OPTERNA
AT LIFE SPEED™

Smart Buildings &
The Internet of Things (IoT)

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The Internet of Things (IoT) is increasingly becoming the agent of change for how properties, both residential and commercial, are managed. Affordable technology is now available to monitor critical conditions in the property, instantaneously notifying the Property Manager of environmental changes that can seriously degrade the integrity and operating efficiency of the building.
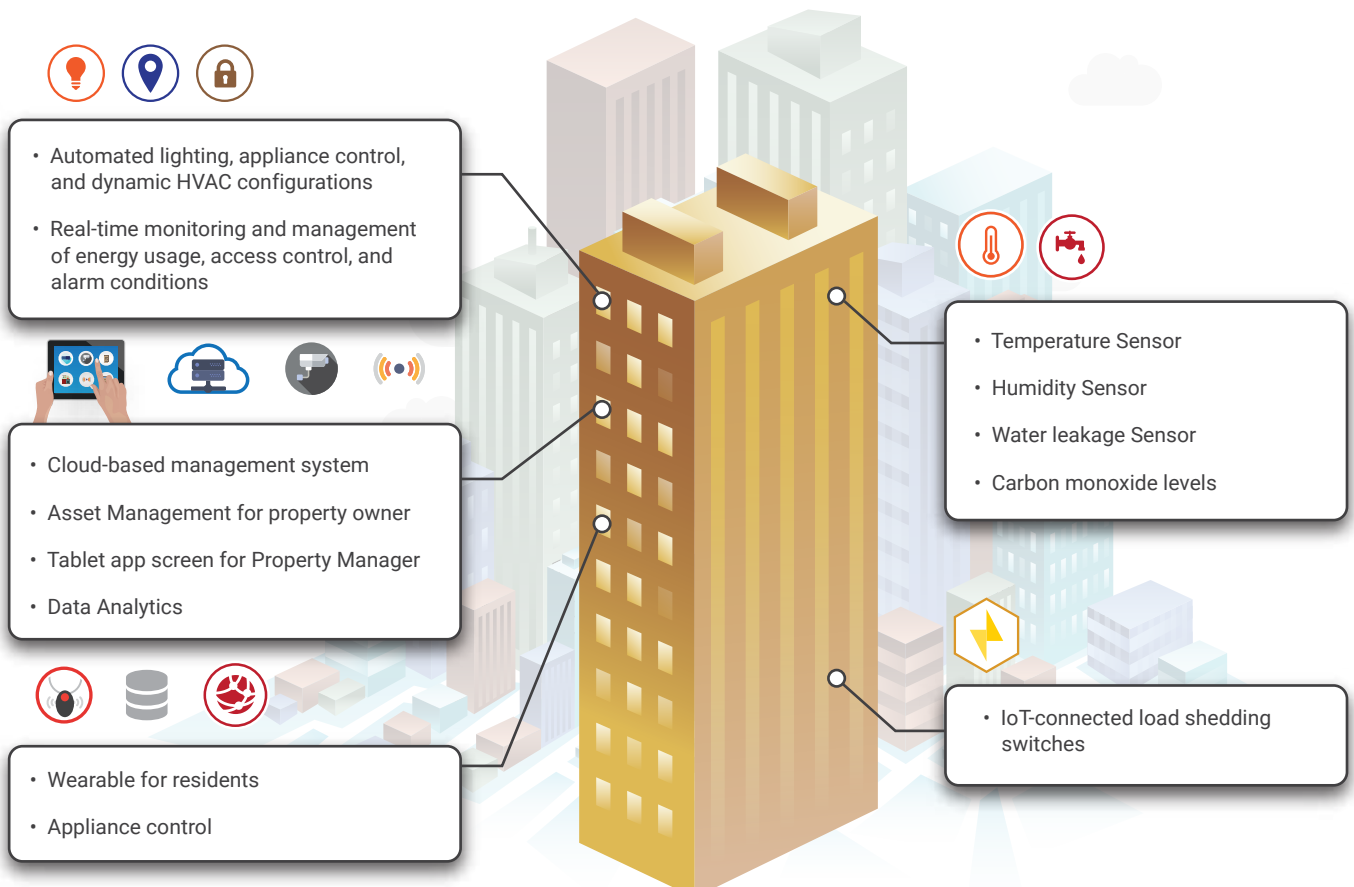
Asset Management is the foundational level of a 'Smart Building' infrastructure, and the good news is that what was once an expensive proposition has now reached a price point where the return on investment for the property owner may be immediate.

