



SIEMENS

Technical article

Industrial Networks

Industrial communication builds a solid base to drive the digitalization of Oil & Gas operations

The recent oversupply in the crude stocks has generated volatile market conditions, where most of the Oil & Gas companies worldwide, need to abandon costly or high-risk development plans. This entails a significant reduction in investment for new capital-intensive projects.

At the same time, it is still unclear when the global oil and gas market will rebalance and whether the oil prices will remain for a short or long time below break-even levels.

For this reason, Oil & Gas operators are aware that in order to remain competitive, it is important to leverage resilience and reduce production inefficiencies, while mitigating profit leakage. This has resulted in an increased attention in the market for the implementation of optimization technologies such as Industrial communication networks.

The Oil & Gas industry has also seen some requirements emerge, as operators are forced to make critical decisions under tight time constraints and limited budget. These are for example: enable secured remote access while improving cross-domain and global collaboration, facilitate mobile workforce and implement data analytics.

Further requirements are the necessity to provide full automation and process transparency, including traceability and central alarm reporting. This has moved to the forefront, in an effort to mitigate incidents due to human errors. It implies as well, that HSSE (health, safety,

security and the environment) regulations are receiving greater attention, in order to ensure process and personnel safety.

And finally, the evolution of exploration and production locations to more remote and hostile environments, increases the importance to count with a reliable and secured data transmission.

These challenges lay the foundation for digitalization in the Oil & Gas industry, and industrial communication is a key ingredient for a long term approach to holistically improve efficiency.

Paving the way for Chinas energy mix restructuring

Discovered in 2011 and developed by China Petroleum and Chemical Corporation (better known as SINOPEC), the Yuanba Gas Field is one of the deepest high-sulfur natural gas reservoirs ever found in the territory of the world's top energy user.

With deposits located at almost 7,000 m depth, presenting extreme environmental and geological conditions, Yuanba is at the same time one of the largest gas fields in the most populated country worldwide. This is translated into a contribution to the energy supply, for almost 14 million people in central and east China, while also supporting to reduce the environmental footprint and Chinas coal dependence.

For the Yuanba Project, Industrial Communication components were required to enable reliable and secure data transmission from the field up to the central monitoring stations. This was necessary to ensure smooth monitoring of production of onshore facilities within the gas field.

In addition to the challenges of developing Yuanba as a productive gas field, it was essential to ensure a continuous transportation of this high valuable hydrocarbon to consumers, while complying with the safety requirements of the supply network. This involved the need to rely on a consistent monitoring system, supported by Industrial Communication components.

Due to the nature of these and further requirements, Siemens proposed a communication solution based on Industrial Ethernet and networked by Scalance switches. The communication network was designed as a completely redundant Industrial Ethernet system with fiber-optic and several VPN (virtual private network) links.

This implementation provides multiple benefits such as an enhanced operational efficiency, due to continuous data availability thanks to the two independent networks in redundant configuration. This resulted in a fourfold redundant architecture which is especially resilient against network failures.

