

MSH-101: Which Mesh is the Right Mesh?

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Why Standards-Based Wireless Mesh Networks?



CONSUMERS

Better connectivity through multi-hop
Instant responses to actions
Advanced controls and functionality



DEVELOPERS

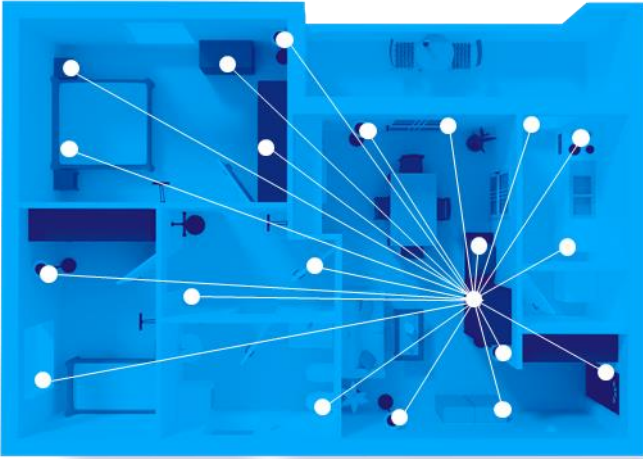
Focus on application implementation
Certification and interoperability
Advanced management tools



BUSINESS

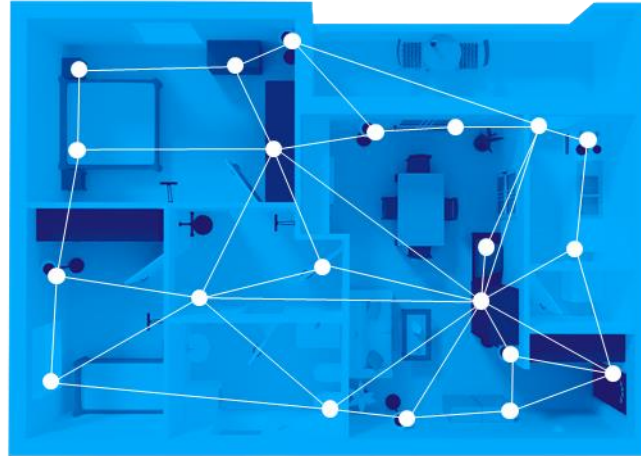
Scale system deployment size
Flexibility compared to wired networks
Enhance with location services

Types of Wireless Networks



STAR NETWORKS

Simpler networks and installation
Limited to RF range & TX power
Connection through a central node



MESH NETWORKS

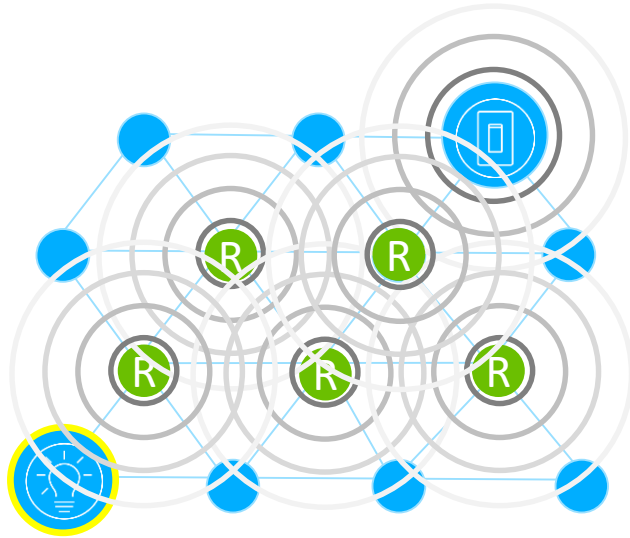
Extend range through multi-hop
Reduce energy consumption
Improve responsiveness & reliability



HYBRID NETWORKS

Combine mesh and star topologies
Point-to-Point Long Range Extension
Maintain network scalability

