

Petroleum Company Improves Real-time Information Sharing with Rigs

Petrobel uses Cisco First Mile Wireless (FMW) with Unified Communications to bridge the digital divide between rigs and headquarters.

EXECUTIVE SUMMARY

Customer Name

Belayim Petroleum Company – Petrobel

Industry

Energy

Location

Egypt

Number of Employees

3900

Business Challenge

- To reduce costly downtime by improving the quality and speed of decision making through real-time, media-rich access between rig personnel, headquarters, and remote experts

Network Solution

- Cisco First Mile Wireless with Unified Communications, certified to work in hazardous conditions, has created a secure, high-speed converged network accessible anywhere on the rig, with just a 256 kbps VSAT link extending back into the corporate network.

Business Results

- Avoiding just 10 hours downtime drilling time per month saves US\$125,000 per rig – potentially US\$9 million a year
- Highly skilled and specialized experts can be consulted in real-time, to and from virtually anywhere in the world
- Better, faster decisions can make the difference between losing or keeping an oil well

Business Challenge

There are few other industries where the adage “time is money” applies so aptly as the oil and gas exploration and production business.

The cost to Petrobel of running just one rig in the Mediterranean Sea off the Nile Delta in Egypt is US\$300,000 a day. Multiply that figure by six – the number of rigs the company operates offshore in the region – and it is not surprising that keeping the drill bits turning is a key business challenge.

The Belayim Petroleum Company – better known as Petrobel – is jointly owned by the Egyptian General Petroleum Corporation and IEOC Production B.V., the Egyptian subsidiary of the Italian Oil & Gas giant ENI. In the energy industry today, increasing demand for new energy reserves is fuelling the viability of projects in ever more demanding areas and driving the optimisation of yields in mature fields.

This development comes at a time, however, when industry consolidation and retirement mean that there are fewer of the highly experienced specialized experts, or “troubleshooters,” who travel the world, helping to solve problems that threaten the viability these projects that ultimately involve billions of dollars.

Out on the rig, much of the day-to-day burden of decision-making falls to the “company man.” Petrobel, like other operating companies, typically rent or lease drilling rigs. The company man is their on-site representative, directly in charge of most operations pertaining to the actual drilling and integrity of the wellbore.

It is a complex business and one that demands close liaison with the team back at their Cairo headquarters, to review progress and solve problems. Occasionally the company has to bring in a troubleshooter to help, perhaps halting production for days at a time.

In the past fast decision-making was made very difficult by the digital divide between the rig and headquarters. Communications were typically limited to a couple of voice-grade circuits, the problem compounded by telephones being restricted for health and safety reasons to the company man's office, often three or four levels from the drill floor where he directs operations.

It is a problem that Petrobel – working with Cisco® and its partners – has solved.

Network Solution

Massimo Insulla, Petrobel's drilling and work over deputy general manager, says: "Our vision is to create a digital oilfield, where all of our assets and people – both onshore and offshore – could be linked using the network as a platform to create a secure, converged IP infrastructure. By bridging the digital divide, we aimed to enable the paradigm of taking the problem to the expert, rather than the expert having to travel to fix the problem."

At the heart of this vision was the concept of the i-Rig – the Intelligent Rig – enjoying transparent communication and exchange of information, even video, between the drilling crew and the headquarters' Asset Team of geologists and reservoir and drilling engineers.

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The first phase of the i-Rig project was to create a converged IP network on the Endurer Rig some 60 kilometers offshore. Cisco Aironet® BR1310 Access Points formed the heart of a converged wireless local area network. Cisco Wireless IP Phones for the company man and the geologist helped ensure that they were within easy contact across most of the rig, while Cisco Unified IP Phones 7960G equipped with Cisco Unified Video Advantage enabled voice and video communications.

A 256 kbps VSAT (Very Small Aperture Terminal) on the rig established a satellite link back to headquarters and beyond over the Internet. For the first time it was possible not only to bring the rig virtually into the headquarters' backyard, but also to make video calls via the corporate network and the Internet to experts anywhere in the world.

Having proved the value of the i-Rig concept, the Petrobel team looked for a solution to the problem of extending wireless coverage everywhere on the rig. Although Cisco Aironet Access Points were rugged enough to withstand the harsh operating environment offshore, they were not certified to operate in the hazardous Zone 1 environment of the drill floor where there is a greater risk of explosion from gases.

