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Intel-Sponsored White Paper

IoT Bridging the Gap for Intelligent Small and Medium Buildings

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1. Introduction

The Internet of Things (IoT) is a platform for data creation, communication, aggregation, and analysis. The IoT can be thought of as a conceptual framework, and it risks being perceived as a buzzword, another technology trend to be hyped rather than an imminent force for industry transformation. A well-positioned IoT solution can, however, help customers overcome specific and significant business challenges while demonstrating the necessary return on investment (ROI). Vendors must present straightforward and impactful use cases to stakeholders to promote deeper market penetration of IoT in commercial buildings. This Intel-sponsored white paper presents the market dynamics that shape the outlook of IoT for intelligent buildings with a specific focus on the value to the small and medium sized buildings (SMB) market.

1.1 Defining IoT for Intelligent Buildings

IoT solutions for intelligent buildings are made up of a combination of devices (e.g., sensors, controllers, and communications gateways), cloud analytics, user interfaces (e.g., web portals and mobile applications), and services. The hallmarks of IoT solution architecture include openness for integration, scalability for implementation, and cyber security for credibility. This design enables customers to leverage any existing automation or controls infrastructure, as well as key existing business data streams such as utility billing or work order management systems. The capacity to support customers by supplementing existing tools with better information—not just more data—is a critical distinction of an IoT solution.

1.2 Defining the SMB

Defining the SMB is an important step in characterizing the opportunity for new technology market growth. There are three important metrics for setting up such a definition: building size, business size, and energy demand. Physical size or floor space is an important indicator of any existing control and automation infrastructure. Business size is also important as a reflection of the value of specific use cases—for example, space utilization may be a very influential use case for a small but dense office building, whereas this kind of benefit would not be as impactful for a small warehouse. Finally, energy demand is also an important business metric. Though energy efficiency may not be the top priority for SMB customers, it is an important aspect of an investment decision. Improvements in energy efficiency are not only a straightforward measure of ROI, but can also align with financial incentives such as utility rebates that can help the economics of an IoT investment. The combination of these three dimensions creates the customer profile in terms of technology requirements and use cases, as described in more detail in the sections that follow.

Figure 1 Segmentation Thresholds

	SMALL	MEDIUM
BUILDING SIZE	<10,000 SF	10,000-100,000 SF
BUSINESS SIZE	10 or less employees	10-500 employees
CONSUMPTION	<100 kWh/month	100-1,000 kWh/month

(Source: Navigant Research)

To further profile the SMB, example customers include grocery stores, retail, bank branches, and elementary schools. Navigant Research suggests that owners and operators of portfolios of these smaller buildings will be the first movers in this segment. The functionality of building energy management systems (BEMSs) and the cost-effective nature of enabling devices and service models aligns with the challenges businesses face in managing smaller facilities:

- Visibility into portfoliowide business operations
- Energy consumption and sustainability transparency
- Energy and resource cost containment
- Operations and maintenance efficiency
- Occupant engagement and satisfaction

1.3 IoT Solution Requirements

The customer point of view is not one-dimensional, and one of the challenges for market development is framing the business case in terms that speak to a variety of potential buyers. What resonates is the impact the technology will have on customers' day-to-day jobs and corporate objectives. The following aspects of IoT-enabled intelligent building solutions—simple use, easy installation, affordable and actionable—resonate with SMB customers:

- Device deployment in under one day—often wireless sensors, meters, and gateways—limits business disruption to help influence the investment decision.
- Dashboards and reports that quantify the impact of operational inefficiencies in terms of energy, costs, and clear/prioritized action items demonstrate the ongoing value of the investment and provide the information necessary to track ROI beyond energy efficiency. Examples include:
  - Business-specific insights (such as space utilization for offices or occupancy data to inform product placement in retail stores) make the investment actionable.

- Small restaurants and convenience stores can monitor refrigeration equipment to minimize food spoilage.
- Retail stores can monitor comfort to keep shoppers longer.
- Office managers can monitor lighting and HVAC to maximize productivity tied to comfort.

2. Market Dynamics

The intelligent buildings market has evolved since the first BEMS began to gain attention around 2005. At that point, BEMS software typified innovation in facilities management with applications that gave new insight into equipment operations and energy use to stakeholders outside the boiler room. As the market has developed, so have the technologies available, and an increasing focus on business benefits beyond energy has emerged. Today, many successful BEMS offerings showcase non-energy benefits and present an array of business information that can be derived from a data-rich commercial facility.

