NEWSLINE

Unidata

Environmental Monitoring & Industrial Measurement No. 14, 2017


# The Internet of Things (IoT)

Unidata is keeping a close eye on and developing technology for the Internet of Things (IoT).

What is the IoT? It is the concept of and the implementation of connecting sensors and control devices to the physical environment, to machinery, and to animals and humans, and then connecting those devices across the internet so we can monitor and control just about everything. It is a good thing? Many say it will enhance our lives. Perhaps it will and perhaps it won't. Regardless it is happening and we need to understand and embrace it to allow better monitoring of the environment.

Unidata has been participating in the IoT for almost 10 years now, but it was not called the IoT then. It was called telemetry (metering from a distance or tele-metering) instead. We started when we released the Neon Range of IP Data loggers, and we have deployed several thousand of these already. These systems monitor water levels, gas pressures and the like over the cell phone and satellite networks. In the last 5 years we have seen a faster growth in this area as well as a steady decline in the cost of connecting sensors across the internet. The type and the number of telemetry applications has grown and now includes such things as monitors for smart agriculture, smart livestock management and smart cities which monitor things like streetlights and parking spaces using relatively inexpensive sensors. The cost of metering from a distance is now lower than having a person come to look at and measure these things.

Apart from the low priced sensors, the networks to carry this data have grown in size and have reduced in cost. There are several emerging and competing technologies becoming available, and these are overviewed below.

## LP WAN Technology

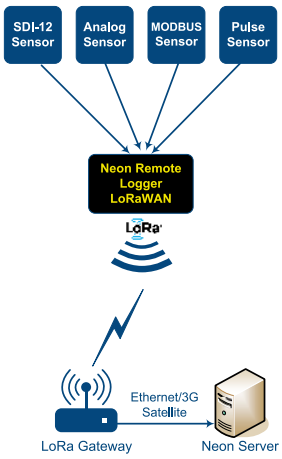
There are many vendors providing LPWAN technology, the main players being LoRa WAN and Sigfox. LPWAN can be described in simple terms as a low cost and low power and very long range (about 5 km) Wi-Fi which can only carry a very small data volume. These volumes are appropriate for some applications for example a farm with a large number of soil moisture sensors, a bore monitoring application for a number of bores in a small geographical area or a metering application. These technologies can be deployed in a private network environment, in the same way you use normal Wi-Fi in your house or office and you manage the network, or you can purchase a service from a Telco and they manage the network.

## Narrowband LTE Technology

This is the cell phone industry approach to the IoT, and there are new low cost low bandwidth options becoming available in the next year, for example current 4G/ LTE provides speeds of up to 25Mb and we all use this for our web browsing and other applications. IoT applications generally only need a speed of 64Kb, or less. There are new 4G /LTE modules being released in the next year which will be much cheaper and these will compete with the LPWAN technologies.

Which technology will win? No one knows, perhaps it will be the same as VHS and Beta when those technologies were competing in the video recording market decades ago.

At Unidata we are offering both technology options. We are also releasing our full range of Neon Remote Loggers, with both technologies, our customers can choose based on their specific needs.


LoRa Logger and diagram

# Neon LoRa Logger and Neon LoRa Bridge

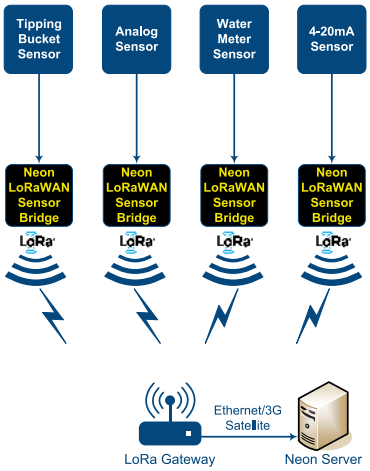
Unidata has developed new products using the LoRa radio modules and has added support within the Neon Application Software to support LoRa communications.

The Neon LoRa logger is a new generation Neon Remote Logger with a LoRa radio communications component, instead of a cell phone modem communications component. This new Neon Lora Logger communicates via a pre-configured LoRa gateway to the Neon Server to deliver data to be stored within the Neon System and displayed on the Neon Web interface as well as being reported on via the usual Neon reporting mechanisms.

As the LoRa communications is a low data rate/ low volume the Neon LoRa Logger needs to be pre-programmed with a logging scheme at the factory, or in the field, rather than the conventional way of downloading a scheme via the Neon Web interface. The Neon LoRa Logger supports a full range of complex sensor interfaces, for example Modbus and SDI 12 as well as analogue and digital inputs and outputs. Closed loop control systems can be set up using standard scheme programs, in the same way as normal Neon systems.

