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A Siemens Company

Building Automation: How to Remotely Manage Buildings with the Help of Secure and Easily Accessible IoT Technology

FIN™ Framework

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Remote connectivity in the smart building sector can be a challenge for many- but new technologies can deliver easier, more secure and scalable solutions.

Introduction

With the constant development and explosion of technology, connecting people and 'things' is now easier than ever and is expected as standard in our personal and working lives. But what about the building industry?

Connecting devices and equipment in buildings offers numerous benefits, including increased efficiency, energy savings, enhanced comfort, improved maintenance, and data-driven decision-making. It transforms buildings into smart and interconnected environments, improving the overall experience for occupants and reducing environmental impact.

This paper will look into what matters for System Integrators (SIs), Original Equipment Manufacturers (OEMs), Facility Managers (FMs), IT managers and End Users when it comes to managing buildings remotely. We will showcase how challenges can be overcome with the use of intelligent technology that can offer secure, seamless and scalable ways to connect buildings. Remote building management is possible with the help of secure and easily accessible IoT technology, and we will show you how.

The changing working environment

The future is remote

As internet capabilities have grown, it has been clear for some years that more work can be achieved remotely, but the COVID crisis has accelerated this trend. This has also impacted the building management market, where businesses have an increased need to resolve issues and manage building services remotely. While the pandemic led to a short-term decline in the Smart Building markets worldwide, the industry bounced back straight after, with the need for remote work fueling changes to how buildings are managed. The long-term consequence will be significant for building automation and especially for remote connectivity.

Now, more than ever, there's an increasing requirement for remote building management that's efficient and cybersecure. Remote building management solutions should offer users the capability to fully manage Building Automation Systems (BAS) from anywhere via mobile devices, as well as desktop browsers.

If, up until this point, you haven't been working with a framework that can deliver this sort of functionality for your customers, it won't be long before it is regarded as essential for all projects.

According to a study by leading cybersecurity experts, Kaspersky, in the first half of 2022, malicious objects were blocked on every third OT computer. Building automation infrastructure turned out to be the most "restless": nearly half of the computers (42%) faced cyber threats.

Staying ahead of cyber security threats

The growing threat of cyber security is real. As building automation is getting smarter, so are those willing to damage the safety and security of the smart buildings, systems, and smart equipment.

According to a study carried out by leading cybersecurity experts, Kaspersky, in the first half of 2022, malicious objects were blocked on every third OT (Operational Technology) computer. Most often, attacks against industrial companies were carried out using malicious scripts and phishing pages (JS and HTML). Building automation infrastructure turned out to be the most "restless": nearly half of the computers (42%) faced cyber threats. Since these systems may not be fully separated from networks of the organizations located in the building, they may be an attractive initial access target for attackers.

What's often the case in these scenarios is that the hacks aren't so much the fault of the system in place, but more so to do with how they're being managed and operated. This could be anything from users not acting on alerts quickly enough or, in the high-profile case of the 2013 Google Australia office hack in Sydney, the company still opted to run an out-of-date version of a legacy system.

It should therefore be a priority to ensure the employment of the latest, most secure connectivity software to avoid becoming another one of those statistics. Mitigating the risk of getting hacked in such a way that damages business and reputation involves both, good operating procedures and deployment of a secure connectivity solution that not only provides end-end encryption of the data connection, but also makes managing user permissions easier and more secure. FIN's Edge2Cloud service provides these features leveraging world-class security technology to enable easy yet highly secure remote access.

Advancing technology

Internet of Things

The Internet of Things (IoT) is an umbrella term that covers a raft of technologies that have enabled new business propositions. Fundamentally, IoT is about connecting devices to a software application (usually hosted at the cloud level) that delivers new business value in some way, such as by monitoring desk utilization to provide hot desk management services or tracking people's location within a building to provide wayfinding and space management services. Typically, the new sensors required to deliver such propositions use wireless technology to enable easy retrofit deployments. As such, they are mostly separate from the already installed building automation system(s). Currently, many of these IoT solutions are designed to send their sensor data directly to the cloud application, which then web serves dashboard-type visualizations to users. The additional real-time data these systems collect would also be useful to help optimize the environmental controls in the building, so there is a requirement to integrate the IoT data with the data from the BMS. However, to respond to a customer's request to achieve this, there is a need for software capable of supporting REST or MQTT type integrations since that is how the new breed of IoT software expects to integrate with other systems.

