The Future
of Smart Home

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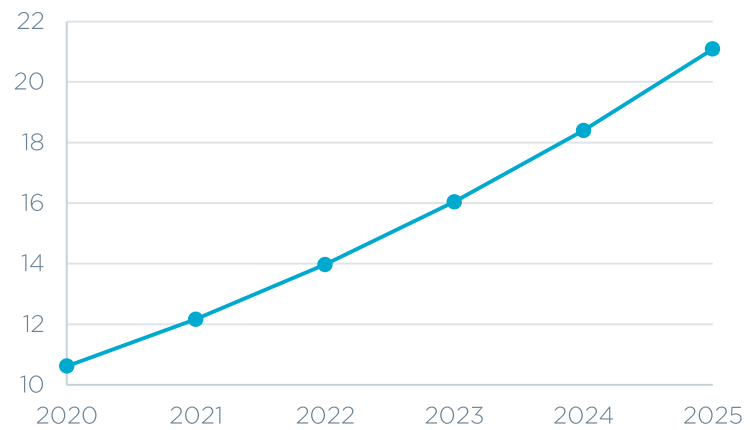
Global Market Overview

Smart Home Device Shipments (M)

- 2021 will see more than 530M devices sold
- 2025 is projected to see 1.8B devices sold
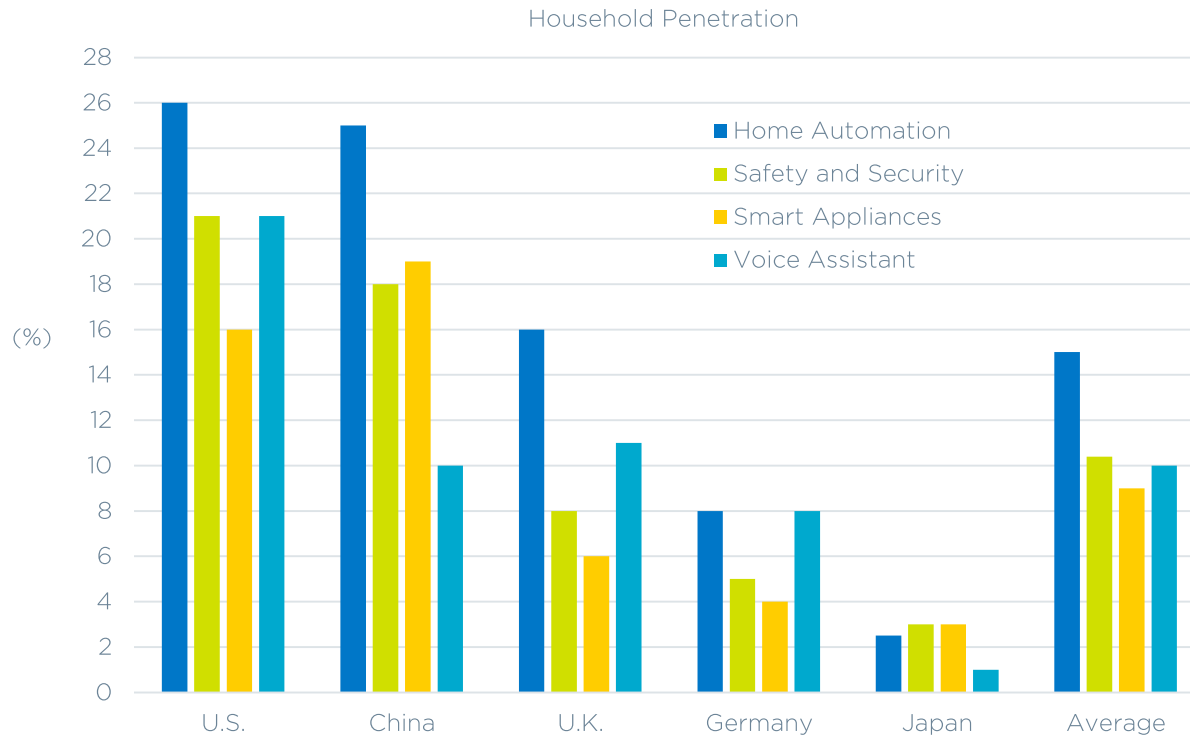- Asia is leading the market
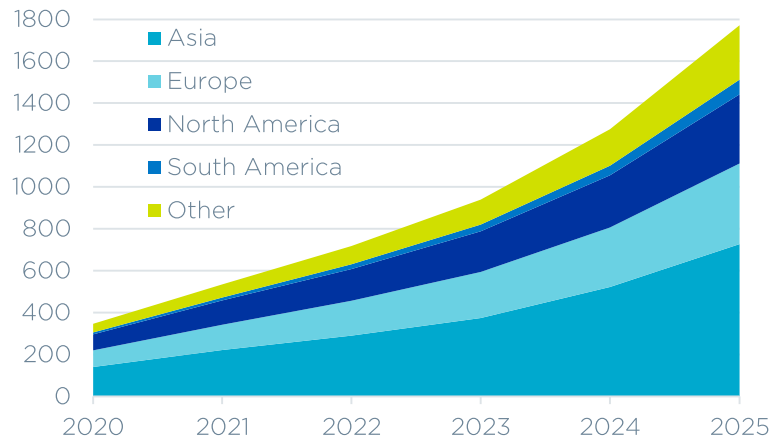
Smart Home Household penetration (%)

