

# Advanced Wi-Fi 8 Technology is Applied in Smart Factories

[Advanced Wi-Fi 8 technology](#), with its ultra-high reliability, low latency and efficient spectrum utilization, provides stable and high-speed wireless connections for smart factories, helping to achieve real-time equipment monitoring, data collection and remote control, and promoting industrial automation and smart manufacturing to a higher level.

## Introduction

With the rapid development of science and technology, smart factories have become an important part of Industry 4.0. Smart factories have realized the automation, intelligence and efficiency of the production process by integrating various advanced technologies.



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Among them, Wi-Fi 8, as the next-generation wireless network technology, its application in smart factories will bring unprecedented changes to factories.

This article will introduce the [application of Wi-Fi 8 technology in smart factories](#) in detail from multiple aspects such as the technical characteristics of Wi-Fi 8, the needs of smart factories, the application scenarios of Wi-Fi 8 in smart factories, and the application advantages.

## [Technical characteristics of Wi-Fi 8](#)

Wi-Fi 8, namely the IEEE 802.11bn standard, is the next-generation wireless network technology after Wi-Fi 7. Its technical characteristics are mainly reflected in the following aspects:

1. **Ultra-high speed:** The target speed of Wi-Fi 8 is 100 Gbps, which is far higher than the current Wi-Fi 6 and Wi-Fi 7. This speed even exceeds the current copper Ethernet (40 Gbps), making wireless networks surpass wired networks in speed for the first time.
2. **Ultra-low latency:** Wi-Fi 8 has extremely low latency characteristics, and the optimal latency time is expected to reach 0.1 milliseconds. This is critical for application scenarios that require real-time response.
3. **Ultra-high reliability:** Wi-Fi 8 is designed based on Ultra High Reliability (UHR). By improving the MAC protocol and innovative channel access mechanisms such as resource reservation and channel preemption, it ensures the stability of the connection and the integrity of data packet transmission.
4. **Multi-access point coordination:** Wi-Fi 8 supports coordination between multiple access points (APs). Through distributed multi-link operation (MLO), different access points can control multiple links to ensure the stability of the connection when the device moves.
5. **Spectrum expansion:** Wi-Fi 8 will further expand support for millimeter wave (mmWave) bands, such as 42.5 GHz and 71 GHz, providing extremely high bandwidth to meet the needs of future high data rates.
6. **Reduced power consumption:** Wi-Fi 8 reduces the power consumption of access devices and extends the service life of devices by optimizing technology.

## Demands of smart factories

As the core of Industry 4.0, the needs of smart factories are mainly reflected in the following aspects:

1. **Efficient production:** Smart factories realize the automation and intelligence of production processes by integrating various advanced technologies, and improve production efficiency.
2. **Flexible response to market changes:** Smart factories can flexibly adjust production plans, respond quickly to market changes, and meet customer needs.

3. **Reduced operating costs:** By optimizing production processes and management models, smart factories reduce operating costs and improve the competitiveness of enterprises.
4. **Improve product quality:** Smart factories ensure the stability and consistency of product quality by real-time monitoring and control of production processes.
5. **Ensure employee safety:** Smart factories ensure the personal safety of employees by integrating safety monitoring and early warning systems.

## Application scenarios of Wi-Fi 8 in smart factories

Wi-Fi 8 has a wide range of application scenarios in smart factories, including but not limited to the following aspects:

1. **Device interconnection:** The high speed, low latency and high reliability of Wi-Fi 8 make it an ideal choice for device interconnection in smart factories. Through Wi-Fi 8, robots, sensors, controllers and other equipment in the factory can achieve efficient and stable interconnection to ensure the smooth progress of the production process.
2. **Real-time monitoring:** Smart factories need to monitor all aspects of the production process in real time to ensure the stability of the production process and product quality. The high bandwidth and low latency characteristics of Wi-Fi 8 enable high-definition video streams and real-time monitoring data to be transmitted to the monitoring center in real time, making it easier for managers to discover and deal with problems in a timely manner.
3. **Data collection and analysis:** Smart factories collect various data in the production process, such as temperature, humidity, pressure, etc., and analyze and process them to optimize the production process and improve product quality. The high reliability and high throughput characteristics of Wi-Fi 8 ensure the integrity and real-time nature of the data, providing strong support for data collection and analysis.
4. **Remote control and debugging:** With Wi-Fi 8, technicians can remotely control and debug equipment in the factory, reducing the risks and costs of on-site operations. This is especially important for scenarios where frequent adjustments to equipment parameters or troubleshooting are required.
5. **Smart logistics:** The logistics system in a smart factory needs to be automated and intelligent to improve logistics efficiency and accuracy. The high speed and low latency characteristics of Wi-Fi 8 enable logistics vehicles and robots to obtain scheduling information in real time, achieve accurate positioning and rapid response.
6. **Employee communication and collaboration:** Employees in a smart factory need to maintain real-time communication and collaboration to ensure the smooth progress of the production process. Wi-Fi 8 provides a stable and high-speed wireless network connection, providing employees with a convenient communication and collaboration platform.

