



Solution: NetCloud Service with CBRS-Compatible Routers ■ **Industry:** Oil & Gas ■ **Use Case:** Private LTE for Video Monitoring

Private Cellular Network Helps Companies Keep Workers Safe at Large Refineries

Private LTE deployments through Nokia and Cradlepoint underpin wide-area Wireless LAN for PK Solutions' IoT devices at huge oil and gas sites



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Ben Burrus
Chief Technology Officer,
PK Solutions

Success Story Highlights

Challenge — On refinery sites, PK Solutions' safety-focused IoT devices and wearables track biometric and gas-related data, along with providing real-time video footage, but the limitations of Wi-Fi in large areas make it difficult to ensure reliable, high-performance connectivity over a Wireless LAN.

Solution — PK deployed Nokia's industrial-grade private cellular solution operating in the LTE / CBRS (Citizens Band Radio Service) spectrum and Cradlepoint's NetCloud Service, delivered through wireless edge routers mounted in ruggedized communication kits.

Benefits — With Private Cellular Network, PK gives its oil and gas company customers the flexible, high-performance, secure, and reliable Wireless LAN connectivity they need to keep employees safe everywhere they go — and to centrally monitor and manage the entire network.

Challenges

Oil and gas companies use PK Solutions' digital inspection software, designed for in-field tablets, and an integrated workforce optimization software called weavix™ — the information is gathered from wearable devices — to eliminate inefficiencies and maintain real-time communication and the utmost workforce safety at refineries. A variety of on-site devices require connectivity, including gas monitors, biometric monitors, the tablets, and the wearable devices.

PK also must ensure network connectivity for workers and devices inside towers, or vessels, that are hundreds of feet tall. When specialists wearing the devices are sent into these towers to perform inspections and repairs, safety is a major concern. The devices track a person's vital signs and environmental readings, while video cameras mounted inside help safety officers elsewhere remotely monitor the situation.

“Our main focus is the health and safety of the people going into those towers,” said Justin Nickel, director of marketing at PK Companies.

From a network connectivity perspective, the biggest challenge is creating a reliable, high-performance Wireless LAN across these large areas. PK tried using Wi-Fi and then public LTE, but key challenges arose, including:

Insufficiency of Wi-Fi in some areas

Oil and gas companies need 24x7 connectivity everywhere for business operations and safety applications, and Wi-Fi connectivity isn't sufficiently pervasive, stable, or robust to meet such demands.

“Wi-Fi just doesn't provide the coverage we need for the things we're trying to connect across large areas,” Nickel said.

That's especially true in and around the towers, which are too oddly proportioned to work well in a Wi-Fi-as-LAN setting, or when the signal needs to penetrate walls and surfaces.

“When you've got workers inside confined spaces, needing connectivity with their lives at stake, Wi-Fi just doesn't get the job done,” Nickel said.

Network congestion causing poor performance

Public LTE is an excellent WAN link for most IoT use cases, but it proved problematic as a Wireless LAN source across a large area.

While LTE coverage is excellent, public networks struggle to meet the needs of industrial deployments where robust performance with low latency and coverage is critical. Secondly, public networks are typically “best effort.” With the high density of devices that need connectivity at these refineries, especially in regions where lots of public LTE users may be attached to the same base station, network congestion was prohibitive.

Because employee safety is crucial at these sites, it could be disastrous if communications between safety officers and workers inside the confined spaces were to cut out or lag due to network congestion generated by lower-priority traffic.



“Quality-of-Service is something we can’t control on a public LTE or Wi-Fi network,” said Ben Burrus, Chief Technology Officer at PK Solutions.

Solution

To ensure a reliable connected experience for its technologies that improve safety and efficiency, PK deployed a Private LTE system — leveraging CBRS shared spectrum instead of Wi-Fi or public LTE — for its sprawling Wireless LAN.

“Private LTE is fantastic because we can arrive at an oil and gas company’s job site, put up temporary towers, and control bandwidth and who’s using it – all while harnessing the same technology that the carriers use,” Burrus said.

Nokia Digital Automation Cloud (DAC) is an integrated plug-and-play, as-a-service private wireless offering that provides an easy-to-use industrial-grade private wireless network. A variety of radios (including for CBRS spectrum) deliver the connectivity, locally deployed edge cloud server, and core network necessary for low-latency applications and local breakout — helping keep enterprise data confidential and the network management accessible via an intuitive web GUI in the cloud.

The weavix devices use SIM cards that work with CBRS, allowing them to always connect to a reliable and secure private network.

Outside the towers, Cradlepoint’s purpose-built wireless edge routers provide CBRS connectivity through ruggedized communication kits. These kits also include a battery and a monitor that constantly gathers gas readings and video footage, all of which is dispersed to safety officers in real time.

Cradlepoint NetCloud Service, which includes robust cloud-delivered visibility into LTE conditions and network configurations, is part of the overall Private Cellular Network that blankets these sprawling refinery sites with the secure, uncongested, and cost-effective connected experience their customers need for monitoring worker safety.



With Private LTE, you can say, ‘Here’s my group of devices that need top priority. If there are bandwidth congestion issues, shut these other devices off so safety professionals’ devices always work.’ ”

Ben Burrus

Chief Technology Officer, PK Solutions

Benefits

Highly reliable and flexible wireless LAN connectivity

PK’s multi-faceted Private LTE solution leveraging CBRS ensures a Wireless LAN that works for all of its edge IoT — from safety devices directly connected via a SIM card to video cameras and sensors relying on wireless routers with embedded modems.

The scalability and affordability of Private LTE has allowed PK and its customers to consider other IoT devices and applications for the near future, such as continuous video monitoring, intercoms, and various applications leveraging “big data.”

“Our R&D team is saying, ‘Now that we have a high-bandwidth network set up, what else can we do?’ The sky is the limit with this Private LTE solution,” Burrus said.

Control over quality-of-service

A Private LTE network provides unprecedented control over Quality-of-Service, as mission-critical communications are crucial for protecting workers. Safety officers are given the highest priority for network access and performance.



Reduced operating costs with CBRS

Private LTE gives PK’s customers a solution based on fixed costs, with no monthly cellular data feeds. CBRS is a free, unlicensed spectrum that takes the mystery out of what would be fluctuating costs through a traditional public LTE network.

“By standing up our own LTE network, we don’t have to pay a cellular carrier for data consumption for individual SIM cards,” Nickel said.

Improved network security

Cradlepoint’s wireless edge solutions support a level of security not possible with Wi-Fi. Along with the inherent encryption of data passed through LTE, these solutions feature SIMs that can be controlled from anywhere.

Seamless Network management and troubleshooting

PK prefers a seamless cloud experience for its technicians, who are tasked with centrally monitoring connectivity and battery life for its widespread communication kits. The extensibility of Cradlepoint’s NetCloud API enables these techs to monitor detailed LTE uptime and performance analytics and adjust network configurations without leaving the weavix platform.

[Learn more at cradlepoint.com/pltenow](https://www.cradlepoint.com/pltenow)