Introduction to Zigbee & Dotdot

Sharee Green - sgreen@zigbee.org
Bruno Vulcano - bruno.vulcano@legrand.fr
ZigBee Alliance

What is the Zigbee Alliance?

Our vision:

We believe all objects can work together in a way that enhances the way we live, work, and play

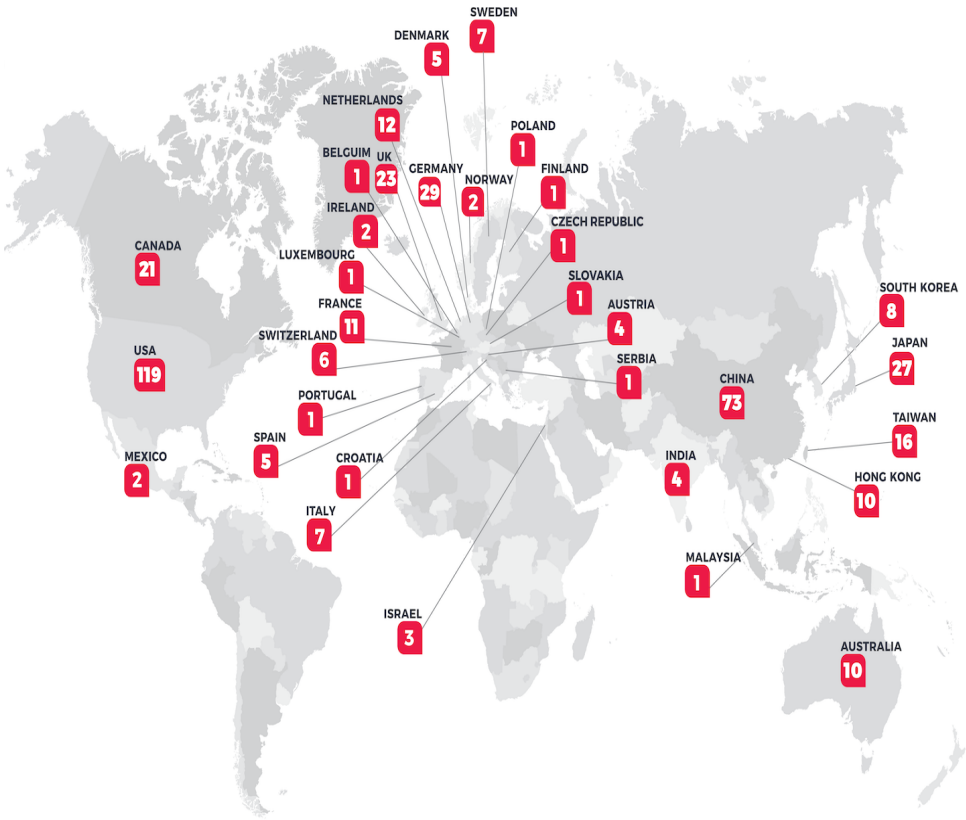
Our mission:

The Zigbee Alliance ignites creativity and collaboration in the Internet of Things, by creating, evolving, and promoting universal open standards that enable all objects to connect and interact

The standard bearer of the open IoT

Established in 2002, our wide-ranging global membership collaborates to create and evolve universal open standards for the smart networks in our homes, businesses, and neighborhoods.

Our standards are the only complete IoT solution – from mesh network to the universal language that allows smart objects to work together.



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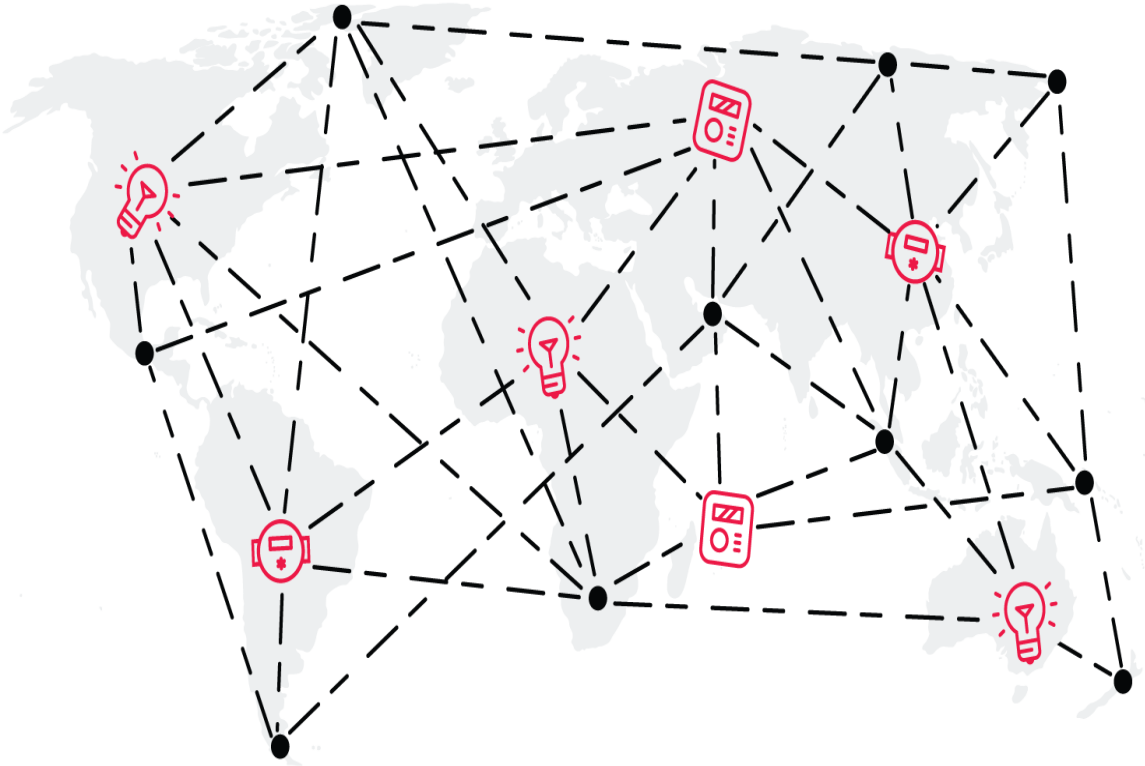
What we do

Develop open, global standards for wireless device-to-device communication for the IoT (Internet of Things).