- North America and Europe are leading with 20%
- Asia is catching up quickly
- 21% is projected for 2025

Global Market Overview - Application Breakdown

Household Penetration

Home Automation

 "Making life easier"

Safety and Security

 "Protecting what's important"

Smart Appliances

 "Saving money"

Voice Assistant

 "The Disruptor"

Smart Speaker – Global Market Share

Chart: Smart Speaker Global Market Share by quarter (Q1 19 – Q2 21). Legend: Amazon, Google, Apple, Baidu, Alibaba, Xiaomi, Others.
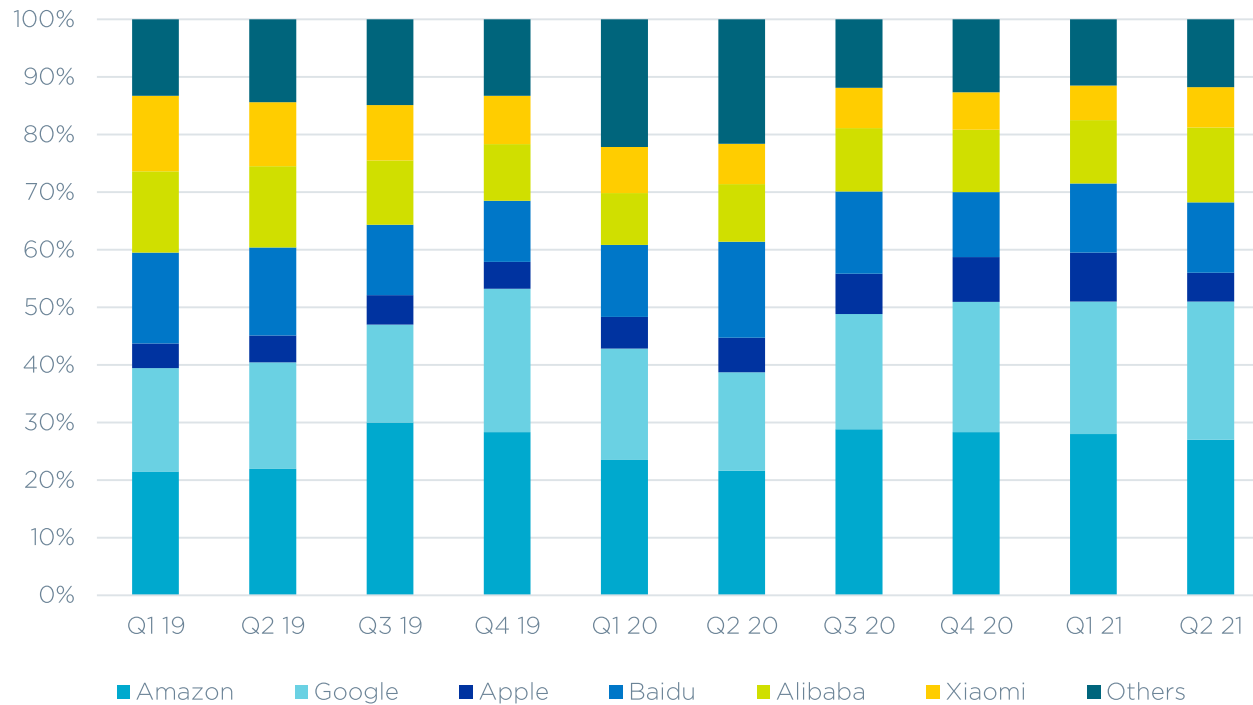
55% Amazon / Google / Apple