It was a problem that Cisco and its partner, TerraWave Solutions, were already working on – the Explosion Proof Enclosure for Cisco Aironet 1500 Access Points. Importantly Cisco Aironet 1500 Access Points can be easily configured to provide a fully meshed radio network, effectively promising to “light up” the entire rig – in effect, the “first mile” of the end-to-end digital oil field. Cisco is a world leader in Mesh Radio technology.

Unlike typical access points used for “hotspot” wireless connections at coffee shops, airports, and other locations, Aironet 1500 mesh access points can operate without a direct connection to a wired network. They have been designed to deliver mission-critical wireless access with a rugged platform that is designed for high performance, ease of deployment, reliability, security, scalability, mobility, and unified policy management across indoor and outdoor networks.

When presented with the opportunity to run a pilot of the new application, Petrobel not only jumped at the chance, but also decided to test it in the most demanding environment available to it – the Adriatic X exploration rig operating 75 kilometers offshore. The rig was drilling deeper than any other operator in the area had gone before and would be a stern test of the equipment and the value of real-time voice, video and data communications.

“For two weeks we were in a very difficult drilling section. Other operators had previously been forced to abandon their exploration wells in this area. Every day I had about ten calls with our company man. We were able to share all available data and together reach the right decisions, fast.”

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Business Results

The pilot established a local area network throughout the Adriatic X rig operating at 48 Mbps, using just three Aironet 1500 Access Points within Zone 1 and 2 Certified enclosures. It took Petrobel just two days to set up the wireless mesh network on Adriatic X – one day for a site survey, and one day for the installation of the equipment and commissioning.

The result has transformed the sharing of real-time information and decision making on the rig. The company man and technicians can take a call and share video images in real time – even on the drilling area – with colleagues at headquarters and beyond.

In early 2007, within just weeks of the Aironet equipment being installed, the Adriatic X had reached a depth of 4800 meters – 200 meters further than any other operator had previously achieved – and well on the way to its target of 5500 meters. During that time the drill hit a high-pressure, high-temperature zone, and the value of real-time communications from the drilling area with headquarters was dramatically proven.

Massimo Finamore, the shore-based drilling superintendent in charge of Adriatic X operations, says: “For two weeks we were at a very critical drilling section. The pressure at this zone was very high – 13,600 psi with a temperature of 120°C – and was one of the reasons why other operators had previously been forced to abandon their exploration wells in the area. Every day I had about ten calls with our company man. We were able to share all available data and together reach the right decisions, fast.”

Industry figures estimate that typically 15 to 25 percent of drilling time is lost due to some kind of trouble encountered during the drilling process. Insulla conservatively estimates that improved and faster decision making could avoid ten hours or more of delays each month on one rig alone – that is a potential saving of some US\$125,000. With six rigs operating offshore, the potential saving to Petrobel could reach US\$9 million each year.

“This technology does not replace the company man or diminish his importance,” Insulla explains. “What it does is enable the wider team to share some of the burden with him: four eyes are better than two, and eight are better than four. This technology gives us the opportunity to more effectively assist the production team to reach the right decision. I expect to see it in place on all rigs within the next five years.”

Improved communications will not only reduce cost, but will also greatly assist in exploiting and even safeguarding mature assets, because the wrong decisions can cause a well to close forever. In addition, there will be significant health, safety, and environment bottom-line improvements.

Next Steps

Key to achieving Petrobel's vision of the digital oilfield is in taking a holistic view of the entire production and value chain and supporting this with an architectural approach to network design. In this way the entire network can be developed as the platform on which to build end-to-end business services and processes.

Petrobel is finalising plans to create an offshore wireless coverage area using Broadband Wireless Wide Area Network and WiMax IEEE 802.16 technology to interconnect the Cisco wireless mesh technology covering the rig.

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The WiMax antennas will provide 18 Mbps coverage within a 25 kilometer radius, enabling even supply vessels and other logistics operations to benefit from access to secure networking. For example, always-on communications could make possible the use of RFID (Remote Frequency Identification) asset tracking and supplies replenishment. There are even plans to equip unmanned production platforms with IP-Webcams and audio systems as part of global security and safety CCTV (Close Circuit TV) network that will help ensure their live monitoring from the headquarters.

