# Secure, Smart Wi-Fi for Industry 4.0

Industry 4.0 is revolutionizing the manufacturing world by leveraging communication technology, analytics and business-intelligence capabilities and the Internet of Things (IoT). Factories and warehouses invest in wireless IoT to improve efficiency and quality, increase process agility and productivity, reduce maintenance costs and operational risks, and increase revenues with revolutionary data-driven business models. However, Industrial IoT applications are characterized by extremely harsh and interference-heavy environments. As such, wireless IoT connections must be resilient enough to deliver reliable coverage throughout the facility.

Celeno is a well-established and leading provider of smart, managed Wi-Fi solutions. Its field-proven Wi-Fi chips and software technology have been successfully integrated into numerous OEM Wi-Fi devices and have been deployed in tens of millions of homes around the world by almost 100 leading service providers worldwide.

Celeno enables wireless IoT in demanding industrial applications via its rich portfolio of Wi-Fi chipsets combined with edge software and cloud analytics. With these, Celeno provides the building blocks for a wirelessly connected factory that enjoys all the benefits of wired connectivity such as data security and mission-critical equipment reliability while delivering frictionless connectivity and ultimate flexibility due to being location agnostic.

## Machine & Process Utilization

In the manufacturing space, IoT technology is a crucial enabler for predictive maintenance. As this trend takes hold, the factory floor no longer resembles a static group of assets, but rather becomes a dynamic, complex system that can be managed – similar to how data networks have been managed since their inception. It is here that Celeno brings its expertise to the fore with Wi-Fi-enabled remote monitoring and trend analytics. The increasing availability of data and computing allows machine operators to evolve beyond condition monitoring to anticipating problems before they happen, thus maximizing the lifespan of equipment and reducing costly system down-time while improving productivity and safety.

In addition, Celeno provides the flexibility to customize the network and have it self-adapt to different profiles for greater operational efficiency. For example, the network can self-adapt to a "Mission Critical" profile for 24/7 operation or an "energy efficient" profile as and when required.

## Factory Productivity and Safety

Celeno's next generation silicon and software technology will enable Wi-Fi-based asset tracking, Geofencing, access control, and other device-assisted location-based services.
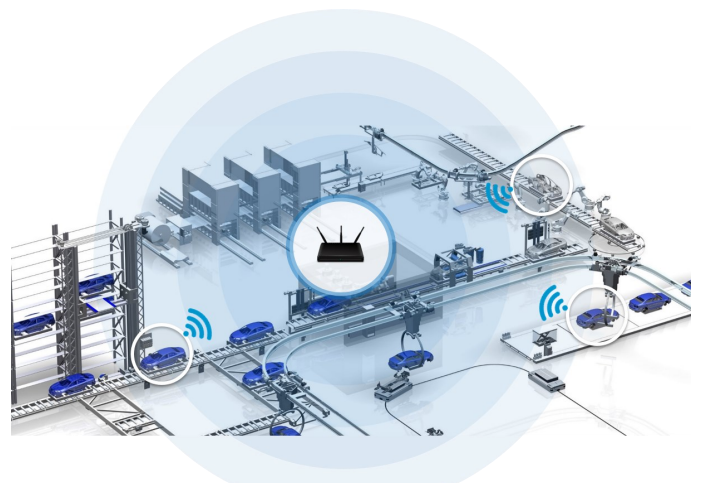


"Track & Trace" turns asset tracking into asset intelligence

Smart factories are creating a fertile market for advanced asset tracking, turning asset tracking into asset intelligence. An example of this is "track and trace" which continually tracks and traces components from the moment they are received until process completion. In this way manufacturers ensure that finished goods match specifications and obtain line-of-sight to the origin of all ingredient or component material.  This type of smart asset tracking and intelligence prevents asset failure, improves asset performance, and lowers machinery downtime in a variety of industries.

In terms of Geofencing technologies and access control, industries such as mining, construction, utilities and energy use these to ensure the safety and security of personnel working alongside machines.

## Wireless Security

Industry 4.0 is not without its downside. Concerns about the protection of networks, processes and operations from malicious attacks persists. Industrial plants and factories can be threatened by

interference, disruption or denial of process controls, theft of intellectual property, the loss of sensitive corporate data, hostile alterations to data, and industrial espionage. Once attackers gain access to a critical application, they can manipulate machines or manufacturing processes remotely.

Malicious hackers may cause network failures such as denial of service, user identity theft, data theft as well as using it as a point of entry to other network assets. For years, this has been a major inhibitor for adoption of wireless connectivity and IoT solutions.

Celeno addresses this challenge with SecureAIR™ - a novel and patented physical layer security embedded within our Wi-Fi chipsets. SecureAIR leverages real-time signal processing techniques to transmit a focused signal together with surrounding shielding beams, which constructs a dynamic virtual electromagnetic shield surrounding the RF communication between access points and legitimate client devices, preventing interception of the Wi-Fi signal.



Celeno's SecureAIR™  physical layer technology