

Domatic

Product Overview

Domatic is a power-distribution and building-automation system that delivers DC power and IP networking to building fixtures over a single low-voltage NEC Class 2 wire pair. Compatible fixtures — lighting, sensors, switches, HVAC controls, doors, shades, audio, and video — are connected, powered, and controlled through an on-premises hub that runs the Domatic OS and bridges to the Domatic Cloud for management and analytics.



System components

Low-Voltage DC Bus

A 2-conductor NEC Class 2 cable that carries DC power and a 240 Mbps IP data channel on the same wires. Arbitrary topologies are supported — branch, daisy-chain, or shared runs.

Domatic PowerHub

The on-premises edge device that delivers power, manages the network, runs local applications, and bridges to the cloud. Ten Class 2 ports up to 1000 W per hub; multiple hubs can be linked for additional capacity or redundancy.

Fixture Development Kit

Driver devices that drop in for a fixture's AC/DC adapter, plus reference designs for OEMs building their own. The PowerNode module encapsulates the network and protocol stack and runs application-specific microcode written by the fixture maker.

Domatic-Enabled Fixtures

Connected fixtures receive up to 100 W and communicate with the PowerHub over the same wires. Like USB device classes, fixtures self-identify so the PowerHub provisions and manages them without per-device drivers.

Domatic Cloud

Aggregates every PowerHub in a building into a single managed entity. Provides a building-manager portal, fault notifications, and a data warehouse for analytics; PowerHubs continue normal operation during internet downtime.

Application Development Kit

For building third-party applications that run on the PowerHub — energy algorithms, building-control coordination, touchscreen UIs. Applications run sandboxed, are updated and uninstalled cleanly, and a JavaScript starter environment ships with the kit.

Table of Contents

Table of Contents 2

List of Figures 2

What is Domatic? 3

Advantages 3

 Safety 3

 Ease of Installation 3

 Automation 3

 Energy Efficiency 3

NEC Class 2 4

 Wiring 4

Simpler Wiring, Less Copper 6

System Description 8

 The Domatic Hub 8

 Fixture Drivers 8

 The Domatic Cloud 9

List of Figures

Figure 1 A simple Domatic installation. 5

Figure 2 Wiring distance considerations. 6

Figure 3 Comparison of Domatic vs. traditional AC wiring of a 3-gang switch box. 7

Figure 4 How Domatic virtual controls work. 8

Figure 5 The Domatic system. 9

What is Domatic?

Domatic is a power-distribution and building-automation system that allows fixtures in a building to be connected, powered, and controlled with simple wiring and plug-and-play provisioning. It uses a low-voltage NEC Class 2 wiring system that combines power and data on two thin conductors that are branch-able and daisy-chainable, and an open protocol that allows fixture manufacturers and software developers to participate in the development of intelligent applications.

By operating within NEC Class 2 power limits, Domatic is safer and easier to install than traditional wiring while still carrying enough power for modern building fixtures. This “low voltage” approach to power distribution is enabled by several factors, including the advent of LEDs for lighting and DC motors for ventilation. Most importantly, every Domatic-enabled fixture gets a unique IP address, meaning every fixture is now a component of a smart building, opening the opportunity to innovate with software.

Domatic supports a wide array of fixtures including lighting, sensors, door controls, ventilation fans, window blinds, speakers, cameras, switches, touchscreens, water meters and cutoffs, power meters, and HVAC controls. As such, Domatic breaks down the silos between different systems enabling applications to optimize building performance in ways never before possible. With standard interfaces, akin to USB device classes, fixtures can be automatically discovered and provisioned with no need for custom drivers or manual configuration.

The Domatic cloud provides the property owner access to manage the building’s fixtures and applications, collect data, and get notified of faults, bringing unprecedented knowledge of building performance. Software developers can then create applications that run on any building, targeting use cases around energy efficiency, resident comfort and convenience, safety and security, property management, and more.

Advantages

Safety

Domatic wiring is inherently safe because of the NEC Class 2 designation, which is the same level as thermostat wiring and networking cables. This means it poses a lower risk of electrical shock or fire, yielding significant benefits for inspections and ease of installation. As such, there is no requirement for turning off the circuit breaker while servicing Domatic fixtures.

