GainSpan™

Wi-Fi® Sensor Networks

Years of Life in a Wi-Fi World

COMMERCIAL
INDUSTRIAL
RESIDENTIAL
METRO
UTILITIES
SUPPLY CHAIN
DATA CENTER

Imagine the Possibilities with Wi-Fi Sensor Networks

GainSpan™

COMMERCIAL

INDUSTRIAL

open loop
supervisory control

condition monitoring
process monitoring
process automation

DATA CENTER

UTILITIES

SUPPLY CHAIN

METRO

HOME

SENSORS MONITOR a host of physical world conditions such as thermal, mechanical, chemical, optical, acoustical, and other measurable parameters, and are readily available for all manner of industrial, commercial, public, and consumer applications. Utilizing wireless technologies for sensor network solutions affords the potential for new capabilities and increased efficiencies.

IEEE® 802.11 networks, commonly known as Wi-Fi, are widely deployed today for commercial, public, and consumer applications as they have met the criteria for such requirements as security, manageability, and cost, but their use in sensor networks has been limited because many applications require years-long battery life for sensors node devices.

New Wi-Fi designs from GainSpan that meet battery life requirements for sensor nodes enable organizations to capitalize on their existing Wi-Fi infrastructure investment.

Benefits of standards-based solutions:

- Lower costs from economies of scale
- Interoperability
- Ease of use
- Availability of mature management tools
- Leverages existing IT staff skill set

GainSpan™

Regulatory compliance

Safety & response

Energy savings

Worker safety

Predictive maintenance

Security

ROI & TCO

New uses, capabilities

— *Savings • Productivity • Visibility • Convenience • Control* —

Deployment of sensors enable users to do more with less, while providing increased convenience, safety, and comfort through improved or automated processes.

Organizations realize positive return on investment with sensor networks by:

- Reducing energy usage
- Reducing labor expenses
- Improving efficiency
- Improving security
- Providing convenience

Sensor networks can integrate with existing enterprise management systems (e.g. accounting, human resources, and databases) and improve or automate processes such as lighting and security systems, inventory tracking, regulatory compliance, and enable remote access for better productivity. Traffic management and home security are other applications of sensor networks used to improve everyday convenience and security.

GainSpan™

Security

Data-rate scalability

Authentication

Quality of Service

Location awareness

Management tools

Battery life

Mature standards & tools

A typical large commercial operation has hundreds of sensors wired to a centralized process with twisted pair RS-485 wiring. In many installations, the cost of the wire, conduit, and labor necessitates adding sensors in only the most critical locations. Replacing hard-wired sensors with low-cost wireless sensor nodes can improve the quality and coverage of sensor networks while facilitating easy reconfiguration and customization.

A wireless sensor network must perform the following functions:

- Processing
- Storage
- Communication
- Sensing and actuation (I/O)

While wired network solutions account for the bulk of the installed base of sensor networks, the increasing need for network flexibility, reduced installation costs, and user mobility demand that a wireless solution be made available for sensor networks. Wireless sensor networks can significantly reduce the installed cost per sensor point thus greatly increasing the number of sensors that meet an ROI threshold.

GainSpan™

Existing infrastructure

Less expense

Faster deployment

Easier install

Support other Wi-Fi devices

In-house knowledge

Architecture support

Maximize ROI & Reduce TCO

Infrastructure

Since Wi-Fi networks are widely deployed and deployments continue at a rapid rate for multiple reasons, the infrastructure cost attached to sensor data distribution can be essentially eliminated, thus greatly reducing the wireless sensor network's total cost of ownership (TCO).

Network Efficiency

Because sensors can transmit their data in discreet micro-bursts, information can easily be prioritized and transmitted within the available capacity of the Wi-Fi network. Using standard Wi-Fi network tools, network capacity can be monitored and additional access points and infrastructure can be installed as network load grows.

Faster Deployments

Since Wi-Fi networks are often pre-existing, Wi-Fi sensors could be deployed in large or small numbers without modifying the data distribution infrastructure. This could enable use of sensors in remote locations, including outdoor environments. Sensors could also be easily relocated to meet changing operating conditions or set up in remote or temporary locations.

Knowledge Base

Enterprise IT departments and many small-to-medium business and consumer network operators are familiar with managing Wi-Fi networks and are familiar with most common Wi-Fi management tools.

Scalability

Since Wi-Fi is continually improving with faster data rates, there are no problems with adding any number of additional nodes.

Mature Global Wi-Fi Standard Broadly Adopted

GainSpan™

COMMERCIAL

INDUSTRIAL

HOME

METRO

Wi-Fi fast becoming wireless backbone

Commercial

Wireless sensors can improve building systems such as heating, ventilation, and air conditioning (HVAC), fire-life, air quality, and

> **Wireless sensor networks help to enable smart environments that:**
>
> - Reduce energy usage
> - Improve security and safety
> - Enable location awareness
> - Support a host of other operating efficiency, product quality, and user convenience gains.

security systems with better monitoring, faster response time, inventory control, and support for mobile applications.