While most HVAC integrations can now be achieved using the BACnet protocol and most electrical integrations via Modbus, this is not the case for IoT integrations, and much of the BMS supervisory software currently used is not well suited to this. Unless a well featured BIoT-oriented (Building IoT) software framework is used on a project, the engineering will be a lot more complicated and is unlikely to deliver all the functionality the customer requires. If outdated technology is used that isn't compatible with IoT, then customers won't be able to benefit from valuable analytics, reporting, control, and data which can be delivered by a modern data management application based on semantic tagging.

It's predicted that the global number of connected devices in operation in smart buildings is set to increase from 1.7 billion in 2020 to just under 3 billion by 2025, showing a CAGR of 10.8%. Therefore, if customers feel they're not getting the most up-to-date, multi-functional, secure and IoT-friendly system, there is a risk they will go elsewhere.

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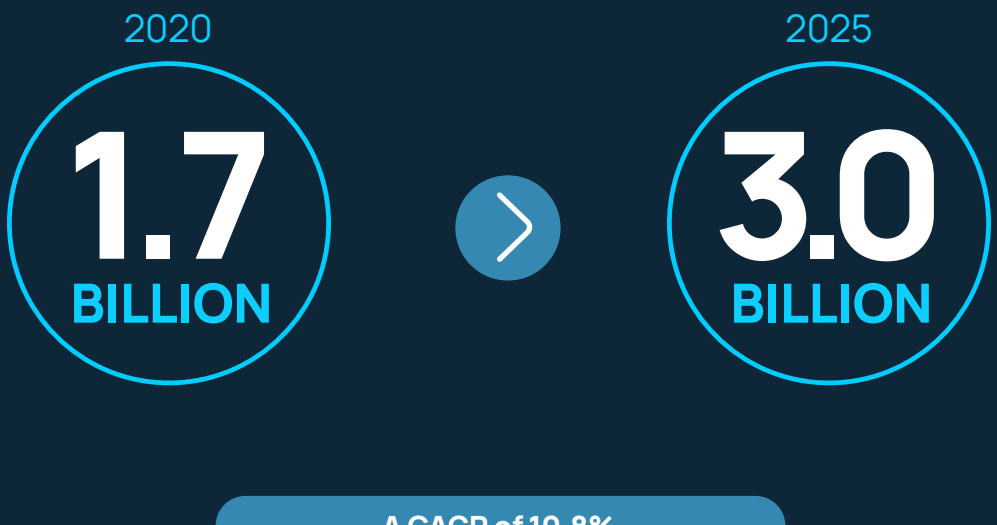

Convergence of IT with OT & Cybersecurity

Even before the rise of IoT applications, and since BAS manufacturers began to deliver IP-based controllers, there has been a desire on the part of building specifiers to converge the information technology (IT) systems with operational technology (OT) systems. In the early stages of the migration, from BAS serial networking to IP, there were many concerns on both sides; the IT departments were concerned about the BAS somehow compromising their business-critical IT infrastructure, either due to poor cyber-security or due to bandwidth issues. On the OT side, there were concerns about the reliability of the IT infrastructure since the environmental control and other services like lighting have to be working 24/7. Now that IP networking has become so ubiquitous, the unification of the infrastructure is happening since installing separate IP networks in parallel is an unnecessary cost. Virtual LANs and a better understanding on both sides of the bandwidth management issues, have made such convergence easier.

For many users, building automation is crucial in the business decision-making process. Therefore, there is a strong need to work with a platform that fully supports the IT requirements and enables such converged network solutions to be delivered efficiently and securely.

One of the biggest preoccupations of IT is how to deliver a cyber-secure solution.