The Neon LoRa Bridge is a simpler product, which is set up to read simple analog and digital sensors and report the readings back to the Neon Server at pre-set intervals. It is a simple, low cost device without any on board intelligence that can't be reconfigured in the field.

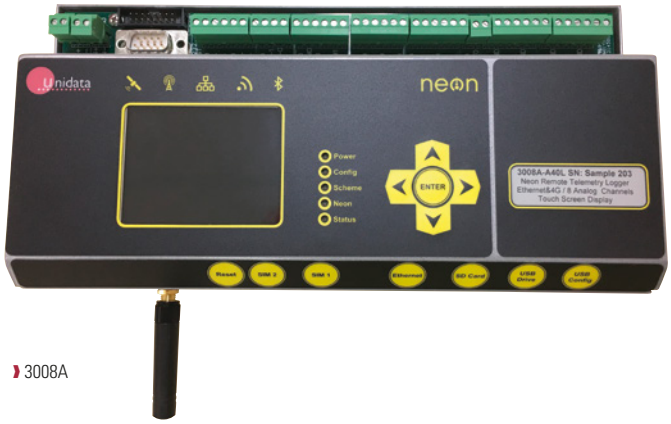
Both of these products are due for release / ready for shipment on July 1. They are currently in the final process of manufacture, and are now being certified for compliance at our external compliance laboratory. We have brochures available on request, and the brochures shall be on our website soon.


LoRa Sensor Bridge and diagram

# Full Neon Remote Logger Range

3004A



3008A

3016A

3200A

Unidata released the 3016 Neon Remote Logger recently, which has 16 hi res analog inputs. We are now releasing the full set of Neon Remote Logger models.

We now have a 3008 Neon Remote Logger with 8 hi res analog inputs and an LCD display and a 3004 Neon Remote Logger with 4 standard resolution analog inputs and an optional LCD display.

These new Neon Remote Loggers are Unidata's next generation of products and they will gradually take over from the current Neon Remote Terminals. We are not planning to obsolete the current range for some time though. The new range has some significant additional features, while also maintaining compatibility with our existing Neon Remote Terminals and our Starlogger and Prologger range of stand-alone data loggers.

The new Neon Remote Loggers can be used in a Prologger / Starlogger mode OR in Neon Remote Logger mode. They all have new Ferrite Ram and Flash Ram and an inbuilt 10 year battery backed up real time clock on board. This feature allows them to be programmed with a scheme at the factory and set to work immediately in the field.

They can also be reprogramed in the field with a scheme using Starlog 4, so they do not need to communicate with the Neon Server to obtain the scheme after a power failure. They store all the critical variables in Ferrite Ram, a new special memory technology which is non-volatile, allowing the logger to wake up and start working from where it left off, but with the correct time from the battery backed up real time clock. There are also several new interface and memory storage options and direct Ethernet interfaces, as well as dual SIM card slots and least cost routing algorithms, for auto failover to satellite in the event of cell phone coverage being lost.

There is a companion Satellite Modem Interface unit, primarily for the GlobalStar modem option, and other satellite modem options as they become available.

The full range of the Neon Remote Loggers is due for release / ready for shipment on July 1. They are currently in the final process of manufacture, and are now being certified for compliance at our external compliance test laboratory. We have brochures available on request, and the brochures shall be on our website soon.

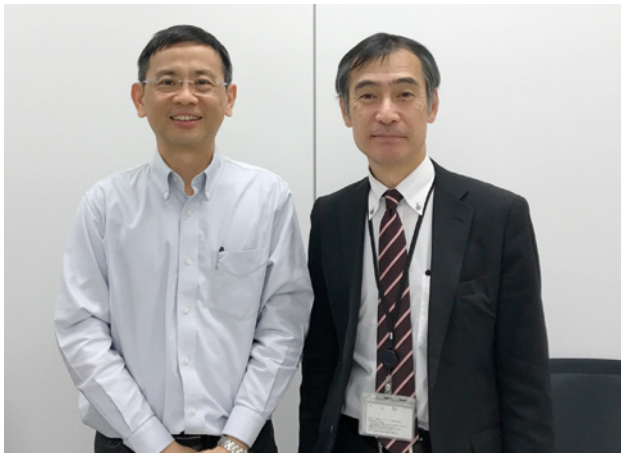
# EKO Instruments - New Partner in Japan

In April, Unidata and EKO instruments signed a partner agreement to work together to sell Neon Systems in Japan and to also work together on the very good weather instruments which EKO provides.

