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Technical
article

Industrial Communication

Rugged and reliable

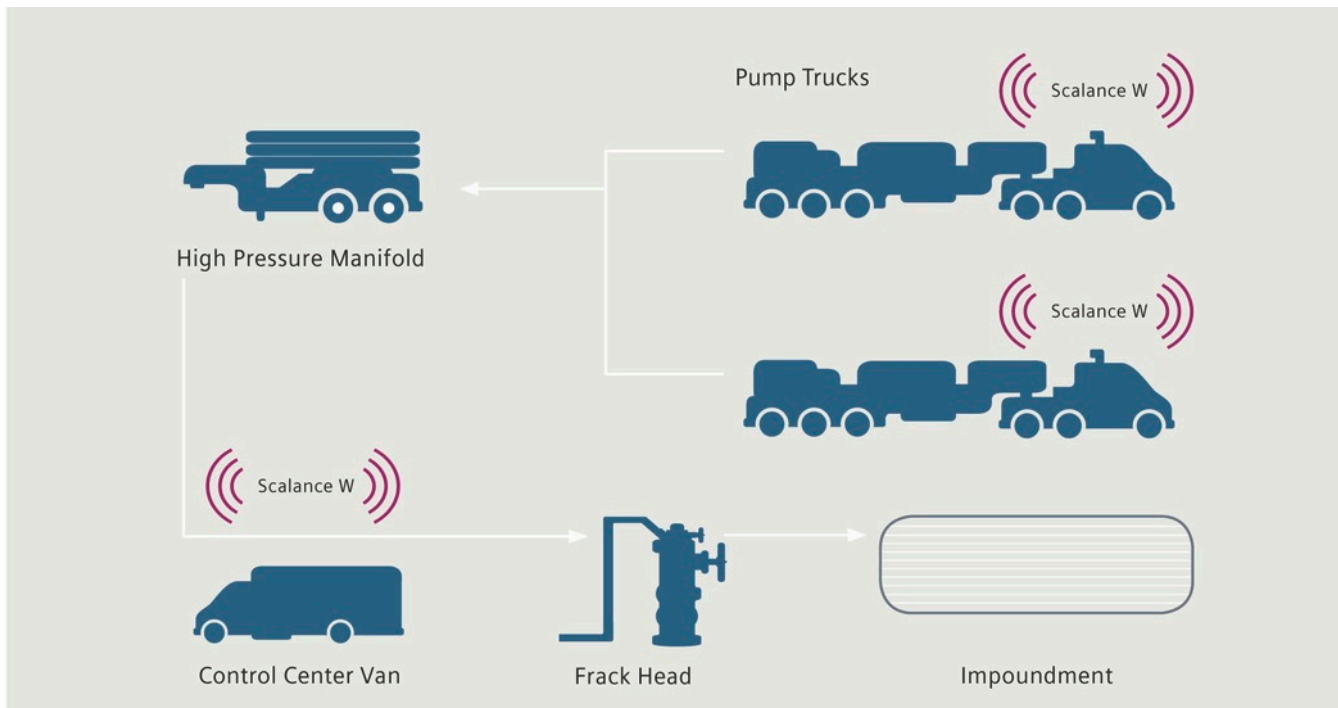
IWLAN technology for monitoring and control of pressure pumping units (frac trucks)

In the oil & gas industry, the challenges are big, the stakes are high and the conditions harsh. Extreme environments and remote locations – oil & gas operations face these realities every day. With a communications portfolio that enables implementation of reliable, high-performing communication infrastructures, Siemens can provide dependable and robust connectivity for even the most demanding applications.

With rising energy costs and demand, oil & gas exploration and production is extending into locations that are even more remote. This means that implementing industrial wireless technology is a must for businesses that need realtime information to reduce their non-productive time (NPT) when facing extreme environments. While modern and intelligent production equipment require and generate increasing amounts of data, recent advances in industrial wireless technology have enabled the provision of cost-optimized solutions capable of robust and reliable communications. Under these demanding conditions, creating reliable communication infrastructures can pose significant challenges.

