

.....

······

.....

Comfort Security Energy efficiency



Smart Home – intelligent connectivity for comfort, security and energy efficiency

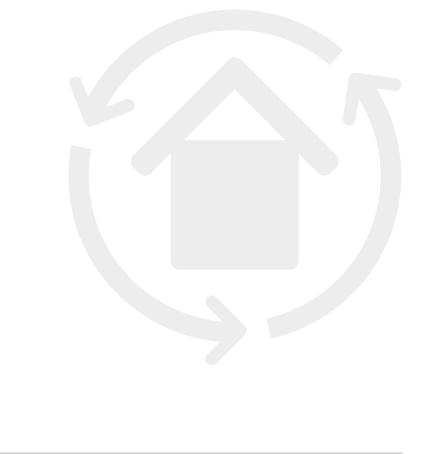
The Smart Home is on the rise. With the increasing range of suitable devices and professional system solutions, connecting one's own four walls is becoming ever easier. What exactly is a Smart Home, for which areas is interconnectivity recommendable and why maintenance-free wireless technology is particularly well suited for this purpose? Just read on for the answers to these questions.

What is a Smart Home?

Smart Home means professional building automation for the domestic environment. Technical devices of different types are connected in a network (ecosystem), they interact with each other and can be controlled from outside.

Alternative terms are > Smart Living > Connected Home > Home automation > eHome







Smart Home – gaining ground as connected all-in-one solutions **Growth Market Smart Home**

The trend towards the intelligent home persists as the development of the global Smart Home market shows. According to Statista, sales in 2021 amount to around USD 104.401 m. Approximately one third of this is accounted for by the US alone. Forecasts indicate that the market volume will reach USD 187.429 m in 2025. This corresponds to an expected annual sales growth of 15.75% (CAGR 2021-2025).

active households are expected in the global Smart Home market by 2025.

is the global household penetration expected to hit by 2025 (compared to 12.3% in 2021).

Source: https://www.statista.com/outlook/dmo/smart-home/worldwide#revenue

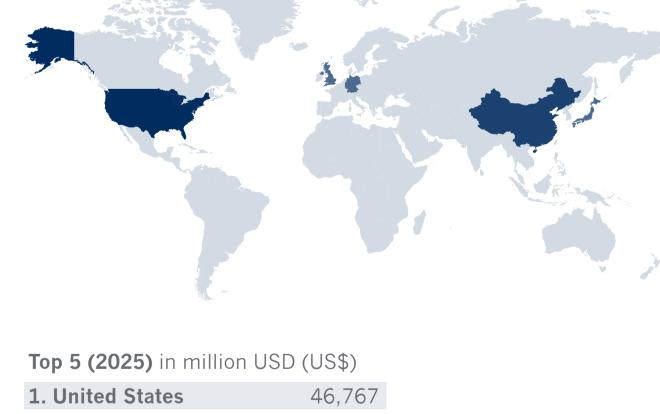
In addition to stand-alone applications for individual areas

Smart Home all-in-one solutions are also gaining momentum.

Smart Home Segments

(in million USD)