EKO instruments is a very successful manufacturer focussed in the areas of Environmental Science and Renewable Energy. EKO Instruments was established more than 85 years ago, with specialisation in pyranometer technology and other equipment to assist in the measurement and management of photovoltaic equipment for the renewable energy industry.

EKO Instruments provides an extensive product portfolio originating from its in-house development and production facilities, ranging from small radiometers, ISO 9060 standard pyranometers, spectroradiometers up to multi-panel IV curve tracer systems for PV performance evaluation.

Unidata looks forward to a long and fruitful relationship with EKO instruments. Please see the photos of Mr Osamu Sakamoto and Kevin Chung at the EKO Instruments facility and some photos of the National Weather Department Conference and Exhibition in Tokyo in May. Kevin Chung attended this event and assisted EKO on their conference stand.

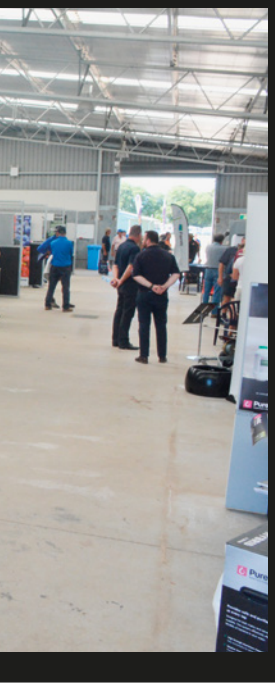

# Inmarsat BGAN M2M Satellite Backhauled LoRa

Where is LoRa very effective?

If you are connecting sensors in cities or in countries where there is wide cell phone coverage, for example in many Asian countries, there may be little reason to use LoRa, as there is an existing lower cost network. However if you are in a remote area, where there is no cell phone network available, then Inmarsat satellite backhauled LoRa is a very attractive option.

Perhaps you have a large farm with a few hundred soil moisture sensors. Perhaps you have a large pastoral property of 250square kilometres. Perhaps you have an important underground aquafer mound which is in a remote area which has a hundred water bore holes to measure groundwater levels within a 100 square kilometre radius? In these applications you could use a small number of Inmarsat BGAN M2M Neon Remote Terminals and a small number of Lora Gateways to provide LoRa sensor coverage over hundreds of square kilometres. The aggregation of a large number of low data rate LoRa sensors via Inmarsat BGAN M2M satellite is effective to cover a large remote area, and as the LoRa sensors are relatively low data rate and low data volume it is economical to send this data via satellite.

Unidata works closely with Inmarsat on many M2M applications. We are an Inmarsat certified partner for Neon Systems for M2M applications. This application of satellite backhauled LoRa is just another example of using Inmarsat BGAN to connect sensors to the internet of things. Inmarsat is also a member of the LoRa Alliance, a group of companies working together on LoRa technology enhancements and applications, lead out of Paris, France by the founding partner Actility.



# Gippsland Irrigation Expo

In March Rod McKay, General Manager NIWA Instrument Systems, and Matt Saunders attended Gippsland Irrigation Expo, in Sale in Eastern Victoria where they exhibited Neon based automated irrigation measurement and control systems.

The main proponent and supporter of this event is Southern Rural Water, the water utility responsible for water management in the lush and fertile East Gippsland region of Victoria, just near the beginning of the snowy mountains range.

This was very much a country affair with cattle shed used as the exhibition venue.

We received strong enquiries for Neon based automated irrigation systems. Most of the attendees were local landholders who had farms in the region over many decades. They all had the view that automation was the way to improve farm productivity and to be able to leave the farm for a short time, something which was regarded as impossible in years past.

They were keen to see how they could control their irrigation systems from their home, with a preference for using smart phone apps to check water levels and irrigation system status. They also were seeking remote image capture, to have a visual indication of the livestock as well, again this is something which allows them to not be in attendance at the farm at all times.

# Starflow QSD on long term trial in Fremantle Harbour

Last year we worked with the Fremantle Ports to install two sets of the new Starflow QSD Ultrasonic Doppler SDI-12 Instrument in the Harbour of Fremantle. The Port Hydrographer has allowed the installation as a long term test for Unidata.

Fremantle ports has much more expensive equipment monitoring the main port area, however Starflow QSD can do reasonable measurements in this environment and at a substantially lower price point for other areas of interest. They can also log on via Neon to observe the collected depth and velocity data at a bridge site where there are high tidal velocities and this is a good observation point for them.

