

# Unidata Newsline

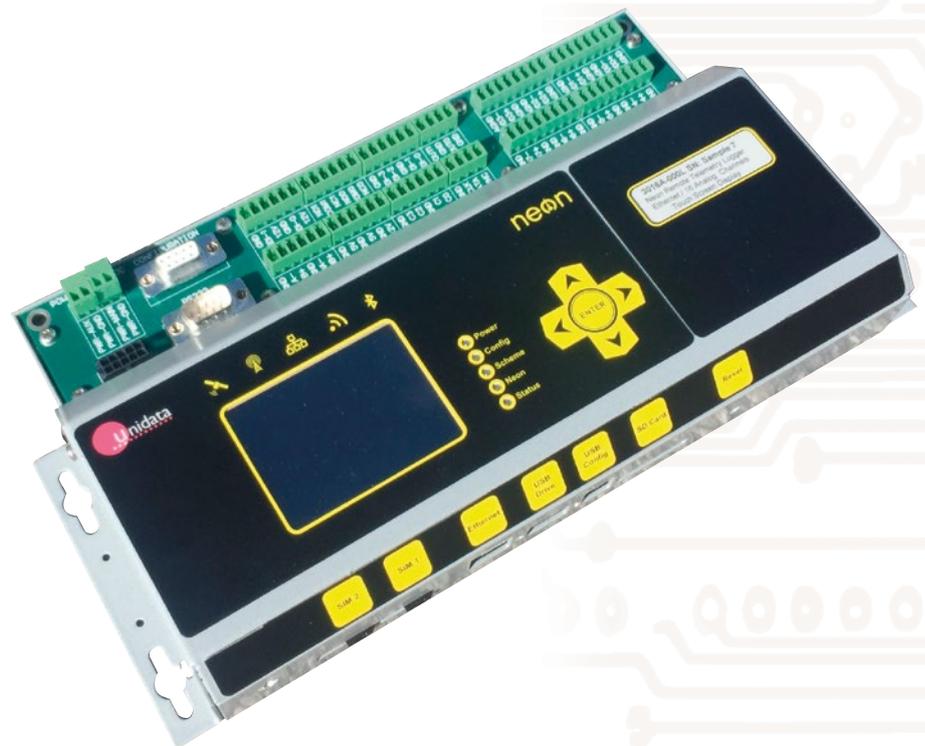
Unidata Newsline No. 13, 2016

New product release -

## New High End Neon Remote Logger

Unidata has been working on a new high end logger range for some time and we will release the first in the series, the 3016 Neon Remote Logger in the first quarter of 2017.

The 3016 Neon Remote Logger (NRL) is a high end Logger and Neon telemetry unit in one package featuring many high tech elements/components. This model has 16 x Single Ended or 8 x Differential Analog channels with a resolution of 18 bits (20uV per bit) which exceeds the performance of our previous high end datalogger, the Prologger. Dual SDI 12 and dual Modbus interfaces, four control outputs and four counter inputs, an accelerometer, a barometric pressure sensor, a 10 year battery backed up real time clock are some of many new features of the 3016. The 3016 NRL also has new fast non-volatile Fram components which allow it to maintain the state of the unit when the power fails, allowing it to power up again and continue to process from where it left off at the time of the power fail. The addition of USB ports, SD Ram memory components, direct Ethernet and Bluetooth for local configuration and dual SIM card slots for high availability operation on cellular networks, further enhance its capabilities and versatility. Touch screen colour LCD display makes it easier for field staff to check the operation of the unit on site, without the need to set up a Neon session.



The 3016 NRL connects to Inmarsat satellite modems through the native Ethernet port and has a connector to attach to the companion NRL Satellite Modem Module, which allows for connection to the Globalstar and Iridium networks.

And finally, a higher computational and memory capacity than our current series of Neon IP dataloggers and Starlogger/Prologger products, which combined with state of the art power management system with a hardware

watchdog timer, a coulomb counter and a very low micro amps standby current usage, makes the 3016 NRL very sophisticated and versatile tool.

Unidata intends to release further models of the Neon remote Logger during 2017 as well as continuing to support the current range of Neon Remote Terminals and Modules. As the Neon Remote Logger can operate in Neon mode as well as in Prologger and Starlogger mode it can be a direct replacement for these models into the future.

## New product release - Starflow product Range Enhanced with the 6527 Starflow QSD

Unidata continues research and development work on the starflow range and will release a new lower cost starflow product the 6527 Starflow QSD in the first quarter of 2017.

The 6527 Starflow QSD is an SDI 12 Velocity and Depth Instrument.

6527 utilises sophisticated QSD (Quadrature Sampling Doppler) Technology to produce depth and velocity profile while integrating Quadrature Sampling Receiver with FFT Demodulation allows for the provision for Range Gated velocity profiling in the future.

The 6527 Starflow QSD is an SDI-12 instrument without an internal logger. It is smaller, less expensive lower end ultrasonic Doppler instrument. While there is no internal logger in the Starflow QSD the instrument can be connected to any IP Neon Remote logger which can then calculate flow, in a similar manner as the 6526 Starflow product does.