> U.S. companies are leading

> Google has caught Amazon

32% Alibaba / Baidu / Xiaomi

> Asia is scaling up

> Expecting Asia to jump ahead

13% Other

Ecosystems will be critical as this market defragments.

Products

Applications, Devices and Systems

Home Automation - Making life easier

› Core – gateway, smart speaker, remote controls, TV

› Lighting – switches, bulbs, fixtures

› Electrical – plugs, power strips, buttons

Safety and Security – Protecting what's important

> Security – door bell, door lock, garage door opener, window sensor, alarm, camera

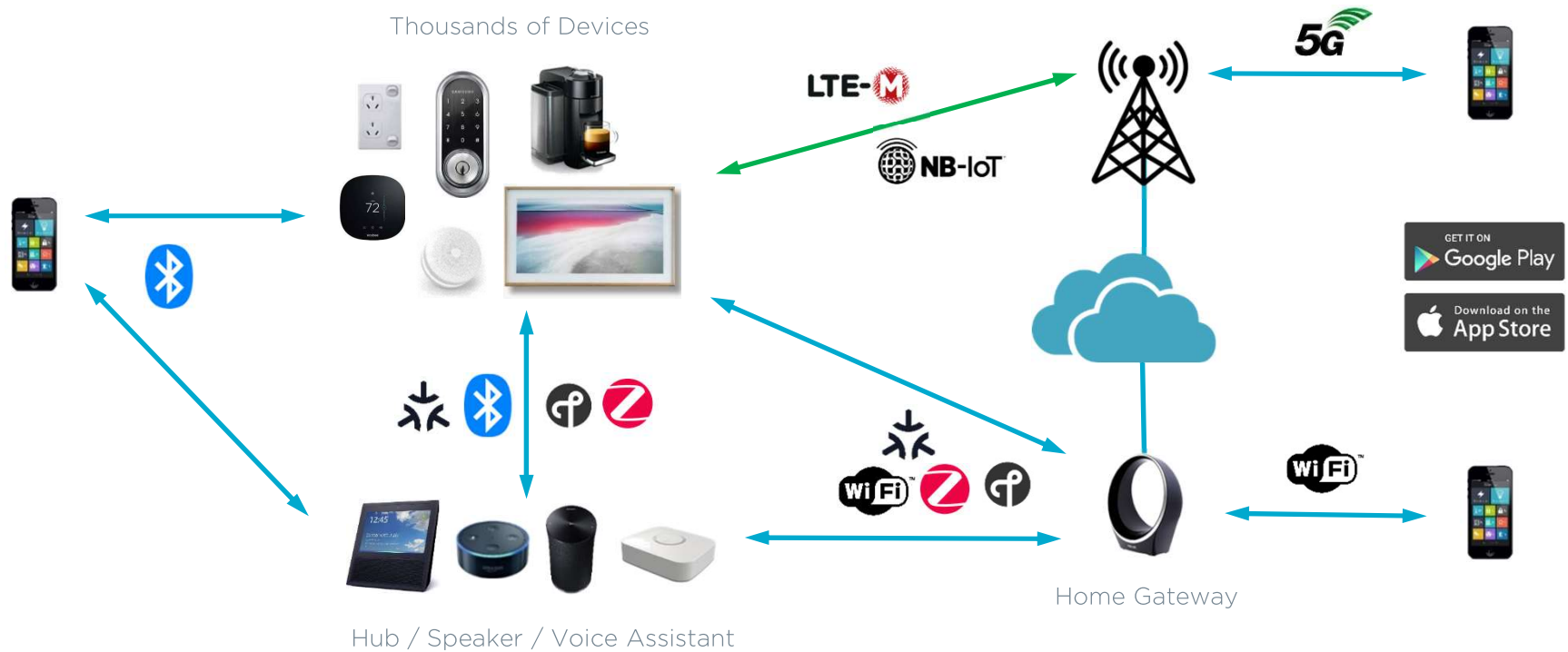> Safety – smoke, gas, moisture, and motion detectors, panic buttons