Revenue forecast 2025 for Top 5 Smart Home markets by country



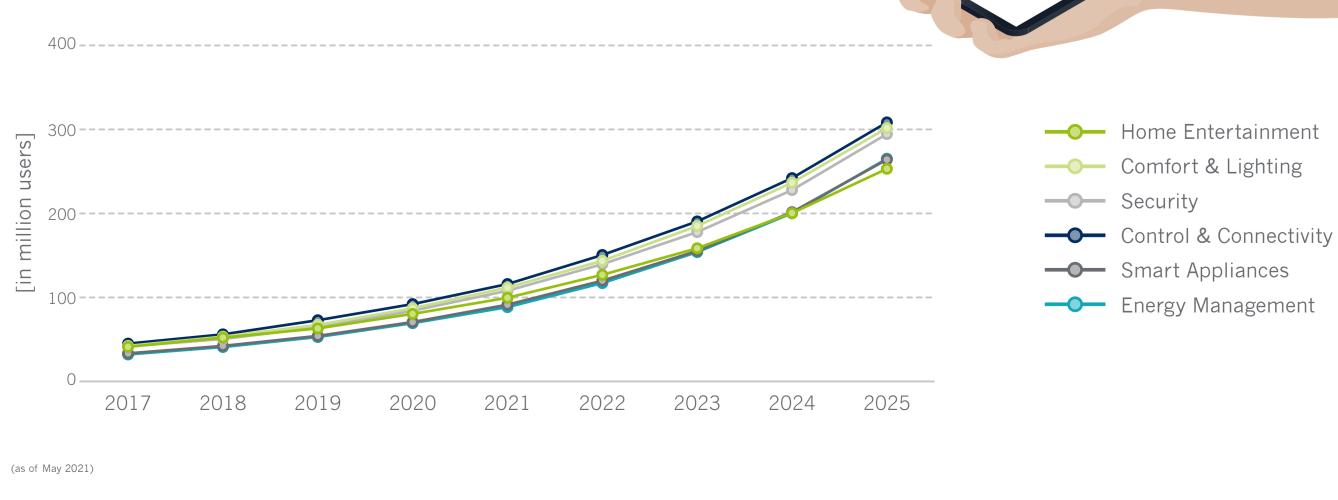
40,098

13,594

11,897

10,471

/www.statista.com/outlool	k/dmo/smart-home/worldwide	e#revenue	
	0111		

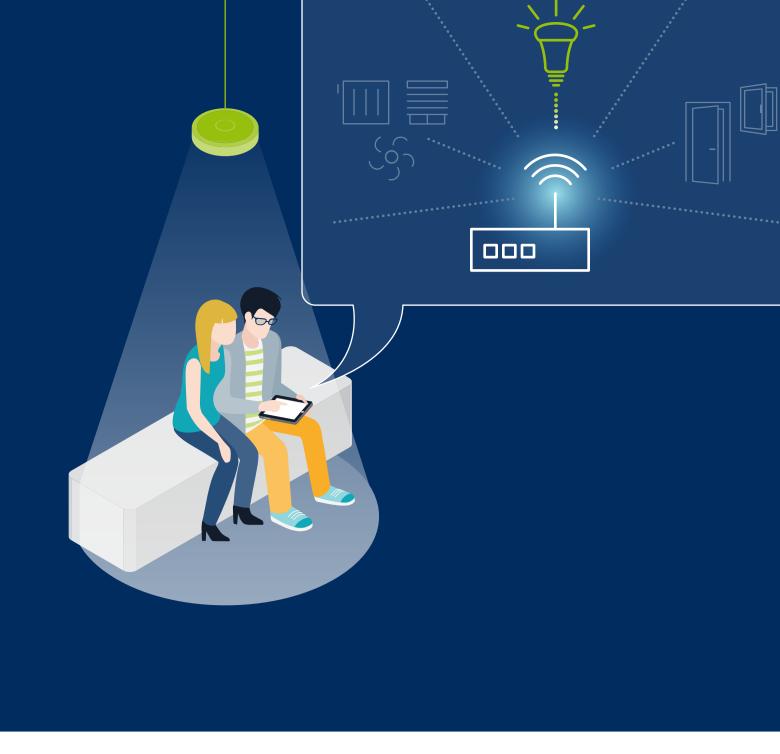


2. China

4. Japan

5. Germany

3. United Kingdom



Home work? A professional Smart Home is an intelligent ecosystem that interconnects individual components (sensors and actuators). A control center (hub or gateway) processes the information collected

by the sensors and transmits the corresponding commands to the actuators (e.g. lamps or radiator valve attachments). The system can be managed remotely via a wall display, smartphone or tablet. In addition, the user can also operate by switch or remote control which is locally related to the specific room. Important: Stand-alone smart products such as voice assistants or smart meters

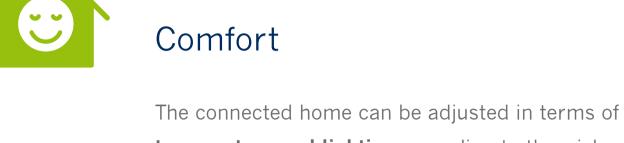
How does a Smart

do not make up a Smart Home.

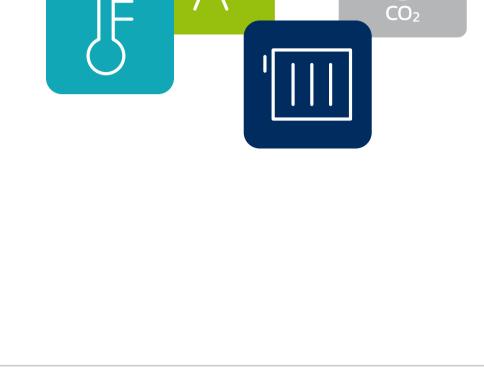


a Smart Home have?

