

# Thread and Matter in Smart Buildings White Paper

September 2022

This Thread Technical white paper is provided for reference purposes only. The full technical specification is available publicly. To join gain access, please follow this link: <https://www.threadgroup.org/ThreadSpec>.

If there are questions or comments on these technical papers, please send them to [help@threadgroup.org](mailto:help@threadgroup.org).

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## White Paper

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## 1. Introduction

With the release of the [Matter](#) spec and the first wave of products being introduced, interest is growing within a large number of markets and industries. Not only the consumer market, but also the commercial and industrial markets are following and contributing to the developments, and with good reason.

Matter, a working group within the [Connectivity Standards Alliance](#), will bring a number of unique new advantages for the IoT space that until recently were unprecedented in the smart building market or only achievable at very significant levels of investment in time and resources.

We know there are varying levels of complexity when it comes to IoT needs for smart building applications. Some need to be able to analyze usage data, allow for the dynamic allocation of workspaces and integrate with company-specific IP-based cloud solutions. [Thread](#) was specifically designed for these needs and the standard was therefore selected by many commercial grade building automation standards like DALI+, KNX IoT, OCF and BACnet as their primary low-power IP-based wireless mesh networking technology.

This document will explore new features and capabilities for the Smart Building market that are possible by combining Thread as a networking technology with Matter.

## 2. Advantages of Scale and Unified Ecosystems

We know that many technologies that found their origin in the consumer space are very suitable for smart building applications as well. We have seen this happen in the past, with Wi-Fi being a primary example. Wi-Fi started in the consumer domain and later became ubiquitous in the building automation world as well. Being able to use the same technology in different environments leads to major advantages in economy of scale, with production capacity of components going up, prices coming down and having a wide selection of manufacturing sources without being tied to a limited number of suppliers.



Until recently, benefiting from this overlap between the consumer and industrial worlds was not really achievable when it came to IoT and building automation, specifically at the level of integration and multi-vendor compatibility with multiple consumer-originated ecosystems.

Today, there are advanced ecosystems for home automation that offer various levels of complexity in interfacing with AI or voice based assistant devices creating an ecosystem of devices that have many applications.

Despite the scale of the consumer space, there are some challenges. Most consumer home automation ecosystems are often centered around a particular device or ecosystem vendor's protocols and interfaces. Control devices (e.g., voice assistants, apps, smart displays, etc.) are produced by, or based on the technology of, one specific manufacturer. As those technologies or protocols are not generally open or licensable, this makes it challenging for commercial systems to integrate most off the shelf smart home devices, without requiring those device vendors to make special accommodations. A further challenge is that many smart home integrations are done in a cloud-to-cloud manner, which may not be well suited to the needs of commercial network management. This means that the options to develop custom solutions or add-ons in-house are limited.

With the introduction of Matter, this is about to change. Matter was developed by a large number of leading consumer electronics and component manufacturer companies who are members of the Matter Working Group within the Connectivity Standards Alliance.

Within the Matter initiative, companies like Google, Apple and Amazon contributed market-proven technologies with the ultimate goal of coming to a unified standard.

### 3. Thread and IP Enable Matter in Smart Buildings

Matter was designed with the ubiquitous Internet Protocol as its foundation. As Thread was specifically developed to be fully IP-based, it's no surprise that



it was chosen as the low-power, self-healing mesh networking technology, complementing Wi-Fi and Ethernet as the supported networking technologies for Matter.

Thread is based on the proven IEEE 802.15.4 low-power radio technology, and because of its IP-foundation, it does not require a manufacturer or ecosystem specific bridge or hub to translate traffic to and from the rest of the network. All that is needed is a Thread Border Router function that can be part of a device such as a smart speaker or a cable modem, comparable to built-in Wi-Fi functionality.

The new unified Matter standard, coupled with Thread, offers a number of advantages for the smart building market:

- For smart building applications, Matter is an open standard that allows for the creation of in-house developed control panels, voice products, touch display dashboards, smartphone and tablet apps or any other form of user interface interaction that might be desired for a specific application. Such devices and apps might even be combined with “off-the-shelf” interface products like smart speakers, offering previously unimaginable levels of flexibility.
- Matter will end the need to support and maintain compatibility with multiple popular voice assistants and ecosystems. One SKU based on one standard will now be usable with all ecosystems that embrace Matter, greatly increasing the number of available IoT devices for commercial applications that require some form of flexibility.
- Matter will allow the mix-and-match of various voice assistants, smart speakers and touch-based smart displays. No longer does a choice for one specific ecosystem need to be made up-front, which liberates from lock-ins and greatly increases choice.