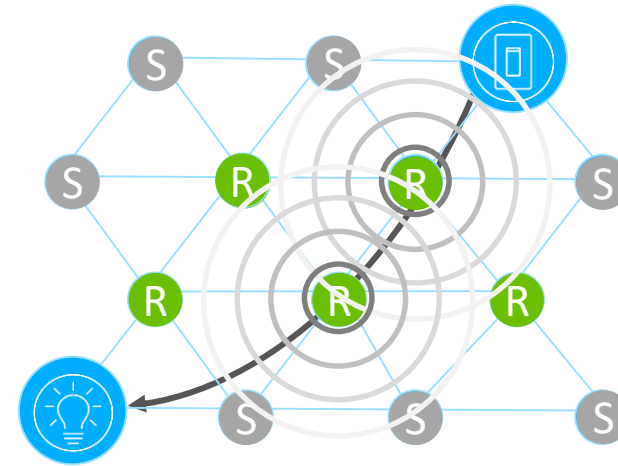
Types Message Relaying in Mesh Networks



MANAGED FLOOD FORWARDING

All relays repeat all messages

Loops avoided through counters, timers and messages cache



DIRECTED FORWARDING

Forwarding only through selected relays

Routing algorithm builds routing tables and computes path to destination

Types of Protocol Connectivity



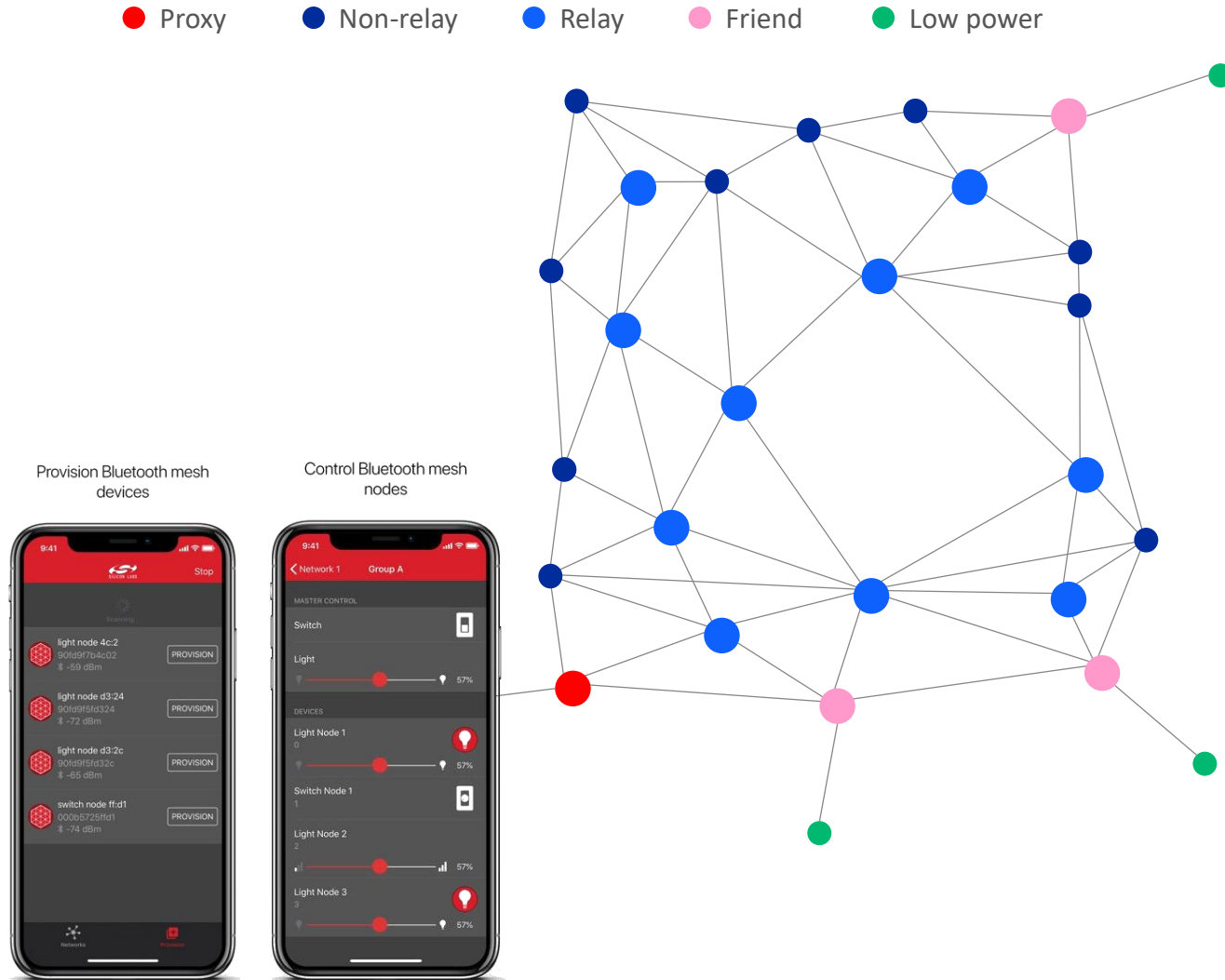
NON-IP NETWORKS