Certify products to help ensure interoperability through our Certified program.

Promote the use of our standards around the world.



Status of the Alliance

- By 2023, **3.8 billion Zigbee devices** will be shipped worldwide.
- "**In 2023, Zigbee PRO will make up the majority (48%) of the smart building 802.15.4 unit shipments** with Thread/other 6LoWPAN making up 39% by this time and other 802.15.4 (12%). "
- "…Wireless mesh sensor network standards have made 802.15.4 the predominant networking technology for the Internet of Things. Z-Wave, Bluetooth Low Energy (BLE) and low power Wi-Fi have been unsuccessful at slowing 802.15.4 market penetration."

- ON World

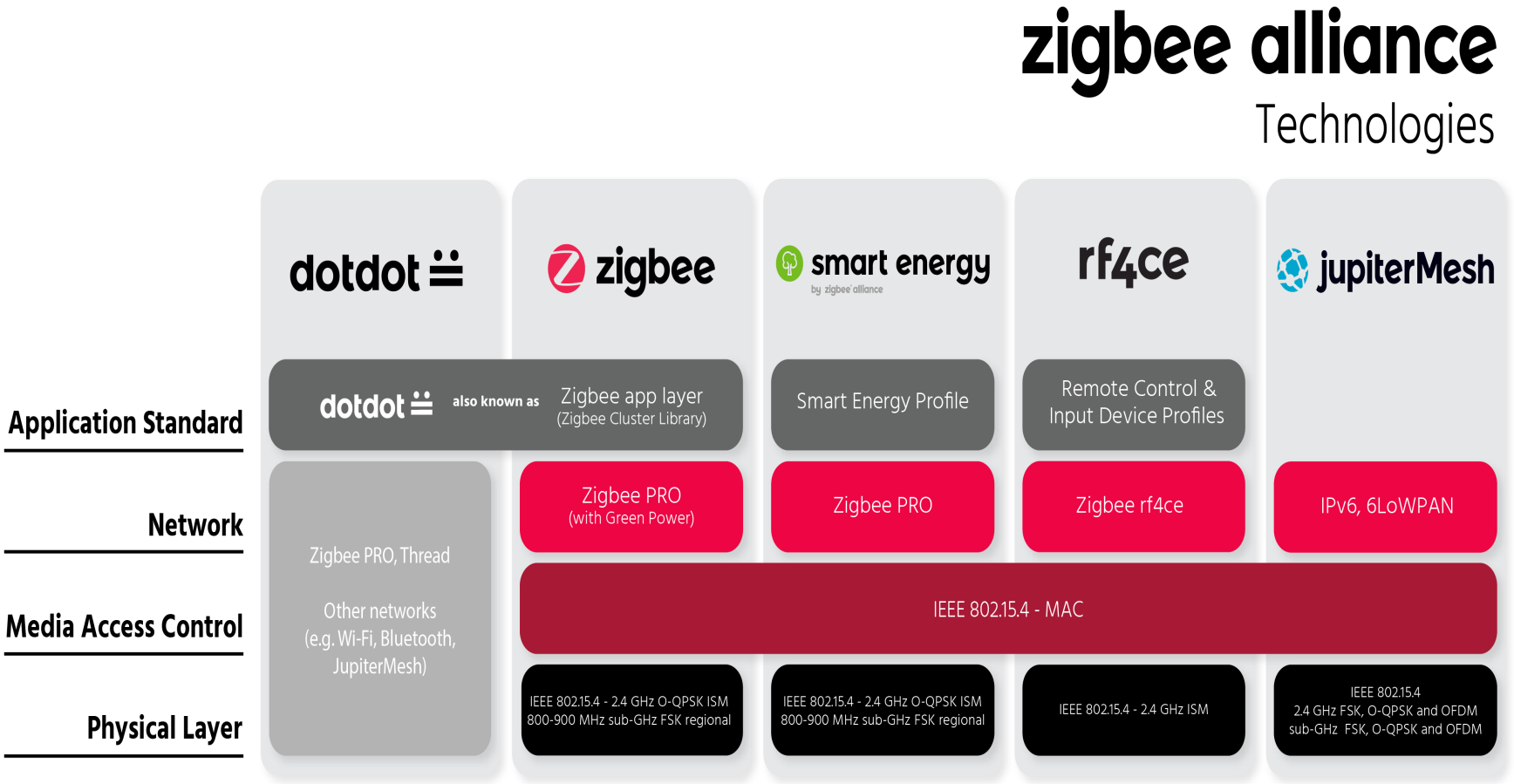
Download the full report at:
https://onworld.com/