The 6526 Starflow instrument will remain Unidata flagship Ultrasonic Doppler Flowmeter as it also has an internal logger and processor function which allows the instrument to calculate and report flow directly. This direct flow reporting makes the 6526 Starflow attractive to customers wanting to use the instrument with non Unidata loggers and Scada systems.

As the 6527 Starflow QSD incorporates an ultrasonic depth sensor as well as



an ultrasonic velocity sensor, vent tube inclusion for pressure sensor compensation becomes redundant, making 6527 an easier instrument to deploy. On top of that, 6527 is a completely sealed unit, so there is no possibility of water ingress into the electronics inside the instrument or need to use drying desiccant tube.

For use in partially filled pipes the appropriate depth measurement technology must be considered:

- The 6527 Starflow QSD has an ultrasonic depth sensor which requires the instrument to be mounted at the base of the pipe so an effective height of water can be found.

- The 6526 Starflow instrument has a pressure depth sensor, so it can be mounted at the bottom of the pipe or slightly above the bottom of the pipe, in which case depth offset is compensated by adjusting instrument settings

Both models of the Starflow have their own advantages; either instrument should be selected based on the measurement site conditions and the datalogger customers wish to use.

Please see photos of the new 6527 Starflow QSD and some of one of the major trial sites.



## New product release - SDI 12 Tester

Unidata has released a new special instrument which assists with the setup and debugging of SDI 12 instruments

The Unidata 6412A SDI-12 Tester is a portable unit to simplify the set up and fault finding of SDI-12 sensors in the

field and on the laboratory bench. It allows sending a variety of commands enabling sensors to be configured and read. It also enables monitoring communications between a logger and sensors on an SDI-12 bus.



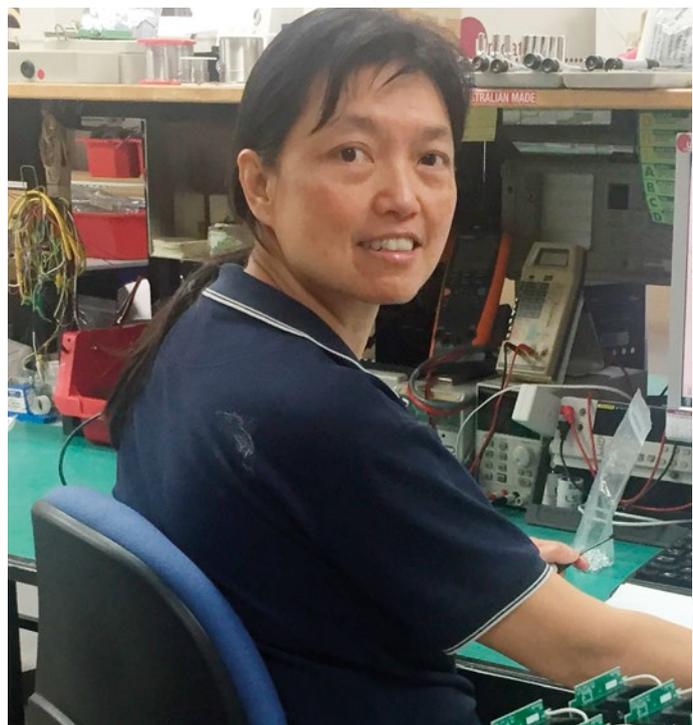
The tester is battery powered and has the ability to perform the functions, Monitor bus, Query address, acknowledge active, change address, send identification, start measurement, send data, send extended command and cyclical measure & send data.

The instrument is very useful on the bench and in the field. Please ask for further information if this is of interest to you.

## Unidata Staff Profile - Rina Burrows

Rina Burrows has been working at Unidata for more than 12 years, and she has been in the electronics industry for 30 years. Rina is one of our most experienced production staff responsible for Unidata Conductivity instruments, Neon Remote Terminals and Modules but her main responsibility in recent years has been the building of our major systems into cabinets and does reliable and very neat wiring harnesses for systems. Rina's wiring is really a work of art rather than an engineering task.

Rina enjoys travelling and cooking, she says she is not so good at cooking but we don't believe that. Rina is also an outdoors person, she likes cycling, kayaking and diving, and she supports the Wallabies and the Western Force rugby teams, in contrast to most of us who are AFL supporters. When Rina is not outdoors she enjoys reading, drawing and handcraft and she loves music and live theatre shows.



# Shanghai Waterway Engineering Design and Consulting Co Ltd - Land Reclamation Project

Our partner in China, the Dianjiang Group Limited, Shanghai Branch, has provided starflow instruments for the Shanghai Waterway Engineering Design and Consulting Co., Ltd. They use the Unidata 6526 Starflow Instrument with a Campbell CR1000 data logger and an OBS+turbidity sensor which they used to build a Sediment Losses Monitoring System for a land reclamation project. The system is installed in the Hengsha Island, Chongming County of Shanghai City. The system is used to monitor the loss of sediment

pipeline during the foreshore land reclamation.

This system is supported with a remote telemetry system so the customer in Pudong office knows up to date information on the loss of sediment and the customer is assured of the ongoing correct operation of the Sediment Losses Monitoring System on the remote island.

The Sediment Losses Monitoring System has performed in a stable manner with a high reliability of data.