- Optimized packet size to physical layer
- Less complexity and less overhead
- Lower latency and lower power



NATIVE IPV6 NETWORKS

- Native built-in internet compatibility
- Existing app layers, tools and knowledge
- Reuse of deployed infrastructure



Consumers

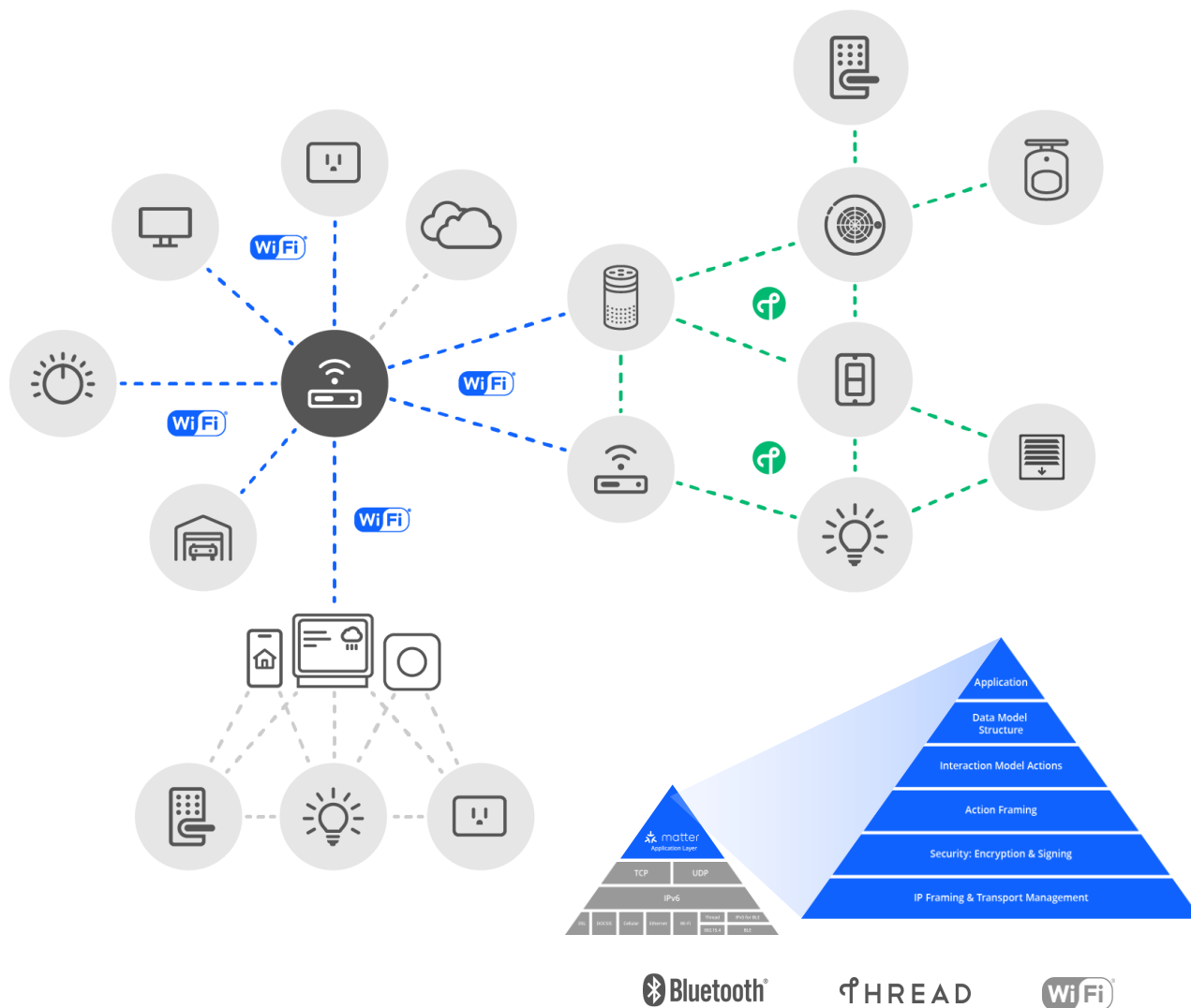
- Smart phone connectivity to control devices
- Simplified provisioning through Bluetooth
- Easy reconfiguration based on user needs

