How NFC
can enhance
smart home experiences

ST25

Smart home market trends

We are currently experiencing an unparalleled era of technological improvements, among which the Internet of Things (IoT) accounts for a large part. Wherever we go, we are surrounded by connected objects, may it be at work, in a healthcare environment and even at home, where smart homes have emerged to save energy and make people's lives easier. This has led to one of the most significant trends of the time, thanks to affordable options now available to consumers.

In 2022, the global smart home market has been estimated at $117 billion, growing at a compound annual growth rate (CAGR) of 12.47% over the 2022-2027 period, reflecting consumers' interest and need for connected homes. Smart home is a wide notion and can even be qualified as an umbrella term, gathering several key applications. Among these, smart appliances hold the largest market share, representing $45.26 billion[1], and "Control & Connectivity" hold the fastest growing CAGR with 13.16%[2]

Comfort and lighting

Bulbs, shading devices, and garage door controls

Control and connectivity

Plugs, sockets, and speakers

Energy management

HVAC, thermostats, and radiator controls

Home entertainment

Remote displays and streaming devices

Safety

Smoke detectors, video cameras, and door locks

Smart appliances

Large (fridges, dishwashers) and small (coffee machines)

$222.9 billion[3]

Expected global smart home market by 2027

Smart home systems include a wide variety of applications to personalize homeowners' living environment and make their everyday life more comfortable. However, the industry still faces some challenges to create a fully convenient ecosystem for consumers.

> In the smart home sector, Near Field Communication (NFC) technology has a lot to offer to make smart homes even smarter and consumers' lives easier.

NFC: an intuitive technology

A WIDELY ADOPTED TECHNOLOGY

Today with most smartphones equipped with NFC technology, a significant number of people throughout the world can readily access this technology.

Even if people currently use their smartphone NFC capabilities mainly for contactless payments and transportation, the technology can be used for a wide range of applications, such as the smart home segment.

7 out of 10
smartphones will support NFC in coming years[1]

In addition to being increasingly widespread, NFC technology is standardized by the **NFC Forum**. The interoperability is thus fully ensured, making its usage and adoption convenient for all stakeholders.

All these reasons make NFC technology perfectly suitable for smart home applications and can enable different use cases.

PROVIDING USERS WITH AN OPTIMIZED USER EXPERIENCE

Thanks to its "Tap & Go" approach enabled by the contactless interface, NFC technology delivers an intuitive and user-friendly way to interact with devices. People are only required to perform a very simple action: to "tap" the tag embedded into any device with their smartphone (bringing the smartphone and the tag in close proximity) to read the tag's content. In addition, the contactless aspect protects against the risk of damaging connectors.

To make this technology even easier to use, particularly to find the tag's location, the NFC Forum has launched its **Wayfinding Marks** (as shown by the pictograms below). These symbols help end users identify where the NFC technology is present but also to guide them to the best tapping locations.

Source: 1: ABI research : Wireless Connectivity Technology Segmentation and Addressable Markets - 3Q 2022
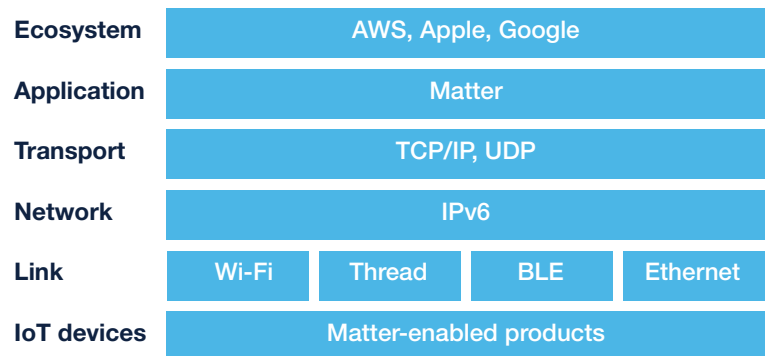
Smart home, interoperability and Matter

MATTER: THE PROMISE OF SEAMLESS DEVICE INTEROPERABILITY IN SMART HOMES

It is difficult to talk about smart home devices without mentioning Matter. Created by a consortium gathering more than 450 major players in IoT within the Connectivity Standard Alliance (CSA), including STMicroelectronics, Matter was born from the desire to bring more interoperability and security when confronted with the growing number of connected devices. Technically, Matter is a protocol enabling communication across smart home devices and ecosystems over a specific set of IP-based networking technologies, starting with Thread, Wi-Fi and Ethernet. This protocol simplifies development for manufacturers and increases compatibility and ease-of-use for consumers.