Ease of Installation

Domatic is easier to install than traditional AC wiring. The flexible 18 AWG (0.82 mm²) wire pair is significantly easier to pull and strip than 3-wire 12 or 14 AWG (3.3 or 2.1 mm²) Romex and requires no conduit or metal-clad wiring sometimes needed for AC wiring. In addition, there is no need for switch legs or 3-way runners. Because all control is done in software, the building engineers need only be concerned about getting power to the fixtures and not worry about control wires. All told this yields **90% savings in installed copper**.

Easier installation translates into faster installation and significant labor savings. Electricians report an overall **labor reduction of as much as 75%**.

Domatic’s plug-and-play provisioning system automatically detects and identifies fixtures and assigns them to roles in the building template. In the process, installers are informed of wiring errors and directed to the suspected location for easy repairs. After the build, failed fixtures are detected automatically, and building owners are informed of the faults. Because the power is low voltage, replacing fixtures is far easier than traditional AC replacements, with no requirement to turn off breakers.

Automation

A Domatic building is fully automated because all connected fixtures are innately intelligent and connected. The central hub communicates over the shared Domatic Bus with Domatic fixtures to provide advanced building features enabled by the Domatic OS. The OS can host automation applications, both on-premises on the Domatic Hub as well as on the Domatic Cloud.

Energy Efficiency

Traditional buildings run AC power throughout the building. Modern fixtures and electronics are typically DC-powered devices that require a converter to be powered from the AC source. AC-to-DC conversion at low power levels (i.e. at the fixtures themselves)

wastes as much as 50% of the delivered energy. By running DC power throughout the building instead, Domatic makes it possible for fixtures to achieve up to 90% efficiency, **saving as much as 30% of the delivered energy versus AC.**

Furthermore, a building with sensors can increase energy efficiency by responding to inputs such as occupancy, door access, location services from occupant devices, ambient temperature, and internet services such as weather reports. This can yield an **additional 30 – 50% increase in overall energy efficiency.**

NEC Class 2

Often referred to as “low voltage”, the NFPA National Electrical Code (Article 725) designates circuits that operate under 60 V and are capped at 100 W as “Class 2”, with significantly relaxed code requirements because of the inherent safety from fire and shock hazards.

Outside of North America, building codes call out “Safety Extra Low Voltage” (SELV) with similarly relaxed requirements, so the advantage of designing a system that operates at safer power levels is a worldwide opportunity.



Wiring

Domatic operates at a nominal 48 VDC, meeting Class 2 as well as international SELV requirements. Wiring is achieved using 2-conductor CL2 or CL3 cables as defined in NEC Article 725. CL2/CL3 cabling is suitable for in-wall installation and is commonly used for low-voltage applications like burglar-alarm cabling, intercom wiring, and speaker wire.

Cables can be joined, branched, and daisy-chained using simple junctions such as wire nuts or lever-clip interconnects. Arbitrary numbers of fixtures can be connected to a single port on the Domatic Hub as long as the Class 2 limitations are observed.

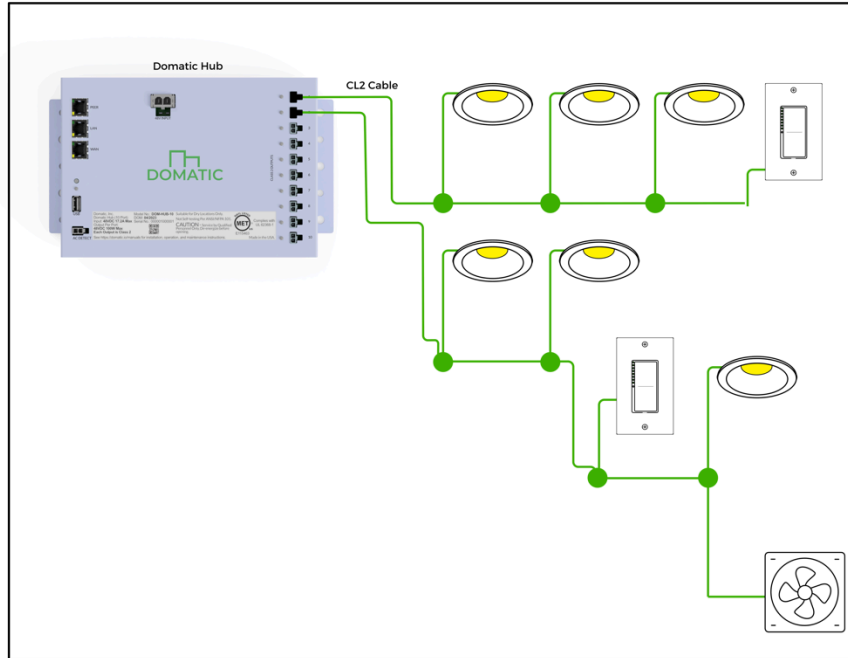


Figure 1: A simple Domatic installation.