zigbee/execsum

- Certifications 3000+
- other updates and growth examples, roadmap

The Technologies

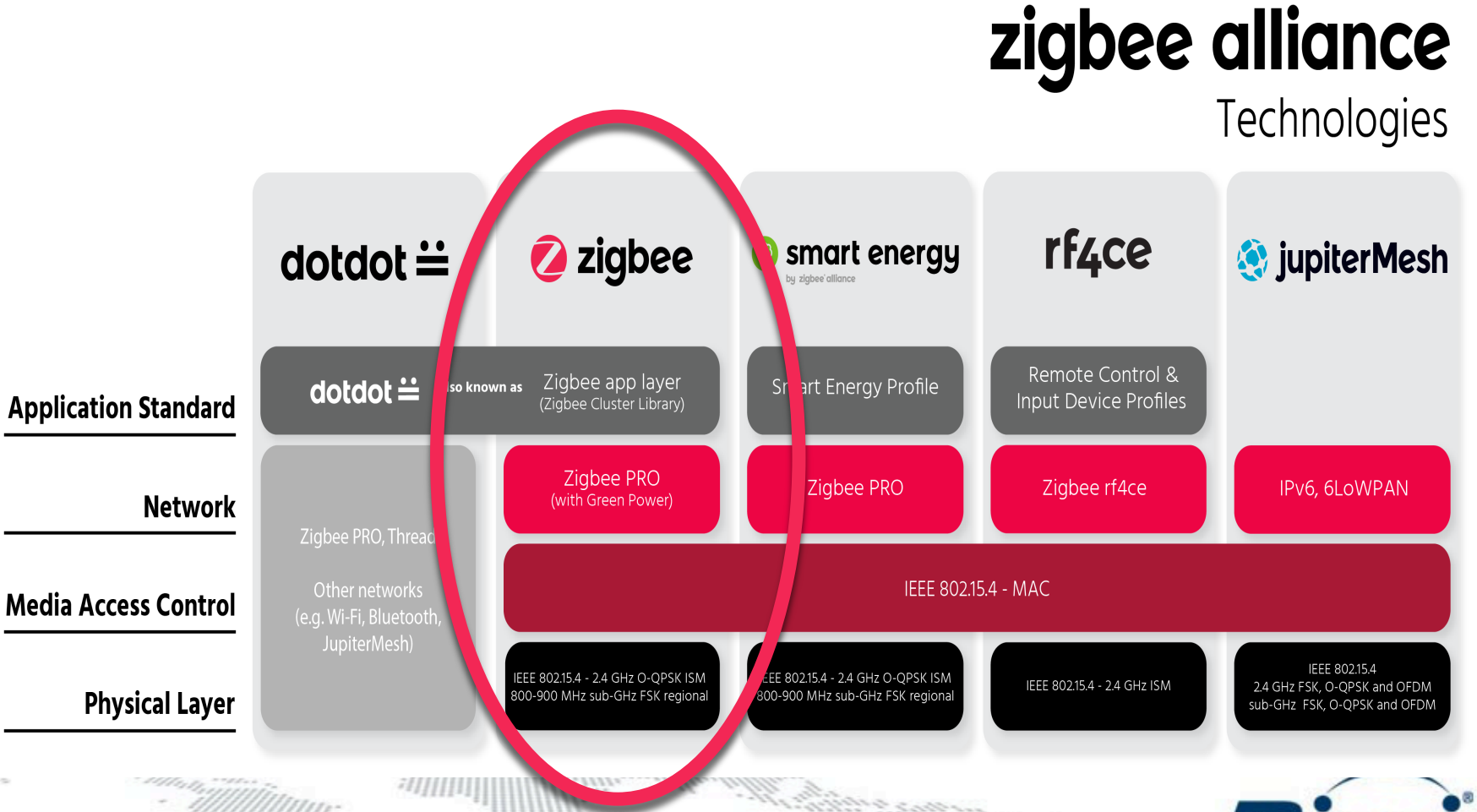
The Alliance Family of Technologies



zigbee alliance

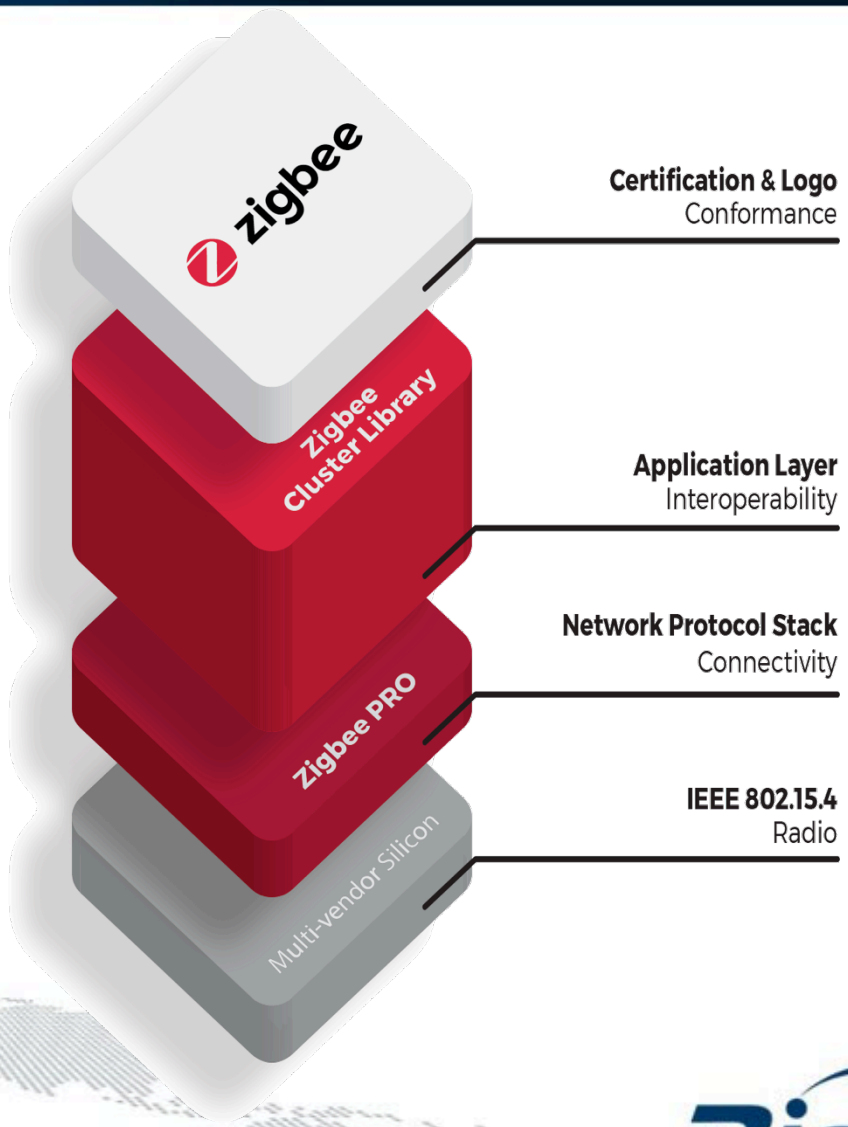
Zigbee: The standard for the IoT

Also known as "Zigbee 3.0"



Zigbee is the only complete IoT solution — from mesh network to the universal language that allows smart objects to work together.

