

## Case Study: Oil and Gas

# Data-Linc Conquers Brazil's Rugged Terrain and Reduces Costs for Large Oil and Gas Pipeline Network

### The Challenge

A large gas and oil producer was tasked with monitoring its vast operations via wireless communication throughout Brazil, a country exceeding both the contiguous USA and the continent of Europe in area and whose terrain throughout its 3.3 million square miles (8.5 million square km) includes narrow coastlines, jungle lowlands, plains, hills and rugged mountains, as well as large metropolitan areas.

Until fairly recently, its principle means of wireless communication employed private band, licensed radio modems. These modems operated primarily in the 400

MHz range and generated 5 watt output power. While the initial up-front cost of the modems was low, when the number of installations reached over 8,000 modems, the cost of maintaining the radio licensing fees became significant. Additionally, despite the 5 watt output, the narrow bandwidth made data transmission susceptible to noise interference, especially in populated areas. The on-going annual cost of license and operation permits, license renewal and noise interference made communication expensive in terms of time, energy, money and reliability.

### The Plan

To address these issues, a communication group was created in late 2002 charged with studying options for communication and data collection. To eliminate the on-going licensing and renewal expense and the problematic noise interference, they looked to the FHSS (Frequency Hopping Spread Spectrum) radio modems operating in the 900 MHz and 2.4 GHz license-free bands. FHSS modems had another advantage—the technology has inherently more noise immunity. Radios operating in the .4 GHz band have a lower power allowance giving them a shorter transmission range and somewhat less immunity to noise than, particularly,

those operating in the 900 MHz band. For these reasons, the focus became full-scale testing of the more robust 900 MHz modems.

Following the addition in mid 2003 of two more demands— security and central control, the company's communications group decided in late 2003, to test the 900 MHz, license-free modems from two different manufacturers. They established two independent networks in São Paul State which offers wireless data transmission a variety of difficulties in regard to environment, terrain and geographic obstacles. If the modems could meet the test criteria despite the challenges of São Paulo State,

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the group could be confident that the modems would work in the other less harsh regions of Brazil as well. They concluded that, at least for the initial phase, the FHSS 900 MHz radios had the best chance of meeting the set criteria in both of the project sites.

### The Solution

Given the complexity of the testing criteria and São Paul State's challenges, AB-Tech (Data-Linc Group's Distributor in Brazil) recommended that Data-Linc be selected as one of the two manufacturers due to the outstanding performance their modems had historically, and repeatedly, delivered under particularly extreme conditions.

AB-Tech had confidence that the Data-Linc Group SRM series modems could meet the multiple technical challenges of the project. Data-Linc's Smart Spectrum<sup>™</sup> technology (a proprietary FHSS technology); its reputation for secure and reliable, long-range wireless data-communication; its modems' demonstrated performance in harsh field conditions and its outstanding technical support gave Data-Linc Group the leading edge. Late in 2003 Data-Linc, in conjunction with their Brazil distributor AB-Tech, made a commitment to

provide custom remote diagnostic software, now called *LincView*<sup>™</sup> OPC, that would be used at a central control station in Rio de Janeiro. AB-Tech worked closely with the customer to address service, technical (link mapping) and software (diagnostic) requirements.

## The Projects

### *Cathodic Monitoring*

The pipeline system is primarily below ground with direct connections to small monitoring huts at varying intervals as the pipe requires constant observation for any sign of corrosion or structural weakness. The majority of the selected modems served this function. Data-Linc SRM serial radio modems, installed at each monitoring location, transmit pipe integrity information to a custom RTU device that converts the serial data into a form that can be sent via a fiber optic network both to and from central control. Command Central can monitor the entire system utilizing the Data-Linc *LincView* OPC Diagnostics and the SRM modems which interface seamlessly with the equipment of Data-Linc's Alliance Partner Allen-Bradley whose PLCs were specified in the project.

### *Pipeline Valve*

Along the pipeline at intervals of up to 20 kilometers, "valve houses" mark where the pipeline comes above ground. Each valve house contains the shut off and diversion valves, automation equipment that controls their functions and the sensors for monitoring the status of the petroleum as it flows through the pipes. Several critical functions occur in this location. The pipeline can be shutdown in case of problems with the pipe itself or other issues. Here, also, is where the oil or natural gas can be diverted to a refinery or other user. Obviously the data associated with this diversion or shutdown has to be accurately, discretely and securely communicated to the appropriate locations. Once again, Data-Linc SRM6000 serial radios are used for this function. And once again, the Data-Linc *LincView* Diagnostic program allows for centralized monitoring and trouble shooting of the system.

## Conclusion

With ANATEL (Brazilian counterpart to the USA's FCC) approval of Data-Linc's SRM6000 radio modems, Data-Linc was awarded the contract involving over 250 modems for the initial stages of the new pipeline system projects covering South Central Brazil from São Paulo to Brasilia. By the project's completion, several thousand modems will be required for the nationwide system. Despite the challenges of San Paulo State, the pipeline control center can monitor the entire system utilizing *LincView* OPC Diagnostics via the SRM modems that interface seamlessly with the Allen-Bradley PLCs.

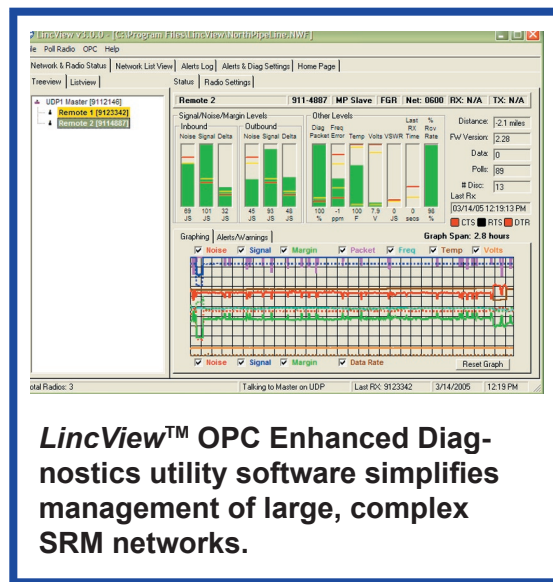
Implementation and expansion of the projects will continue until the entire national pipeline is linked to the communication center in Rio de Janeiro with plans to include video surveillance of the valve houses and oil fields.

License-free wireless communication has eliminated the expensive on-going annual cost of license and operation permits and license renewal while increasing the reliability of data transmission along the pipeline. Additionally, the HMI (Human Machine Interface) and *LincView* OPC Diagnostics Software at Command Central make monitoring and control of the entire operation

over a huge area relatively simple with the accompanying advantage of dispatching maintenance personnel to remote areas only if a problem arises that demands repairs or replacement.

Data-Linc and A-B Tech have offered a viable solution to monitor the integrity of the pipelines, and within the foreseeable future the monitoring will be able to be done from one central location that encompasses the entire 3.3 million square miles of Brazil.

Please contact Data-Linc at 425-882-2206 Pacific Coast Time or modems@data-linc.com for assistance regarding your project or for details about the capabilities of *LincView* OPC Diagnostics network management software and its appropriateness for your specific application.



***LincView*<sup>™</sup> OPC Enhanced Diagnostics utility software simplifies management of large, complex SRM networks.**