Developers

- Optional gateway, reduced development
- Simplified testing, no single point of failure
- State of art security w/ different keys per layer

Businesses

- Scalable from a few to thousands of nodes
- Value added services through beacons
- Enhanced w/ location services & asset tracking



Consumers

- Solves the interoperability between ecosystems
- Simplifies user experience for setup & control
- Allows bridging to legacy networks & protocols

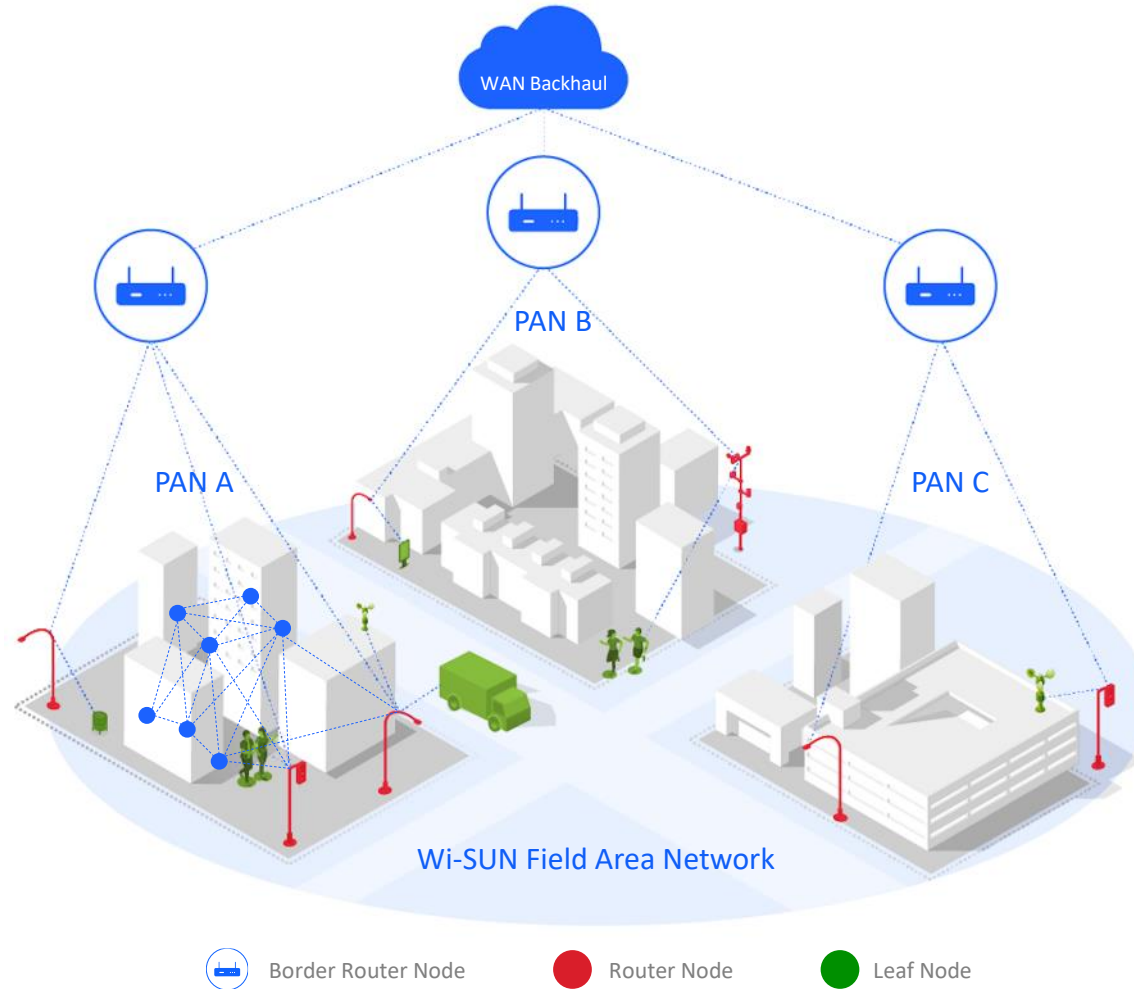
Developers

- Reduces IoT complexity for product developers
- Application layer using market-tested IPv6 tech
- Self-healing, no single point of failure

Businesses

- Cross-ecosystem single SKU compatibility
- Scales network through multiple border routers
- Robust and streamlined state of art security