## Advantages of Wi-Fi 8 in smart factories

The advantages of Wi-Fi 8 in smart factories are mainly reflected in the following aspects:

1. **Improve production efficiency:** By realizing functions such as device interconnection, real-time monitoring and smart logistics, Wi-Fi 8 improves the production efficiency of smart factories and shortens the production cycle.
2. **Optimize production processes:** Through data collection and analysis, Wi-Fi 8 helps smart factories optimize production processes, reduce waste and loss, and improve resource utilization.
3. **Improve product quality:** The high reliability and high throughput characteristics of Wi-Fi 8 ensure the integrity and real-time nature of production data, providing strong support for product quality control.
4. **Reduce operating costs:** Through remote control and debugging, smart logistics and other functions, Wi-Fi 8 reduces the operating costs of smart factories and improves the competitiveness of enterprises.
5. **Enhance employee collaboration:** Wi-Fi 8 provides stable and high-speed wireless network connections, enhances real-time communication and collaboration capabilities among employees, and improves work efficiency.
6. **Ensure production safety:** Through the integrated safety monitoring and early warning system, the application of Wi-Fi 8 in smart factories helps to timely discover and deal with safety hazards and ensure production safety.

## Implementation and Challenges of Wi-Fi 8 in Smart Factories

Although Wi-Fi 8 has significant application advantages in smart factories, its implementation also faces some challenges:

1. **Technology maturity:** Currently, Wi-Fi 8 is still in the research and development stage, and its technology maturity needs to be further improved. Therefore, during the implementation process, it is necessary to pay attention to the latest developments in technology and the formulation of standards.
2. **Device compatibility:** Since Wi-Fi 8 is a new generation of wireless network technology, its device compatibility may have certain limitations. During the implementation process, it is necessary to ensure the compatibility of existing devices with Wi-Fi 8 to avoid affecting the normal production process.
3. **Spectrum resource allocation:** Wi-Fi 8 will further expand support for millimeter wave bands, but the spectrum resources in the millimeter wave bands are limited and subject to regulatory restrictions. Therefore, during the implementation process, it is necessary

to pay attention to the allocation of spectrum resources to ensure the normal use of Wi-Fi 8.

4. **Security and privacy protection:** With the continuous development of wireless technology, security and privacy protection issues are becoming increasingly prominent. When implementing Wi-Fi 8, effective security measures and privacy protection mechanisms need to be taken to ensure the security and privacy of production data.
5. **Cost and investment:** The implementation of Wi-Fi 8 requires a lot of money and resources, including equipment purchase, network deployment, personnel training, etc. Therefore, the balance between cost and return on investment needs to be fully considered during the implementation process to ensure the sustainability of the project.

## Future Prospects of Wi-Fi 8 in Smart Factories

With the continuous development and maturity of Wi-Fi 8 technology, its application prospects in smart factories are broad. In the future, Wi-Fi 8 will play a greater role in the following aspects:

1. **Promote the in-depth development of Industry 4.0:** The high speed, low latency and high reliability characteristics of Wi-Fi 8 will further promote the in-depth development of Industry 4.0 and realize the comprehensive automation and intelligence of the production process.
2. **Promote the popularization of intelligent manufacturing:** By integrating Wi-Fi 8 technology, smart factories will be able to realize intelligent manufacturing more efficiently, improve production efficiency and product quality, and reduce operating costs.
3. **Promote the innovation and development of wireless technology:** As a new generation of wireless network technology, the application of Wi-Fi 8 will promote the innovation and development of wireless technology and provide more powerful technical support for smart factories.
4. **Promote the construction of smart cities:** Smart factories are an important part of smart cities. By integrating Wi-Fi 8 technology, smart factories will be able to better integrate into the smart city system and achieve seamless connection between urban management and industrial production.
5. **Promote the upgrade of global Internet infrastructure:** With the popularization and application of Wi-Fi 8 technology, the global Internet infrastructure will usher in a comprehensive upgrade, providing strong support for the digital transformation of all walks of life.