For a typical 16 AWG (1.3 mm²) cable, Domatic can support a maximum distance of **50 m (164 ft)** from the hub to the furthest devices. The range is dictated by voltage drop along the cabling. Further reach is possible if needed simply by using thicker wiring. Conversely, a smaller deployment, limited to 25 m, can use 18 AWG (0.82 mm²) wiring successfully. The Domatic Solutions team can help with designing the wiring solution for specific use cases.

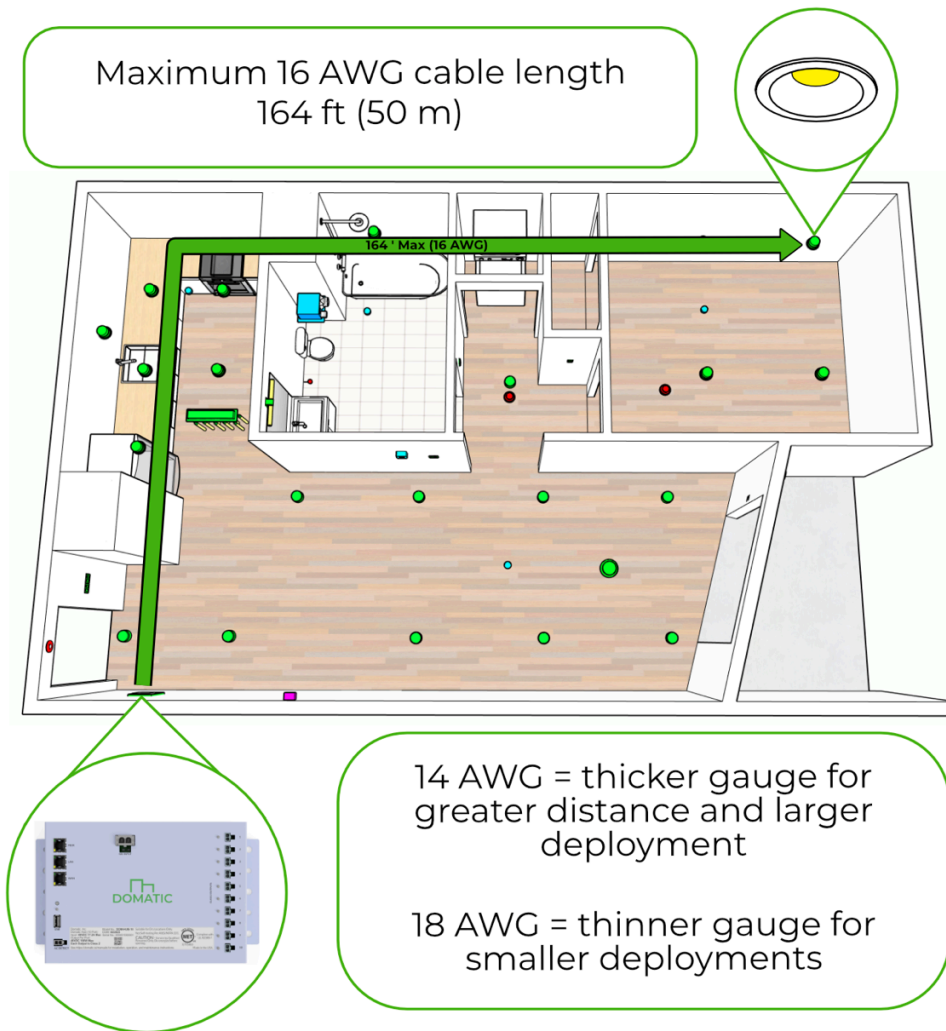


Figure 2: Wiring distance considerations.

Simpler Wiring, Less Copper

Consider the wiring needed for a 3-gang wall switch as depicted in Figure 3.

For a traditional-voltage AC power distribution, this box requires at least one in-bound circuit, typically on a 12/2 Romex (containing 3 conductors: Line, Neutral, and Ground), plus one Romex per switch to feed the controlled power to the associated fixture (the switch leg). These switch legs are either 12/2 Romex or, in the case of 3-way switch configurations, 12/3.

