to communicate more than a few times a day and their messages are relatively small in size. This is a perfect use case for LoRaWAN. Sending data every 5min (for example) is of little value and not a normal use case.

- We believe that utilities are not likely to be comfortable with large telcos controlling access. Unless multiple carriers were involved and required to work together, there would be a lack of real diversity if cell networks fail, especially if load control activities are contemplated. A LoRaWAN / NNNCo solution offers coverage redundancy and backhaul technology (3G/4G, Ethernet, etc.), and our networks are designed specifically for utilities as we understand how high the performance bar sits. This is especially so in the area of end-to-end security, such as potential cyber attacks. Utilities have particularly high standards set by government/regulators that they must meet.

- Finally, even while addressing and meeting SLA requirements, LoRaWAN network providers still have a significant economic advantage that can be exploited by the utilities.

Our team combines the necessary deep skills

Our CEO, Rob Zagarella has spent over 20 years supporting utilities globally with the management and operation of their respective networks. Our management and technical teams have deep relevant experience in network communications, device development and management for utilities and other segments, and technology operations and development.

Our deeply technical team and technology deliver:

- Understanding of the potential challenges of new technology and need for flexibility around endpoint suppliers and associated risk associated with these;

- Adaptability, meaning the team and our partners can provide unique and extensible solutions for new use cases as required; and

- A clear understanding of the things that need to be done to manage and support SLAs in an operational environment.

Fully Australian owned, our experienced and respected Board members are also major investors.

… giving NNNCo a strong competitive position

NNNCo's competitive advantage springs from multiple sources:

- Depth of understanding of the utilities market, requirements and technical challenges (CEO and key contractors)

- Depth and breadth of understanding of radio and Wi-Fi networks and challenges associated with these from practical implementation and operational experience

- LoRa Alliance recognition of our role and competence, enabling us to influence direction and content of global standards, proven through past experience and current levels of influence- for example leadership in approach to multicast for LoRaWAN.

- Service level focus - a capability to deliver based on breadth and depth of experience across multiple domains.

- Commercial relationship with Actility (recognised as one of the top LoRaWAN network server providers globally in this space).

- Ability to solve complex problems by melding a team with varied relevant deep skills. This provides an ability to understand and work with the strengths and weaknesses of the LoRa standard to manage the tradeoffs necessary with any COTs/standard type technology. Note: NNNCo's development of LoRaWAN multicast is an early world first.

- A developing end-to-end network management capability that will:

  - Enable NNNCo to gain and manage an end-to-end view across a variety of endpoint devices, covering multiple industries with different service levels, access and security requirements and providing the appropriate information to manage to service levels for different customers;

  - Allow NNNCo to adapt as components change by providing appropriate monitoring, trend assessments, alerts, multi-varied input types and extensive analytics. These are linked to analytics that include performance reporting across multiple service levels, service costing linked to billing; and

  - Permit different parties to operate endpoints across the same networks and achieve potentially different levels of service and/or frequency of use at appropriate price-points.

NNNCo is the only dedicated IoT carrier grade network provider in Australia with an end-to-end service offering with the ability to measure, report and guarantee service levels. We meet the conditions for and we are currently applying for a carrier license. Other competitors either do not have our deep network skills or are large carriers with different challenges and/or using a different technology, which is still yet to be fully developed and proven.

… and verified in the market through commercial trials

We have undertaken extensive trials in Queensland and Victoria with major water and energy utilities with results that have exceeded our expectations.

Recently, NNNCo was selected from 50 global technologies and solutions providers to present to Isle TAG (Technical Advisory Group) members - via the Water Services Association of Australia. The TAG includes utilities from Asia.

Outside of utilities, we have been approached to partner with Cisco on Smart City roll-outs and with their innovation centres, initially in Sydney, Perth, Adelaide and Newcastle. We are also partnering with Hills Industries who will provide end-to-end solutions over the NNN to their Security, Healthcare and Transportation customers, in addition to SAP who are providing real-time integration of field data over the NNN into their cloud platforms.

Evidence of Functionality

Pilots undertaken with energy and water utilities prove NNNCo's ability not only to use LoRaWAN in the field but to adapt this to specific, often complex, customer needs. Such needs include the following functions for DREDs (Demand Response Energy Devices):

- Management of hot water load circuits;

- Unicast connection to set and manage individual DRED functions;

- Multicast to control groups (based on attributes such as retailer, consumer, feeder, distribution transformer, DRED type etc.) of DREDs, turn on and off DREDs depending on their set functions; and

- Constructing a physical LoRaWAN network to distribute control signals to DREDs and monitor their status.

We have also confirmed the following functions in the field:

- Performance of LoRaWAN networks in a range of geographic circumstances;

- Coverage information that proves the performance of technology and forecasting tools;

- Development of devices for testing by the utilities;

- Testing the performance of battery life in devices – proving 10+ years of battery life;

- Reduced cost of operation compared to legacy systems; and

- Only end-to-end IoT service offering with a dedicated end point controller with integrated communications, network and back end application.

In the process, we are proving our ability to deliver to milestones and to provide a full-scale network to our clients. This will cement our proposal to extend the national narrowband shared/multiuse IoT network, with geographic and use-case priority for these key clients.

Appendix 1 – Short form resumes

David Spence, NNNCo co-founder and Chairman, is well known in the internet/communications industry both in Australia and New Zealand. He has been involved in over 20 Internet related businesses, as Chairman, CEO, Director, major shareholder or advisor. He launched Australia's first search engine ANZWERS in early 1997 and was first to market in Australia with consumer broadband satellite services in 2001 under the name of Access1.

