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Real-time communications for remote rig sites

A new high-speed microwave network from the wellsite to corporate offices allowed Apache's drilling team to increase the transmission speed of decision-making data.

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In 2008, as Apache Corporation upgraded its suite of drilling engineering software and data management tools, initial testing and implementation indicated a need for increased bandwidth and communication system reliability. This testing and implementation resulted in a search for alternatives to the rig operators' conventional satellite and landline systems—the traditional solutions used for rig communication.

The need was basic—a network that would provide a real-time, continuous communication link from remote rig sites to corporate servers located in Houston. Advanced well-logging and real-time collaboration with corporate resources housed in distant cities requires communication links with higher bandwidths and lower latency rates than were available. The nature of the land-based rig site is nomadic, with drilling periods that generally range from 14 to 75 days. The operation moves from one remote location to another within days, necessitating the ability to easily reestablish a high-speed communication link to be used by the operating company, drilling company and other subcontractors on the site. Traditionally, each remote drilling and production site was limited to a low-speed, high-latency satellite communication link. This link was often very expensive and could not easily accommodate real-time collaboration involving the transfer of high-bandwidth files or any applications requiring high-capacity bandwidth. Cellular coverage, if available, did not have the speed or capacity to support advanced third-generation digital services.

ERF Wireless, Inc., a Houston-based wireless internet service provider, collaborated with key Apache personnel to deliver more than 10 times the bandwidth (128 kbps to 1.5 Mbps) and less than one-eighth of the latency (60 ms) of traditional Very Small Aperture Terminal (VSAT) systems—all on a nomadic trailer platform, Fig. 1. A Mobile Broadband Trailer System (MBTS) was developed to provide the same fixed-location, high-capacity communication service that the service provider had provided to other commercial enterprises in the Permian Basin and elsewhere in Texas, New Mexico and Louisiana, but with nomadic capabilities.

Fig. 1. A Mobile Broadband Trailer System (MBTS) on site at an Apache Permian Basin drilling site.

RESULTS

The MBTS facilitated real-time, continuous communication between key personnel at the remote wellsite and corporately secured servers at Apache's Houston headquarters, enabling drilling and geophysical experts to access drilling and well data in real time. The increased transmission speed of critical decision-making data saved overall rig time, reduced risk and exceeded the requirements set by the Apache drilling group, thereby providing more efficient workflows. The faster broadband speeds allow more complex software applications to be run from the wellsite than was possible with traditional VSAT connections. It is also possible to expand this service from a point-to-point connection to a WiFi cloud coverage, allowing several locations to connect simultaneously without a reduction in bandwidth or an increase in latency. This could provide an economic method to better monitor permanent well and surface sensors, allowing for better field production management. In addition, Apache documented that the new broadband was delivered at a cost in line with traditional VSAT services.

DATA FOR FAST DECISIONS

Adopting a high-capacity network for data transmission from the field would naturally result in less administrative time on several levels, leading to a more productive drilling process. Larry Rader, drilling technical advisor for Apache's Central Region, called upon Pat Moller, Apache process control systems advisor, for assistance. Moller had incorporated the use of high-speed microwave networks for packet transport in the company's production Supervisory Control And Data Acquisition (SCADA) networks. Although the packet sizes were much smaller in the SCADA reporting, the concept of network speed could be applied to the drilling side of Apache, which required faster networks and lower packet latency rates to handle voluminous information flow.

ERF Wireless was already providing high-speed internet to Apache's Forbes Field office 50 mi from Lubbock, Texas. This particular field office was located more than a mile off the local roads. The

service provider was able to offer more than 5 Mbps of internet bandwidth to the site via its microwave broadband network—typical of its Permian Basin network speeds.

Realizing the need for better communication capability in the oil and gas field, the service provider began to pursue a strategy whereby the MBTS that it already used for emergency response situations—an unfortunate but common occurrence across the Gulf Coast over the last several years—could be customized to address these communication needs. This production field office became the initial test bed for microwave communication for Apache's drilling operations.

After initial testing, Rader said, "I am seeing Internet connection speeds at this field office as fast as those I experience in my corporate offices in downtown Tulsa, Oklahoma."

MONITORING THE LINKS

In addition to providing MBTSs to Apache's remote rig sites, ERF Wireless also provides a monitoring service that tracks the performance of each piece of communication equipment on a 24/7 basis. Personnel at the company's Network Operations Center, located at its corporate offices, have the ability to spot a problem prior to the customer's detection and to repair the link remotely. The commitment to Apache is to have the communication links operational as quickly as possible, while maintaining a 99.95% reliability index during drilling and production operation periods.

By enabling "real-time" decision-making, the real-time delivery of packets makes drilling and production operations more efficient from a time and knowledge perspective, thereby making each day more productive. The dynamic management of data and communications can expedite the on-site processes and abbreviate the time spent by personnel at the site.

CONCLUSION

During the course of the past year, ERF Wireless and Apache Corporation have worked together to develop a state-of-the-art, high-speed IP communication system that has parlayed a microwave broadband network into a useful tool for oil and gas operators, enabling the deployment of faster, more efficient networks to the field. The MBTS is nomadic and matches the urgency required by the industry to get to remote sites quickly and cost-effectively with the resilience to withstand the rugged terrain and variable conditions. These communication links have proven to be much faster, with much lower latency, than standard VSAT satellite links at competitive pricing. **WO**

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John Nagel is the managing officer of ERF Wireless' Oil & Gas Division, with operations in New Mexico, Texas and Louisiana and expanding to international locations. Prior to this position, Mr. Nagel coordinated construction and deployment of wireless infrastructure for ERF's banking customers as well as the internal expansion of the network operating center and integration of acquired networks. He previously held several senior positions at Eagle Broadband, Inc. Mr. Nagel holds a BS degree in mechanical engineering from the University of Tennessee, Knoxville.