Back End | Head End | Control Center Services



Consumers

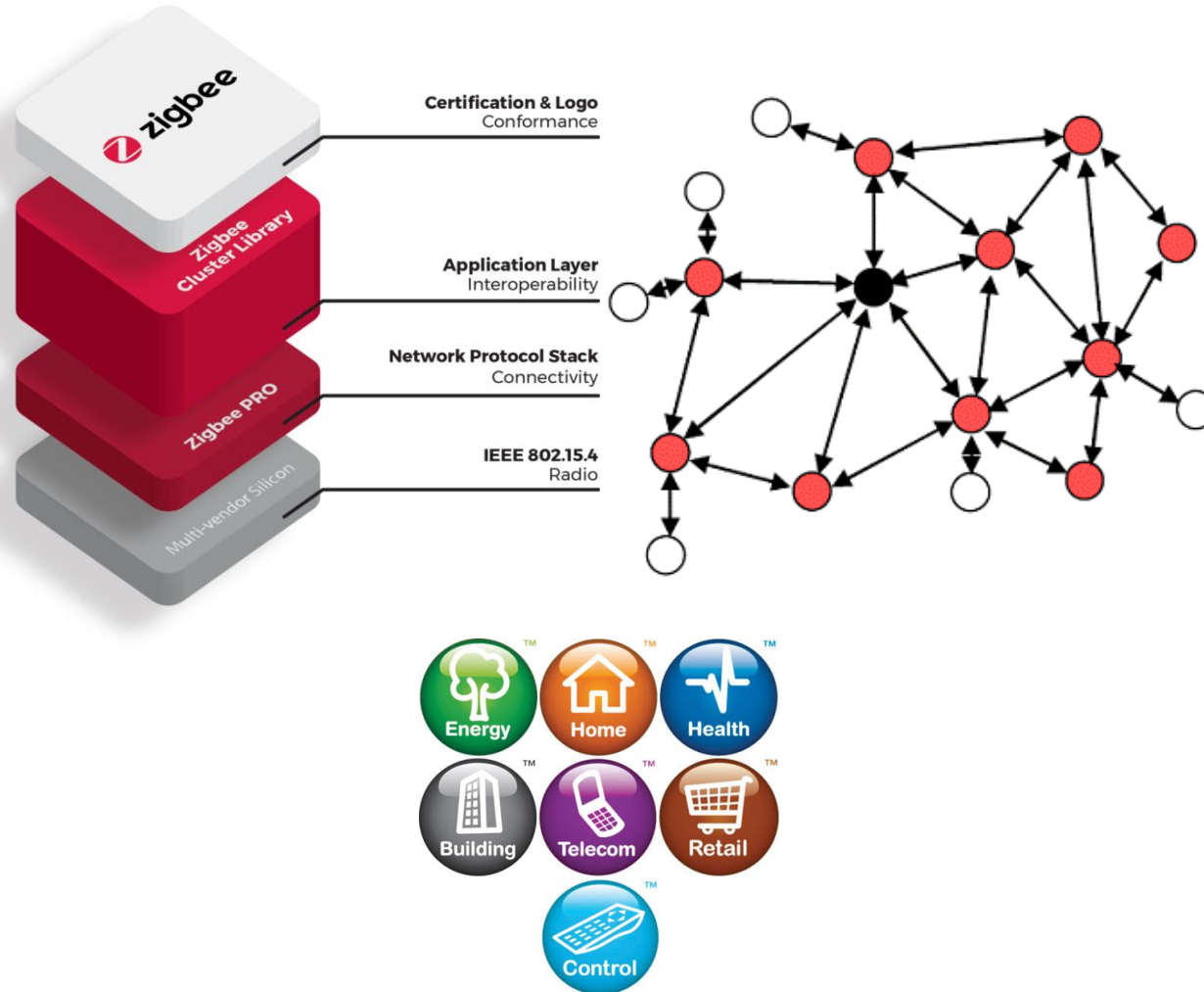
- Real-time remote management and control
- Ability to select different energy usage plans
- Automatically generate maintenance orders

Developers

- 2.4GHz & Sub-GHz long range IPv6 network
- Native public-key infrastructure(PKI) integration
- Multi-vendor interoperability and certification

Businesses

- Ubiquitous & scalable to thousands of nodes
- Multiple paths from end device to backhaul net
- Energy management & smart cities services