A Smart Building architectural design can go well beyond asset management, with convenience features such as automated lighting, appliance control and dynamic HVAC configurations. Real-time monitoring and management of building parameters such as energy usage, access control, and alarm conditions, all contribute to improved operating efficiency for the property. An interconnected network of IoT sensors, aggregating data into a cloud-based management system, yields a user-friendly, remotely-accessible property management tool for the Property Manager.

What is a Smart Building?

At its core, a Smart Building creates a safer, more responsive environment for residents, employees and the property owner. Ubiquitous sensors placed throughout the building monitor key indicators within the property. By continuously monitoring environmental conditions such as temperature, humidity, water leakage and carbon monoxide levels, potentially catastrophic problems are immediately identified, resulting in a safer space for the occupants, and a protected asset for the property owner. Protecting the building and its occupants should be priority one for any Smart Building.

With a smart foundation in place to address building safety, IoT technology can also be employed to enhance the operating efficiency of the property, primarily through energy management. With smart meters, all utilities can be continuously monitored. Data analytics applied to the energy usage data collected over time; i.e., trend analysis, will reveal a deterioration in the performance of the energy systems.

- Automated lighting, appliance control, and dynamic HVAC configurations
- Real-time monitoring and management of energy usage, access control, and alarm conditions

- Cloud-based management system
- Asset Management for property owner
- Tablet app screen for Property Manager
- Data Analytics

- Wearable for residents
- Appliance control

- Temperature Sensor
- Humidity Sensor
- Water leakage Sensor
- Carbon monoxide levels

- IoT-connected load shedding switches

Installing IoT-connected load shedding switches allows the utility to perform demand management, in exchange for a lower energy rate.

A Multi Dwelling Unit (MDU) property is an ideal candidate for a smart infrastructure, providing numerous management features which facilitate the everyday responsibilities of the Property Manager. A single screen of a tablet app graphically displays the temperature and other environmental conditions of an entire floor. Using the same tablet app, the Property Manager can place an unoccupied living unit in the "vacant" mode, automatically arming the door entry and motion detection sensors, and setting back the temperature.

Residents who enable a beaconing feature on their smartphone, or choose to wear a panic button pendant, can be immediately located in a building, an important feature for aging in place and assisted living facilities.

Now we come to the futuristic lifestyle, so commonly associated in popular culture with a Smart Building. With the interconnection of property sensors, human sensors and appliance control, myriad convenience features can be realized. A motion detector in the master bedroom turns on the heated flooring in the master bathroom, but only during typical wake-up hours in the morning. Sensing that you've arrived at home at the end of a work day, the system turns on the TV to your favorite news channel. Hundreds of "if this, then that" scenarios can be envisioned and programmed into the Smart Building system.

Lastly, a Smart Building enables an unprecedented opportunity for academic research into human behavioral analysis on a broad scale. The sensors imbedded in a smart building infrastructure collect data on everyday human activities, sending the data (in anonymous form to protect the privacy of individuals) to a data analytics engine for analysis by private and public enterprises. The insights gleaned from this research holds the promise of societal advancements in a wide array of disciplines, including urban planning, telemedicine, and human factors and ergonomics, ultimately leading us to a world in which Smart Cities are commonplace.

How Does IoT Work:

There are three functional layers in the IoT system model: Sensing, Aggregation, and Services. The Sensing layer can be segmented into two sub-classes: property sensors and human sensors.

Property sensors are embedded in the building infrastructure to monitor key environmental indicators such as air quality, temperature and humidity, to generate security alerts such as door open/close and motion detection, to measure energy consumption, and to facilitate location awareness.

Human sensors are associated with human activity, and are typically worn or carried; examples are wearable wrist bands, panic button pendants, and even a mobile phone. In a Smart Building, the combination of fixed property sensors and mobile human sensors produces a tremendous amount of data for the system to interpret and act upon.
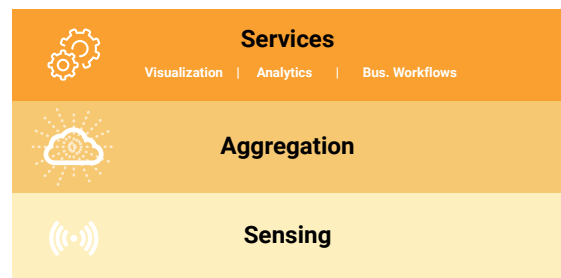
It is advisable to use wired sensors whenever possible for fixed property sensors, to circumvent the need for periodic battery replacement. However, wireless sensors powered by a battery are the practical choice for human sensors.