Currently, a number of widely popular proprietary and semi-proprietary product portfolios exist for markets such as smart lighting. Many of these are based on non-IP technologies like Zigbee Pro/Zigbee 3.0, and hence will not be directly compatible with the Matter standard. In order to give these products the possibility of being used in a Matter ecosystem, the Matter specification will include guidelines for a bridge device that can act as a translation gateway between the non-Matter devices and the Matter standard. This means that a Matter smart speaker or app can operate and



control these bridged devices as if they were native Matter devices. This provision gives both manufacturers and end users who have invested in existing products and technologies some headspace towards a transparent and bridge-less future, without making these products obsolete.

## 4. Use Case: Thread and Matter in Apartment Buildings

For decades, apartment buildings have been equipped with networked technology. Everything from elevators and security systems to the lighting and climate control systems, consists of connected devices that communicate with one another to perform efficiently and reliably.

However, in today's buildings, most of these systems are separate, siloed installations that are limited to their own operating domains. And they primarily run on their own network infrastructure. For instance, lighting systems do not interact with the HVAC system and both systems require independent cabling, security and maintenance.

Additionally, the building's "smarts" are not connected to each other, making it difficult to integrate applications such as security systems, lighting or door access in order to offer a more integrated and streamlined experience to the building's tenants. Let alone allowing them to customize their setups or extend them with additional devices and functionality.

Thread, as a low-power secure wireless networking technology, and Matter, as an integrated application framework that supports many types of devices across major industry ecosystems, offer an ideal solution to this constrained situation. Buildings outfitted with Thread and Matter networks offer a great number of benefits for the building owner/rental company in terms of installation and operational costs while increasing value to the tenants. Buildings equipped with Thread and Matter technology also offer a great starting point for consumers to invest in their apartment's smart capabilities, making them an appealing target for after-market consumer IoT devices.



## 4.1. Benefits for Building Owners

Apartment building owners have to manage a building consisting of many homes, making all the systems and infrastructure needed for necessities like lighting, security, heating and access control the responsibility of the building's owner. Bringing Thread technology and the same basic technologies used in smart home devices to these buildings offers a number of benefits.

### **Integration of building network infrastructure systems**

The silos found in current buildings, as explained above, mean that building technology domains are limited to one or a small number of applications. For example, there is minimal overlap between the networks that operate the building's climate controllers and the networks operating its lighting systems. Both systems require their own physical wiring with complex planning and expenses as well as limitations when it comes to integrating services.

To solve these issues, the world of building automation is making a shift to IP-based networks. New buildings are equipped with IP-based network infrastructure and retrofits are happening to existing buildings, sometimes also driven by local or governmental regulations related to security or energy usage.

Since Thread is based on the IP protocol, devices built on Thread can easily connect to a building's IP-backbone. Only a single networking infrastructure needs to be installed and maintained which can carry all applications, ranging from security and HVAC to lighting and access control. The wired IP infrastructure can handle all the centralized needs of the building and the communication to the Internet and the outside world.

Thread, in contrast, wirelessly connects devices such as lights, sensors, buttons and control panels within the tenant's apartment. This means that a building owner and staff have to maintain just one network infrastructure and can use that network infrastructure to aggregate valuable information about all the systems needed to operate a building.

### **Future-proofed infrastructure**



Traditionally, every single button or sensor in a tenant's apartment needs to be wired to a specific function, i.e., turning on a particular light. This not only requires extensive planning when it comes to the placement of buttons, lights and devices, but it also severely limits the flexibility to change the behavior of buttons or to add an additional light or two in the future.

With Thread, the communication between buttons, sensors and control panels and specific groups of devices is fully wireless and can be set up to any desired configuration, which can be changed as needed, either by the building owner or tenant. Flexibility for reconfiguration gives building owners the ability to easily adapt their buildings to meet future requirements.

### **Safety and stability of an independent IoT network**

If an apartment is equipped with a Thread network through the installation of devices, including at least one that functions as Thread Border Routers, there is an opportunity for the building owner to secure the IoT or home automation operations in the tenant's unit.

Since a Thread network is specifically designed for IoT purposes, there's no need for frequent replacement or updates of the internet network infrastructure.