## Conclusion

In summary, the application of Wi-Fi 8 technology in smart factories will bring unprecedented changes to factories. By realizing functions such as device

interconnection, real-time monitoring, data collection and analysis, remote control and debugging, intelligent logistics, and employee communication and collaboration, Wi-Fi 8 improves the production efficiency of smart factories, optimizes production processes, improves product quality, reduces operating costs, enhances employee collaboration, and ensures production safety.

Although there are some challenges in the implementation process, with the continuous development and maturity of technology, Wi-Fi 8 has broad application prospects in smart factories.

In the future, Wi-Fi 8 will further promote the in-depth development of Industry 4.0, promote the popularization of intelligent manufacturing, promote the innovation and development of wireless technology, promote the construction of smart cities, and promote the upgrading of global Internet infrastructure. Therefore, we should actively pay attention to the latest progress of Wi-Fi 8 technology, strengthen technology research and development and application promotion, and inject new impetus into the development of smart factories.

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## FAQs

FAQs and answers about the application of advanced Wi-Fi 8 technology in smart factories:

What is Wi-Fi 8?

Wi-Fi 8, the IEEE 802.11bn standard, is the next generation of wireless network technology after Wi-Fi 7. It is designed to provide ultra-high reliability wireless domain connections, especially for applications with strict requirements for low latency and high stability.

What are the main upgrades of Wi-Fi 8 compared with previous Wi-Fi technologies?

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Compared with previous Wi-Fi technologies, the main upgrades of Wi-Fi 8 include improved throughput, reduced latency, reduced data unit loss, and reduced power consumption. It increases the throughput measured by MAC data services by 25%, reduces latency by 25%, reduces the loss of MAC service data units (MPDUs) by 25%, and reduces the power consumption of access devices.

How is Wi-Fi 8 technology applied to smart factories?

In smart factories, Wi-Fi 8 technology can provide stable, high-speed and low-latency wireless connections, which are essential for real-time monitoring, data collection, remote control and automated production of equipment. The high reliability and low latency of Wi-Fi 8 make it an ideal choice for wireless transmission technology in smart factories.

How does Wi-Fi 8 technology solve network coverage and stability issues in smart factories?

Wi-Fi 8 technology enhances the stability and coverage of Wi-Fi communications by optimizing the use of spectrum resources, introducing features such as dynamic spectrum optimization (DSO) and non-primary channel access (NPCA). In addition, it can intelligently coordinate multiple access points (APs) to reduce interference and improve overall network performance.

Does Wi-Fi 8 technology support multi-device connection in smart factories?

Yes, Wi-Fi 8 technology not only supports multi-device connection, but also significantly improves the coordination efficiency and data transmission speed between devices. This is crucial for the connection and management of large-scale IoT devices in smart factories.

What is the application prospect of Wi-Fi 8 technology in smart factories?

The application prospect of Wi-Fi 8 technology in smart factories is broad. With the development of Industrialization 4.0, the demand for wireless connection in fields such as industrial automation, robotics, and smart manufacturing is increasing. With its ultra-high reliability, low latency and high throughput, Wi-Fi 8 will become the preferred solution for wireless transmission technology in smart factories.

What challenges do smart factories face when adopting Wi-Fi 8 technology?

Challenges that smart factories may face when adopting Wi-Fi 8 technology include how to provide high reliability and low latency services in unlicensed frequency bands, and how to coordinate multiple access points to improve overall network

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performance. In addition, factors such as device compatibility, network security and cost need to be considered.

When is Wi-Fi 8 technology expected to be widely used in smart factories?

The standardization of Wi-Fi 8 technology is in progress, and it is expected to gradually mature and be widely used in the next few years. As one of the fields with extremely high requirements for wireless connectivity, smart factories are expected to be the first to adopt Wi-Fi 8 technology after it matures and benefit from its performance improvements.