Consumers

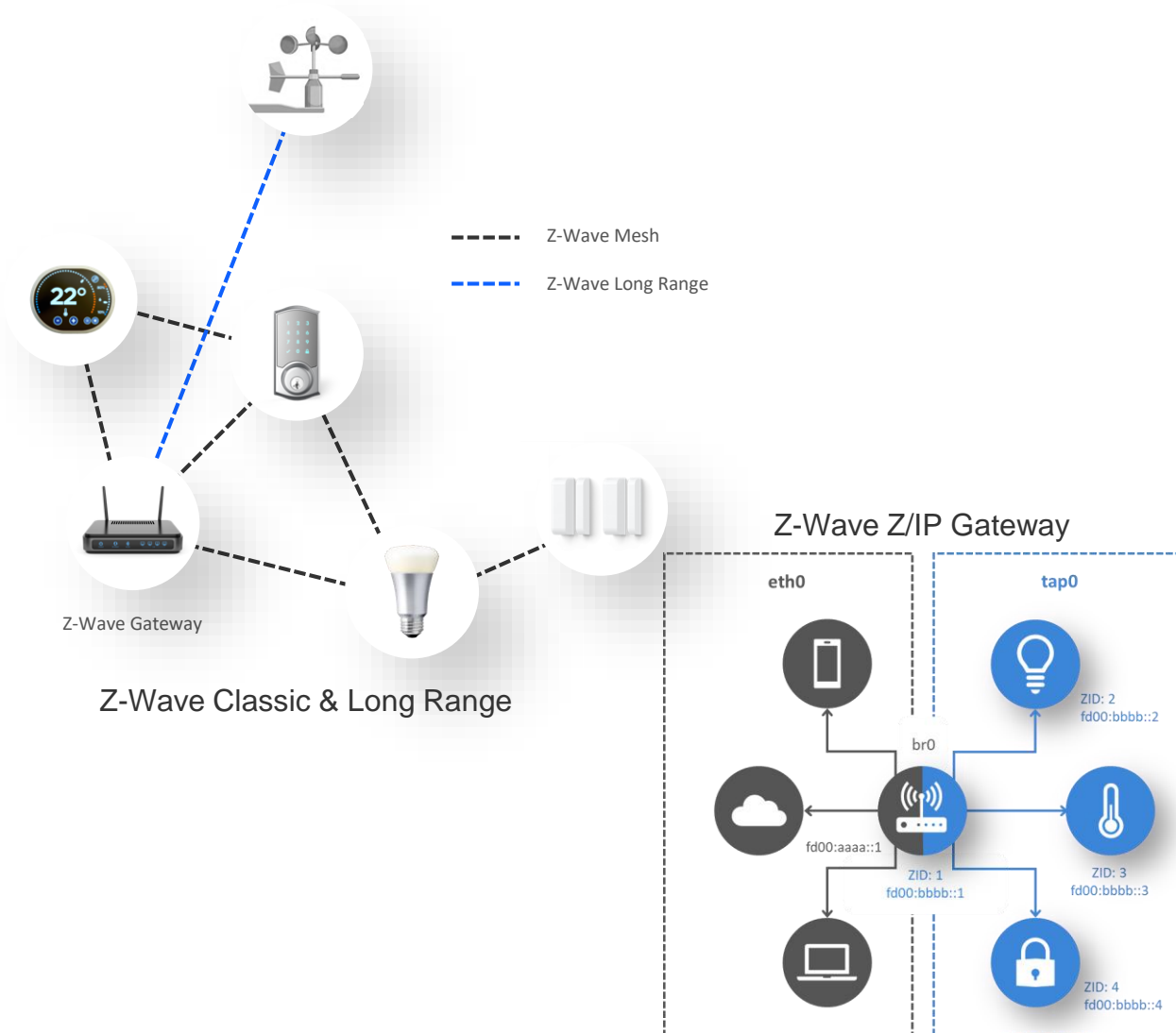
- 4000+ certified products and large ecosystems
- Efficient use of spectrum on 2.4GHz band
- Low power / battery-less Zigbee Green Power

Developers

- Reliable and robust intelligent mesh network
- Unified application profiles through Zigbee 3.0
- Enhanced networking and security

Businesses