Historically, BAS software has offered relatively poor cybersecurity, mostly due to the ageing architecture mentioned earlier, as well as the applications only being able to run on Windows rather than the inherently more secure Linux OS. There have been well-publicized examples of poorly configured systems being hacked. This is why selecting a modern software framework that has been designed to provide a high level of cybersecurity should be a priority. With technology like Edge2Cloud, remote connectivity proves to be secure, seamless and scalable.

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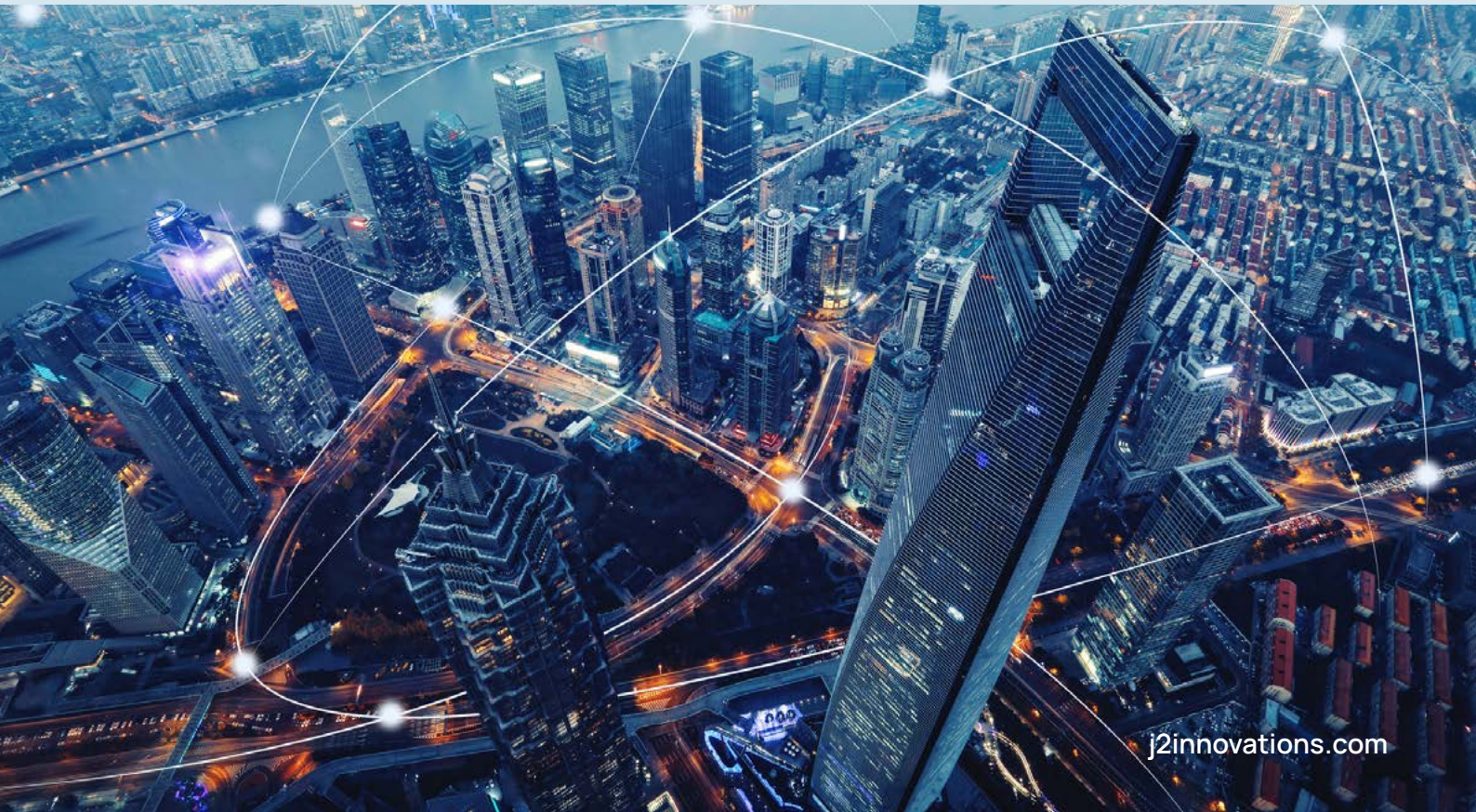