The system has been maintained recently and despite the use of anti-foul coating on the instruments and housings, there has been significant bio foul growth on the system. While this is a challenge when we maintain the system it does indicate a healthy water environment within the harbour, and that is a good thing.

As the measurement system is ultrasonic, the additional bio foul on the instruments does not affect their operation.

We also have other long term trial sites for Starflow QSD in New Zealand and also in the UK.

## UNIDATA **STAFF PROFILE**


# Elena O'Neill

**Elena looks after all things administration and finance here at Unidata.**

**Elena is the person you speak to first when calling Unidata, so you know her already.**

**Elena assists with sales by preparing quotations and product and pricing information to customers. Elena is also our HSEQ Manager.**

**Elena has been with Unidata for just over 17 years and the company runs very efficiently under Elena's guidance. We also never cross Elena because she may simply forget to pay us next week. That has never happened by the way, but it could if we are not careful.**

**Elena is married and has two grown up children. Elena is a Fremantle girl of Italian heritage. She lives close to the Unidata Factory and is an active bush walker and occasional bike rider in the beautiful Bibra Lake nature reserve. Last year Elena travelled back to her parents' hometown in Italy and used her Italian which, although rusty, still remains quite good.**

**Elena is also what we call a Fremantle Dockers tragic. There is considerable football banter at work with Clint who remains a strong West Coast Eagles supporter.**

**We rely a lot on Elena, she is such an important part of our life here at Unidata, and we thank her for continuing to look after all of us and put up with us.**

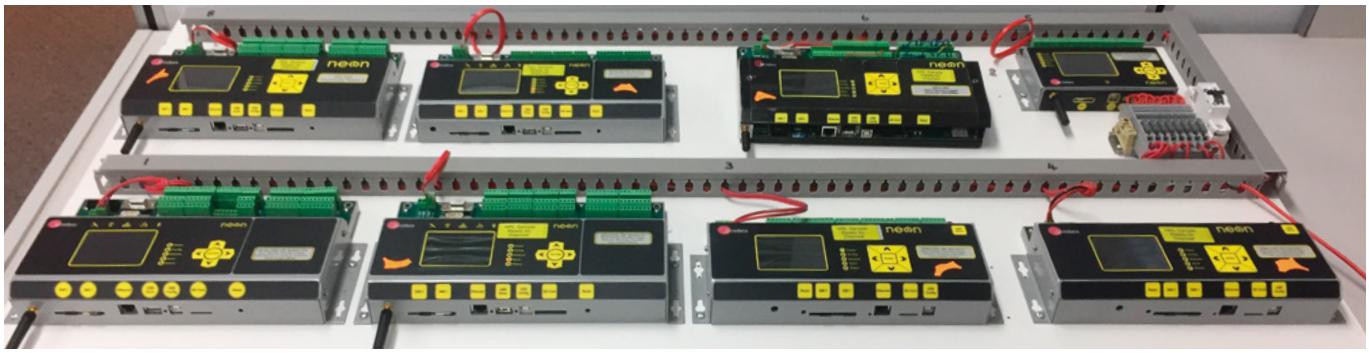
# Quality Enclosures Protect Valuable Equipment

Our customer the City of Joondalup has recently brought back one of their systems to Unidata for refurbishment. Please note the significant corrosion, caused by long exposure to brackish water, in a sump monitoring project for the city.

The City of Joondalup has a very forward thinking approach to remote monitoring and has recently started a new IoT (Internet of Things) project, to monitor many systems within the area, including lighting and parking assets. This is often called a smart city approach.

Unidata has worked with the City of Joondalup for several years and we were happy to refurbish this system for them. Note how the enclosure is very corroded, but the equipment inside was not damaged.

Replacing the enclosure was relatively inexpensive. Now the system can be set to work again in the field for another few years. Please also see the new enclosure ready to go back out in the field.



Test units in the Unidata office

# Neon Remote Logger Test Facility

We have been working on our new range of Neon Remote Loggers for quite a while. We have also had them under test for a long time on a test setup, and we thought we would show you.

There are 8 loggers set up, based on various releases of prototype models and they are all communicating to our Neon Server at different rates and different communications methods.

We also have two units in the test setup we have at the rear of our factory.

Long term tests are very important before such a product release hence most of these units have been operating in this test mode for 18 months already. New products will always have teething problems, and with our long term tests, we believe we have significantly reduced the chance of these teething problems. We also have the facility to update the internal firmware over the air/ over the communications link. This is a must for modern embedded processor machines, same as your phone, television, and soon your fridge and dishwasher.

Test units in the field

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