No longer will you need multiple mobile apps to communicate with several objects; it makes devices easy to set up and ensures a reliable ecosystem.

Matter is a promise to offer the most simplified, seamless, and secure user experience for connected devices.

|	
Ecosystem	AWS, Apple, Google
Application	Matter
Transport	TCP/IP, UDP
Network	IPv6
Link	Wi-Fi · Thread · BLE · Ethernet
IoT devices	Matter-enabled products

Matter protocol layers structure

BUILT ON THREAD

Perfectly adapted for Matter and designed for low-power IoT devices, the Thread mesh networking technology runs on the Internet Protocol (IP). It is a reliable, secure and energy-saving network protocol delivering fast response times.

It enables home automation devices such as lights, thermostats, door locks, sensors and smart speakers to securely, reliably and simply integrate the smart home environment and connect directly to the cloud.

Every Thread network requires a Thread Border Router to connect the Thread network to other IP-based networks and the Internet, such as Wi-Fi or Ethernet.

Once a Thread Border Router is connected to the network, all Thread devices can be securely accessed from applications on a mobile phone or tablet, or from a cloud-based online service.
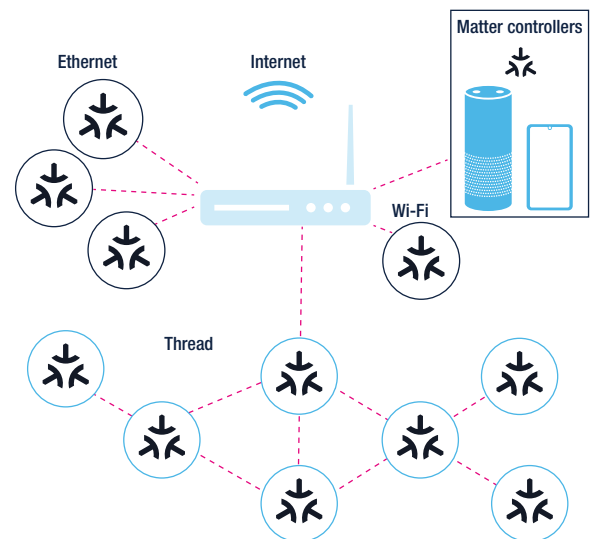
Role of a Thread Border Router in Matter

NFC for commissioning

WHAT IS COMMISSIONING?

Adding a new device to a home network (Wi-Fi, for instance) is a key step in a smart home environment: the "just-bought" device must be identified and authenticated by the home network before being "connected". This process, as important as it is complex, is called commissioning. It consists of many steps that are more complex and time-consuming than it may seem.

Consumers can be asked to visit the device manufacturer's website, to fill in a form to receive an activation code or commissioning can be done through push-buttons for synchronization. As this process is for a single device, it needs to be repeated for each new device.

However, commissioning new devices on Thread home networks should be as smooth as possible for the end user. The use of a home automation standard such as Matter makes commissioning quick, easy and reliable.

As a customer-oriented technology, NFC perfectly fulfills these functions with an optimized end-user experience.

BENEFITS OF COMMISSIONING OVER NFC

Due to widespread health concerns and the growing adoption of mobile payment services, NFC technology is now well-known.

With NFC, a proven intuitive technology, adding a new device to an existing network becomes easier, only requiring to tap the tag with an NFC-enabled smartphone. No need to look for the appropriate app or to use a scanning method that often depends on the brightness, readability and good physical condition of the label.

In addition, since NFC only sends data over very short distances, commissioning is therefore inherently secure.

Easy, quick and convenient, commissioning over NFC fits well in the smart home environment.

