

Wireless Field Communication Protocols Analogy for Wellhead Monitoring & Upstream SCADA in Kuwait Oil Company: A Review

Huda A. AlMutairi¹

¹Kuwait University

Abstract

The oil and gas industry is a vital sector that plays a crucial role in meeting global energy demands. However, the production and transportation of oil and gas pose significant challenges, including safety concerns, environmental impact, and operational efficiency. To mitigate these challenges, the industry has increasingly turned to remote monitoring and Supervisory Control And Data Acquisition (SCADA) to improve operations and reduce risks.

SCADA offer several advantages for the oil and gas sector, including error reduction, faster crisis response, better decision making, supervision from distance and automation. The use of SCADA has the potential to enhance operational safety, reduce environmental impacts, reduce downtime and increase overall process efficiency to monitor and control complex system with high level of accuracy and precision.

Transmitters associated with SCADA generate large amounts of real-time data that need to be transmitted reliably and securely. Several communication protocols were utilized by Kuwait Oil Company (KOC) across multiple projects, including ZigBee, LoRa, and WirelessHART. Each protocol offers a set of advantages and limitations. This paper compares wireless field communication protocols used in SCADA for Kuwait Oil Company. The analogy focuses on the range, data rate, power consumption, network topology, interference immunity, and security of each protocol.

Two factors have great significance when selecting wireless field communications protocols. First, the protocols themselves should have built-in security features, such as encryption and authentication, to prevent unauthorized access and data breaches. Second, the transmission of data should be optimized to ensure efficient use of network resources and minimize data loss. This can be achieved through techniques such as data compression, error correction, and quality of service prioritization.

In addition, a good understanding of wireless communications protocols use-cases and implementation scenarios can lead to a significant cost saving, less complications and flexible management of the system.

In conclusion, selecting the appropriate communication protocol is critical for ensuring reliable and secure data flow in SCADA applications for the oil and gas sector. It is also important to implement additional measures, such as encryption, data optimization, and centralized data management, to enhance the security and efficiency of real-time data flow for analysis.