The Shanghai Waterway Engineering Design and Consulting Co., Ltd is very satisfied with the system and the after-sales service of The Dianjiang Group Limited.

Please see photos of the installation below.



# Pacific Environment Air Quality Monitoring and Weather Monitoring Projects



Unidata's partner, Pacific Environment, is a large specialist environmental and technology company with offices in Sydney, Brisbane, Adelaide and Perth. Numerous successful Unidata and Pacific Environment partnerships on water and meteorology monitoring projects led to new involvement with Pacific Environment's specialist section for ambient air quality monitoring.

Unidata worked with Pacific Environment to interface a complex Particulate Monitor to a Neon Remote Terminal for continuous monitoring of ambient air quality.

The Instrument deployed is a TEOM 1405-DF Continuous Dichotomous Ambient Air Monitor which is designed



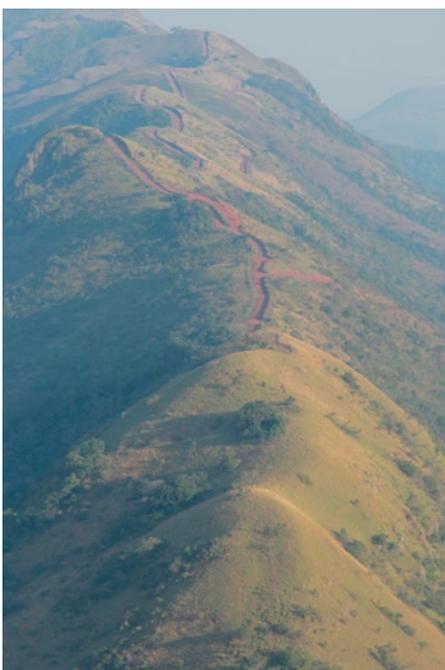
Left: Teom tall box. Above: Neon screen shot with the various parameters recorded over time

to provide representative short and long term measurements of the ambient particulate matter (PM) concentration, even in the presence of volatile materials. Conventional PM monitoring approaches do not account for the rapid loss that can occur with collection on a filter while sampling ambient PM. The 1405-DF monitor overcomes this challenge by automatically generating mass concentration measurements ( $\mu\text{g}/\text{m}^3$ ) that account for both non-volatile and volatile PM-10, PM-2.5 and PM-Coarse components. The system's default data output consists of a running 1-hour and 24-hour average mass concentration updated every 6 minutes and on the hour respectively. The monitor computes a 1-hour FDMS base and reference.

Please see the Neon screen shot with the various parameters recorded over time

The measured air quality data is being telemetered via Neon and is hence able to be observed in real time. The telemetered data is also continuously checked for out of limit conditions and alarms are sent via text and email to the relevant stakeholders. The alert function greatly adds to the useability of this instrument located at a remote site and enables any problems to be addressed in a timely fashion, resulting in vastly improved data capture.

This year Unidata also worked with Pacific Environment staff on scoping work for air quality and water quality systems for the potential re-opening of the Rio Tinto Simandou mine. This work was led by Accenture's team based in London and Pacific Environment and Unidata provided inputs to the study. The Simandou mine is located on a 110 km long range of hills located in Calmonz and Kankan regions of south eastern Guinea.





## Royal Irrigation Department Thailand installs Aquarius Hydrometric Analysis Software

Unidata's worked with our customer, the Royal irrigation Department of Thailand (RID) this year to install the Aquarius Hydrometric Analysis Application Software package to assist this department manage the river systems in Thailand.

The existing Neon systems within RID will feed data directly into the Aquarius software package by the new Neon Aquarius direct interface.

For this project Unidata teamed with local partner union TSL and the National Institute of Water and

Atmospheric Research (NIWA). Unidata and Union TSL provided the software installation services and the necessary high capacity computer equipment required for this large system while NIWA staff provided advice on the setup of the scientific aspects of the system. In addition, NIWA provided training on the setup and operation of the system.

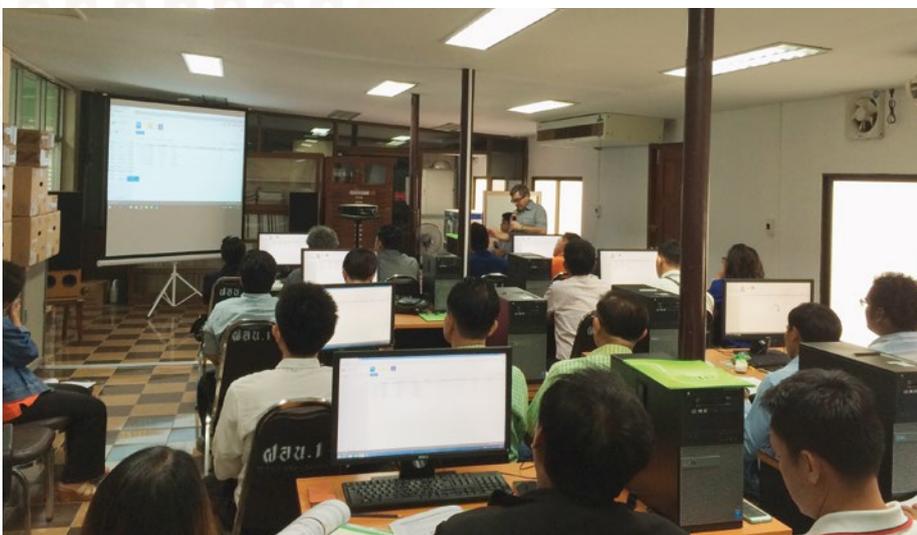
With this system RID will have better visibility of the river flows and related conditions allowing for improved management of river systems. The system shall also provide the complex



Flood Monitoring, Analysis and Forecasting which will assist RID to mitigate the damaging effects of floods in Thailand.