Smart Appliances – Saving money

› Cleaning – washer, dryer, iron, vacuums, hot water heater

› Cooking – oven, stove, dishwasher, coffee machine, thermometer

› HVAC – heaters, air conditioners, thermostats, fans, shades

A Fragmented Ecosystem

Thousands of Devices

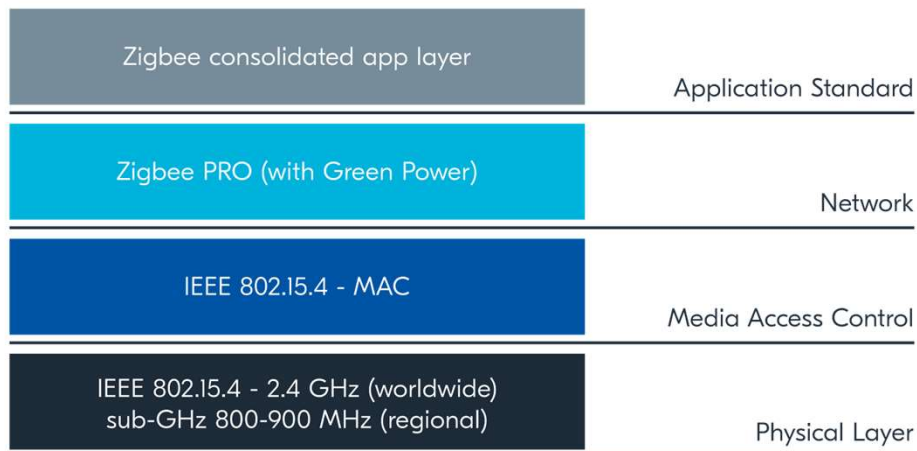Hub / Speaker / Voice Assistant

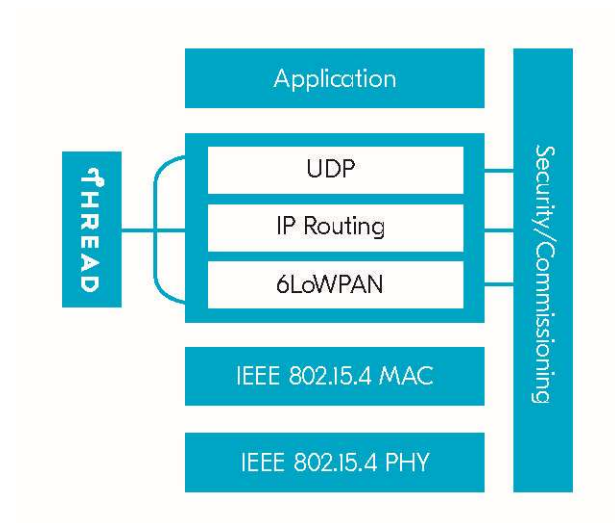Home Gateway

Smart Home

Protocols

Zigbee

- Zigbee is a smart home protocol which delivers a complete IoT solution – from mesh network to the universal language that allows smart objects to work together

- Millions of Zigbee products already deployed in smart homes and buildings

- Challenges:
  - No standardized gateway
  - Fragmentation
  - No support for IPv6