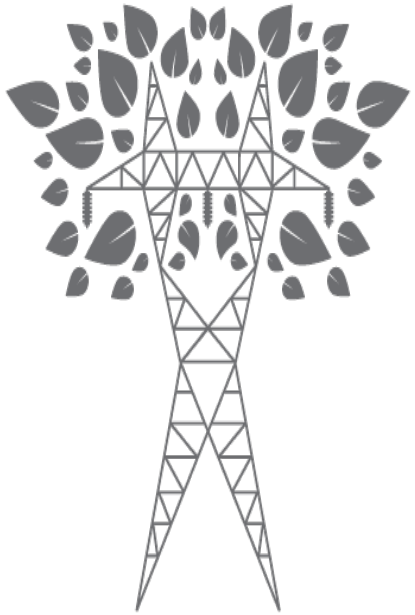
Zigbee increases choice and flexibility for users and developers, and delivers the confidence that products and services will work together through standardization and testing of all layers of the stack.



Green Power Transitional slide

Green Power Feature of Zigbee PRO

- Green Power is a feature of Zigbee PRO networks.
- It seamlessly integrates battery-less (energy harvesting-based) or lifelong battery-operated devices into the Zigbee network.
  - Key benefit: Adds nodes/devices to the network that are virtually completely maintenance-free
- Green Power adds green capability to Zigbee by eliminating battery usage and waste.
- Read the full white paper: http://www.Zigbee.org/Zigbee-for-developers/Zigbee/