Compare this to IoT devices that are connected to a Wi-Fi network. Wi-Fi technology and the requirements of wireless internet are rapidly changing, with tenants wanting more control to choose their own routers or access points. This increases the probability of connected devices to malfunction. Thread is more suitable for IoT applications due to its low-power and reliable mesh functionality. Separating the wireless IoT network from the generic wireless internet network also greatly reduces the possibility of conflicts and malfunctioning, due to a potential spike in network load caused by multiple users of intensive data applications.

### **Ease of updates, maintenance and direct access**

Thread is based on the widely deployed and familiar IP protocol and does not require a hub or gateway to translate communication that comes from the internet into a proprietary IoT networking protocol.



Since the devices are IP addressable, the IoT network can directly update firmware or perform software maintenance making it much easier for the building owner to deploy firmware updates that enhance security or add new functionality to devices.

### **Personalizing control apps, branding and partnerships**

A Thread network that contains devices based on the Matter application platform offers tremendous flexibility in terms of how to operate and control devices. This ranges from simple and familiar buttons and dials, via smart displays, to interactive voice assistants. Since Matter is backed by major IoT vendors across multiple ecosystems, users can choose their preferred method of operating the devices in their apartment.

And, since Matter is a fully open application framework, a building owner isn't limited to these standard user interface (UI) platforms. For example, it's possible to create smart displays that can be installed on a wall or to develop control applications that a user may install on their smartphone or tablet. These in-house developed interfaces might add additional functionality and have specific branding. Depending on the situation, a building owner might work with specific partners that offer additional features or promotions in these applications.

### **“Smart” adds value for tenants**

Furthermore, providing extensive smart features to an apartment building adds significant value for a tenant over “traditional” apartment buildings. Living in a “smart apartment” adds comfort and convenience for its occupants as it allows for easy control of lights and heating. It also adds to the feeling of safety since occupants receive notification of smoke detection or movement. And it simplifies a variety of home tasks as many devices can be automated based on the detection of user presence, time of day, weather conditions and more.

As consumers become more accustomed to the concept of smart homes and the benefits of IoT over traditional homes and devices, having both the network groundwork already set up along with operating control panels, sensors, lights, heating and other smart devices offers both building owners and tenants considerable value.



## 4.2. Benefits to Device Manufacturers

There are a number of ways in which smart home product manufacturers can benefit from an increased number of pre-installed smart products in rental apartments. Not only in terms of increasing market awareness but also because it creates a point of entry for after-market products. Let's look at these benefits in greater detail.

### **Raise awareness of IoT benefits among consumers**

Living in an apartment equipped with numerous IoT devices is a great way to educate consumers about the possibilities offered by smart homes. As with most new technologies, consumers making a first-time purchase are likely to see the benefits and advantages of these new technologies over time and will embrace and accept them into their lives.

When apartment dwellers are exposed to these technologies, it will greatly help the process of making consumers accustomed to what they are, how they work, and how they add value to their lives. In fact, many of these customers are more willing to invest in products to enhance the functionality of their smart homes even further and will start looking for products to address those additional needs.

As customers grow accustomed to the devices in their homes being "smart," it is more likely this will increase the perceived value of smart devices among consumers and drive future purchases. A washing machine that does not signal the end of a cycle by sending a notification to the home's operating panel or smart speaker or a robotic vacuum cleaner that is unaware of the user's presence in the house will ultimately become less and less attractive to consumers.

### **Eliminate the setup and maintenance burden**

One of the most common reasons consumers are holding back from investing in smart home products is not knowing how to get started. Often, outfitting a home or apartment with IoT devices entails a decision-making process about which protocols to choose, which gateways to select and which applications to use, presenting challenges to potential buyers.



Having your house or apartment already equipped with the proper “plumbing” in the form of the network and buttons, smart displays or apps to operate the devices will give consumers confidence that the necessary groundwork is in place and that it will be easy to add new smart devices to the home.

### **Device compatibility for consumers**

Tenants who live in an apartment that’s pre-equipped with smart devices will look for specific branding and logos (like the Thread and Matter certification marks) when purchasing new devices to have confidence in it working seamlessly with the rest of their smart home.

Thread and Matter-based devices don’t just cater to a market of individuals who are new purchasers of smart home products, they also underscore demand among high-value consumers already convinced of the benefits of the smart home who are looking to further enhance their way of living.

## 5. Conclusion

As we have seen, Matter is an exciting development for the smart home and building worlds. It has the potential to bridge the gap between consumer and professional applications and offer choice in products, flexibility in eco-systems and options for in-house development and customization that were not available before.

With Thread as its low-power IP-based mesh networking foundation, Matter is destined for a future that will impact not only the consumer market but will be of extreme value to the smart building market as well.