Unidata will continue to work with RID and NIWA implementing further aspects of the system over the coming year.

Please see photos of the RID staff. Many of these people travelled from the remote regions of Thailand to attend the training. Each region of Thailand is responsible for managing the river parameters within their regions, and the head office staff provides the overall management of the system country wide.





## Unidata Neon Camera System Captures Victorian Flood Events

Unidata's partner Ventia installed Neon Camera Systems for early flood warnings for local authorities in Victoria over the last 2 years. Remote Neon camera systems augment the local authorities instrumentation systems for early warning of rising river levels and for accurate and timely road closures during flood conditions.

These systems were invaluable during the recent floods in Victoria as local authorities could see images of the flood levels at remote bridges

See the time lapse photos showing the rise of the flood waters

Unidata has two types of Remote Neon Camera system, one high resolution system and one lower cost low resolution system. The low resolution system is generally all that is required for this application.

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## 2G Networks being Shut Down

This is a reminder about the shutdown of 2G networks. We note all major networks have announced shutdown dates, and this is a result of a decline in 2G traffic, and also network operators are needing to re use their 2G spectrum for the later 4G / LTE technology which offers faster / higher bandwidth services.

Over the next six months we expect all major network operators

in Australia will close their 2G networks

Unidata offers upgrades from 2G to either 3G or 4G, and these are a similar price. It is best to determine where you need coverage and then decide which is the best option for you. At this time 3G coverage remains the best in regional areas, and 4G coverage is best in the cities, however this pattern will change quickly

as network operators roll out 4G networks in regional areas.

We have had requests for an upgrade to a combined 3G/ 4G module, however most modem manufacturers are not offering this option as there is a license fee payable to Qualcomm for use of the 3G and 4G technology and including both in one module incurs a double license fee, so the price of combined units would be too expensive.

## Radar Sensors for River Level Measurement

Unidata has provided radar river level instruments for challenging installations in Asia recently. The Radar sensors are accurate and very convenient in some installations, especially when they can be suspended from an existing bridge.

Radar sensors do not require any civil engineering works as do the traditional

shaft encoder in a stilling well, so the higher cost of the sensor is balanced by a lower cost of installation. The range of these sensors is also large, up to 30 metres, and even at that range they remain quite accurate. Also, the non-contact nature of radar sensors make them very low maintenance.





## Irrigation Australia Conference



Unidata attended and exhibited at the large irrigation conference in Melbourne in May this year. We shared a stand with NIWA and exhibited our Neon Loggers and our instruments for measuring water in irrigation applications. NIWA showcased various projects for automated irrigation in New Zealand based on Neon, and provided a scientific paper for the main conference.

What is evident in the Irrigation Industry was very much the increase in automation, and telemetered decision support systems which assist farmers in production and water



usage and management of agriculture generally. Automated Irrigation gates were on show and many different automated reticulation systems were being offered. There were some new soil moisture sensors and these were telemetered, and were powered by small rechargeable batteries and very small solar panels, integrated into the case of the units.

Please see photos of our stand and an example of a small reticulation controller with an integrated solar panel, perhaps only 2 watts, but sufficient to maintain a reasonable supply of continuous power to the

controller, provided displays are shut down most of the time.

The conference was held at the Melbourne exhibition centre, which is informally known as "Jeff's Shed" because it looks like a large shed and it was initiated by former premier the Honourable Jeff Kennett AC. The Melbourne Exhibition centre remains sensitive about this undesired nick name. It was one of the conditions of use for the exhibition was that we agreed not to mention the nick name Jeff's shed in any promotional material.



## RID Thailand-Retirement of Khun Sumet

This year we celebrated the retirement of our long time customer the Head of Department for Hydrological Instruments at the Royal Irrigation Department in Thailand.

We have worked with Khun Sumet for ten years and we have built up a relationship of respect and friendship. To honour Khun Sumet we arranged a small retirement function for him and his staff in Bangkok, with the assistance of the Australian Embassy / Austrade. Khun Sumet came to the function with his wife and we arranged the usual exchange of gifts. Senior staff from the Australian Embassy attended the function and



picked up Khun Sumet and his wife in an Australian Embassy car as a mark of respect. Khun Sumet thanked Unidata for all the years of work with RID and introduced the staff who are taking over from him. Khun Sumet will spend his

retirement continuing to keep fit and health by increasing his running activities. We again thank Ms Acharaporn for all her hard work in assisting the arrangements for the retirement function.