Intuitive and convenient

Quick process

Good user experience

Inherently secure
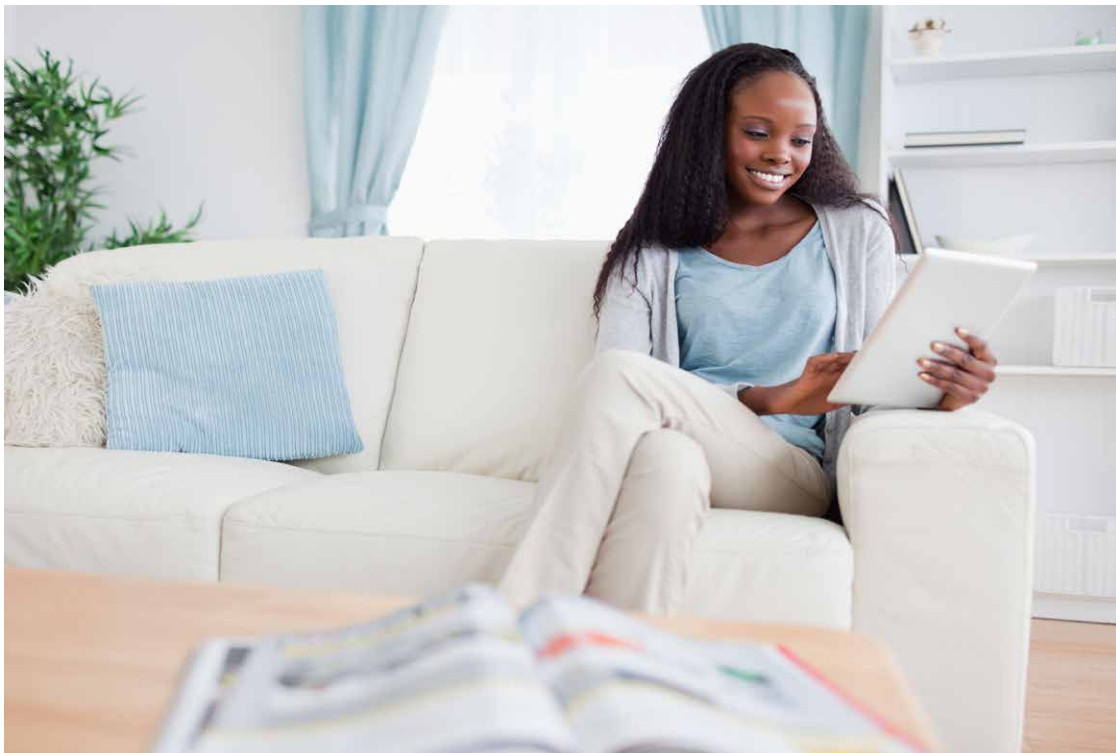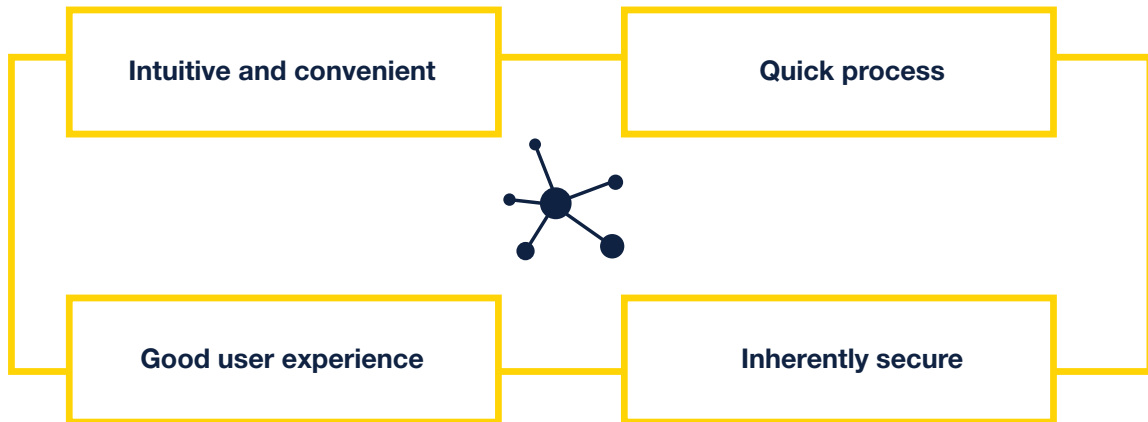
Opening up new opportunities

While dynamic NFC tags are particularly useful for commissioning, the technology has a lot more to offer to the smart home market.

DELIVERING A COMPLETE SOLUTION THROUGHOUT THE PRODUCT LIFECYCLE

Manufacturing　　　**Consumers**　　　**Maintenance services**

Addressing all smart home applications, dynamic NFC tags are suitable for a wide range of use cases from manufacturing, residential and maintenance services. One advantage of these tags is their ability to support multiple use cases all along a product's lifecycle.

Embedding dynamic NFC tags into a smart home product turns them into a real asset and provides a competitive advantage for all stakeholders.

DISCOVER THE NFC USE CASES

Parameter settings

Thanks to dynamic NFC tags integrated into products, manufacturers can directly configure the products with the correct settings at the production level. Product parameters can be modified on packaged goods ("In-the-box programming"), without having to power on the device.

