
# Motion Sensors Optimize Office and Hotel Spaces

## Introduction

Effective occupancy detection in commercial buildings, hotels, and offices is crucial for energy efficiency, space optimization, and occupant comfort. Traditional detection methods rely on wired sensors with complex installation requirements and limited flexibility. An occupancy detection system that incorporates wireless PIR motion detectors with EnOcean illumination sensors and Contemporary Controls' EnOcean to BACnet gateways provide a comprehensive, easy-to-implement solution that enhances energy efficiency, improves space utilization, and optimizes building management.

## Understanding the Protocols

**EnOcean** is a wireless radio standard (ISO/ IEC 14543-3-1X) developed for self-powered, wireless devices with ultra-low power consumption. EnOcean devices and networks utilize energy harvesting technology which draws energy from ambient resources—such as, motion, light, or temperature variations—eliminating the need for batteries or external power supplies. With an indoor radio range of up to 30 m, EnOcean devices only require minimal maintenance, and most can be installed without wiring, making them ideal for newly constructed buildings and retrofit projects.

**BACnet** (Building Automation and Control Networks) is an ASHRAE, ANSI, and ISO standard communication protocol developed for building automation and control systems. This open standard provides a framework to ensure interoperability between different manufacturers to enable seamless integration and centralization control of:

- Building systems—HVAC, lighting, security, and energy efficiency
- Communication networks—Ethernet, IP, MS/TP, and wireless

## Key Components

**Wireless PIR Motion Detectors** are sophisticated sensors that detect infrared radiation changes caused by human movement within their field of view. These sensors can be ceiling-mounted or wall-mounted depending on the application requirements. Modern PIR sensors feature adjustable sensitivity settings and detection ranges up to 5 meters, making them suitable for various room sizes and configurations.

**Integrated Illumination Sensors** work alongside motion detection to measure ambient light levels in the monitored space. This dual-function capability enables intelligent lighting control based on both occupancy and natural light availability, maximizing energy savings while maintaining optimal lighting conditions for occupants.

*EnOcean GmbH EMDCA – Motion Detector with Illumination Sensor (868 MHz)*

**EnOcean to BACnet Gateway** provides bidirectional communication between EnOcean wireless devices and BACnet/IP networks. This gateway is the critical link that allows building automation supervisors to seamlessly discover and integrate EnOcean devices into existing BACnet systems.


## How the System Works

1. **Occupancy Detection**: The PIR motion sensors detect when spaces are occupied and transmit this information wirelessly using the EnOcean protocol.
2. **Illumination Measurement**: Integrated light sensors measure ambient brightness levels, enabling intelligent lighting control based on both occupancy and natural light availability.
3. **Energy Management**: When unoccupied spaces are detected, the system can automatically adjust HVAC and lighting systems to conserve energy while maintaining standby comfort levels.
4. **System Integration**: The EnOcean to BACnet gateway translates EnOcean wireless signals into standard BACnet objects, allowing the system to be monitored and controlled through existing building management systems.
5. **Space Utilization Analysis**: Occupancy data can be collected and analyzed over time to optimize space usage, which is particularly valuable for meeting rooms and flexible office environments.


*The occupancy detection system integrates a wireless PIR motion detector with EnOcean illumination sensors and an EnOcean to BACnet gateways to provide a comprehensive solution that enhances energy efficiency, improves space utilization, and optimizes building management.*

## Advantages of the Solution

**Energy Efficiency**: By detecting unoccupied spaces and integrating with HVAC and lighting systems, the solution prevents energy waste, contributing to significant cost savings and reduced environmental impact.

**Space Optimization**: Occupancy data enables better understanding of space utilization patterns, allowing organizations to optimize their real estate investments based on actual usage.

**Perfect for Retrofitting**: The wireless nature of the solution makes it ideal for retrofitting existing buildings without the disruption, cost, and complexity of running new wires. Installation requires no drilling through walls, no cable routing, and no electrical work, making it perfect for heritage buildings, occupied spaces, or any retrofit project where minimal disruption is essential.

**Seamless Integration**: By incorporating virtual routing technology, the EnOcean to BACnet gateway allows building automation supervisors to seamlessly discover EnOcean devices via BACnet because each device will appear as a separate BACnet-compliant device. The gateway creates a set of BACnet objects, specific for each EnOcean Equipment Profile (EEP), and decodes the received EnOcean data into standard BACnet objects, eliminating complex programming.

**Enhanced User Experience**: Automated lighting and climate control based on actual occupancy creates more comfortable environments while eliminating the need for manual adjustments.

**Maintenance Efficiency**: Self-powered and long-battery-life sensors minimize maintenance requirements, reducing operational costs and ensuring reliable system performance.

## Application Scenarios

**Hotel Rooms**: Motion sensors provide automated control of lighting and HVAC systems based on guest presence, enhancing comfort while reducing energy waste during unoccupied periods. Compact, discreet sensors with long operational life are ideal for these applications, minimizing maintenance disruptions to guest rooms.

**Meeting Rooms**: Occupancy detection can trigger automated room booking systems that release reservations for no-show meetings and provide real-time availability information. Ceiling-mounted sensors with wide detection angles provide optimal coverage for these spaces, ensuring accurate occupancy monitoring regardless of where people are seated.

**Office Spaces**: Motion sensors help optimize workspace utilization in flexible office environments, providing data on usage patterns while automatically controlling lighting and HVAC systems. Sensors with dual motion and illumination capabilities offer the most comprehensive solution for modern office environments, supporting both energy efficiency and occupant comfort.

## Conclusion

Wireless occupancy detection based on PIR motion detectors with illumination sensors, integrated through EnOcean to BACnet gateway technology, offers an efficient solution for modern building management. By combining advanced sensing technologies with standardized building automation protocols, this system provides comprehensive occupancy monitoring while improving energy efficiency and enhancing space utilization.

The solution stands out for its minimal maintenance requirements, cost-effective implementation, seamless integration capabilities, and exceptional suitability for retrofit applications. As buildings become increasingly smart and connected, this wireless occupancy detection system represents an essential component of modern building management, contributing to sustainability goals while improving operational efficiency without the constraints of traditional wired systems.

## Recommended Manufacturers

For implementing wireless window monitoring solutions, the following manufacturers are recommended:

1. EnOcean GmbH - Pioneer in energy harvesting wireless technology
2. NodOn - Specialist in smart building and home automation devices
3. Eltako - Provider of professional building automation solutions
4. Pressac Communications - Expert in smart building sensors and monitoring technology

| EnOcean to BACnet Gateway Ordering Information<br>Visit e-store | |
|---|---|
| **Model** | **Description** |
| BASGE-EN868 | EnOcean to BACnet Gateway 868 MHz (European Version)<br>Note: An antenna is required but not included. Be sure to purchase either the BASGE-ANT868 or the BASGE-ANT-2M (listed below). |
| **Antennas:**<br>**Model** | **Description** |
| BASGE-ANT868 | EN868 stick antenna |
| BASGE-ANT-2M | EnOcean antenna with 2 m cable |

For more information about the EnOcean to BACnet Gateway, visit EnOcean to BACnet Gateway

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