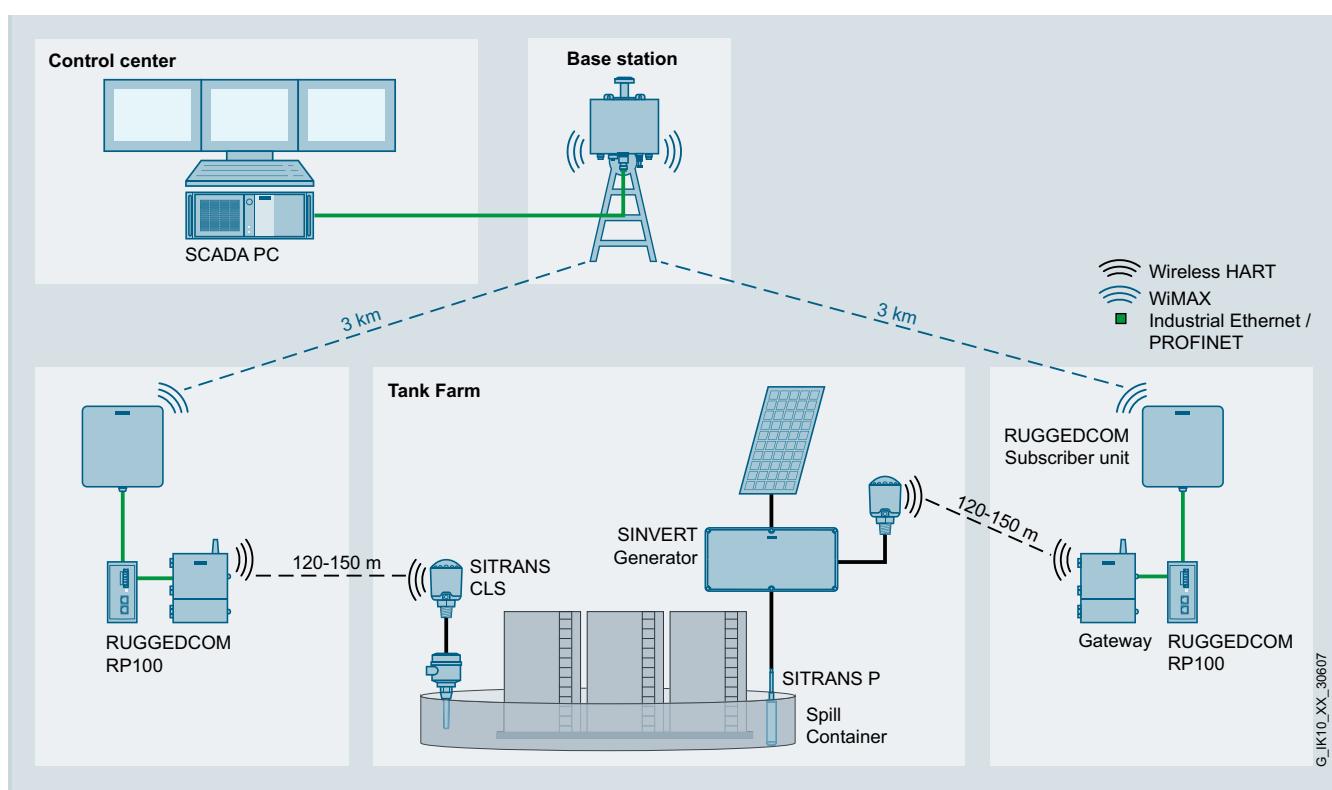
And finally, OPEX optimization thanks to the implemented VPN links, enabling secure remote access to technical experts without the need to dispatch them on the remote production sites immediately.

Mitigating HSSE impact in downstream operations

Another success story, is a project in the downstream segment, in which a mayor National Oil Company (NOC) in South America benefits by implementing WiMAX. WiMAX (IEEE 802.16e) is a technology that permits the deployment of private and secure long range industrial wireless data transmission.

The main challenge for this project was the need to mitigate HSSE incidents, as potential oil spills in tank farm facilities, would cause a fire on the plant, representing a threat for the field operators. Additionally, it was necessary to reduce cabling within the facilities as it represents higher costs for installation, commissioning, maintenance and troubleshooting, compared with a wireless solution.

The application consists mainly in a remote monitoring system for tank farm facilities (Diagram), located in one of the biggest refineries in South America with a refining capacity of more than 150,000 barrels/day. The level monitoring is based on best-in-class process instrumentation Siemens Sitrans L and Sitrans P families. These consist on a wide



Private long-haul wireless communication solution to communicate with the central monitoring station that is located around 3km away from the tank farms.

scope of technologies, configuration options and features for a reliable and accurate pressure and level measurement.

As the central monitoring station was located around 3 km away from the tank farms, it was necessary to implement a private long-haul wireless communication solution. In this case, Siemens supported this NOC to identify and implement the right technology which would fulfill these and further requirements. For example, comply with international and non-proprietary standards, provide a technology designed for private wireless networks and wide area wireless coverage (5-40 km range). Moreover, broadband rates with 10-40 Mb/s throughput, enhanced cybersecurity and full flexibility for future implementations such as voice over IP or video transmission.

The clear answer was to implement private broadband wireless communication based on Ruggedcom WIN (WiMAX). This delivers the benefits of carrier-grade 4G technology to critical infrastructure applications in harsh environments.

With this implementation, it was possible to gain central monitoring capabilities for the complete tank farm facilities within the refinery.

This is translated in tangible benefits such as CAPEX and OPEX optimization as commissioning time, troubleshooting and costs are dramatically reduced compared with a wired solution. Furthermore, it was possible to mitigate HSSE incidents as a reliable and continuous monitoring of the tank farm facilities, supports to avoid future oil spills. These might endanger the safety of the workers and facilities, including environmental disasters as the refinery is located close to a river.

Conclusions

Along the history, commodities have been characterized by uncertainty and volatility. In the particular case of the Oil & Gas market, the conditions and timeline for the normalization of oil inventories at recent times are still unclear.

For this reason, a key for success of many oil and gas operators is to identify and implement optimization technologies. These are able to provide an added value, supporting them to overcome their biggest challenges.

Even though Oil & Gas is a market known for being adverse to change, several visionary Oil Companies are already aware, that Industrial Communication networks are one of these optimization technologies which have the potential to support them with these challenges.

In other words, industrial communication networks are an essential ingredient to build a solid base and drive the digitalization of Oil & Gas operations.

Security information

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Siemens AG
Process Industries and Drives
Process Automation
Postfach 48 48
90026 Nürnberg
Germany

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