Benefits of connected devices through IoT

Effective energy management

Enhanced user experience

Seamless adaptation

Maximum efficiency

Data-driven decision making

Cybersecurity

Cost savings

Scalable solution

Remote connectivity

Remote connectivity plays a crucial role in building automation systems for several reasons. Remote connectivity allows you to monitor and control building automation systems from any location. Systems can be accessed remotely through a secure connection, enabling to check the status of various devices, sensors, and equipment, as well as adjust settings and parameters as needed. This capability provides real-time visibility and control over building operations, regardless of physical proximity.

Building automation systems are designed to optimize energy consumption by adjusting lighting, heating, cooling, and ventilation based on occupancy patterns, weather conditions, and other variables. With remote connectivity, facility managers can remotely analyze energy usage, identify inefficiencies, and make adjustments to optimize energy performance. This helps reduce energy waste, lower operational costs, and meet your sustainability and net zero goals.

In case of emergencies, equipment malfunctions, or system faults, remote connectivity allows building operators to respond quickly and effectively. They can remotely diagnose the problem, assess the situation, and take necessary actions without having to be physically present on-site. This capability minimizes downtime, prevents further damage, and ensures prompt resolution of issues, improving operational efficiency.

Additionally, building automation systems can generate vast amounts of data about the performance, health, and condition of various components and equipment. Remote connectivity enables users to remotely access this data, analyze it using advanced analytics tools, and identify patterns or anomalies that indicate potential maintenance issues. By proactively addressing maintenance needs, they can prevent unexpected failures, extend equipment lifespan, and reduce maintenance costs.

There is no doubt that remote connectivity allows building automation systems to be easily managed and expanded. It provides the flexibility to add or modify system components, sensors, or devices remotely, without the need for physical access to the building. This capability simplifies system management and enables seamless scalability as building needs evolve over time. It reduces the need for on-site visits and manual interventions, resulting in cost savings.

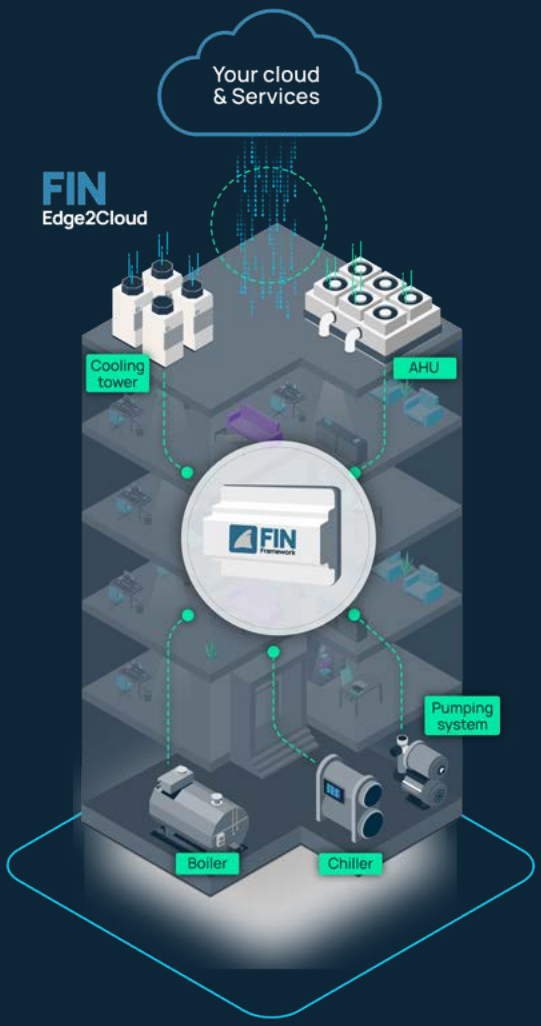
Remote monitoring, adjusting system settings, performing diagnostics, and troubleshooting issues without incurring travel costs or downtime associated with physical visits is extremely valuable. Additionally, the ability to remotely optimize energy usage and proactively address maintenance needs leads to long-term cost savings.