Industrial

Industrial processes can be improved with smart use of sensors for such applications as predictive equipment maintenance using vibration, temperature, pressure, corrosion detection, flow rate, or other monitored parameter to reduce downtime, decrease energy usage, and improve efficiencies and safety.

Residential

Home security, comfort, and entertainment systems may be installed faster and cheaper by

using a home Wi-Fi network and can be made to be remotely accessible over the Internet.

Metro

Wireless sensor networks can be used to enhance traffic management systems, improve maintenance monitoring of widely dispersed assets such as street lights, and support first responders such as fire, police, and hazmat professionals.
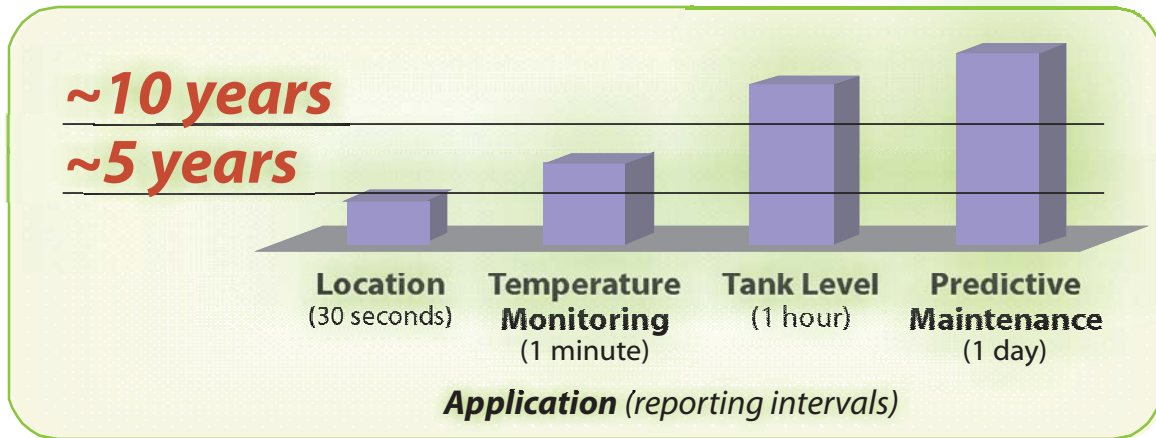
Customer requirements drive the need for a scalable, low-cost wireless sensor network solution:

- Increase productivity and efficiencies
- Reduce cost and energy consumption
- Meet or exceed compliance standards
- Realize a competitive advantage

GainSpan has devoted significant effort to developing a standards-based, low-cost, years-long-battery-life wireless solution. Innovative new power management technology allows GainSpan wireless sensor networks to leverage established Wi-Fi advantages to meet common network requirements.

Interoperability

Wi-Fi provides a worldwide interoperability standard that is unmatched by other communication protocols. Wi-Fi devices operate in the same spectrum regardless of vendor, allowing for greater deployment flexibility, hardware portability, and customer choice.

Architectural Support

The establishment of Wi-Fi as a dominant worldwide standard guarantees a technical advancement and on-going support for a complete range of critical enhancements necessary for reliable, robust network operation. With devices available and continued development supported by multiple vendors, the risks associated with single sourcing are eliminated.

Battery Life

To meet many sensor application requirements and be truly wireless, it is necessary that sensor deployment be free of both communication and electrical wiring. GainSpan has recently implemented technology resulting in years of battery life for Wi-Fi sensor devices through its integrated silicon and software solutions.

GainSpan™

Utilizing newly-available, low-power-consumption Wi-Fi silicon for sensor node devices from GainSpan enables organizations to:

- Leverage the benefits of existing Wi-Fi infrastructure and standards.
- Implement new capabilities.
- Realize enhanced return on investment and total cost of ownership.

GainSpan represents a breakthrough in the world of Wi-Fi sensor networks capable of monitoring, controlling, and managing processes, from the factory floor to the city streets, delivering remarkable cost and energy savings, increased efficiency and added convenience. Thanks to a total solution, incorporating GainSpan's innovative combination of silicon and software products, you'll be leveraging more of today's expanding Wi-Fi network infrastructure.

Wi-Fi® is a trademark of Wi-Fi Alliance.

More than technology – a total solution

GainSpan thinking goes well beyond superior product design. Our total solution includes semiconductors and software that operate with standard 802.11 wireless networks. The technology incorporates a highly integrated "system on a chip" and a comprehensive suite of software, featuring intelligent power management that enables sensors and other devices to operate for years on a single AA-size battery. Together, the chip and software solution is designed to speed OEM time-to-market and reduce development costs, delivering a better return on investment. No other company combines the low battery consumption, Wi-Fi friendliness, and complete solution available from GainSpan.

GainSpan is headquartered in Sunnyvale, CA, with offices in Bangalore, India.

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