Please see photos of the function and Ben Giles, Trade Commissioner and Ms Acharaporn from the Australian Embassy / Austrade. Please also see photos of Mr Vichakorn from Union TSL, one of our partners in Thailand. All attended the formal ceremony of gift giving of some small items of Australian Honey for promoting good health.

## Neon Field Units with 4G LTE / Sensors Networks with LoRa LPWAN and Narrowband LTE

LTE, Long Term Evolution, is part of 4G mobile communications standard which offers wireless internet access at much high speeds than 3G. Unidata Neon Remote Terminals and Neon Metering Modules are available with 4G/ LTE connectivity and in recent months we supplied a large number of the new 4G units to our customers.

Unidata worked with its partners and major customers during the introduction of the 4G version of Neon dataloggers and we are pleased they were implemented without too much trouble.

During integration, it was noted that the new 4G modules connect to the network very quickly, almost too fast for our application, so Unidata made needed adjustments to communication timing to the cellular network to allow a robust connection.

While we would like to have modem components offer both 3G and 4G in the same package, sadly that option is not yet available. Modem manufacturers are often required to pay a licence fee to Qualcomm for each 3G and 4G unit manufactured and it is this additional fee may make combined units too expensive.

Unidata also has a development program LoRa LPWAN and the soon to be introduced, narrow band for 4G / LTE IOT for sensor networks. In a way, Narrowband LTE is the cell phone industry response to the developing LoRa LPWAN technology for local area low power sensors utilising free spectrum. We suspect that the cell phone companies will soon catch up to LoRa by offering narrowband LTE for low cost sensor networks in the future. Unidata also believes that the free spectrum will be attractive initially, but as the number of people using this free spectrum increases, the quality of service will degrade unless it is carefully managed. Unidata's ongoing research and development program includes LoRa LPWAN for our suite of solutions. In some applications, for example a remote farm with a satellite backhauled internet connection, LoRa is a very efficient technology.

Unidata is keeping close eye on the development of The Internet of Things (IoT). In essence IoT represents the interworking of various devices and objects (all different kind of sensors, cars, trucks, escalators, computers, etc.) that enables them to collect and



exchange data, assuming there is adequate network connectivity.

Earlier this year, at the 3GPP plenary meeting in South Korea, the standardisation of NB-IoT (Narrowband Internet of Things) has been completed utilising the already existing NB-LTE (narrowband LTE) technology. With standardisation now complete, the next challenge for mobile industry is to progress with commercialisation of these new technologies. At the same time, the work is well in progress on developing specifications for further evolution of IoT concept on the roadmap to 5G.

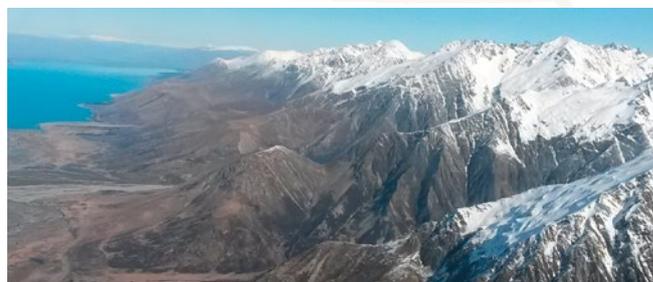
## Just another day at work in New Zealand

While it sure looks cold, another day at work in New Zealand means an opportunity to see magnificent scenery.

Recently Steve de Lima, one of our work colleagues and a senior software developer at NIWA in Christchurch needed to check on a weather station which incorporates Unidata Neon Satellite unit. That required a helicopter ride to the mountains and viewing the scenery along the way, and also a warm coat.

New Zealand is a beautiful country with great rivers and mountain ranges.

In Western Australia the campaign to promote tourism is called "just another day in WA" but we promote sandy beaches and the vast outback. How different we are to New Zealand.





# Neon Application Software and Neon Field Units Improvements

Unidata has released a further version of the Neon Applications Software this year with several new features to improve the performance and the robustness of the system.

We continued to work on improving the robustness of the communications between the Neon Field Units and the Neon Server especially during noisy communication sessions, for example when using the Globalstar Satellite system, whose satellites transits the sky rather than remain in one position in the sky creating regular breaks in the system availability.

Unidata introduced additional synchronisation processes between the Neon Server and the Neon Field units to allow them to successfully recover and maintain synchronisation during very noisy communication environments. This is particularly

useful when doing firmware upgrades of Neon Field Units over the air. In general, the more maintenance that is done over the air, the easier these larger systems are to manage and fewer visits to site are required. This improves system uptime and reduces operating costs for our customers.

Software development engineers have also worked to increase the performance of the Neon Server as the number of connected Neon Field Units grows, and as existing users increase their reporting rate into and out of the server. This year we introduced improved multi-threading throughout the system. The system is now scaled to have 5000 connected Neon Field units on each Neon Server system and we have plans in place to double this figure in the next year. Additionally, the session and IP retry timeouts in the system were optimised for different



forms of communication, improving resilience and reducing costs when using time based satellite airtime providers.

We note that Neon system increase can be attributed to additional Neon Field Units being added and the communication intervals becoming more frequent as customers seek to have more up to the minute data. We also note the growing number and frequency of web services calls on the system as customers broaden their web services use of the system. Unidata have plans in place to for a significant expansion to the web services systems in the coming year.