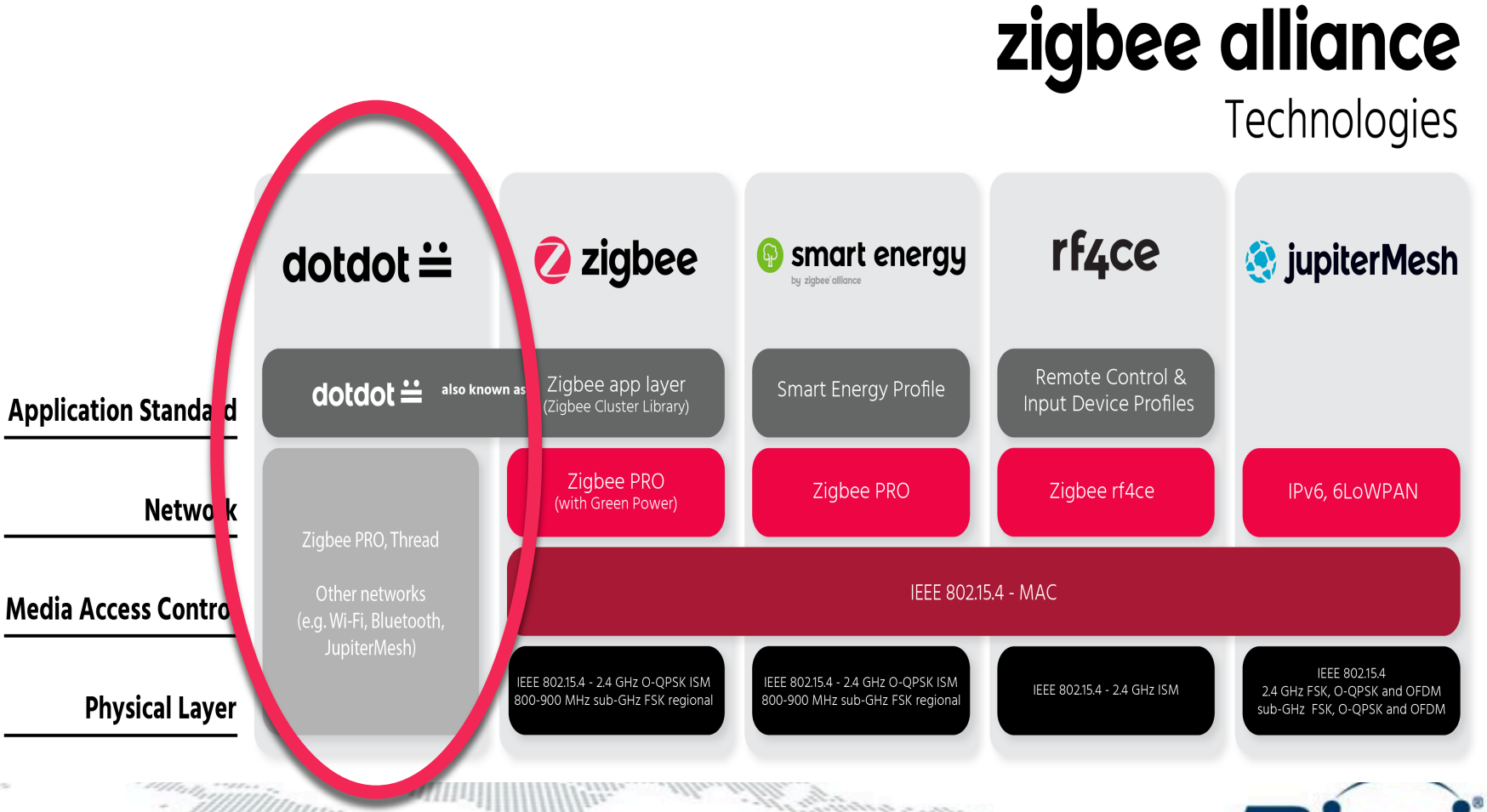


dotdot

Dotdot: our universal application layer

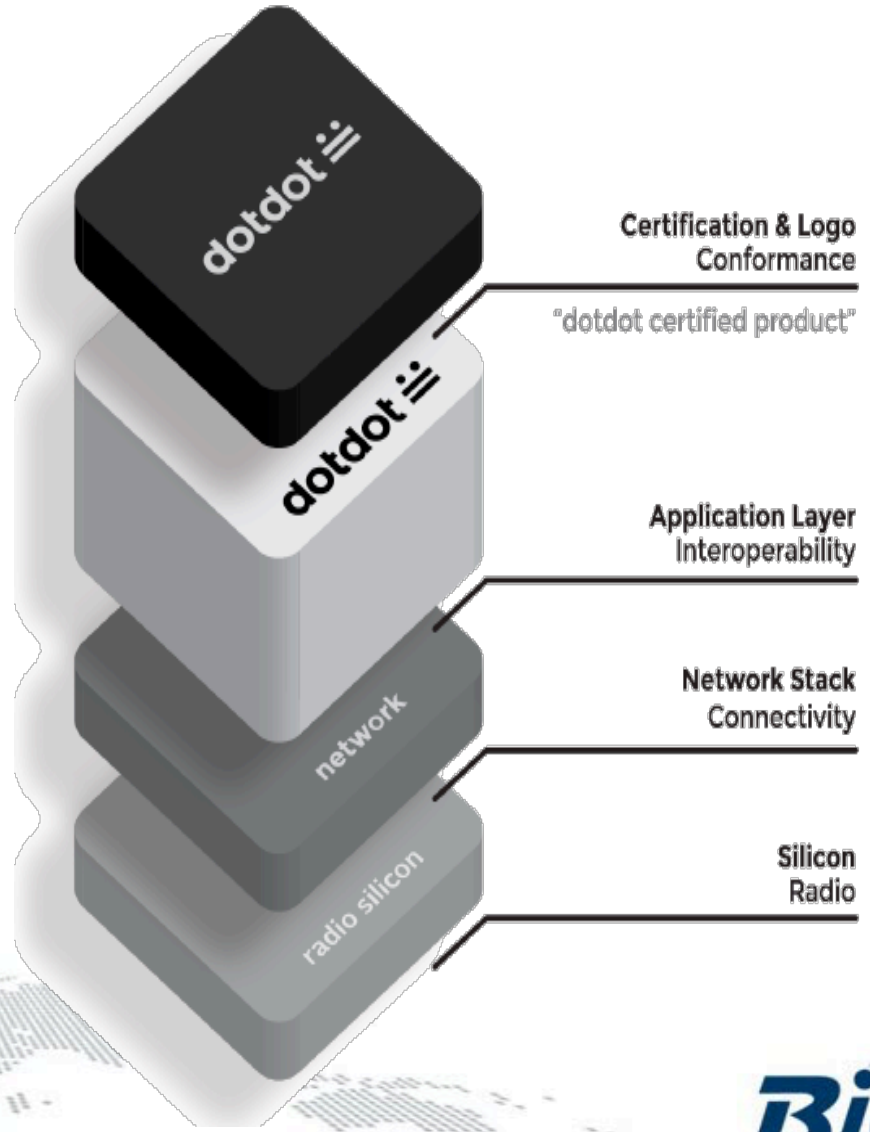
zigbee alliance

Dotdot: The standard for the IoT application layer



Dotdot is the first open, interoperable, certified application layer that can run over any network.

Based on our Zigbee Cluster Library, it comes to market with maturity and an ecosystem of suppliers, manufacturers, and experts.

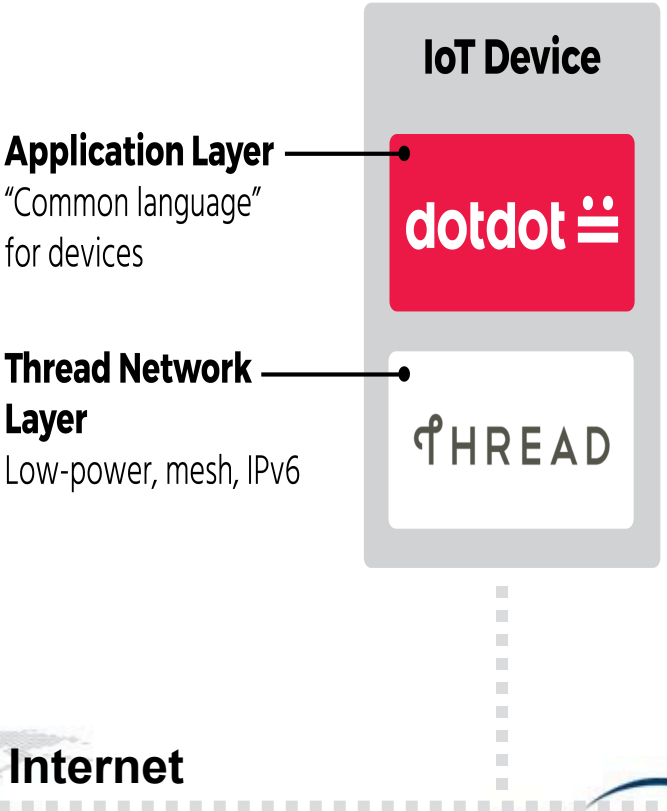


Dotdot + Thread

The first open, interoperable device language running over an Internet (IP) based network.

Open, universal protocols like HTTP over IP unlocked and accelerated innovation on the Internet.