Data from the sensors are collected at the Aggregation layer; this typically takes the form of an IoT Gateway or Hub. For example, in an MDU application, each living unit may have an IoT Gateway installed as part of the building infrastructure, to collect data from the wired and wireless sensors in the living unit. The intelligence associated with interpreting and acting upon the collected data may reside in the gateway, or the gateway's role may be limited to only collecting the data and passing it up to the next level. In many cases, a hybrid approach is the best solution, in which some limited functionality is performed locally within the gateway, while the majority of the system intelligence is at the next level.

That next level is the Services layer, consisting of management software residing in the cloud or on an on-property computer. Here, at one central location, is the repository for all the collected data. The Services layer interprets the data for the purpose of passive monitoring, real-time control, and "if this, then that" functionality. And, performing data analytics on the accumulated data produces insights for a multitude of business, lifestyle and societal applications.

Another component of the Services layer is the User Interface (UI). The consumers of the IoT data, whether they be the Property Manager, resident, security personnel, etc., access and view the information reported by the IoT system with a UI. The UI can take many forms: a smartphone, smartwatch, tablet PC, a laptop, a smart TV, a voice control device such as the Amazon Echo, or a management console in a monitoring center. Certain UI types are more appropriate for different consumers; for example, a smartphone app may be most convenient for a resident, while the larger screen of a tablet PC is more suitable for a Property Manager.

Key Advantages of a 'Smart' building:

- Enhanced quality of life for all occupants.

- Marketing advantage over non-smart properties.

- Lower turnover rate for rental properties.

- Empowers remote caregivers for Aging-in-Place and child monitoring applications.

- Immediate notification of threats to property.

- For MDUs, monitor usage of common areas.

- Security for vacant units.

- Cloud-based, no server to maintain on premises.

- Establishes an IoT eco-system for future applications and technologies.

- Encourages a sense of community with retail promotions, neighbor interaction and neighborhood watch.

- Maintenance efficiency: reduced administration, phone calls, and fewer property visits will be required in order to diagnose potential issues and carry out repairs.

- Enables Utility demand management for energy efficiency and a reduced rate.

- Financial benefit: the property will be significantly more attractive to insurers and lenders as the system mitigates accidents that may lead to costly repairs.
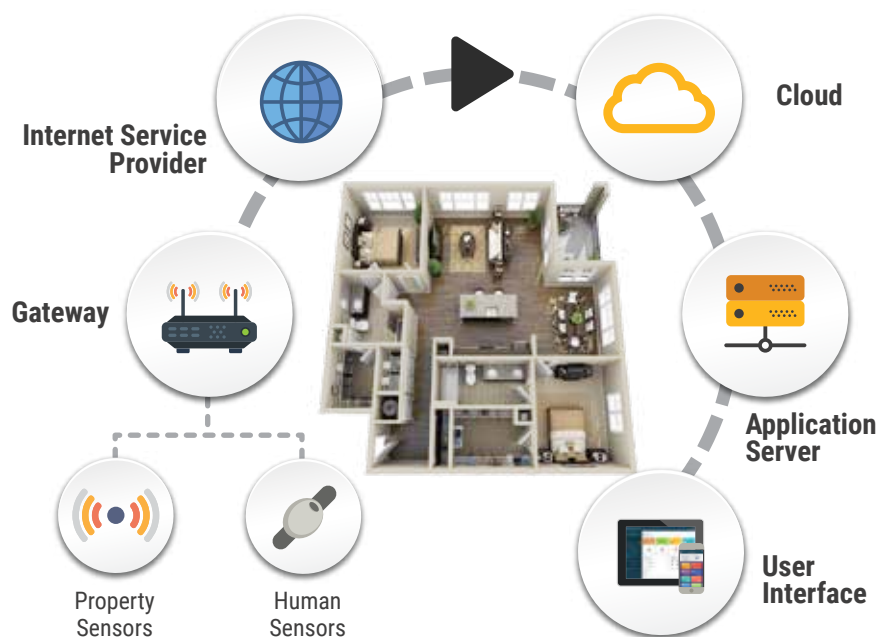
The Opterna Relyance™ System

The Relyance System is an integrated, foundational IoT-based solution designed to protect assets and empower occupants, transforming any property into a Smart Building.