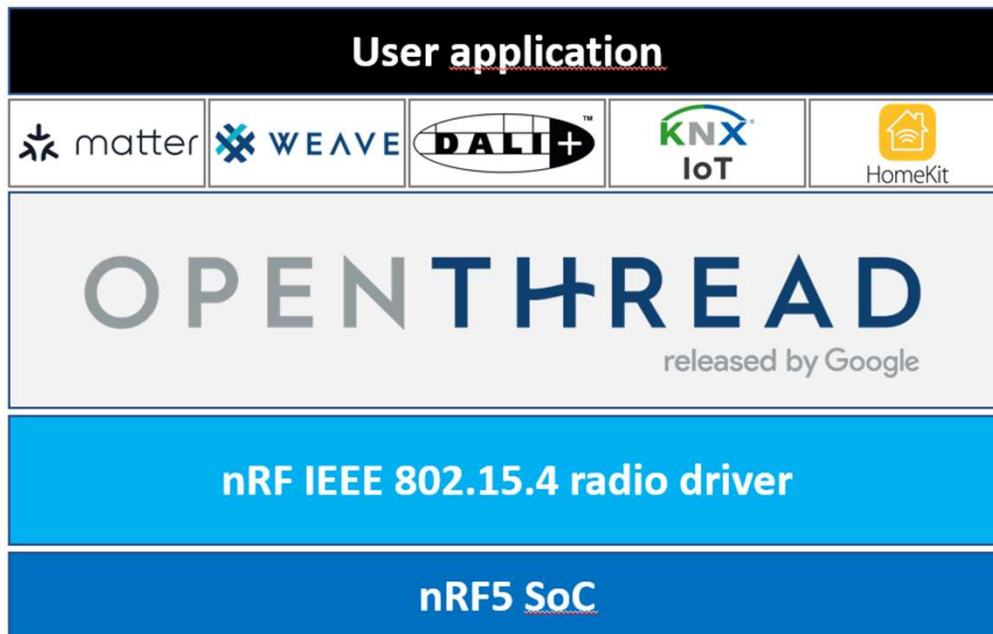| Zigbee consolidated app layer | Application Standard |
Zigbee PRO (with Green Power)	Network
IEEE 802.15.4 - MAC	Media Access Control
IEEE 802.15.4 - 2.4 GHz (worldwide) sub-GHz 800-900 MHz (regional)	Physical Layer

Thread – What it delivers

- Thread is secure wireless mesh network for connected product in homes and commercial buildings

- Build on proven, widely available and supported technologies
  - Uses IPv6 (6LoWPAN)
  - Runs on existing 802.15.4 silicon

- Legacy-free design with updated architecture
  - Designed with a new security architecture to make it simple and secure to add and remove products
  - Supports hundreds of products per network
  - Designed for very low power operation

Application	Security/Commissioning
THREAD → UDP / IP Routing / 6LoWPAN	
IEEE 802.15.4 MAC	
IEEE 802.15.4 PHY	

Thread-based solutions

- Thread protocol is application layer agnostic and does not define the application layer itself
- To create a full-featured product, a designer usually puts an IP-enabled application layer on top of a Thread stack

Extended Apple HomeKit Accessory Protocol

- Traditionally Apple HomeKit uses WiFi and Bluetooth LE to connect smart home devices into Apple's smart home hubs

- The latest Apple HomeKit Accessory Protocol Specification adds Thread networking protocol as another option for low-power, low-bandwidth accessories

  - Apple's HomePod Mini launched in November 2020 is the first Apple's device natively supporting Thread

  - Followed by Apple TV 4K launched in April 2021

  - Customers do not need any proprietary bridge to connect Thread HomeKit accessories

What is Matter?

- Matter (formerly *Project Connected Home over IP* or *Project CHIP*) is the foundation for connected things

- Matter is an applications layer standard unifying the smart home industry

- Matter is a promise of reliable, secure connectivity where devices work seamlessly together. Matter simplifies development for manufacturers and increases compatibility for consumers

Who is behind Matter?

- This collaborative breakthrough is built on proven technologies and guided by the Connectivity Standards Alliance (formerly Zigbee Alliance)

- Currently more than 200 companies have joined Matter Working Group in CSA

- Over 2 000 individual members participates in efforts to create Matter

Some founding partners:

Matter charter

- Define, develop, and deliver a comprehensive application layer and data model which enable communication across smart home devices and mobile apps
  - Build upon Internet Protocol (IPv6)
  - Reuses contributions from market-proven technologies from Amazon, Apple, Google, Zigbee and others
  - Extendible to cloud

- Matter version 1.0 targets Wi-Fi and Thread as main connectivity protocols. Bluetooth LE is used for device onboarding (commissioning)