David was COO, and then CEO, of OzEmail, which was the largest ISP in Australia in the '90s before it was sold to Verizon Business. From January 2004 to February of 2010, David pioneered wireless broadband in Australia as CEO of Unwired Limited. Unwired was sold to Seven Network Limited in 2008, and was recently sold again to Optus under the name of vividwireless.

Our CEO and co-founder **Rob Zagarella** is a successful international executive who has spent the last 20 years focused on the M2M/IoT ecosystem with key global market players. As President of Gridsense in the US, he drove the company's M2M monitoring & control solutions into the Utility sector on the back of a public listing. He was the Asia Smart Grid leader for General Electric, including its range of Enterprise Software, Hardware and Services solutions. More recently he was EVP of Grid Net, a Silicon Valley M2M networking platform software startup with investment from Intel, GE and Cisco.

Our CTO, **Eric Hamilton**, delivers sustainable networks at scale. He is known for turning technologies inside out to produce pioneering network solutions that work. He is that rare combination of innovative, thorough and commercial. He took the early BigPond to profitability and scale and was CTO of Unwired, the world's first fixed wireless network to make a profit. Eric has led teams on a number of firsts across a range of Wireless (point-to-multipoint, backhaul and satellite solutions), Telecommunications, ISP and IT technologies. His expertise is recognised by frequent requests to act as an expert witness on complex telecommunications cases.

Margaret Wright, our Head of Strategy, People and Risk, is a highly experienced executive with deep skills in both accounting and technology, employed over a wide variety of industries from financial services to retail, manufacturing and distribution, transport and construction and government. Her recent focus has been on assisting large organisations to better manage and learn from complex projects and supporting not-for profits as a board and audit committee member.

A former National Practice Partner at KPMG overseeing technology risk management including security, Margaret has worked with executives and boards of a number of Australia's largest organisations and has managed a number of challenging, high profile engagements. During that time she was a member of the Auditing Standards Board in Australia, a Telstra Businesswoman of the year finalist and author of an internationally recognised guide on controls over electronic commerce.

NNNCo has built a highly experienced engineering team focused on providing sustainable, cost-effective and secure end-to-end IoT solutions. The team comprises expert practitioners across a wide range of industries and is headed by two 40-year veterans in technology and engineering:

Jon Keeble, a product architect in electronics and manufacturing, heads the development and adaptation of devices to connect into the Australian LoRa environment. Jon has led the design and implementation of devices in many industries, from audio to energy measurement to management and effective integration of solar technology. He is adapting the Wattwatchers product (which enables consumers and energy companies to measure and visualize power usage) to act as a LoRa end node.

In mid-2016 Wattwatchers appointed new MD Gavin Dietz, who was global CIO for the world's largest smart meter manufacturer Landis+Gyr for nearly a decade (2005-14). Wattwatcher's small, highly-expert hardware and systems development team provides advanced hosting applications - for example fine-grain, low-latency Demand Monitoring - with a significant product roadmap in place. This includes promoting new industry data protocols that enable CAPEX efficiencies. Wattwatchers was handpicked for the international CEM7 Showcase event (San Francisco, June 1-2, 2016).

Dean Cooper has built and maintained remote, flexible, battery powered data loggers, supporting water metering using proven core technology. He has also led teams covering wireless, product test plans and compliance and embedded engineering. His specialist consulting capabilities cover RF design, and EMC and safety design, testing and certification through accredited laboratories. Dean ensures our solutions work safely, sustainably and reliably.

As a team Dean, Jon and Eric are particularly skilled in:

- Building and operating large scale carrier wireless networks;

- Embedded microprocessor design, development, integration and manufacturing;

- RF design, development, certification and testing; and

- Enterprise class secure and highly scalable software based data management systems.

The NNNCo team is supported by a dedicated group of hardware and software developers, and highly experienced Project Managers who are involved with customers in specifications, trials, testing and implementation.

Roger W. Allen is a major investor and Board Member of NNNCo. Roger is the Director and Chairman at Allen & Buckeridge Investment Management, which he co-founded in 1996. He has directly relevant credentials based upon over 30 years as the Chief Executive of a major Australian IT services company with worldwide operations, then 13 years as an active investor in private companies in the ICT industries.

Roger has extensive experience in selling Australian IT products and services in the United States, Europe, and Asia. He has extensive experience in commercializing and globalizing R&D and innovative ideas by nurturing and expanding these businesses and entering the international markets. Apart from A&B, Roger also has a significant personal investment portfolio that invests in early stage venture capital. He is a very active investor and provides extensive mentoring and assistance in areas of strategic planning, board and management recruitment and marketing relationships.

Appendix 2 – Partners

IoT Global Service Provider

Cisco is taking a leading position within the LPWA LoRaWAN ecosystem globally as a key enabler for its Internet of Everything vision and strategy and working closely with service providers such as NNNCo to support its growth objectives.

LoRaWAN Network Server

Actility is providing LoRaWAN software for IoT networks globally, including the Netherlands, Belgium and France and Asia among others and is a founding member of the LoRa Alliance.

Distribution & Installation Services

Hills is a majority Australian-owned publicly listed company (ASX:HI). Through its national distribution capabilities and professional management and install services, Hills is ideally placed to support all forms of IoT applications installation and maintenance.

Sensors on the ground   Brains in the cloud   Control from anywhere

Wattwatchers has built a data layer for the electricity grid, driven by real-time data from the AUDITOR series of energy metering internet appliances. Wattwatchers is working with NNNCo to provide a LoRa AUDITOR, adding to current 3G and Wi-Fi versions. Wattwatchers supports Time of Day (TOD) metering and allows consumers to monitor and manage multiple energy sources to reduce energy costs and lower their carbon footprint.