With the Relyance System, the building network infrastructure is state-of-the-art for today and future-proof for tomorrow. The system facilitates asset management through the monitoring of hard-wired environmental and security sensors embedded in the property. System sensors monitor key environmental indications such as temperature, humidity, water and gas leakage, as well as carbon monoxide levels. In addition, the system addresses security concerns with entrance monitoring and motion detectors.

And, Relyance is an eco-system for the Internet of Things, now and in the future, with the addition of smart appliances, health monitoring devices and wearables. Wireless protocols are supported, allowing the property owner or tenant to add new IoT devices into the system over time.

For MDU applications, an intuitive app installed on a tablet PC provides the Property Manager with a comprehensive, real-time view of the property status. A smartphone app for residents displays appropriate information about their living environment.

With the many property management and quality of life features supported by the system, Relyance is not just a future-proof system, it's a future-now system.


The Relyance™ Gateway:

At the heart of the Relyance System is this multi-interface IoT Gateway, connecting the 'Things' within the property to the Cloud. It continuously collects data from sensors installed in the living unit, both wired and wireless, and features integrated temperature and humidity sensors. A full complement of compatible sensors are available, assuring a trouble-free installation.

The Gateway is designed to fit in a standard 4-gang wiring box, and is flush mounted in the wall, blending into the room's decor. Security protocols protect communications between the Gateway and a cloud-based server. The Gateway can be configured with a WiFi or Ethernet connection to the Internet; Gateway configuration is easily accomplished using the **Setup Relyance** smartphone app.

User Interface Applications:

The **Property Relyance** app is a full-featured interface for the Property Manager, enabling efficient asset management of an MDU property. Alerts from all living units are displayed and logged by the app. Resident profiles are entered and viewable. Property Relyance monitors the security of vacant units, as well as activity in common areas such as game rooms. Residents can be located within the property in case of emergencies. The Property Manager can enter bulletins in the app, which are sent to all resident's smartphones. Residents can report maintenance issues through their smartphone app to the Property Relyance app.

Home Relyance is a smartphone app with a feature set appropriate for the home owner or MDU tenant. Environmental conditions for their living space are displayed. Security sensors are monitored and alerts can be configured.   Bulletins from the Property Manager can be viewed, maintenance requests can be entered. For families, an "at home" feature detects the presence of each family member's mobile phone, a reliable indication that the family member is at or near the property.
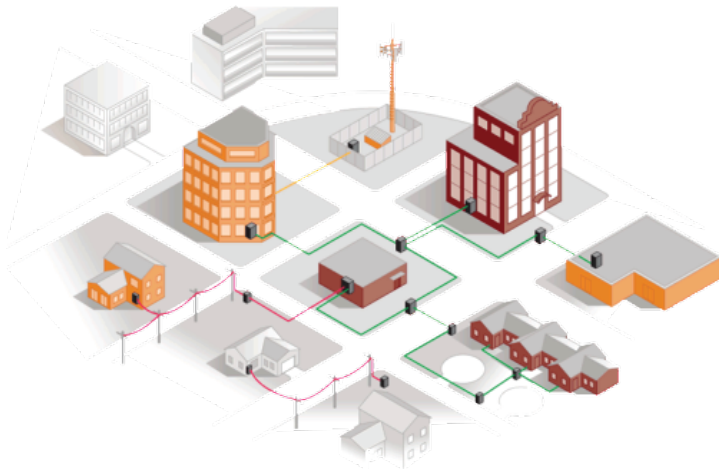
The Relyance Advantage:

Equipping a property with the Relyance System unquestionably improves quality of life for residents and clients, instilling an increased sense of safety and security; the result is a more satisfied customer and a significantly lower turnover rate. Relyance provides early detection of issues such as gas and water leaks before they become catastrophic, lowering maintenance costs and insurance rates. With a Relyance cloud-based server, there's no computer on premises, an important consideration for properties with no IT support. Recognizing that different property owners may require different features, Opterna has a world-class software team ready to provide customization services.

Combining Opterna's fiber optic connectivity with the Relyance System provides an unsurpassed level of smart building infrastructure in one integrated system.

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