

IoT Considerations, Requirements, and Architectures for Smart Buildings – Energy Optimization and Next Generation Building Management Systems

ABSTRACT

The Internet of Things (IoT) is entering the daily operation of many industries; applications include but are not limited to smart cities, smart grids, smart homes, physical security, e-health, asset management, and logistics. For example, the concept of smart city is emerging in multiple continents, where enhanced street lighting controls, infrastructure monitoring, public safety and surveillance, physical security, gunshot detection, meter reading, and transportation analysis and optimization systems are being deployed on a city-wide scale. A related and cost-effective user-level IoT application is the support of IoT-enabled smart buildings. Commercial space has substantial requirements in terms of comfort, usability, security, and energy management. IoT-based systems can support these requirements in an organic manner. In particular, Power over Ethernet (PoE), as part of an IoT-based solution, offers disruptive opportunities in revolutionizing the in-building connectivity of a large swath of devices. However, a number of deployment-limiting issues currently impact the scope of IoT utilization, including lack of comprehensive end-to-end standards, fragmented cyber security solutions, and a relative dearth of fully-developed vertical applications. This article reviews some of the technical opportunities offered and the technical challenges faced by the IoT in the smart building arena.

EXISTING SYSTEM

The Internet of Things (IoT) is entering the daily operation of many industry sectors. For example, the concept of ‘smart city’ is emerging. Smart city systems not only offer improvements in the Quality of Life (QoL) of the inhabitants, but also greatly improve efficiency

regarding asset management, including Intelligent Transportation Systems (e.g., smart mobility, vehicular automation and traffic control); smart grids; street lighting management; traffic lights management; waste management; environmental monitoring (e.g., sensors on city vehicles to monitor environmental parameters); water management; surveillance/intelligence; smart services, and crowd sensing (where the citizenry at large uses smart phones, wearable, and car-based sensors to collect and forward for aggregation a variety of visual, signal, and environmental data.) (Some of these services are known as ‘smart street’ services.) In the short term smart cities’ industries spans five key areas: energy, water, mobility, buildings, and government. The next granular evolution of the smart city is the application of these concepts in a more confined physical space, namely, to commercial building environments. In fact, nearly all the applications for smart cities have comparable applicability to building management (e.g., traffic/access control, surveillance, energy management, indoor environmental and air quality [IEAQ]/comfort control,

DRAWBACKS

- Energy cost is more

PROPOSED SYSTEM

Smart Building based on IoT concepts are expected to evolve rapidly in the next five years. The confluence of IoT, PoE, IP (IPv4 as well as IPv6) is expected to enhance the functionality, capabilities, energy efficiency, and cost-effectiveness of buildings, moving them up the automation continuum to a “smart building” status. In recent years, governments and regulatory agencies around the world have increased their focus on commercial buildings, given the fact that buildings are large consumers of energy. Continued regulation is expected (at least in some parts of the world), including mandates for greenhouse gas (GHG) emissions targets. Therefore, stakeholders should investigate evolving technologies such a next-generation BMS, PoE, IoT, cloud services, and converged networks to get a better handle on the issue, save expenses on the bottom line, and future-proof their environments and their investments. In the face of some of the challenges faced by energy management of smart buildings based on IoT-centered systems (a

number of which were highlighted in Section VII), there are significant industry and technical opportunities. The desire to reduce energy costs both by the building owners and the tenants, as well by the energy suppliers looking to cut peak-rate consumption and construction of peaking power plants, along with the optimization of comfort levels for office users and residents for both temperature and lighting conditions, affords this industry a strong business opportunity. From a technology perspective, the development of appropriate architectures and supporting standards, such that both equipment cost-effectiveness and interoperability will be beneficial. It is also critical to develop and deploy strong IoT Sec capabilities system-wide. Another important transition is currently underway: core carrier networks are in the process of adopting the principles of function virtualization, driven by the goals of reducing hardware costs and increasing functionality; virtualization has already been successfully and profitably adopted by the enterprise community during the past 15 years for server consolidation and improved computing throughput and good put. The anticipated migration by carriers to Network Function Virtualization (NFV)/Software Defined Network (SDN)-based Network Elements by the turn of the decade, will enable networks to be better suited to carry IoT traffic (for example from the building to the cloud), increasing communication flexibility, optimizing resource management and service provisioning, and simplifying the administration of the network . Finally, the development of cloud-based high-quality analytics will facilitate global optimization and appropriate data mining, trending, and forecasting.

ADVANTAGES

- It reduce energy costs.
- cost-effectiveness and interoperability will be achieved.

SYSTEM REQUIREMENTS

H/W System Configuration:-

- Processor - Pentium –IV
- RAM - 4 GB (min)
- Hard Disk - 20 GB

- Key Board - Standard Windows Keyboard
- Mouse - Two or Three Button Mouse
- Monitor - SVGA

S/W System Configuration:-

- Operating System : Windows 7 or 8 32 bit
- Application Server : Tomcat5.0/6.X
- Programming Language : Java
- Java Version : JDK 1.6 and above