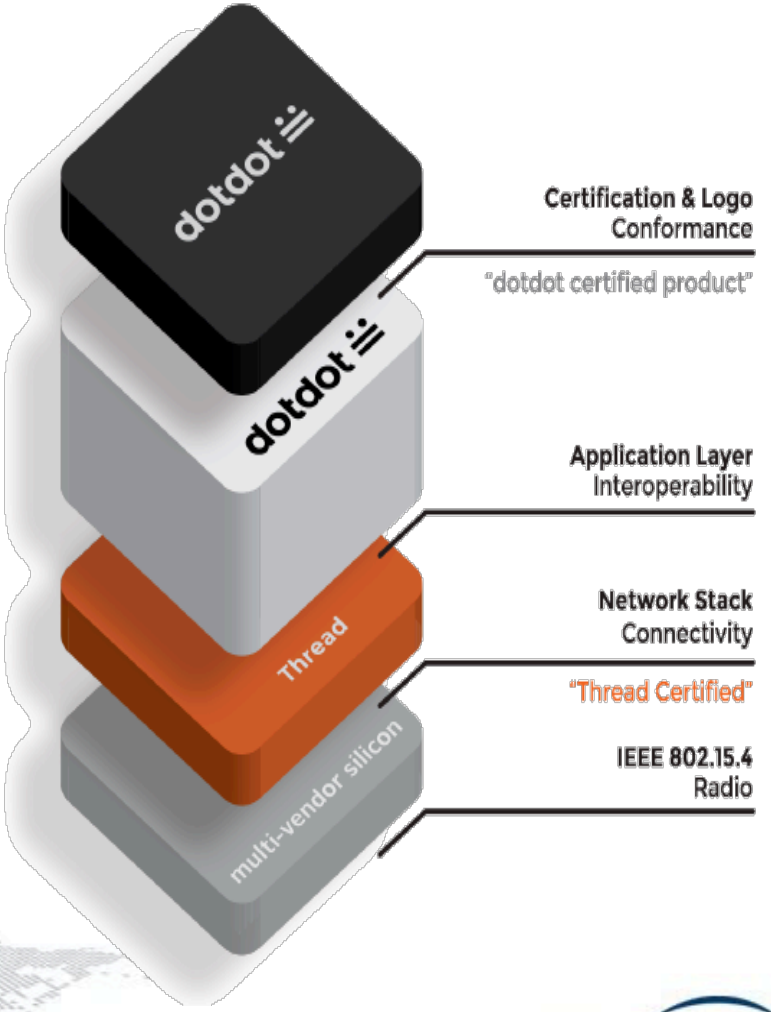
Dotdot's common device language over Thread's IP network brings this foundation for innovation to the Internet of Things.



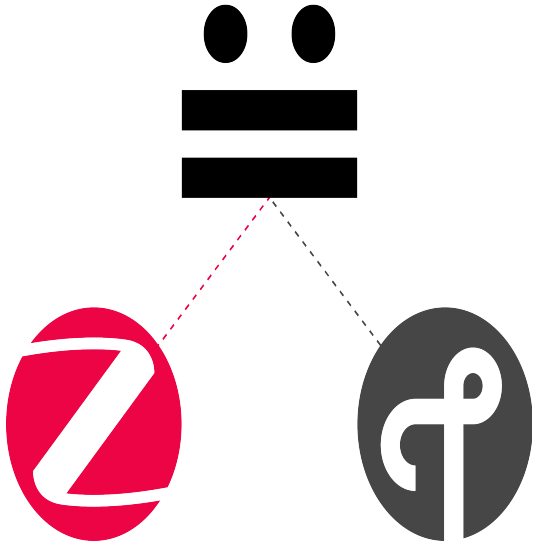
Dotdot + Thread

The Dotdot over Thread Specification was released December 2017.

Certification opens January 2019.



Dotdot + Thread
Start connecting the dots



Our members are working together to achieve this roadmap, through technical work, joint marketing, tradeshow demos, and events.

Join the Zigbee Alliance and Thread Group, learn about Dotdot + Thread, participate in demos, and see how others in your market are planning their roadmaps around Dotdot + Thread.

Dotdot Effort Announced
Dec 2016

Dotdot over Thread Specification Released, Demos at CES
January 2018

Dotdot over Thread Certification Program Open
January 2019

Additional networks added
2019

Why Zigbee?

zigbee alliance

Why Zigbee is leading the industry

It is interoperable

- Certification ensures devices to device interoperability with hundreds of millions of devices
- A single application language provides for multi-vendor ecosystems
- Designed with forward and backward compatibility

It is a single solution for all markets

- Home, building, industrial, retail, health, and more
- As a single choice for developers and consumers, it ends market fragmentation
- Includes the application layer for complete implementations

Why Zigbee is leading the industry

It is easy

- All necessary documents in a single location
- A single certification mark on every certified product and package
- Multiple options for chip, stack, and module vendors means you are not locked-in to a single supplier

It is reliable and robust

- Proven mesh network eliminates single point of failure and provides for large networks
- Self-healing and scalable provides for networks with hundreds of devices

Why Zigbee is leading the industry

It is global

- 2.4GHz and sub-gig 800-900 band for use anywhere in the world
- A single application language provides for multivendor ecosystems

It is green

- The network is designed to work with energy harvesting and ultra-low power products
- Every Zigbee routing devices supports Green Power technology proxy assuring mesh support for Green Power products

It is proven

- Over 2,500 products certified and half a billion products deployed

Why Zigbee is leading the industry

It is future-proof

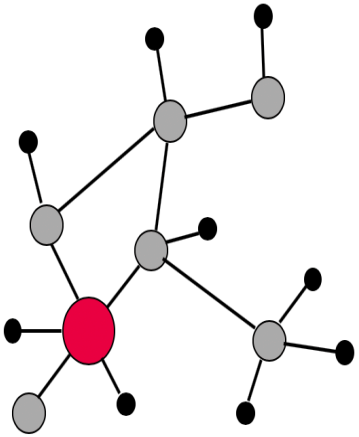
- Brought to market with support from over 400 member companies with decades of experience in the IoT industry
- A history of innovation – some of the largest, smallest, oldest and newest companies in the industry

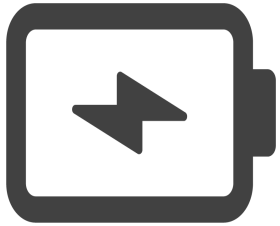
It is well-tested

- Comprehensive testing and certification programs covering MAC/ PHY, network, and applications/product layers

zigbee certified product

- Security & Safety
- HVAC
- Lighting
- Retail
- Sensing
- Commissioning
- Energy metering
- Appliances
- Telecommunication





Flexible self-organizing mesh + **Ultra low-power** + **Library of applications**

Bicsi

What devices can I certify to the Zigbee standard?