- Proven scalability to large networks
- Standardized interaction between SE and Z3.0
- 20 years of development and learning



Consumers

- 3500+ certified products & 100% interoperable
- Low power: 10 years on a coin cell battery
- 100% backwards compatibility

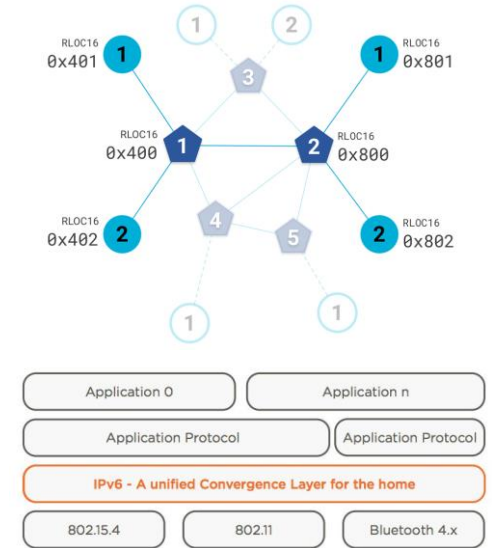
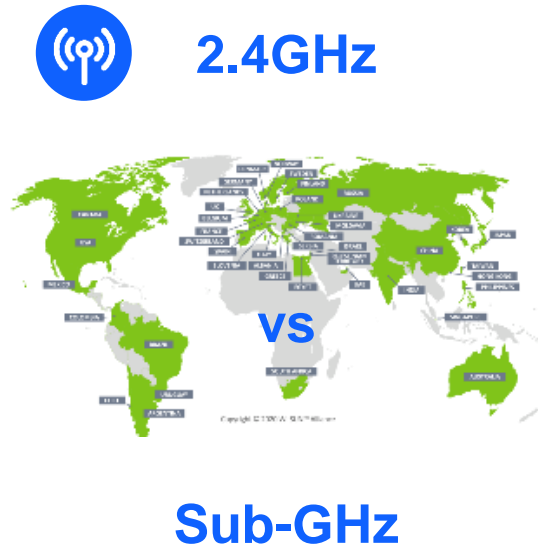
Developers