User application	
Matter	
TCP	UDP
IPv6	
Thread · Bluetooth LE · Cellular · Wi-Fi · Ethernet · · · ·	
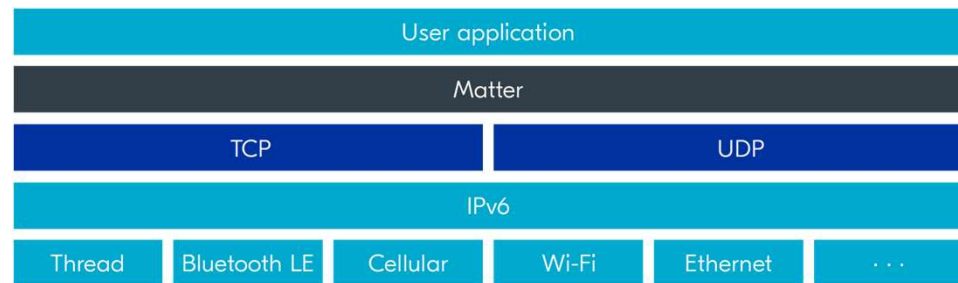
Ecosystems commitment to Matter

Matter Support Across Google's Ecosystem

Thread + Wi-Fi
Nest Hub Max
Nest Hub (2nd gen)
Nest Wifi

Wi-Fi only
Google Home
Nest Mini (1st & 2nd gen)
Nest Hub (1st gen)
Nest Audio

Control as a Matter device
Starting with the new
Nest Thermostat

Mobile & Voice
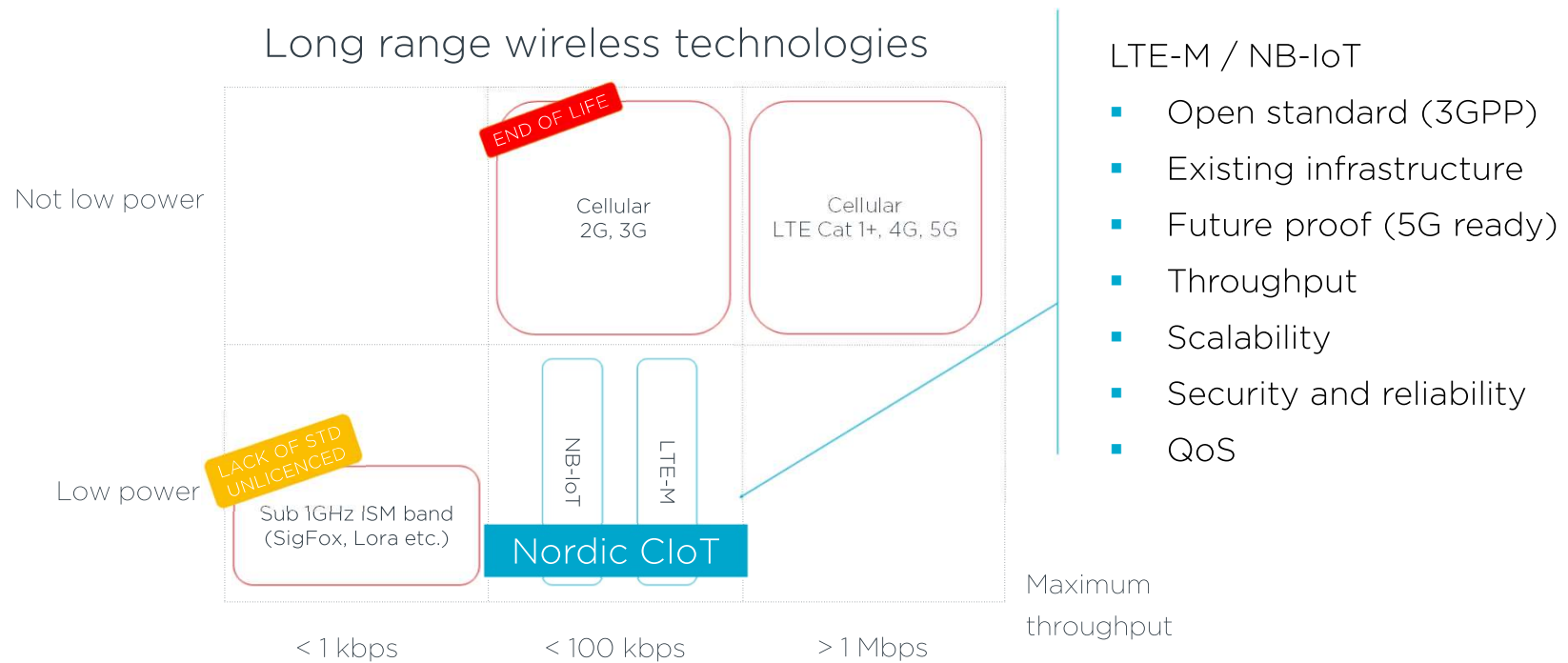Google Home App
Android Power Controls
Google Assistant

matter **supports*:**

· **Echo**
· **Echo Dot**
· **Echo Studio**
· **Echo Flex**
· **Echo Plus**
· **Echo Show**

