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Industry 4.0 Offers Creative Solutions for Manufacturing's Most Pressing Challenges

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The Network is Critical for Industry 4.0 Success

By Jeff Hipchen • RF Connect

Industry 4.0 is transforming static, single-purpose production lines and often-erroneous asset tracking into agile, reconfigurable factories optimized through big data analytics. These initiatives are achieved through myriad innovative and still-emerging technologies such as machine learning, augmented reality, artificial intelligence and more to streamline complex automation, processes, systems and operational and information management. However, none of this can be accomplished without connectivity.

To attain optimal results, Industry 4.0 connectivity must be untethered.

Connectivity Conundrums and Opportunities

Until recently, manufacturing organizations undergoing Industry 4.0 modernization have been forced to make tradeoffs when it comes to connectivity. Machines and applications that need reliable high bandwidth and low latency are often hardwired despite the expense of multiple cable runs using special rugged cables or conduit. Wi-Fi, although it offers untethered connectivity, lacks the performance, reliability, security, coverage area and handoff capabilities to support rapid reconfiguration and mobility which are hallmarks of smart factories and plants. Lastly, while Public Cellular Networks provide untethered connectivity and overcome nearly all of Wi-Fi's vulnerabilities, manufacturers utilizing this strategy have little control of their network; they must rely upon and pay the wireless operator to deliver the required network capacity and provision any and all devices that need to be connected to the network.

The good news is the holy grail of connectivity became available in early 2020 when the Federal Communications Commission (FCC) commercialized the Citizens Broadband Radio Service (CBRS) frequency band which, for the first time, empowers nearly any organization to use carrier-grade cellular spectrum to build a private wireless network without the prohibitive costs of owning or licensing the spectrum. These networks, commonly known as private LTE and private 5G, deliver the same technical capabilities of public cellular networks including high speed and throughput, low latency and strong security which are critical for Industry 4.0 within smart manufacturing, heavy industry, logistics and related sectors. More importantly, the organization has complete control of the private wireless network including bandwidth and upgrades, management of users and devices, and full access to data analytics.

Advice for the Untethering Journey

The untethered connectivity toolkit is continually being innovated and evolved. Next-generation wireless technologies and solutions including 5G, Wi-Fi 6 and CBRS-enabled Private Wireless Networks – and, in the future, 6G and Wi-Fi 7 – will play a critical role in scaling Industry 4.0 initiatives. However, more options often lead to complexity. Whether you are just beginning or course-correcting, there exist best practices for navigating the untethering journey which is critical to achieving Industry 4.0 implementation success:

- Be proactive, not reactive.
- Consider short-term (12-24 months), mid-term (3-5 years) and long-term (7-10 years) scenarios.
- Embrace a heterogenous network approach and adopt the best wireless tools for the job.
- Plan for the unexpected by designing for capacity and infrastructure upgrade contingencies.
- Don't go it alone: engage trusted resources early and often

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