In addition to the high number of wires needed, NEC has numerous rules governing how Romex is to be selected, routed, cut, and joined. Generally, Romex cabling needs to be tacked down along its path to the junction box, preventing slack allowance for work performed. This makes doing work at hard-to-reach locations more difficult.

The Domatic equivalent is remarkably simpler. A single 16/2 cable from the Domatic network carries power and a data connection to all three switches in the box, which significantly simplifies the wiring.

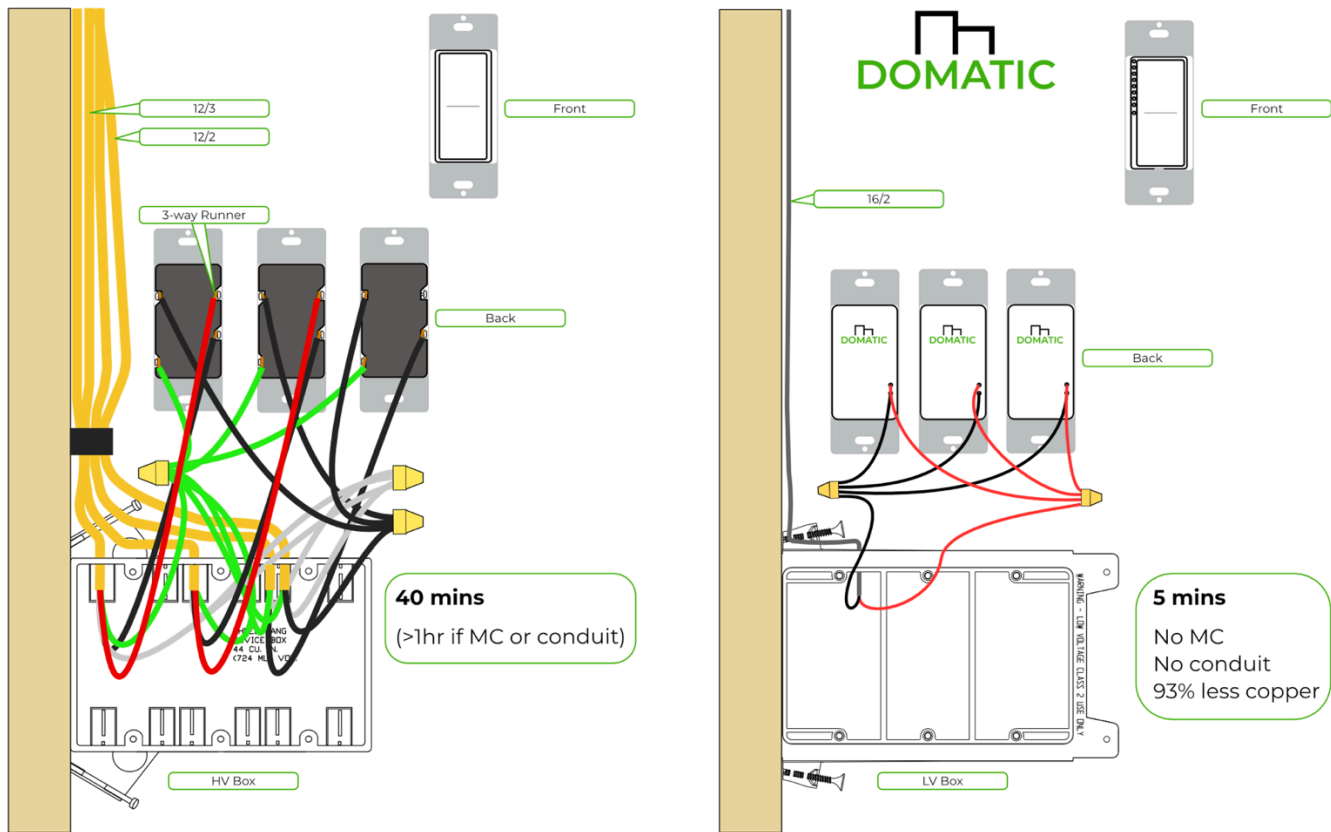


Figure 3: Comparison of Domatic vs. traditional AC wiring of a 3-gang switch box.

No matter the complexity of the control (3-way, 4-way...N-way), there is no need to run any switch legs at all. Each Domatic fixture is a tiny computer on the IP network, and they simply respond to commands being sent to them. A tap on a Domatic switch sends a message over the Domatic Bus to the hub, and the hub then sends a message to the Domatic fixture to adjust itself, be it brightness level, fan speed, door-lock state, etc. This software-based virtual control is depicted in Figure 4.