What advantages does



temperature and lighting according to the wishes of its residents. The temperature is controlled room by room based on occupancy, preset routines or weather forecast. Other products analyse the heating behaviour of the occupants and adapt themselves after a self-learning phase. The air quality is continuously monitored by fixed parameters (e.g. CO₂ concentration). And the lighting can also be controlled according to room occupancy, time of day or defined scenarios.



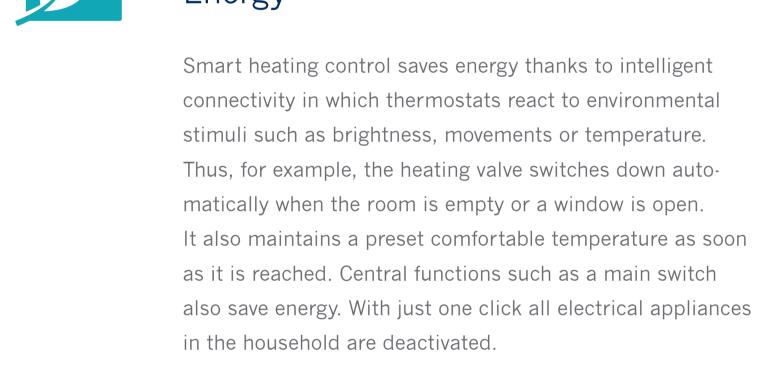


Motion, smoke and glass breakage sensors work in conjunction with surveillance cameras and alarms. No danger escapes them. They register window breakage or

Security

movement around the house and trigger an alarm. And anyone who wonders whether all the windows and doors are closed can check this on the smartphone in real-time.

The connected home controls itself and is therefore safer.







In the connected home, communication is everything – no matter if it is wired (e.g. bus system, Ethernet) or wireless. The different options have typical strengths and weaknesses. Wiring in the Smart Home involves relatively

How does communication

work in the Smart Home?

high installation costs. Another disadvantage is the inflexibility of the system as, once installed, switches and sensors remain in place. Suitability of Manufacturer the frequency band independence 5G/LoRa/ (unnecessarily high range and

high energy demand)

(unnecessarily high data rate

and high energy consumption)

NB-IoT/Sigfox

WLAN

Component selection Power supply Compatibility Encryption (ecosystem) (switches & sensors)

Thus, a hybrid solution of wiring and radio is usually installed in the

Smart Home. Wherever possible however, wireless solutions should

Here is an overview of the common wireless protocols:

* Considera	Z-Wave	ability of the frequency band	Source: Trends in the 'Smart Bo	++ uildings' sector and suitability comparis	+++ son of radio-based transmission proto	Battery cols; IGT – Institut für Gebäudetechnik (In	+++ estitute for Building Technology); 202
	Zigbee	+++	++	++	++	Battery	+++
	Thread	++	+++	++	+	Battery	+++
	KNX RF	+++	+++	++	++	Battery	+++
	EnOcean	+++	+++	+++	+++	Energy Harvesting	+++
Radio							

be used.

Radio-based solutions offer clear advantages: > Simple installation without cable lines > Cost advantage over wired solutions (up to 70 % for retrofits, up to 15 % for new buildings) > Flexibility: sensors or push-buttons can be installed

anywhere, easily added or repositioned.

wireless technology in

the Smart Home?

The maintenance-free wireless EnOcean technology offers further benefits: > Self-powered operation thanks to energy harvesting: wireless modules harvest energy from the environment (e.g. movement, light, temperature differences)

time savings > High range of radio transmission (up to 30 m indoors, up to 300 m outdoors).

> No maintenance, no battery changes, thus cost and

What are the benefits of

of interoperability?

open radio standards in terms

sensors are typically used in a Smart Home. With EnOcean

wireless technology they function maintenance-free without

Switch on glass - no problem thanks to radio technology

batteries.