# Inmarsat BGAN M2M Terminals Comparison

There are several different manufacturers of Inmarsat BGAN M2M terminals on the market and it is interesting to note the comparison between each manufacturer. All of these manufactures are Inmarsat type approved. It is always good to have a choice of manufacturers when selecting terminals.

Unidata feels that the low power consumption feature remains the

most important buying choice/ differentiation between the various models. For that reason, our preferred choice remains the Hughes 9502. However, increasingly we are choosing the integrated antenna and modem in- one module. It has the same performance as the split antenna and modem module system but is often more convenient to mount and it allows us to reduce the size of equipment enclosures.

Please see the comparison table below where Hughes compares each model.

**Competitive Advantages**  
**HUGHES 9502 vs. Ranger M2M vs. Explorer 540**

Advantages	Hughes 9502 Integrated Antenna	AddValue Ranger M2M	Cobham Explorer 540
Higher performance class mark	✓	✗	✓
Peak data speeds (down/up)	448 kbps/464 kbps	384 kbps/240 kbps	448 kbps/464 kbps
Ingress protection rating	IP66	IP65	IP66
Super low power consumption, ideal for solar battery installation	1.0W IDLE mode	6.0W IDLE mode	2.8W IDLE mode
Accredited for hazardous locations	✓	✓	✓
Fully compatible with RTM	✓	✓	✓
Standard, non-proprietary connectors	✓	✗	✓
Alphasat and Extended L-band compatible	✓	✗	✓
Dedicated installation mode, simple to install	✓	✗	✓
Separate maintenance port, keeps RTUs connected	✓	✗	✗

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An Exelion Company

Please see the various models available below:



Cobham Explorer 540



Hughes 9502 one piece integrated antenna



Hughes 9502 two piece split antenna



Add Value Sabre Ranger

# Satellite Telemetry Airtime Models Update

In the last year we have seen a significant growth in pooled data plans in the satellite telemetry market. We see the market moving away from a \$ 20Month / \$50 Month / \$100 Month plan per field unit with more focus on pooled data plans.

For a typical, older, plan a customer may have 100 SIM cards in the field and they may pay \$ 50 a month each for a 50MB data allowance per SIM card, total cost \$ 5000 per month, with additional charges on a per SIM card basis if the data used exceeds 50MB in any one month

For a typical, newer, pooled data plan the customer may be provided with 100 SIM cards with a nominal cost and pay \$2500 a month for 250MB of data across any or all of those SIM cards, allowing the data to be shared across in use and not in use SIM cards. We see this method has reduced the cost of satellite telemetry significantly over the last couple of years. The old plan per month method seems to be outdated now.

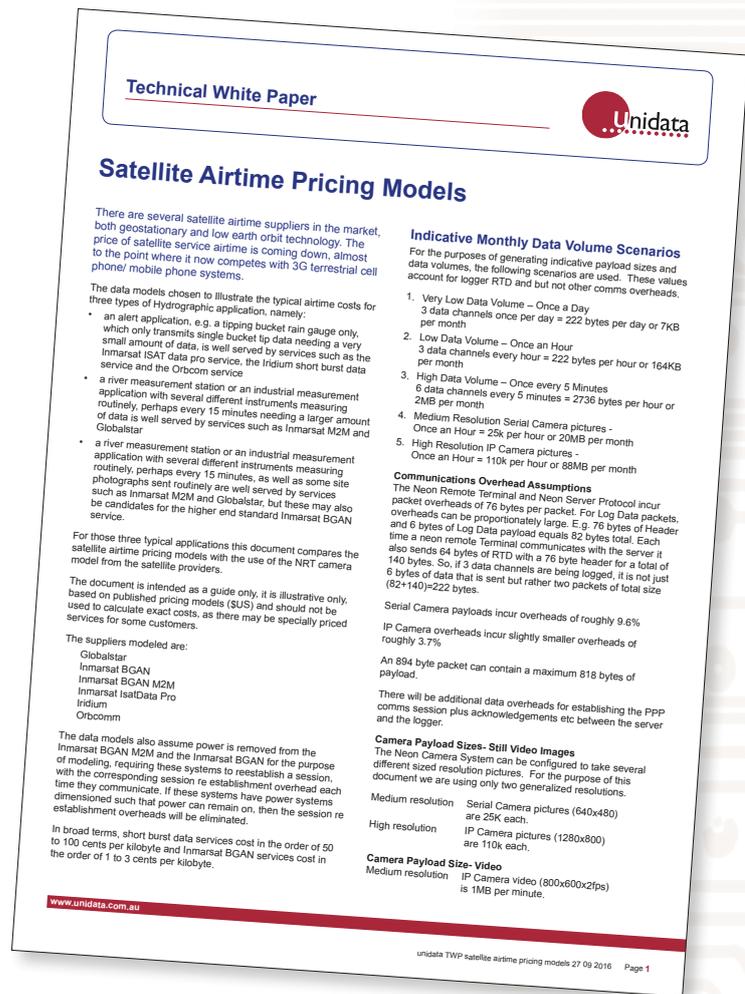
The cost of Satellite telemetry is still higher than cell phone based systems, however the gap between the two is narrowing, and the quality of service from carriers like Inmarsat far exceeds the quality of service from cell phone carriers. The robust nature of the Inmarsat network and removing reliance on ground based cell towers

especially in a flood situation makes satellite a good choice.