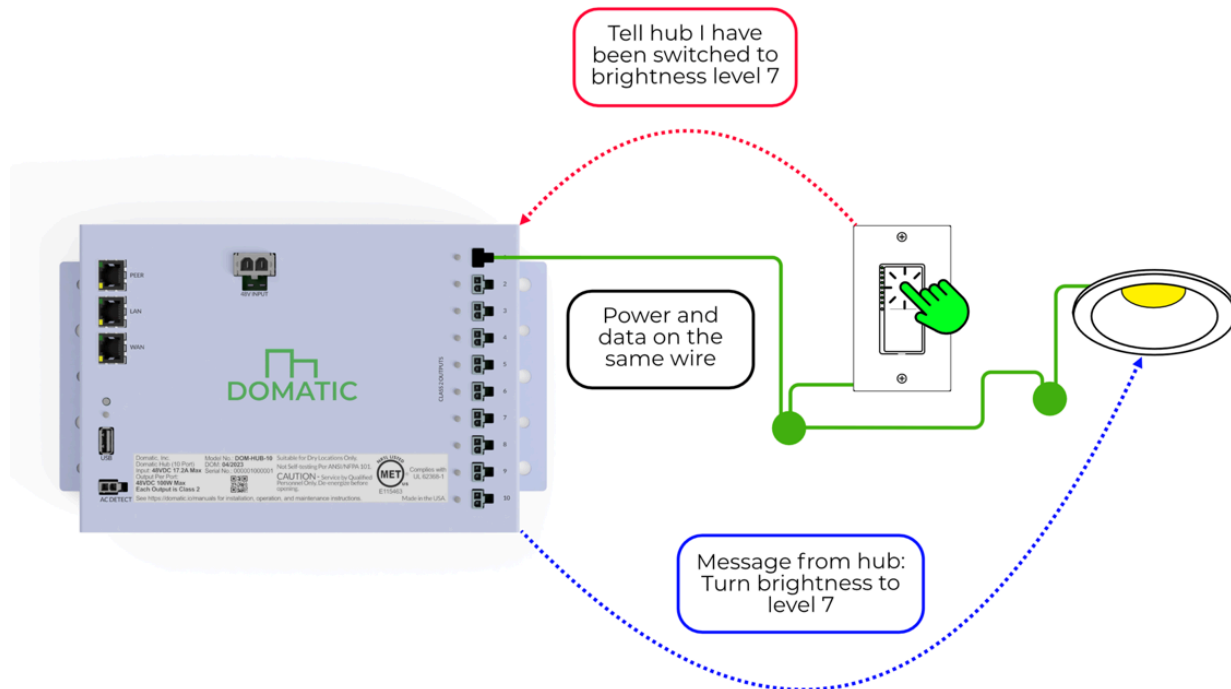


Figure 4: How Domatic virtual controls work.

System Description

The Domatic Hub

The Domatic Hub is an intelligent on-premises device that manages power delivery to building fixtures and runs the local portion of the Domatic software stack. Each of the ports on the Domatic Hub meets the definition of an NEC Class 2 power source, making it safe to carry power to the fixtures on simple cabling at low voltage. Each port has an internal switch to turn off power delivery (and notify the installer or building manager) if the load exceeds the Class 2 maximum of 100 W.

In addition to managing power distribution, the hub runs the Domatic OS, supporting local applications for automation. The hub is also a network gateway for Domatic fixtures and devices connected to it, and it maintains a secure connection to the Domatic Cloud for remote access and synchronization when the Internet is available.

Note The hub does **not** require the Internet to perform critical functions like lighting and HVAC; however, having an Internet connection allows for remote control and monitoring of the system through a property-owner phone app, as well as periodic software updates. The Internet may be required for normal functioning by third-party integrations like voice assistants (e.g. Alexa, Siri), music streaming services, and building management systems.

Fixture Drivers

Domatic fixture drivers are the key enablers that convert AC-powered fixtures to work on the Domatic DC network. By replacing the fixture's existing AC/DC converter with a Domatic driver, the fixture becomes capable of participation in a software-enabled smart building, often enabling features that were not possible in the original fixture design, like circadian lighting, flicker-free dimming, and variable-speed fans.

Fixture manufacturers can participate more directly by building Domatic-compatible drivers based on reference designs provided by Domatic and leveraging the open Domatic APIs to layer on intelligence for their fixtures. Domatic uses the same concept as USB device classes to define standard fixture interfaces so that fixture manufacturers can be confident that their fixtures will work seamlessly with the Domatic ecosystem.