The company is also planning to significantly improve its backhaul links to shore-based facilities. Although recent advances in compression techniques will increase effective VSAT bandwidth fivefold, these upgraded links are destined to provide redundancy backup to WiMax systems. One such system, from Redline Communications, was deployed successfully for about eight months to link a rig 42 kilometers offshore in the Port Fouad field back to an IEOC base station at Port Said with a minimum bandwidth of 18 Mbps.

The service and financial case for wireless is already proven. The annual capital expense of a 128 kbps VSAT link in Egypt is US\$40,000, with operating costs for space segment totalling US\$48,000 each year. In comparison, an 18 Mbps broadband wireless link requires equipment costing US\$15,000 and has annual operating expenses of just US\$3,000.

Consequently, projects are being finalised to extend wireless broadband and optical fibre connectivity to all the shore-based plants and rigs operating across the Sinai and the Red Sea. From an operational perspective, these projects are aimed at providing a transparent, integrated WAN that enables a highly secure, real-time view of what is happening on the front. This will be possible from the Cairo headquarters and, eventually, from the intelligent operations centres worldwide.

When complete, Cisco First Mile Wireless, with Cisco Unified Communications will provide the foundation for the vision of the digital oil field, with rig operations moving – albeit virtually – from the headquarters' locale into the main office.

Technical Implementation

Petrobels vision of the network as a platform uses an architectural framework that Cisco calls its Service Orientated Network Architecture (SONA). SONA delivers business solutions to unify network-based services such as security, mobility, and location with the virtualization of IT resources. Using this framework, Petrobel is assured that each discrete networking project is part of the bigger, more strategic roadmap.

The first step has been to build mobility services using Cisco Aironet 1500 Series Access Points, and the Cisco 2006 Series WLAN Controller which supports zero-touch configuration and simplified the installation of the network for Petrobel.

The Cisco Aironet 1500 Series Outdoor Wireless Mesh Access Points (MAP) have omni-directional antennas. A radio engineer is not needed to mount each MAP. No antenna pointing is required, and the wireless mesh is formed automatically. No further local configuration of the access point is required. Once a Cisco Aironet 1500 Series Mesh Access Point is mounted and powered on, it will discover its neighbor mesh nodes and find the best path back to the Root Access Point (RAP) which has a connection to the Wireless LAN controller.

Petrobel manages its entire wireless network through a single, unified management system that transparently integrates with indoor wireless LANs and wired networks, called Cisco Wireless Control System (WCS). From this single system, Petrobel can view a map of the entire system and monitor the status of individual wireless mesh links between Cisco Aironet 1500 Series access points. Cisco WCS performs many additional functions to help ensure smooth, secure operations, including automatic radio frequency management, policy provisioning, network optimization, troubleshooting, location tracking, security monitoring, and wireless LAN intrusion detection and prevention.

One of the Aironet 1500 Series Outdoor Wireless Mesh Access Points on the Adriatic X operates in a Zone 1 (Class 1/Division 1 in the US) area where there is a high concentration of natural gas, and it is, therefore, safely contained within an explosion-proof enclosure.

For More Information

To find out more about Cisco Wireless Mesh solutions, go to: http://www.cisco.com/en/US/netsol/ns621/networking_solutions_package.html

Product List

Cisco wireless and Unified Communications

- Cisco Aironet 1500 Series Access Points
- Cisco Wireless Control System (WCS)
- Cisco Unified IP Phone 7960G
- Cisco Unified Personal Communicator
- Cisco Wireless LAN Controllers
- Cisco Unified CallManager
- Cisco Unified Wireless IP Phone 7920
- Cisco Unified Video Advantage

Cisco Service Orientated Network Architecture (SONA) services include:

- Security
- Unified Communications
- Mobility



Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

Asia Pacific Headquarters
Cisco Systems, Inc.
168 Robinson Road
#28-01 Capital Tower
Singapore 068912
www.cisco.com
Tel: +65 6317 7777
Fax: +65 6317 7799

Europe Headquarters
Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: +31 0 800 020 0791
Fax: +31 0 20 357 1100

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