works with
by SILICON LABS

LR-102

Smart, Far, and Connected - Expanding IoT with Z-Wave Long Range & Amazon Sidewalk

Jeremy Stacy

Product Marketing Manager

Agenda

Introduction to Long-Range Wireless & LPWAN

Z-Wave Long Range Deep Dive

Amazon Sidewalk Deep Dive

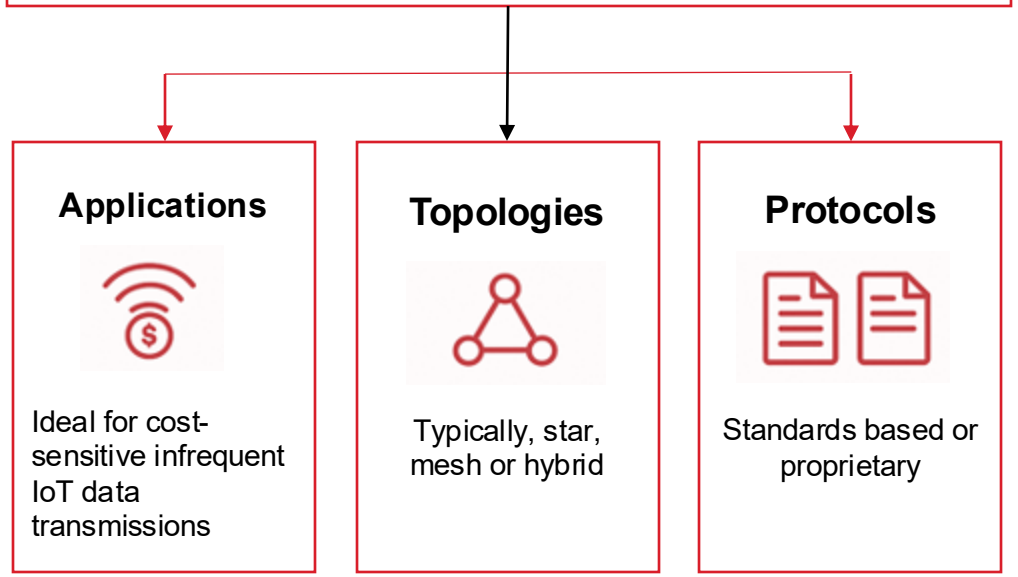
Z-Wave LR and Amazon Sidewalk Comparison

Conclusion

Introduction to Long-Range Wireless & LPWAN

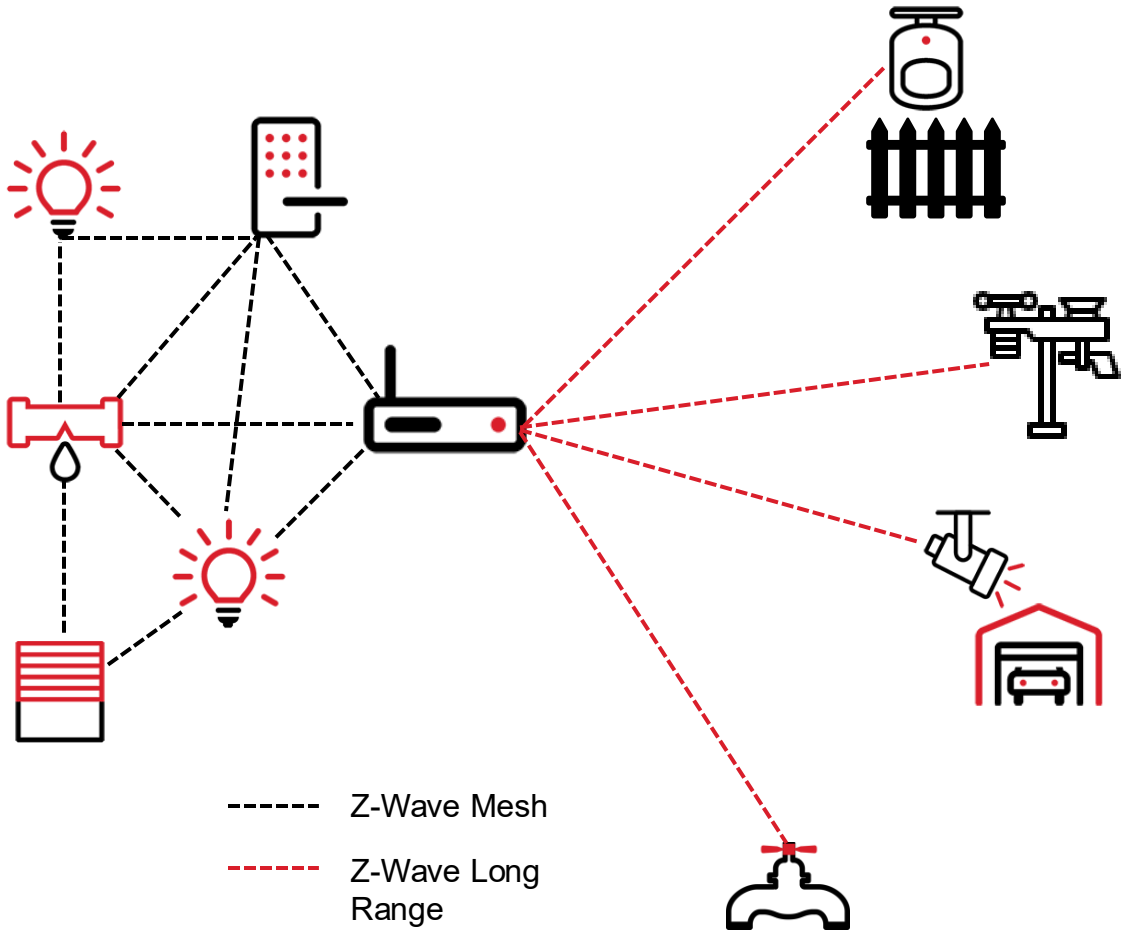
Low Power Wide Area Network are Wireless Technologies designed for:

- Low Power Usage
- Long Range Communication
- Low Data Rates
- Large-scale device connectivity



- **LPWAN Solution:**
  - Long-range, low-power protocols fill the gap for IoT devices needing extended reach without heavy power draw.
- **Smart Home Context:**
  - Enables devices at the edge of properties or across neighborhoods (e.g. sensors in yards, mailboxes, trackers) to stay connected.
- **Key Players:**
  - Z-Wave Long Range and Amazon Sidewalk are two leading LPWAN options for Wireless IoT, each with different network models and strengths
- **Focus Today:**
  - A comparison of Z-Wave LR vs. Amazon Sidewalk in terms of architecture, specs (frequency, range, data rate, power, security), use cases, pros/limitations, and what Silicon Labs' offers for each.

Z-Wave Long Range (Z-Wave LR) – Overview



What is Z-Wave LR?

- A long-range extension of the Z-Wave protocol (Sub-GHz IoT standard) for greatly expanded range and node count.

Topology:

- Star network topology – devices connect directly to a central Z-Wave hub/gateway (no mesh repeating in LR mode)*

Coexistence:

- LR nodes can coexist with classic Z-Wave mesh nodes in the same network (one hub managing both) for backward interoperability

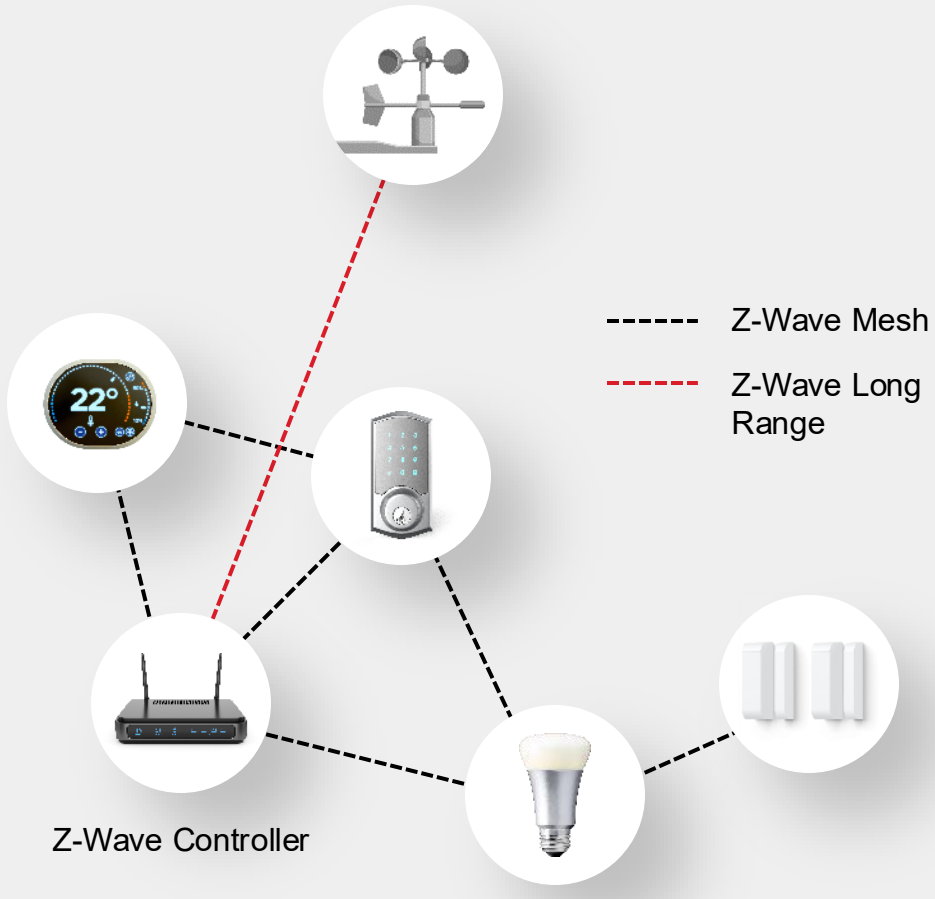
Ownership Model:

- Private network – the homeowner's hub owns and manages the network (no reliance on external infrastructure).