Security
Access control (fobs)
Occupancy sensor
Door lock
Door lock controller
Fobs

Generic Devices
Configuration tool
Remote control
Combined interface
Range extender
Mains power outlet
Control bridge
Level control switch
On/off switch
On/off sensor
On/off output

Lighting
On/Off light switch
Dimmable plug-in unit
Dimmable light
Color dimmable light
Dimmer switch
Light sensor
Color temperature light
Extended color light
Color controller
Color scene controller
Non-color controller
Non-color scene controller
Scene selector
Light level sensor

Green Power Devices
Proxy basic
Combo basic
Green Power (energy-harvesting) device

HVAC
Heating/cooling unit
Humidity sensor
Thermostat
Temperature sensor

Intruder Alarm System
IAS control & indicating equipment
IAS ancillary control equipment
IAS zone
IAS warning device

Closure Devices
Shade controller
Window covering devices

…and more!

Building Use Cases

CONNECTED LIGHTING

Wireless networked control systems bring smart lighting with control strategies such as task tuning, daylight harvesting and scheduling to deliver demand-based lighting optimized for each zone.

HVAC & FAN CONTROL

Wireless offers the ability to add advanced schedule and occupancy control to HVAC, fans and mechanical loads.

ELECTRICITY PLUG & LOAD CONTROL

Plug-loads account for 25% of total electricity consumed in offices. Warehouse offices have hundreds of receptacles that can be powered down when not in use.

FACILITY CONFIGURATION BASED ON ROOM OCCUPANCY

Increase cross-docking efficiency in a ware-house or remodel office cubicles to make way for conference room, facility reconfigurations have become the norm

FAILURE SENSOR DETECTION

Smart wireless sensors can detect luminaire failure and send alert signals.

BUILDING ENERGY MANAGEMENT

Optimize operational processes, maximize resources and
meet corporate sustainability goals.

Building Use Cases

FACILTY CONFIGURATION BASED ON ROOM OCCUPANCY

Increase cross-docking efficiency in a warehouse or remodel office cubicles to make way for conference room, facility reconfigurations have become the norm.

SAFETY & PRODUCTIVITY

Exhaust fans and thermal destratification fans can be remotely switched on (or off) based on demand. Zigbee motion sensors can automatically lite up the entire aisle when forklifts are moving merchandise inside warehouse or occupants are using stairway enhancing visibility and improving safety.

OCCUPANCY SENSING

Advanced EMS solutions such as ControlScope go beyond simple monitoring & control and provide: Web-based command center to manage multiple facilities; Automated fault detection, alarm and alerts to give total
visibility; Analytics and insight to drive out inefficiencies and optimize operations.

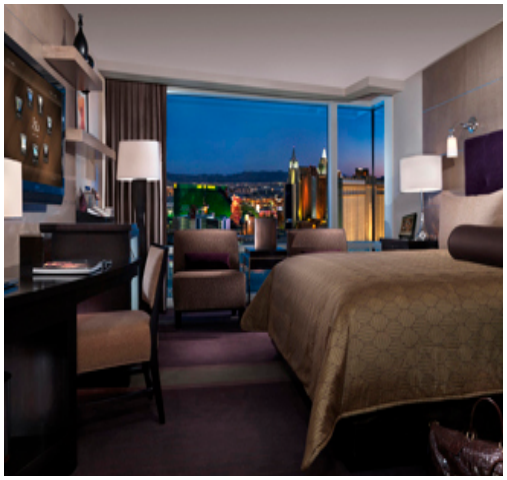
SHADE CONTROLS

Access control and monitoring for window treatments.

DEMAND RESPONSE

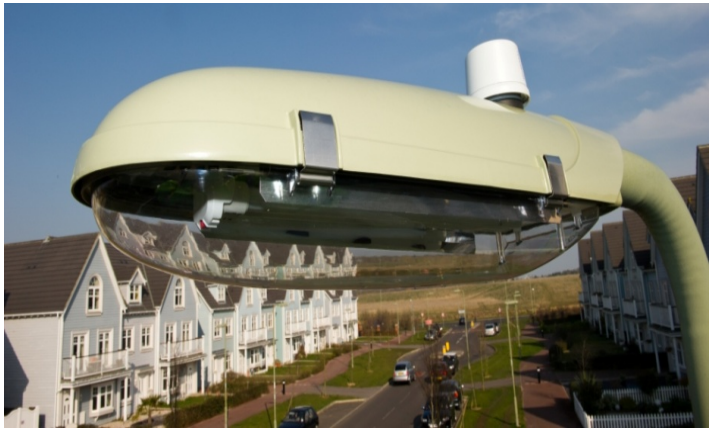
Facility managers can leverage wireless control system to automate demand response. With Zigbee sensors, the large industrial grade exhaust fans can be programmed to operate in sequence reducing the sudden surge and avoiding the peak load penalty.