*may not be supported on
certain older generations

Low Power Wide Area Network Landscape

Long range wireless technologies

Not low power

END OF LIFE

Cellular
2G, 3G

Cellular
LTE Cat 1+, 4G, 5G

Low power

LACK OF STD
UNLICENCED

Sub 1GHz ISM band
(SigFox, Lora etc.)

NB-IoT

LTE-M

Nordic CIoT

Maximum
throughput

< 1 kbps   < 100 kbps   > 1 Mbps

LTE-M / NB-IoT

- Open standard (3GPP)
- Existing infrastructure
- Future proof (5G ready)
- Throughput
- Scalability
- Security and reliability
- QoS

Smart Home

Nordic's HW and SW

Product Portfolio Snapshot

Low power short-range SoC
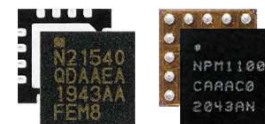### Decades of low power connectivity experience

nRF52

nRF53

Dual Core
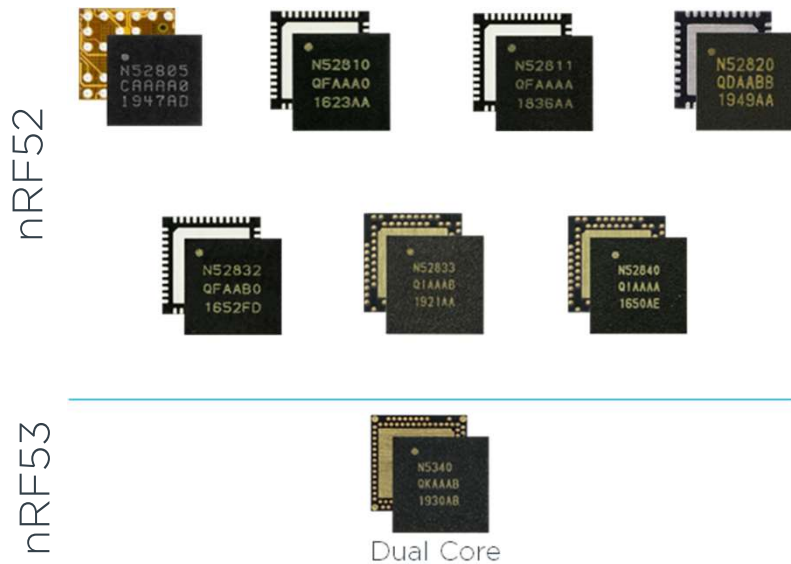
Low power Cellular IoT SiP
Future proof and global platform

nRF9160

10mm

16mm
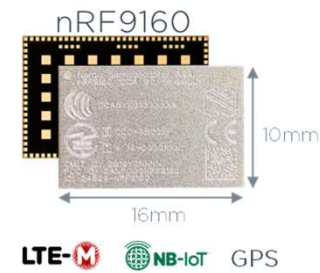
LTE-M   NB-IoT   GPS

Complementary
FEM and PMICs

nRF Connect SDK

- All in one place

- One code base and toolchain for nRF91, nRF53 and nRF52 Series

- Includes Bluetooth Low Energy, Bluetooth mesh, Thread/HomeKit/Matter, Zigbee and LTE-M/NB-IoT/GPS

- Based on Zephyr RTOS which is governed by Linux Fundation

Manage Source Code and Configurations

West	Kconfig	Device Tree
Multi-repository management tool	Source module / feature configuration for compile	Target Board / Device description

Clone / update → **Configure features** → **Configure target**

nRF Connect SDK

- nrf
- nrfxlib
- MCUboot
- Zephyr

Your Code

west.yml

*Kconfig

*.dts

Code Base

- Application 1
- Application 2
- Application ...