

ENABLING the connected world

Key benefits of BGAN M2M

- 1 Reliability:** operates on the Inmarsat L-band satellite and terrestrial global network, with 99.9% availability.
- 2 Performance:** standard IP at a rate of up to 448 kbps with a low latency of 800 milliseconds.
- 3 Practicality:** simple for field teams to configure, integrate and conduct maintenance on.
- 4 Economy:** low-cost terminal, low data rate billing plans without reconnection fees.

Cemig

OnixSat and Inmarsat help Cemig improve performance in controlling its distribution reclosers remotely

About Cemig

Cemig is the largest integrated electric power company in Brazil, with 83 power stations and participation in nearly 200 companies and consortia in 22 Brazilian states and the Federal District. In the state of Minas Gerais, Cemig Distribution is responsible for a concession of approximately 96% of the area, with 8.5 million consumers in 774 municipalities, an area of more than 500,000 km².

The challenge

In December 2015, the Brazilian Ministry of Mines and Energy once again granted Cemig the contract to distribute electric power to its customers in Minas Gerais for 30 years. However, the contract came with new service limits established by the National Electric Energy Agency (Aneel), which Cemig had to comply with. The main supply quality indicators are the Equivalent Interruption Duration per Consumer (EDC) and the Equivalent Interruption Frequency per Consumer (EFC). The limits of these quality indicators are progressively decreased each year, which means that Cemig has to constantly improve the supply of electrical energy for its customers.

One of the main problems that Cemig faces in improving the EDC is the performance of cellular connectivity in remote areas of

Minas Gerais, which, despite having major cities such as Belo Horizonte, also has very remote areas with a lower population density.

In the event that there is an incident with the electrical system, reclosers, switches that test the medium voltage distribution network automatically, interrupting the power in the event of a problem and restoring the supply if they detect the problem is no longer present, would normally bring power back on line. However, the lack of connectivity in remote areas hampered communication with Cemig's Centre of Operations meaning it wasn't possible to send remote commands to the automated reclosers in the field.

Flavio Henrique Martins Vieira, Distribution Automation and Protection Engineer, Cemig, commented:

"With unreliable cellular communication networks in several areas of Minas Gerais, we had difficulty controlling our reclosers remotely. Many times, we had to send a team to operate the equipment manually, aiming to restore power to the affected area. This significantly increased the time it took us to resolve the power outages and restore services to our customers."



The solution

OnixSat and Inmarsat developed a solution based on satellite connectivity to enable Cemig to improve the availability of remotely controlling its reclosers.

Sandro Bernardes Oliveira, a telecommunications engineer at Cemig, commented: "The solution was specified by the Management of Telecommunications Solutions and Maintenance, in partnership with the Management of Distribution Assets Automation, and uses a serial/ ethernet converter and Inmarsat's BGAN 9502 terminal to connect the reclosers to Inmarsat's ultra-reliable L-band satellite network, in order to ensure the effectiveness of the commands issued to the reclosers by Cemig's Centre of Operations."

The Inmarsat satellite communications network has been crucial for assuring connectivity, reaching reclosers in very remote locations in the Cemig distribution network. Its coverage enables Cemig's field equipment to send and receive data regardless of its location, and its 99.9% uptime ensures that they will always remain connected, even in adverse weather conditions. With the BGAN terminal to install, and without a complex terrestrial infrastructure to deploy, the solution is easy

to configure. Cemig's technicians do not need to have an advanced knowledge of communication via satellite to implement the solution, because it is very easy to establish a connection with the Inmarsat satellite network.

The results

The collaboration between OnixSat and Inmarsat has produced impressive results for Cemig. Before deploying the solution, Cemig had an effective availability of remotely controlling the reclosers in the remote recloser project of less than 90%. After deployment of the Inmarsat and OnixSat solution, this indicator now shows an average of 98% at the points where satellite communication was installed. Such was the success of the solution based on connectivity via satellite that, after starting by deploying the solution in 150 reclosers, Cemig now plans to install 760 further satellite terminals, to be applied in its distribution networks and substations.

Daniel Senna Guimarães, Manager of Telecommunications Solutions and Maintenance Management at Cemig, concluded: "Inmarsat's satellite connectivity has played an important role within the mix of telecommunications solutions currently used by Cemig, Specifically it provides a

communication means with the availability required for mission-critical services, contributing to the improvements in supply quality indicators for the company."

Flavio Henrique Martins Vieira concluded:

"Now we rarely send teams to remote areas where the satellite communication solution was installed, reducing the need to travel for several hours to operate our reclosers manually on site. With OnixSat's satellite communications solution, we are able to assure availability and automatically activate the equipment remotely. The solution has helped us to restore the power supply more quickly, thus enabling an improved service provision to our customers."

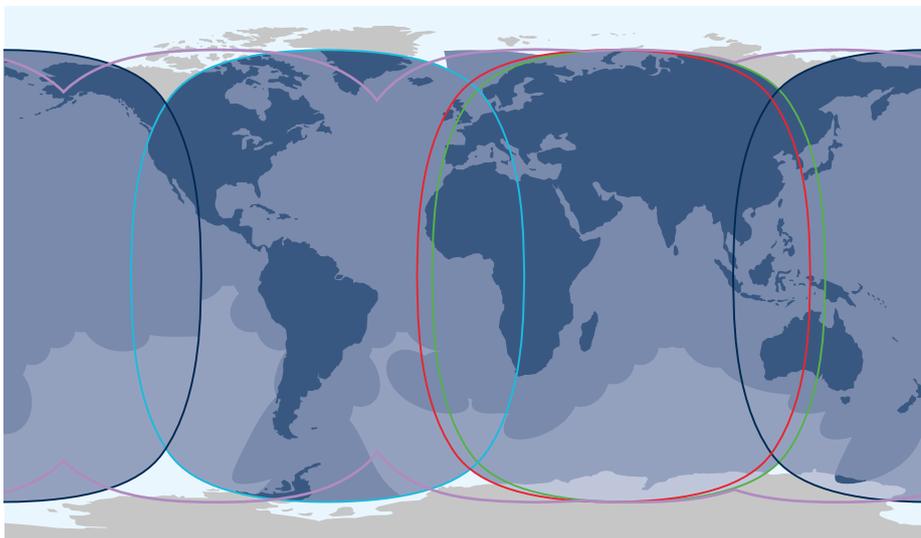
About Inmarsat

Inmarsat plc is the leading provider of global mobile satellite communications services. Since 1979, Inmarsat has been providing reliable voice and high-speed data communications to governments, enterprises and other organizations, with a range of services that can be used on land, at sea or in the air. Inmarsat operates around the world, with a presence in the major ports and centres of commerce on every continent. Inmarsat is listed on the London Stock Exchange (ISAT.L). For more information, please visit www.inmarsat.com

About OnixSat

OnixSat provides high-orbit satellite tracking and communications solutions for the air, land and sea markets. In addition, the company operates in Special Projects that seek to understand and meet, on a case by case basis, the needs of its clients. Within a few years, it became the fastest growing organization in the industry in Latin America.

Inmarsat I-4 and I-5 network coverage



□ I-5 F2 □ I-5 F1 □ I-5 F3 □ I-5 F4 □ I-4 and Alphasat coverage

■ Global Xpress network available over at least 99% of this area ■ Extendable Global Xpress coverage via steerable beams

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