

Initial Cathodic Monitoring Network Results in Long-term *DATA-LINC* relationship

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The Challenge

In 2002, a large oil and gas 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.

In late 1990s, the principle means of wireless communication employed private band, licensed radio modems that 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

In mid 2003 when two more demands were added— security and central control— the company's communications group decided to test 900 MHz, license-free modems from two different manufacturers. They established two independent networks in São Paul State that offered wireless data transmission a variety of difficulties in regard to environment, terrain and geographic obstacles. The Plan? To eliminate the on-going licensing and renewal expense and the problematic noise interference they had been experiencing and add security and central control capabilities. The manufacturer selected? Data-Linc Group, whose SRM FHSS modems offered license-free, frequency hopping spread spectrum technology and unsurpassed noise immunity, ensuring robust, reliable data delivery.

Data-Linc's modems met the test challenges and provided confidence that the modems would perform well in the other less harsh regions of Brazil as well. 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, of the two manufacturers competing, Data-Linc Group was selected for demonstrating outstanding performance and because their modems had

historically, and repeatedly, delivered on promises of data transfer integrity and reliability under particularly extreme conditions. Late in 2003 Data-Linc, in conjunction with their Brazil distributor, made a commitment to provide custom remote RF network diagnostic software, LincView™ OPC, to provide network performance data to the central control station in Rio de Janeiro

Cathodic Monitoring

Allen-Bradley PLCs were also specified for the SCADA portion of the system. The pipeline system, primarily below ground, has direct connections to small monitoring huts at varying intervals. The pipe requires constant observation for any sign of corrosion or structural weakness, for which the majority of the selected modems serve 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 including the SRM modems via LincView OPC RF network diagnostics software. Data-Linc's Rockwell Encompass Partner status provided further confidence that its modems would interface seamlessly with Rockwell's Allen-Bradley SCADA equipment for trouble-free installation and performance.

Pipeline Valves

Along the pipeline at intervals of up to 20 kilometers, "valve houses" mark where the pipeline comes above ground. Each valve house contains sensors for monitoring the status of the petroleum as it flows through the pipes including shut-off and diversion valves as well as the automation equipment to controls their operation and critical functions. From the valve houses, the pipeline can be shutdown in case of problems with the pipe itself or other issues. This is also where the oil or natural gas can be diverted to a refinery or to other users. Obviously the data associated with this diversion or shutdown must be accurately, discretely and securely communicated to the appropriate locations. Once again, Data-Linc SRM radios are relied upon to provide critical, accurate and timely data transfer. Data-Linc's LincView diagnostic allows centralized monitoring and trouble shooting of the system ruling out an RF data problem and facilitating confidence in the reporting so that any pipeline issues can be swiftly resolved.

Project areas and applications expand

Because the SRM serial modems were able to meet and exceed performance and reliability expectations, the oil

company expanded its use of Data-Linc modems for wireless communication to other equally sensitive or even more critical areas of operation and production. More recently, with a surge in the volume of data required for expanding SCADA and because of the industry's growing use of Ethernet connectivity, they turned to Ethernet wireless modems for new and expanding networks. Data-Linc's SRM wireless Ethernet modems share the robust performance of the serial members of the SRM Family. With the many years of unsurpassed quality, reliability and service, the company again chose Data-Linc to be their supplier.

Once crude oil has been processed into its end products (petroleum gas, gasoline, kerosene, diesel ethanol, etc.), the products are pumped into large storage tanks and then distributed further to smaller storage tanks at various distribution points where companies like ESSO, Shell, and others send their tanker trucks to accept the product. This transfer process from the oil company's storage tank and eventually to the distributors' tanker trucks is the end-of-the line for the oil producer and another of the critical areas that require the integrity and reliability of Data-Linc modem performance to ensure all functions of the process are closely monitored for safe and efficient product transfer.

The interface between the production terminals and distributors, approximately a mile away, generally require multiple steps marked by critical data points in a physical space where tanks, pipes and truck loading are in close proximity—no room for a communication or operational error. It is during this transfer process from tanks through pipes to tanker trucks where crucial flow rate and pressure data require real-time monitoring with instant access to shut down or diversion.

Conclusion

Data-Linc was awarded the data communication contract in 2003 that initially involved over 250 modems for the first stages of the new pipeline system projects covering South Central Brazil from São Paulo to Brasília. The network continues to grow toward the several thousand modems that are expected to be installed by the project's completion. Because Data-Linc met the challenges of São Paulo state pipeline and its easy, seamless interface with the Allen-Bradley PLCs, implementation and expansion of the projects in multiple areas of operation 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, Data-Linc's broad product line including the 900 MHz band, 54 Mbps OFDM FastLinc FLC910E modem, Data-Linc looks forward to supplying unsurpassed products as the company continues to expand its systems.

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.

Within the foreseeable future, monitoring will continue to be done from one central location that encompasses the entire 3.3 million square miles of Brazil providing operational safety and integrity and optimizing pipeline and data security while Data-Linc and Rockwell continue to offer industrial grade solutions for a wide variety of SCADA and video security applications.

Oil Distribution Control Center

Oil Distribution Areas