The Domatic Cloud

A building has many hubs, typically one per dwelling unit as well as in the common areas. To aggregate these units into a single building entity, the Domatic Hubs connect through a building Internet connection to the Domatic Cloud to enable management services, integration with building management systems, and insights from data analytics. The Domatic Cloud also performs periodic backup of the system configurations so that any failed part of the system can be easily replaced while maintaining its configuration.

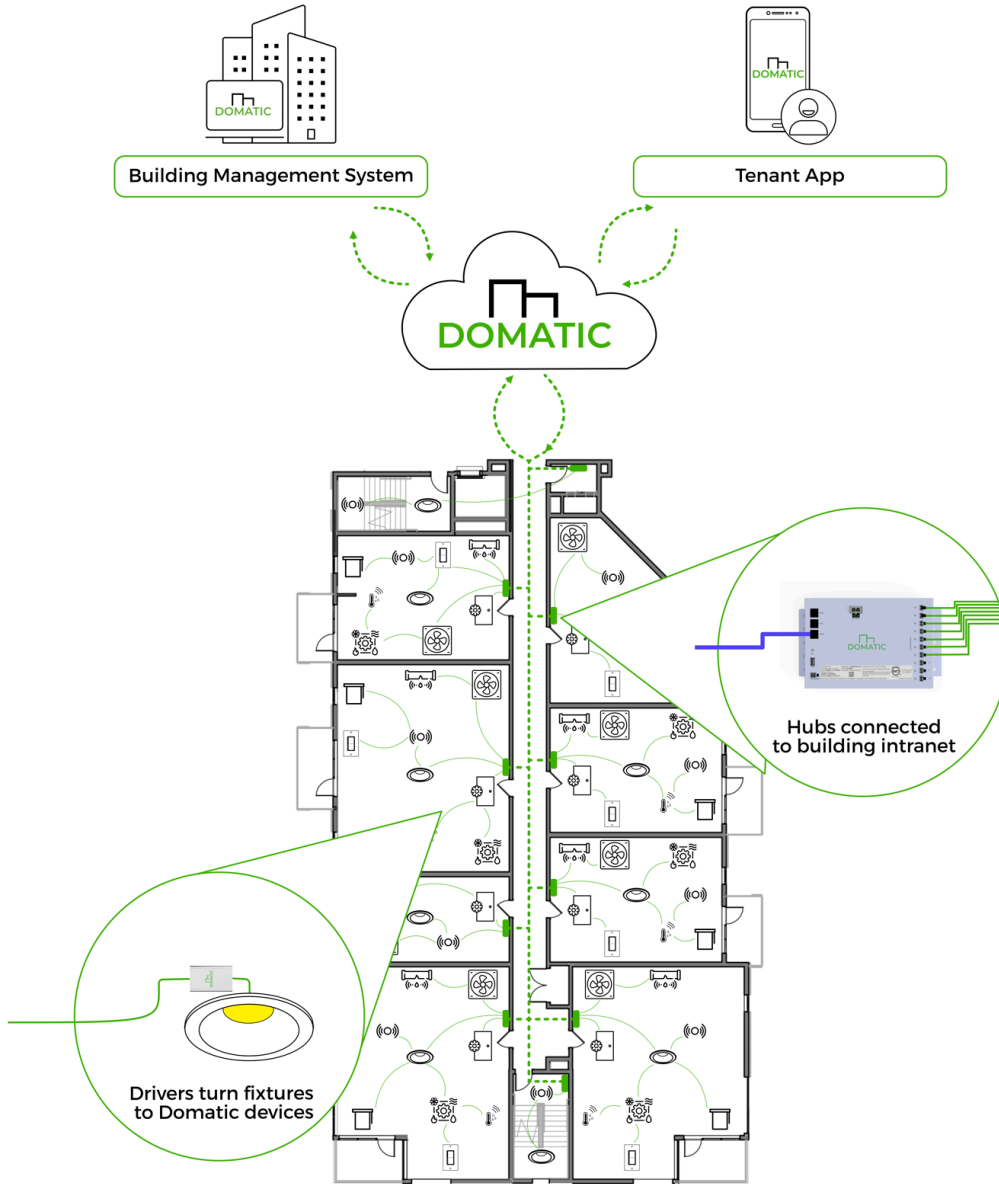


Figure 5: The Domatic system.