Firmware upgrade

Upgrading the firmware of a device or equipment can be painful, time-consuming, and counterintuitive.

By using dynamic NFC tags, manufacturers as well as end users can easily upgrade a device's firmware by simply tapping the tag with an NFC reader or smartphone.

Pairing

With NFC-enabled products, consumers can benefit from easy pairing to Wi-Fi or Bluetooth® Low Energy (BLE) devices or networks.

Consumers no longer need to enter complex passwords to get connected. All they are asked to do is to simply tap the tag embedded into the products with their smartphone with NFC capabilities.

Thanks to its native functionality, NFC technology does not require any app download.

Diagnostics

Regarding smart home installations, taking the next step with servicing and maintenance is not always convenient nor efficient.

Thanks to dynamic NFC tags and their contactless interface, data logging and diagnostics are quick and easy. This task does not require any specific equipment as it can be performed directly using an NFC-enabled smartphone or NFC reader. This means that homeowners can run diagnostics themselves, without the need for a technician.

By tapping the tag embedded in the device, people can quickly access diagnostics and display the reasons for failure.

Backup solution

For devices commissioned on a network, dynamic NFC tags can also be of great help when it comes to network failures and can be used as a backup solution.

Let's look at an example of a thermostat commissioned to work on a network. Imagine that for some reason this network is temporarily no longer working. Thanks to the tag embedded in the device, you can still collect data as well as configure the thermostat thanks to the NFC's close-range operating capabilities.

ST solutions

ST25 DYNAMIC NFC TAGS: HOW DO THEY WORK?

NFC is a wireless technology enabling contactless communication between a reader and a dynamic tag.

A dynamic NFC tag is a passive (and batteryless) electronic component that can be embedded in any kind of device including smart thermostats, home appliances, security cameras, and many more. It provides a bi-directional channel for communicating with the microcontroller embedded in the equipment, considerably increasing the system's capabilities.

On the other hand, there is the NFC reader used to power the tag and access its content. The reader can be any mobile phone with an NFC feature (fully supported in both Android and iOS), but also any kind of professional NFC reader used by maintenance teams, for example.

Dynamic NFC tag

NFC-enabled thermostat

NFC reader (mobile phone...)
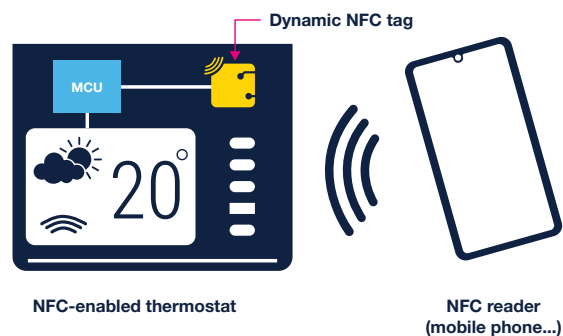
ST25 DYNAMIC NFC TAGS

ST25DV-I2C Series

This dynamic NFC tags series offers a long-range 13.56 MHz connectivity. Thanks to its I²C interface, it can be connected to a host (MCU or MPU).

Compatible with NFC phones and NFC/RFID readers, ST25DV-I2C Type 5 tags are certified by the NFC Forum and comply with ISO/IEC 15693 specifications.

WHAT MAKES IT SUITABLE FOR SMART HOME APPLICATIONS?

• **NFC Forum Type 5:** thanks to its long-range operating capabilities, our dynamic NFC tags offer users and homeowners a convenient and intuitive user experience

• **Fast Transfer Mode:** all stakeholders, from maintenance services to consumers, can quickly and easily update smart home device firmware thanks to its dedicated Fast Transfer Mode

• **Energy Harvesting:** this feature lets devices function without requiring a battery, which is particularly useful in case of failure or if devices run out of battery

• **Low-power capabilities:** dynamic NFC tags work at low power, which allows them to be well integrated into environmentally conscious smart home ecosystems

• **Memory:** from 4 to 64 Kbits of EEPROM with best-in-class cycling (1 million write cycles) and long data retention (40 years), protected with passwords

To find out more about our ST25DV dynamic
NFC/RFID tags which include an I2C interface,
visit **www.st.com/ST25DV-I2C**

ADDITIONAL RESOURCES

ST25DV-I2C series of dynamic NFC/RFID tags [Product page]

Tap. Connect. NFC for Simplified Commissioning [Webinar]

NFC design considerations for an improved User Experience [Whitepaper]

STM32 MCU solution for Matter: the promise of seamless device interoperability in smart homes [Solution page]