Please see the table below for an example of the costs for a pooled data package. Unidata also notes that the older method of charging for time

connected rather than data sent is becoming much more expensive.

Please also ask us for an updated copy of our Satellite Airtime Models document which compares costs between many different satellite providers.



## Inmarsat BGAN M2M Service Model

Hughes 9502 Sat. Modem Cycled Every Session (High SIMS - Data Pool Based))

Data Charged in Bytes, not by Time.

Assume Fixed \$10.00 per SIM Monthly fee and \$10 per MB (some providers may offer this for large numbers of SIM cards)

BGAN M2M 12 Month Plan Per SIM Card	Very Low Data Volume	Low Data Volume	High Data Volume	Medium Res Photo	High Res Photo
Comms Frequency	Daily	1 hour	10 minutes	1 hour	1 hour
Payload Bytes per Comms	222	222	240*1	25,000	110,000
Billing Bytes per Month	30,500	732,000	4,392,000	31,671,976	136,867,892
Monthly Subscription Cost	\$10	\$10	\$10	\$10	\$10
<b>Monthly Allowance</b>	<b>OMB</b>	<b>OMB</b>	<b>OMB</b>	<b>OMB</b>	<b>OMB</b>
\$/MB Out of Bundle	\$10.00	\$10.00	\$10.00	\$10.00	\$10.00
<b>Monthly Total Price</b>	<b>\$10.31</b>	<b>\$17.32</b>	<b>\$54</b>	<b>\$327</b>	<b>\$1,379</b>

# Contact us

## AUSTRALIA

### Unidata Pty Ltd

40 Ladner Street  
O'Connor, Western Australia 6163  
Tel: +61 8 9331 8600  
Fax: +61 8 6210 1854  
Email: sales@unidata.com.au  
Web: www.unidata.com.au

### Measurement Engineering Australia

41 Vine Street  
Magill, South Australia 5072  
Tel: +61 8 8332 9044  
Fax: +61 8 8332 9577  
Email: sales@mea.com.au

### Hydro Terra

6/339 Williamstown Road  
Port Melbourne, Victoria 3207  
Tel: +61 3 8683 0091  
Fax: +61 3 9681 9421  
Email: info@hydroterra.com.au

### VENTIA Pty Ltd

1/12 Sauer Road  
New Gisborne, Victoria 3438  
Tel: +61 3 5428 8845  
Mobile: +61 458 110 204  
Email: Michael.Wheaton@ventia.com.au

### Environmental System & Services

8 River Street  
Richmond, Victoria 3121  
Tel: +61 3 8420 8999  
Fax: +61 3 8420 8900  
Email: george.dutka@esands.com

## NEW ZEALAND

### National Institute of Water & Atmospheric Research Ltd

NIWA Instrument Systems  
10 Kyle Street, Riccarton,  
Christchurch 8011, New Zealand  
Tel: +64 3 343 7890  
Fax: +64 3 343 7891  
Email: g.elley@niwa.co.nz

## CANADA

### Geo Scientific Ltd.

4938 Queensland Road  
Vancouver, BC V6T 1G4  
Tel: +1 604 731 4944  
Fax: +1 604 731 9445  
Email: info@geoscientific.com

## SOUTH AMERICA

### TE.SA.M Peru

Calle Coronel Odrizola 126 – 128  
San Isidro Lima 27 – Peru  
Tel: + 511 705-4141  
Fax: + 511 705-4142  
Email: acliente@tesam.com.pe

## MIDDLE EAST

### Focus Middle East FZCO

No. 322, Bldg. 5EA, Dubai Airport Free Zone  
P.O. Box 293541 Dubai, UAE  
Tel: +9714-6091600  
Fax: +971-6091602  
Email: miran@focus-me.com

## EUROPE

### Streamline Measurement Ltd

11 Hawthorn Bank  
Hadfield, Glossop  
Derbyshire SK13 2EY, England  
Tel: +44 01457 864334  
Fax: +44 01457 854129  
Email: sales@streamlinemeasurement.co.uk

### Denar Ocean Engineering Services Ltd

Gazeteciler Sitesi  
Hikaye Sokak 1/4 Sisli  
Istanbul 34394, Turkey  
Tel: +90 532 579 5353  
Fax: +90 212 216 6483  
Email: cagan@den-ar.com

### Elite Elektrik Uretim Ve Makine Sanayi Ticaret A.S

8 Cadde 14 / 4 06460 Ovecler  
Ankara, Turkey  
Tel: +90 312 472 8393  
Fax: +90 312 472 2067  
Email: elite@elite.com.tr

## ASIA CHINA

### Dianjiang Group Limited

1510,15/F, New Commerce Centre,  
No 19 On Sum Street, Shatin, NT, Hong Kong  
Tel: +852-36901588  
Fax: +852-36901586  
Email: sales@Dianjiangtech.com  
(Unidata 6526 Starflow exclusive partner for China)