IoT is supporting the continued transformation of the market. BEMS offerings, increasingly positioned as intelligent building software more generally, can be deployed with inexpensive hardware devices to provide end-to-end solutions. Getting to the heart of this white paper, these solutions are now accessible down market.

2.1 Broad Business Benefits

The pain points that drive customers to invest in IoT solutions vary in each situation, but there are some common themes Navigant Research has identified. Vendors that are making traction with SMB customers are pitching benefits beyond just energy efficiency. Some examples include:

- **Retail:** The centralized data of an IoT solution can be translated into information that is critical for shop owners across multiple metrics. Occupancy and environmental data can provide insight into the customer experience, sustainability, and operational costs: How long do shoppers stay, what route do they travel, and how long do they wait for help? These are non-energy benefits, but they are fundamental to retail business owners' bottom lines. While the IoT solution may help optimize the environmental conditions for energy efficiency, the cost savings on energy bills are only amplified by longer or more streamlined customer experience.
- **Small and medium sized offices:** Energy efficiency is foundational to calculating intelligent building ROI. Fewer kilowatt-hours used mean fewer dollars on a monthly utility bill. There is an important soft ROI for IoT-enabled solutions for office spaces, albeit of a squishy metric of productivity. There are many use cases for intelligent lighting controls, HVAC optimization, and indoor air quality that tell the story of worker productivity. It is the simple narrative that happy employees are more productive. IoT solutions provide the data-driven insight to create the necessary environments to maximize worker satisfaction.

2.2 Single Platform for Business Improvement

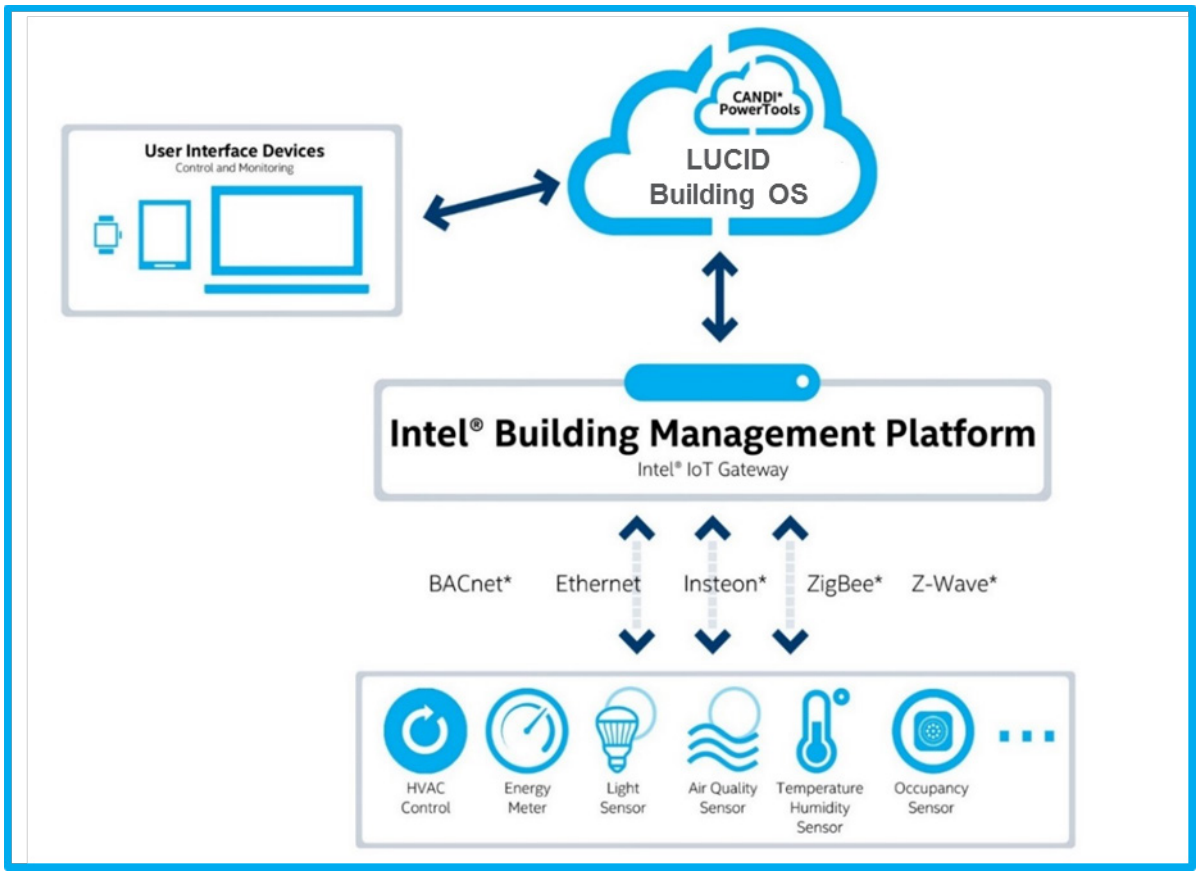
One of the major benefits of an IoT intelligent building solution is the ability to provide customers with a single tool for business and energy management. The IoT platform can support the goals of the C-suite, operations staff, and even occupants. The data-rich environment of a commercial building with an IoT deployment creates valuable business insights through:

- **Data aggregation:** The promise of the intelligent building—and IoT for that matter—is the ability to have a centralized view of building operations to direct changes and make investments that drive down costs and improve experience. One of the biggest challenges for new customers is that their business has operated with management silos. Spreadsheets, monthly bills, and rules of thumb have often led the approach to energy or facilities management because the work at hand is the business happening inside the walls, not facilities optimization. IoT offers customers a new unified platform to bring data together across silos to make better informed decisions that create efficiencies, generate cost savings, and even enhance sales.
- **Data presentment:** Once the data is centralized, another benefit of an IoT-enabled intelligent building is the visual communications of sometimes complicated data sets. Dashboards, mobile applications, and automated alerts can give customers a quick and concise view of the performance of their facility.

3. Technology Landscape

The significant reductions in cost associated with the IoT approach as compared to traditional controls and automation make the benefits of developing intelligent buildings attainable to smaller facilities. IoT-enabled intelligent building systems are secure, scalable, and interoperable. They assist with open communication and standards within the building space, assisting with reduced costs and improved integration possibilities. Security is becoming a high-profile aspect of intelligent building investment decisions. Solutions providers are installing network-secure IoT platforms that scale to support the same opportunities for improved efficiency and reduced costs in SMBs that are available in large buildings. IoT can deliver essential data down to the asset level to support better directives via the analytics or BEMS via architecture, as illustrated below.

Figure 2 Illustrative IoT Solution Architecture



(Source: Intel)

3.1 SMB Technology Requirements

IoT design is fundamental to its appeal for SMBs. These solutions support connectivity that is fast, flexible, and module. This is important both for beginning implementation, as well as for expanding capabilities over time. It is also worth noting that SMBs (as defined by square footage) will most likely have very different infrastructure than large buildings. It is unlikely that a new IoT customer in the SMB space will have a legacy building automation system or complex set of controls in place. It is important to leverage what technology is deployed, and the focus should be on deploying the right mix of sensors, analytics, and services. A few specific examples of technology requirements of the SMB:

- Cloud analytics enable portfoliowide insights for geographically dispersed portfolios. Where it may have been cost-prohibitive to deploy control solutions across many small stores or restaurants, for example, an IoT solution can give owners remote connectivity.
- IoT enables the integration of information technology and operations technology, and for many SMB customers, these solutions can be a way of outsourcing technical tasks that have languished because of a lack of specialist human capital.
- IoT solutions are deployed as an operational expense rather than a capital expense. As a result, the accounting for these investments can be much easier when it comes to finding budget.

3.2 Cyber Security

The breech of a major big box retailer and the recent breech of IoT devices in homes are just two high-profile examples that have pushed cyber security to the top of mind for many customers. It is important that IoT intelligent building solutions demonstrate the same security as enterprise solutions, such as:

- Secure login and password policies
- Certificate-based authentication of devices and software
- Authorized device-specific software requirements
- Cloud and data security rules for software as a service (SaaS) analytics offerings

Customers need to know that the system is protected against breeches that could affect operations or external access to energy and equipment data that can be used to quantify their business performance.

4. Conclusions and Recommendations

The bottom line is that IoT solutions deliver data-driven insights to SMB decision makers without significant business disruption and with a strong ROI. These technologies can deliver horizontal benefits, including cost reductions, through energy efficiency and improvements to repair and maintenance processes. There are also specific benefits by vertical, and if vendors showcase how the solutions tackle industry-specific challenges, there will be higher adoption. Navigant suggests the following recommendations to ensure continued momentum in the IoT for intelligent SMB market:

- Showcase use cases around building management processes such as lighting and HVAC that can be delivered in the absence of onsite technical staff and without the total cost of ownership for full building automation systems
- Offer scalable solutions that can be stacked over time to expand the scope of the business insights and energy and operational improvements
- Develop partnerships that leverage domain, technical, and service competencies for full end-to-end offerings
- Follow the lead of the consumer market with solutions that are easy to use and have design-focused user interfaces
- Focus on the business problem and promote the solution, not the technology design

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