Easy, secure and scalable solution

Setting up remote connectivity can be difficult for system integrators, OEMs, facility managers, IT managers or end users. Their common challenges often include the complexity of configuring VPN solutions and limited IT resources.

Rapid technological changes and complex user access management can also make it difficult to keep products up-to-date and cybersecure.

Until now, remote connectivity has required IT support, including the use of a VPN connection, or having to go on-site, using up valuable time and resources. Thanks to the new technology from J2 Innovations, Edge2Cloud, remote connectivity becomes an easy, less resource-intensive task. It allows users of FIN Framework™ to access their building automation and IoT systems in an easy, secure, open and scalable way.



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Edge2Cloud

Edge2Cloud allows users of FIN Framework™ to access their building automation and IoT systems in an easy, secure, open and scalable way.

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FIN Edge2Cloud - an easy, secure, open and scalable way to connect to building automation and IoT systems.

Edge2Cloud is paving the way for OEMs, System Integrators, Facilities Managers, IT Managers and End Users of buildings to reap the benefits of remote and secure BMS connectivity without the need for additional IT support or a VPN.

It comprehensively manages FIN-based building automation systems once in the field and is easily connected to other cloud platforms. Edge2Cloud has a simple way to provide secure remote access to building owners. Fine-grained authorization using access groups enables you to provide access to particular sites based on Haystack tags.

Secure

Edge2Cloud uses the latest IoT web services technology from AWS to 'push' a highly secure, certificate- authenticated link, encrypted to TLS 1.2 and above, between an instance of FIN Framework on site, and the cloud. Where possible, Edge2Cloud relies on well-established and secure Amazon Web Services (AWS). Users only need to log in to the cloud service once to access the FIN (and building) data remotely from anywhere. Edge2Cloud leverages the Haystack standard for site-to-cloud communications. Edge2Cloud is regularly pen-tested.

Better management and scalability

Sites can be deployed and connected to the cloud in just minutes, utilizing a simple registration webpage or connecting via an optional QR Code using their cellphone. It's also easily connected and integrated with other cloud platforms via an open API framework based on Haystack 4.0.

The plug'n'play nature of Edge2Cloud makes it easy to add new devices, plus an advanced user management portal provides comprehensive user management.

As the number of sites grows, it becomes problematic to maintain an individual user access database for every site. With Edge2Cloud, user groups are managed globally and comprehensively in the cloud, greatly simplifying the process of creating and maintaining users and privileges across the enterprise.

Edge2Cloud provides exact control over access permissions, enabling large multi-site organizations to determine the appropriate level of access for maintenance subcontractors and other user groups.

FIN™ Edge2Cloud

Project Haystack

Time savings

Registering FIN with Edge2Cloud is super easy and quick, making time savings significant. User management is greatly simplified as it's all managed from the cloud. Edge2Cloud also offers a secure by default solution. The headache of setting up and maintaining end-to-end encryption for site access is already handled.

Helps troubleshoot problems remotely

Having the ability to remotely troubleshoot and diagnose issues can help proactively identify a problem. For example, when a "cold call" is received by a service provider, the BAS software can be utilized to pull up summary graphics, historical trends, and alarm history to help pinpoint the root cause. In the large-scale context of big data, this can be daunting, but through the use of Haystack tags and queries, it becomes a more manageable task.

Enables remote enhancements and updates

System integrators and solution providers who create the engineered systems of traditional BAS have a unique opportunity to provide new service offerings for optimizing the building's performance throughout the year. With Edge2Cloud's remote connectivity capabilities, the logistics and efforts required to analyze and enhance the software solution are greatly reduced. Imagine remote alarming, fault detection diagnostics (FDD), and after hours support easily implemented without the overhead of complex IT connectivity.