The Siemens industrial communications portfolio, consisting of the SCALANCE and RUGGEDCOM product lines, is built and optimized for constructing reliable, high-performance communication infrastructures designed to provide oil and gas companies with a comprehensive, end-to-end range of world-class network products from a single source, ensuring that fully integrated networks can be quickly and seamlessly deployed.

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Communication for monitoring and controlling the high-pressure pump units controlling the pressure pumping units (frac trucks)

Connectivity in the field

One specific example is an application for connecting the remote and distributed data vans and hydraulic pump units used in the fracturing processes. A typical fracturing process fleet consists of several truck-trailers with mounted hydraulic pump units, hydration units, blenders, proppants, chemical storage tanks, and a site data acquisition and control center. Each of these trailers serves a unique purpose in the fracturing process. For instance, one trailer will house the blenders, which process the powders, chemicals, gels, and liquids pumped downhole. Another trailer houses the hydraulic pump unit that delivers the high volumes of fluid and proppant to the wellbore at high pressure levels. Combined, these units provide the pressure levels needed to open fractures at the bottom of the hole, while at the same time, valuable data is captured.

The site data acquisition and control center, commonly referred to as a data van, provides a centralized command center to control all critical well site equipment, while also monitoring, recording and supervising the fracturing treatment. The data van controls, monitors, and records the rate and pressure at which the fracturing fluid is pumped down the wellbore, the proportions of the necessary additives in the fluid and the proppant concentration.

The data vans' primary goal is to reduce the number of equipment operators needed to complete the treatment, while greatly improving job quality and safety through centralized real-time data capture and presentation.

Wireless solves cable issues

Siemens helped one customer solve connectivity issues at its well pads that arose when pump trucks were hardwired to the data van. The first issue was complex cabling in a congested area. Companies start the drilling process on a pad of land of about 3 acres, which includes space for the many trucks that become part of an oil & gas drilling process. On a typical 3-acre wellpad, there can be between 20 and 50 tractor-trailer-mounted fracturing pumps, in addition to the rest of the required fleet. This causes severe congestion of the well pad, especially close to the actual fracturing operation.



Another issue the customer faced was frequent cable breakage during setup and dismantling as the pump trucks moved from site to site on different jobs. Maintaining the cables became a major issue.

Siemens determined that the answer to this connectivity issue was to use Industrial Wireless LAN (IWLAN) to establish a connection between the data vans and the fracturing pump units.

The customer's data van and pumping fleet were fitted with SCALANCE W786-1 RJ45 units as access points to communicate using IEEE 802.11n as basis. This setup allowed the data van to serve as the point of contact, facilitating operations control, site surveillance



SCALANCE W786-1 RJ45 offers operational reliability in extremely harsh environments due to its high degree of protection and extended temperature range

and system diagnostics of the fracking operation from a safe distance. Additionally, the SCALANCE W786-1 RJ45 offers operational reliability in extremely harsh environments due to its high degree of protection (up to IP65) and extended temperature range from -40 °C to 60 °C (-40 °F to 140 °F), all while delivering data transfer rates of up to 450 mbps.

Higher productivity, lower costs

With IWLAN, the customer eliminated the use of cables, which was the main cause of communication failure and frequent maintenance work. IWLAN also helped reduce operating costs and reduce non-productive time related to communication issues. Furthermore, this solution offered an added value by reducing setup times – made possible by access points that dynamically establish connectivity without the need for a skilled communications technician on-site.

Benefits of IWLAN technology

- IWLAN is based on the proven IEEE 802.11n standard and can be used in industrial environments without any problems.
- Deterministic Profinet communication is possible via IWLAN.
- Installation and maintenance costs can be reduced while saving time-to-production because contact wires and trailing cables are no longer required for communication.
- IWLAN allows networks to be flexibly and securely expanded.
- Mobile operator stations provide universal availability.

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