Applications

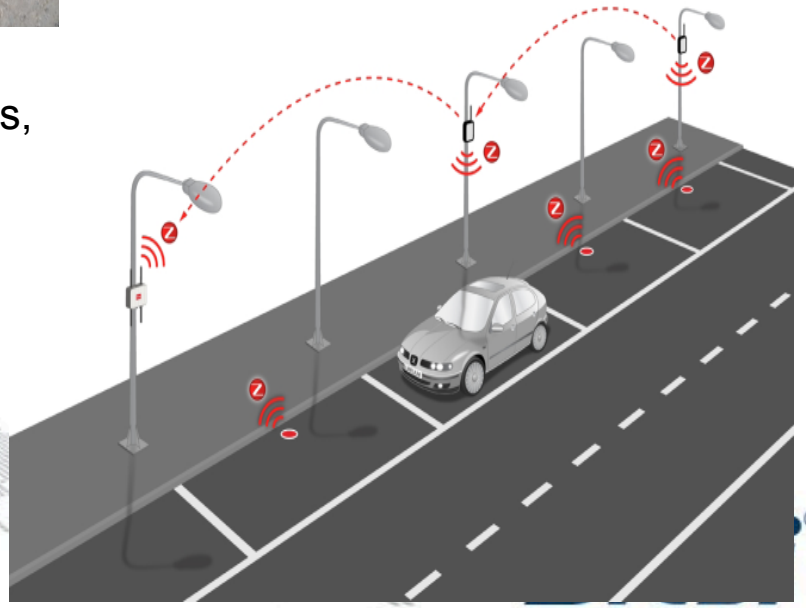


Aria Hotel City Center, Las Vegas:
+ 100,000 Zigbee devices

Hampshire City Council, Hampshire UK:
90,000 connected street lights



GM Spring Hill Plant:
28,773 connected lights,
20 million square feet



Ecosystems powered by zigbee

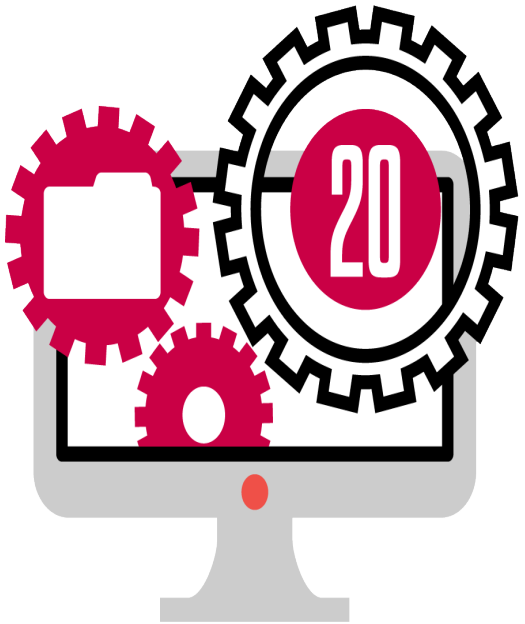
The Alliance has made building Zigbee devices easy

zigbee alliance

Building a Zigbee device

1. Development
Zigbee Compliant Platforms

- More than 2,500 Zigbee products have been built and certified on our Compliant Platforms.
  - Includes 250 manufacturers using Zigbee standards for smart home, smart building, and connected city
- More than 20 Compliant platforms to choose from that support Zigbee & wide industry support
- Silicon from eight major vendors now certified, with many more module, software and integration support members ready to help product developers build Zigbee products



1. Development
Technical Specifications

Solution	Description
Network Protocol	Zigbee PRO 2015 (or newer)
Network Topology	Self-forming, Self-healing MESH
Network Device Types	Coordinator (routing capable), Router, End Device
Network Size (# of nodes)	Up to 65,000
Radio Technology	IEEE 802.15.4-2011
Frequency Band / Channels	2.4 GHz (ISM band) 16-channels (2 MHz wide)
Data Rate	250 Kbits/sec
Security Models	Centralized (with Install Codes support) Distributed
Encryption Support	AES-128 at Network Layer AES-128 available at Application Layer
Communication Range (Average)	300+ meters (line of sight) 75-100 meters indoor
Low Power Support	Sleeping End Devices Zigbee Green Power Devices (energy harvesting)
Legacy profile support	Zigbee 3 devices can join legacy Zigbee profile networks. Legacy devices may join Zigbee 3 networks (based on network's security policy)
Logical device support	Each physical device may support up to 240 end-points (logical devices)

2. Testing
The Zigbee Test Harness

The Test Harness is an affordable way to enable product developers to check the functionality of their implementations before starting the official testing process.

This brings a common test platform to all labs, and is available to members

2. Testing
Authorized test service providers

Zigbee devices can be tested at any of its five authorized test service providers, at any of their worldwide locations

3. Certification
Certification Programs

After testing, the Zigbee Alliance will review submissions.

Approved devices will then be able to display the Zigbee Certified logo, and join the global ecosystem of half a billion Zigbee devices with confidence that the device will be interoperable.

zigbee
certified
product

Conflate building a device slides

Our Certification Programs

zigbee alliance

Open to the public!

Certification for New Devices

This path is for new products that haven't previously been Certified. They are put through a rigorous testing phase carried about by authorized testing service providers that ensure products are designed to Zigbee specifications. This path is required for all new product entries seeking Certified status. The following technologies have live Certification programs.
It is available for:

- Zigbee
- Smart Energy
- Green Power
- Rf4ce
- Zigbee PRO
- Dotdot + Thread coming soon!

Certification by Similarity

This path allows members to certify a product based on its similarity to a product that the same member has already certified. Member companies seeking Certification by Similarity can apply for testing exemption and if approved, move directly to the certification submission stage. This is a nice way for derivative products to get to market faster by piggybacking on the Certification of original products that are the same in functionality and makeup, while allowing minor changes.

Certification Transfer Program

The Certification Transfer Program enables Certifications between companies. The program allows Zigbee Alliance Participant and Promoter members to offer their Certified Products to customers (members and non-members) for re-branding and non-functional modification while maintaining those products' Certified status. The original vendor (a Participant or Promoter) simply registers their Certified Product with the program, and their customers (another member, or a new company entering the market) may apply to receive a Certification Transfer.

Resources

Alliance Resources

Zigbee

- Webinar Slides: Introducing Zigbee 3.0
- White Paper: Zigbee Green Power
- White Paper: Securing the Wireless IoT
- White Paper: Zigbee Interoperability

Dotdot

- Blog: Delivering on the Promise of the IoT with Dotdot + Thread
  - Part 1
  - Part 2
- Blog: The Path to Dotdot starts with Zigbee
- Webinar: How Dotdot + Thread Brings the Internet to the Internet of Things

Smart Energy

- Visit our web page for the latest standard

Questions?

- For technical questions, marketing questions, or questions regarding membership, please contact help@zigbee.org

www.zigbee.org

zigbee alliance

www.zigbee.org

Thank You for Your Attention !

Questions ?

END