For (OEMs) that provide hardware and firmware for building HVAC systems, Edge2Cloud offers a new opportunity to expand their business and enhance their products. By connecting to the equipment they have supplied on site, they can monitor performance over time, generating huge amounts of aggregated data across multiple customers. With this data, analysis of how their equipment performs under various conditions can identify optimization opportunities and make software updates automatically.

FIN™ Edge2Cloud

What's unique about it?

Customized experience

FIN Edge2Cloud offers a customized experience, including a branded user interface catering to your needs. Utilizing the robust FIN Framework at the edge, you can create your custom dashboard at the site level, and display them on the map in EdgetCloud. You can even effortlessly integrate your own cloud solution with just a few clicks. Edge2Cloud's key differentiator is the ability to add customization and the speed at which we can get you up and running.

Single sign-on

When it comes to remote access, using competitive products often means dealing with the need to log in multiple times. Not only does this take up valuable time, it also adds to the management workload. With Edge2Cloud, you can enjoy the benefits of single sign-on, using your cloud identity for remote access without the need for additional local logins or multiple user databases to manage. Whether you have 50 sites or just one, Edge2Cloud makes remote access simple and efficient.

It's at the edge

When it comes to the cloud approach, our team takes a different route than most organizations. Many believe that the cloud is where applications and data are aggregated.

In our view of Edge2Cloud, we utlize the FIN Framework at the edge and complement that by using the cloud for navigation, remote access and user management. Edge2Cloud puts the right resources in the right locations so that they work together seamlessly to provide an exceptional user experience.

Easy onboarding

Connecting a new device is a breeze. All you need is your user login for E2C. Once you've logged in, it only takes a few clicks to get FIN up and running. The plug'n'play nature of Edge2Cloud makes it easy to add and manage users. Edge2Cloud also offers a secure by default solution. The headache of setting up and maintaining end-to-end encryption for site access is already handled.

Easy connection

Connecting to Edge2Cloud is made easy with FIN. Usually, there are several barriers to overcome, such as firewalls that protect IT networks. However, our team has simplified the process by allowing FIN to connect to Edge2Cloud over Port 443, the HTTPS port. This means that minimal or no changes are required by the local IT network for Edge2Cloud to call out to FIN. In certain environments, connecting a device to an outgoing cloud platform can be a challenging task. That is why Edge2Cloud's core value proposition is to be as easy as possible to connect with FIN.

Fast remote connectivity

Fast remote connectivity is a top feature of Edge2Cloud. While other remote access solutions may offer good connectivity, their speed can often be painfully slow. When designing Edge2Cloud, J2 Innovations has put a lot of effort into ensuring that E2C remote connectivity is lightning-fast. In fact, the Edge2Cloud system can even load faster than if you were accessing it locally. This platform allows for remote access without the need for a VPN, not only for humans but also for machines with access tokens. It serves as a development platform that can be customized to fit specific needs.

How to get started with Edge2Cloud?

Check out the Edge2Cloud getting started guide!

FIN™
Edge2Cloud

> The release of FIN Edge2Cloud is a game-changer for the building automation industry. For the first time, organizations can now procure an open framework that enables highly secure remote access to data from multiple systems on their sites that use BACnet, Modbus, and other protocols. All of this is done without the hassle, cost, and complexity of a VPN

Gareth Johnson, J2 Innovations Chief Software Architect

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Customer requirements, usability, and productivity

The need for – and value of – data

Buildings are an expensive asset to build and maintain, but also manage. As building automation technologies have developed, and lower-cost sensor technologies have become available, more and more building-related data is being generated in real-time. The value of analyzing and basing decision-making on this real-time data is becoming more and more apparent. To enable this data to be processed automatically by computer software, it needs to be structured by using a data modeling and semantic tagging methodology like Haystack or Brick.

Building managers want to be as productive and efficient as they possibly can, using state-of-the-art technology and standards which System Integrators could be working with.

Standards like Project Haystack, which is an open to all initiative, defines how data is abstracted using a data-model and semantic tagging, making data easier to obtain and exchange between systems and applications.

