

New Results for improving safety in Oil and Gas offshore project construction using Wireless Sensors Networks

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The wireless technologies have been exponentially evolved over the past 10 years due to the many advantages of wireless system. In particular, wireless communication system in oil and gas fields has a number of advantages, including: Portable and mobile device applications, removing the need to install the wire and thus preventing the need to shutdown, the low cost associated with installing and operating wireless networks vs wired networks, and the operation flexibility and convenience. In simple terms, it is a simple matter to relocate a wireless communicating device, and no additional cost of rewiring and excessive downtime is associated with such a move. As a result, a major change is taking place across the Oil and gas industries toward the use of wireless. Information transported through the wireless network is becoming part of the engine that runs the Oil and gas operation. From process monitoring, to production operations and extended to product distribution, wireless is playing a key role in transferring information from all domains and across the operation stages, all the way to the enterprise networks. In a new offshore project that include drilling and construction of a new gas and oil field, the safety of workers and environmental is a major factors. Since the H₂S could be present in this field and it is one of the most deadly gases, mobile H₂S gas sensors required to be installed before such offshore platform start wells drilling and island construction. Since the field is a new, there is no infrastructure for wire and power. As a result, the option of using H₂S sensors during drilling and construction using wired connectivity and normal power source became impossible. Wireless solution present to be the perfect choice for this connection and the use of wireless would mean significant reduction in project completion time. Many challenges faced deploying proposed wireless solution; one of the major challenges is that all off the shelf solutions does not satisfy the environment requirements in terms of the H₂S sensors standard, temperature, humidity, and also in terms of the wireless technology reliability for the application.. Also since the site is still new and the sensors will be mobile, availability of power becomes another challenge. To overcome these problems and challenges, a complete system was designed by Aramco to meet the minimum safety standards. The designed wireless system is interfaced with the disaster recovery center. Furthermore, the designed wireless system provides mapping between the various work areas, the environment conditions, wind direction, possible H₂S release points, and the locations of H₂S sensors. In this project, a remote stand alone H₂S sensor with wireless radio along with solar power plus battery and built in local beacon and horn, all this equipment shall be mobile and shall be weather proof. Such compact wireless system shall be installed and relocated to the appropriate location prior to the start of each task work. This system consist of different components from different manufacturers but all of these component are using approved international standard, that means you can replace any part of the system by another equipment from different manufacturers and it will work with other equipments perfectly. The wireless radio used In this project is using IEEE 802.11 “WiFi” standard. There were many benefits and lessons learned from this project, include the effect of vibration on the wireless system and effect of the water on signal propagation. This presentation will share the user requirements for safe operation, the system design, system layout, equipments integration, challenges and the various concluding results.