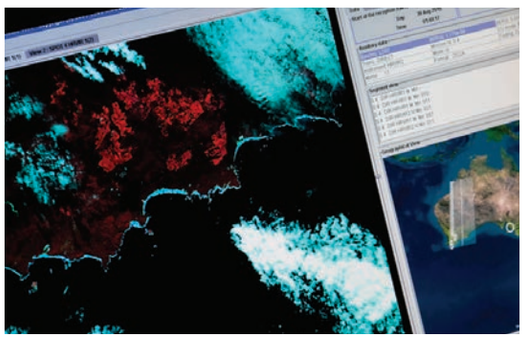
University of South Australia | Institute for Telecommunications Research

The Global Sensor Network

Reaching Further for Remote Monitoring



Only a very small proportion of the earth's surface is covered by terrestrial communication networks. Major natural assets such as fisheries, agriculture, rangelands and mining are out of reach of affordable communication. Until now.

The **Institute for Telecommunications Research** at the University of South Australia has developed the Global Sensor Network (GSN). This new wireless network retrieves data from remote sensors, using very low cost user terminals and a network of low earth orbit micro satellites.

The use of micro satellites instead of the traditional geostationary satellites allows the network to service many more users simultaneously, and at far lower cost, than was previously possible.

The GSN features an innovative system architecture that can be reconfigured while in orbit to facilitate data collection and exchange, according to individual needs. The use of Software Defined Radio (SDR) with highly advanced signal processing capabilities also pushes this Australian technology to the forefront of data collection. These innovations lead to real flexibility and spectral efficiency.

The Global Sensor Network was originally co-founded with the support of $5 million under the Australian Government's Australian Space Research Program. GSN partners who contributed to its development and applications are COM DEV (Canada), SAGE Automation, the Defence Science and Technology Organisation (DSTO), the Commonwealth Science and Industrial Research Organisation (CSIRO) and the Australian Institute of Marine Science.

"Analysts are currently predicting the Machine to Machine communications market will increase to become billions of terminals in the near future. And at the same time, there's an increasing need for monitoring our environment. The Global Sensor Network system is a real game changer, because it enables an entirely new category of sensor applications that previously were simply not cost effective."

Professor Alex Grant
Institute for Telecommunications Research
University of South Australia

Applications

Applications of the technology developed within the Global Sensor Network Program are considerable, and include the environment, commercial and defence and security. Examples include:

- Monitoring of drill rigs in remote locations
- Monitoring maritime shipping and fishing routes
- Monitoring of defence sensors in remote locations
- Water temperature monitoring in reefs and waterways locations

Key GSN Outcomes

The Global Sensor Network Program uniquely combines the following elements that allow gathering and control of remote sensors and assets to be undertaken at a scale and cost not previously available:

- System designed for very large numbers of terminals
- One or two way service options, with variable message sizing
- Low cost infrastructure based on microsatellites and micro-gateway terminals
- Low complexity, low cost terminals by design
- High efficiency data transport using high bandwidth efficiency proprietary waveforms, resulting in minimal satellite bandwidth
- Scalable and flexible operation using software defined radio approaches

Results to date

Following successful aircraft and satellite trails, late 2013 saw the GSN gain further proof-of-concept during field trials in Canada. GSN ground terminals were positioned in remote sites thousands of km apart, collecting data on soil moisture, air temperature, wind speed and precipitation. The terminals transmitted this sensor data to a satellite, which successfully captured, stored and downlinked the information to a central ground station. ITR conducted the trials in collaboration with space hardware company COM DEV and satellite data services company exactEarth, for the Water Institute at the University of Waterloo.

GSN – The Future

This program demonstrates breakthrough fundamental research that enables new technologies, applications and commercialisation opportunities.

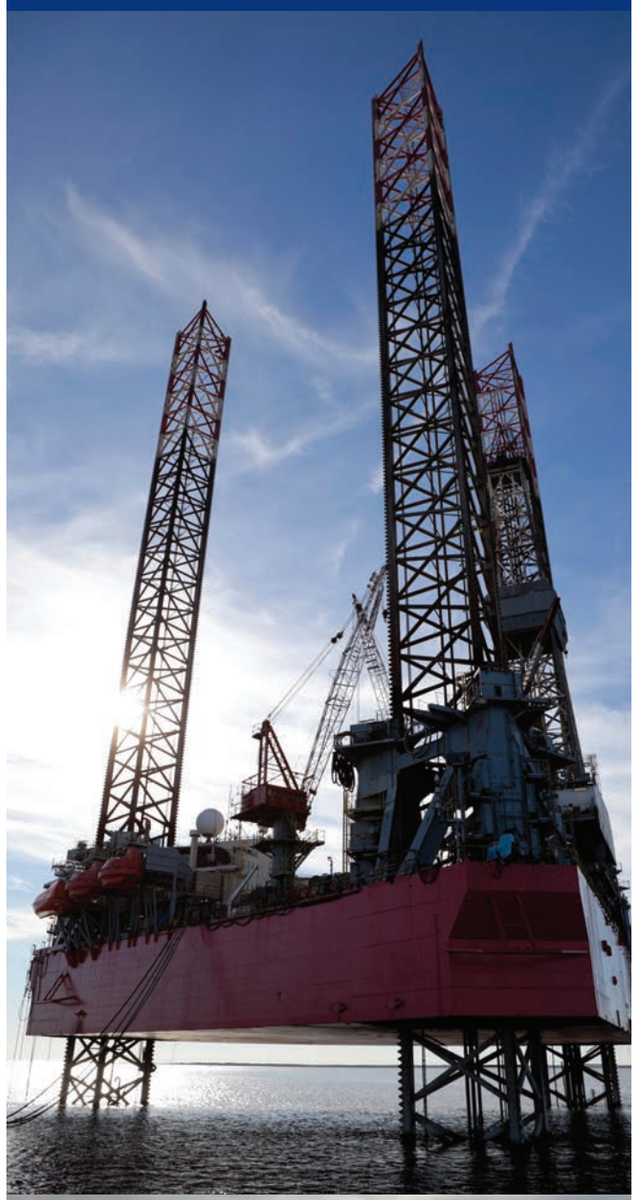
Through ongoing engagement with end users and organisations interested in the deployment and proliferation of this technology, the GSN team are actively working to commercialise the program outcomes.

Further information contact:

Dr David Haley
Technical Director, GSN Program
Institute for Telecommunications Research
University of South Australia
Mawson Lakes SA 5095
Email: david.haley@unisa.edu.au
Phone: +61 8 8302 3853
/www.itr.unisa.edu.au/projects/global-sensor-network

"There's no technology that makes that data easily collected. It's either very expensive or not available at all. So that's why this program was so important and why we got involved in the first place."

Paul Johnson
General Manager of Defence
SAGE Automation



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