FIN's use of Haystack tagging creates new possibilities, as fault detection diagnostics and analytics rules can be easily applied across a whole project remotely. For example, automated sequences generating reports can pick up on things such as sensor and actuator faults. This is beneficial to the building's maintenance and can save both time and money.

Standardizing on the use of Haystack isn't just better for the customer, it's also efficient for system integrators too.

Simplifying integration and configuration tasks means getting the job done quickly and making more profit while giving the customer a better end-result and, most importantly, giving them valuable data at their fingertips.

"Standards like Project Haystack, which is an open to all initiative, defines how data is abstracted using a data model and semantic tagging, making data easier to obtain and exchange between systems and applications."

Project Haystack

What software is needed?

If you were to shop around, there are most likely several different solutions that could be used side by side to tackle each of the hurdles and changes we've discussed above. Doing so is not only complicated and clunky when it comes to integration, but it's also not cost-effective.

There's only one solution that can provide the answer to every single one of these problems on its own, with all features as standard and no additional costs – and that's J2 Innovation's FIN Framework™ with secure connectivity thanks to Edge2Cloud technology.

- Reducing systems engineering/ configuration time.
- Offering a more intuitive user experience, both for its End Users and System Integrators' own project engineers
- Delivering better dashboard visualization for end users
- Having secure remote access, thanks to Edge2Cloud technology
- Supporting IoT and IT style protocols (e.g., MQTT, JSON and REST)
- Enabling data-modelling and semantic tagging
- Having the ability to integrate with systems beyond building services (e.g., room booking and asset management systems)
- Annual Life Cycle Management (LCM) program to keep systems up-to-date and for optimum performance

Edge2Cloud essentials

Included in Life Cycle Management (LCM) / maintenance

User & device management – intelligently manage users, devices and their data once they are registered with the cloud

Portfolio management - manage all devices for all projects from one central place

Remote access - seamless integrated remote access: No VPN, no 2nd logon, secure, fine-grained authorization

Web-of-things basic - connecting FIN instances over the Internet with other FIN or 3rd party cloud solutions utilizing Haystack API - Up to 1 GB / month free per FIN instance

The backup feature provides three automatic rolling backups and three selected permanent backups

Dashboards - simple live dashboard for device health, alarms and other key data from device

Edge2Cloud add-on

Web-of-things enterprise

Connecting FIN instances over the Internet with other FIN or 3rd party cloud solutions utilizing Haystack API – More than 1 GB / month per FIN instance

Additional capacities priced on request

Conclusion

Remote connectivity is key

Outdated software applications that are complicated to configure or are not possible to manage remotely will lose out to newer “next-generation software” able to offer end users and those who install and commission systems a simpler and easier way to interact and manage buildings.

The adoption of data standardization will enable the various building systems to become more easily integrated than ever before.

Throughout this whitepaper, we provided examples of how remote connectivity can be achieved in an easy and scalable way without compromising on security.

It’s possible to keep costs down

With all these new trends, as well as increased labor costs due to the market’s skill shortages, dealing with the pressure to improve smart buildings’ performance while decreasing system costs can feel overwhelming, especially as the complexity of projects is increasing. This is a solvable challenge.

You can reduce costs and increase value by using a software framework that:

Is faster to engineer, thus reducing installation costs and offering opportunities to work with more customers

Provides visualization tools to enable rapid customization to meet end-user requirements in a cost-effective way

Utilizes a standardized data model and tagging to make multiple system integration much easier

Uses cloud and IoT technology to simplify deployment and remote management

The demand for automated and secure system configuration, greater functionality, and the constant desire to make buildings smarter should be seen as an exciting and challenging opportunity.

Let’s take this exciting journey together.

Find out more about Edge2Cloud: www.j2inn.com/fin_edge2cloud

Find your answers in: Frequently Ask Questions on Edge2Cloud

Read the latest Edge2Cloud Guide for IT Managers: Edge2Cloud-Security-Overview

Find out more about FIN Framework™: https://www.j2inn.com/finframework

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