- Global Sub-GHz standard (ITU-T G.9959)
- Better walls penetration & less interferences
- Long range (1mile+) extension in N.A.

Businesses

- Easy SmartStart installation and provisioning
- Enables large Hotels and MDUs ecosystems
- Virtual IP addresses through Z/IP gateway

So, How Do I Chose My Mesh Network?



1 SELECT TARGET ECOSYSTEM

Ecosystems dictate protocols and application layer selection based on:

- Deployed infrastructure
- Targeted customer experience
- Future ecosystem plans

2 SELECT MARKET APPLICATION

Each market applications may have specific needs and tradeoffs:

- Battery vs mains powered
- Throughput vs range
- Gateways vs mobile connectivity

3 SELECT REGIONS & FREQUENCY BAND

Market application and target region dictate frequency bands choice:







- Range, penetration and regulations
- 2.4GHz ISM - worldwide but busy
- Sub-GHz ISM - region specific

4 SELECT IP/NON-IP CONNECTIVITY

IP vs Non-IP selection driven by:

- Energy consumption requirements
 - Infrastructure management, scalability and tools needs
- Device to cloud security constrains

High Level Mesh Networks Comparison

	 Bluetooth Mesh	 Zigbee	 Matter w/ Thread 	 Wi-SUN	 Z-Wave
Market Focus	Lighting, Building Automation	Home Automation, Lighting, Building Automation, Metering	Lighting, Home Security, Home & Building Automation, Appliances	Metering, Street Lighting, Smart Cities	Home Security & Automation, Building Automation
Frequency Bands	2.4GHz	2.4GHz	2.4GHz	2.4GHz & Sub-GHz	Sub-GHz
IPv6 Connectivity	No	No	Yes	Yes	No
Cloud Connectivity	n/a, Gateway, Phones	Gateway	Border Router	Border Router	Gateway
Application Layer	Native Mesh Model	Zigbee Cluster Library	Matter (ZCL/ZAP)	n/a (DLSM, DALI, BacNet,...)	Device Command Class
Promoter Ecosystems	Amazon, Leedarson, Alibaba, Xiaomi,...	Amazon, IKEA, Signify, Somfy, Legrand, Tuya, Landis+Gyr...	Amazon, Apple, Google, Comcast, SmartThings, IKEA,...	Itron, Landis+Gyr, Cisco, Omron, Trilliant,...	Alarm.com, Ring, ADT, Leedarson, Assa Abloy,...
Mesh Forwarding	Managed Flooding	Directed Forwarding	Directed Forwarding	Directed Forwarding	Directed Forwarding
Routing Algorithm	n/a	Source Routing & AoDV (Ad-hoc On-demand Distance Vector)	Optimized RIPng (Routing IP Next Gen)	RPL (Routing for Low Power and Lossy Networks)	DSR (Dynamic Source Routing)
Additional Notes	Location services, Direct phone connectivity	Mature technology, 4000+ certified devices, Battery-less ZGP	Self-healing (Thread), State of art security, Large ecosystems interest	Large Networks, Long Range w/ OFDM	Mature technology, 3500+ certified devices, new Long Range in NA



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