### SHANGHAI OFFICE:

Building 42, Caifuxingyuan No.188 Maoting Rd  
Chedun, Songjiang, Shanghai 210611 China  
Tel: 86-21-37620451  
Fax: 86-21-37620450  
Branches at Beijing, Kunming, Hefei

### Channel Technology Group HK Limited

8/F, Flat A-C, Kwai Shun Ind Ctr.  
51-63 Container Port Road  
Hong Kong  
Tel: +852 6852 3248  
Fax: +86 21 37620450  
Email: sales@qudao.com.cn  
Branches at Beijing, Wuxi, Shenyang, Chengdu and  
Changsha

### Beijing Channel Scientific Instrument Co., Ltd.

Suite 7B15, Huajie Mansion, Dazhongsi 13th  
Haidian District, Beijing 100098, China  
Tel: +86 10 62111044  
Fax: +86 10 62114847  
Email: jack@qudao.com.cn

### Cinotech Consultants Limited

Room 1710, Technology Park  
18 On Lai Street, Shatin, NT  
Hong Kong  
Tel: +852 (2151) 2088  
Email: hf.Chan@cinotech.com.hk

### Keihsing Measurement System Corp

9F-1C No. 97, Sec 4, ChongSin Road  
SanChong City, Taipei County, Taiwan 241  
Tel: +886 2 2972 5528  
Fax: +886 2 2973 7885  
Email: flow.sensor@msa.hinet.net

## KOREA

### WESS GLOBAL INC,

Unidata 6526H Starflow exclusive distributor for Korea  
5F Young Sang Media Center  
Cheonan Valley, Jiksanro 136, Jiksan-eup  
Cheonan, Korea  
Tel: +82 41 584 8820  
Email: Les@wessglobal.com

### Encosys Co. Ltd

#1514, Sungjee Starwith, 38, Road 427  
Heungan-daero, Gwanyang-dong, Dongan-gu  
Anyang-si, Gyeonggi-do, South Korea  
Tel: +82 31 345 0700  
Fax: +82 31 345 0707  
Email: encosys@encosys.kr

## JAPAN

### Senecom INC.

1-1-25 Kawaguchi Nakaooki  
Saitama, Japan 332-0032  
Tel: +81 48 242 0770  
Fax: +81 48 242 0771  
Email: saito@senecom.co.jp

## ASIA

## THAILAND

### Union TSL Limited

30/34 Soi Yakthanoon Na Ranong  
KlongToey, Bangkok 10110, Thailand  
Tel: +66 26710688/89  
Email: vichakorn@utsl.co.th

### Intelligent Control Engineering Co Ltd

67/165 Soi Phaholyothin 69 Phaholyothin Road  
Anusaowari, Bangkok 10220, Thailand  
Tel: +66 892 062 060  
Fax: +66 2 972 4942  
Email: icintel@truemail.co.th

## SINGAPORE

### Wetec Pte Ltd (200810252Z)

21, Bukit Batok Crescent  
#16-82 WCEGA Tower  
Singapore 658065, Singapore  
Tel: +65 6570 6938/+65 9728 9826  
Fax: +65 6734 5706  
Email: sales@wetec.com.sg

### Network Innovations Inc.

52 Telok Blangah Road,  
#03-07 Telok Blangah House,  
Singapore 098829, Singapore  
Tel: +65 9116 6464  
Email: sebastian.anthony@networkinv.com

## MALAYSIA

### Surechem Sdn Bhd

No. 35 Jalan Radin Anum 2  
Bandar Baru Seri Petaling  
Kuala Lumpur 57000, Malaysia  
Tel: +6 03 9058 6626/36  
Fax: +6 03 9058 7368  
Mobile: +012 316 1923  
Email: mblim@surechem.com.my

### GAC Teknikal Sdn Bhd

42E & F Mendu Commercial Centre  
Jalan Mendu, Kuching, Sarawak, Malaysia  
Malaysia 93200  
Tel: +60 82 489 393  
Fax: +60 82 489 489  
Email: gac9393@streamyx.com

## INDONESIA

### PT. New Module INT.

Jl. Abdul Muis No. 36Q  
Jakarta 10160 Indonesia  
Tel: +62 21 385771  
Fax: +62 21 3808281  
Email: nmi@nemoint.com

## VIETNAM

### Dai Quang Company Limited

No. 18, Lane 172, Thai Thinh Str  
Lang Ha Pre., Dong Da Dist.  
Hanoi, Vietnam  
Tel: +84 4 35581722  
Email: Lam@daiquang.com

### Digi Technologies

18/A20 Quach Van Tuan, Tan Binh District  
Ho Chi Minh City, Vietnam  
Tel: +84 8 811 2736  
Fax: +84 8 811 2735  
Mobile: 84 90 382 9996  
Email: lqchi@digivn.com

## INDIA

### ShailronTechnology Pvt. Ltd

E-21 Surya Kunj near C.R.P.F.  
New Delhi 110 072 India  
Tel: +91 011 2801 0280  
Fax: +91 011 2531 5699  
Email: info@shailrontechnology.com