seamless expansion of the Smart Home and automation of processes. The EnOcean wireless standard (ISO/IEC 14543-3-10) is designed for solutions with particularly low energy consumption and energy

harvesting. In Europe, the wireless radio technology operates on

the 868 MHz frequency channel, which is only approved for pulse

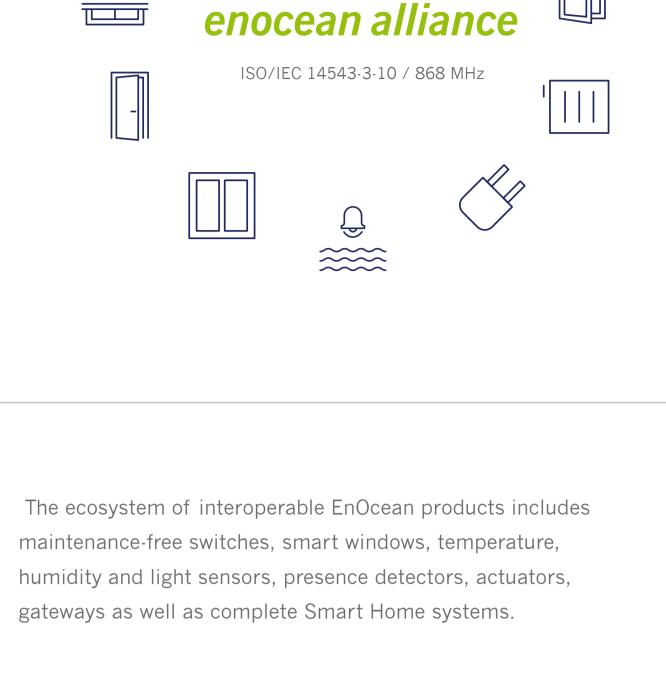
In contrast to self-contained Smart Home systems based on

proprietary communication standards, systems based on open

wireless standards such as EnOcean increase flexibility and enable

signals.

Interoperable ecosystems in the Smart Home The EnOcean Equipment Profiles pave the way for a fully interoperable wireless technology enabling devices from different manufacturers to work together seamlessly.



AES

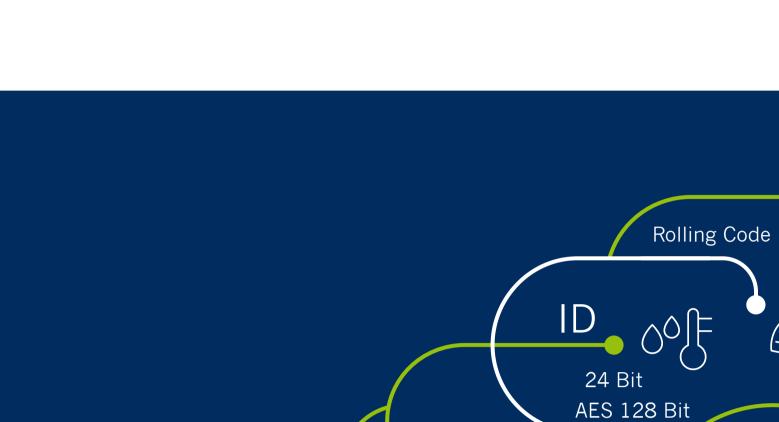
Rolling Code

Rolling Code

ID 24 BIT

128 Bit

128 Bit



ID

24 Bit

ID 24 BIT

What about security in the Smart Home? Intelligent networking in residential buildings requires A central protective measure against the misuse of a system is

Rolling Code

Are radio-based Smart Homes healthier?

additional security levels for radio systems to prevent:

> Unwanted intrusions into privacy

> Loss of control over the system

> Interception of data

Geringere Hochfrequenzfelder

A study by the independent ECOLOG

Short signals on demand The radio signals are only transmitted for a few milliseconds and on activity

demand.

the encryption of data in the Smart Home. Every EnOcean-based

sensor or switch has a unique ID (24 bits). In addition, the radio

signals can be encrypted (AES 128 bit). Constantly changing

rolling codes protect against replay attacks or eaves dropping.

Institute shows that the high-frequency fields of maintenance-free radio solutions are a hundred times lower than those of wired solutions.

No electro-smog Wireless sensors/switches do not generate low-frequency electromagnetic emissions. Conclusion: Even radio-sensitive people can safely use radio solutions in their Smart Home. $Source: https://www.enocean-alliance.org/wp-content/uploads/2020/12/ECOLOG_measuring report_v1.4.pdf$

A dynamic network for professional Smart Homes

With their decades of experience, EnOcean Alliance members strive to co-create a healthy, safe and sustainable environment in smart homes, smart buildings and smart spaces for the benefit of all.

As an international association of leading companies in the building and IT industries, the EnOcean Alliance has been committed since 2008 to enabling

and promoting interoperable, maintenance-free and proven eco-systems based on the wireless EnOcean radio standard (ISO/IEC 14543-3-10/11).

© 2021, EnOcean Alliance

Scan the QR code to learn more about the world of