Role in IoT:

- Extends Z-Wave beyond traditional home limits into larger properties and light commercial settings (MDUs, hotels, campuses) while maintaining Z-Wave's interoperability principles

Z-Wave LR Key Specifications and Features:



Mesh Network Topology

100 kbps
data rate
+0/14 dBm TX power
GFSK Modulation

400 m
range (4 hops)
Coverage for the smart home and end of yard

200+ nodes
scalable
8-bit address space

Star Network Topology (LR)

100 kbps
data rate
Up to +30 dBm TX power (US)
Up to +14dBm TX (EU Limit)
DSSS OQPSK Modulation

~2.5 km
range (LoS)
Coverage for the whole home, yard, and beyond without a repeater

4000 nodes
highly scalable
12-bit address space

Z-Wave Long Range – Advantages

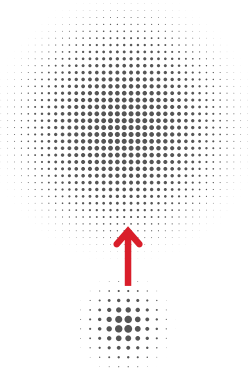
LOW POWER

SECURE

INTEROPERABLE

COVERAGE

SCALABILITY



LOCAL CONTROL

- **Ultra-Low-Power for Battery Operated Devices:**
  - Multi-year battery life (sleep modes, dynamic TX power).
- **Robust Security**
  - Leverages mature Z-Wave S2 security (AES-128 encryption, authenticated key exchange
- **Interoperability**
  - Maintains Z-Wave Alliance certification interoperability.
- **Regional Availability:**
  - North America, and Europe; global expansion expected once compliance is ensured.
- **High Node Scalability & Long Range**
  - Covers ~1 mile LOS with direct hub-to-device links.
- **Local Control:**
  - No cloud dependency required for core operation.

Z-Wave Markets: Applications and Use Cases

SMART HOME

MULTI DWELLING UNITS

HOSPITALITY

Yard Lighting Front Gate

Water Leak Tenant Safety

Guest Comfort Energy Mgmt.

Over A Mile Range, 4000 Nodes Network Capacity, and 10-Year Battery Life Enable New Use Cases & Reduce Cost

The Silicon Labs Z-Wave 800 IoT Solution

Z-Wave Certified Application

Application Framework	
S2 Security with SmartStart	
Mesh Routing	LR Network
Mesh Network	
MESH MAC	LR MAC
MESH PHYs	LR PHYs
EFR32 Platform: RAIL | Gecko bootloader | NVM3	

Z-WAVE PLUS

Z-WAVE PLUS LR

Stack

- Based on open specification
- Complete solution - PHY to App
- Controller reference design
- Secure Vault™ integration

Hardware

- SoCs & SiP Modules
- Supports all Z-Wave frequencies
- Mesh & Long Range
- Z-Wave & Proprietary support

Development Tools

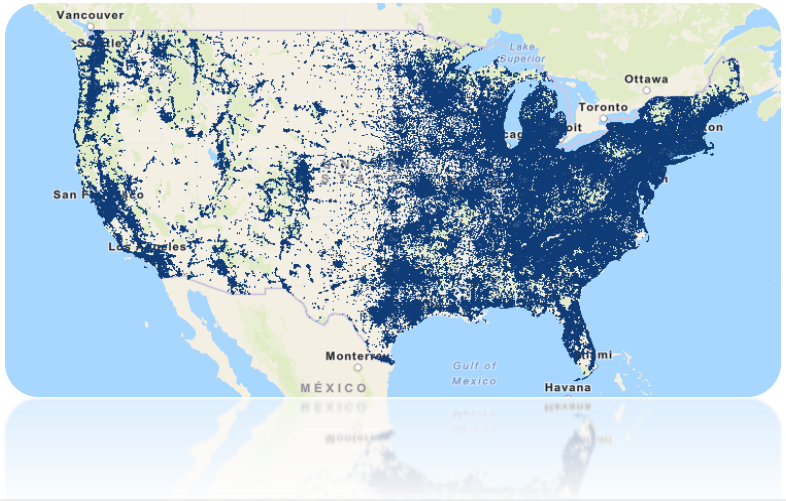
- Packet sniffer & analyzer
- Energy Profiler
- Network controller
- Installation & maintenance tool

Certification

- Ensures interoperability & backwards compatibility
- Z-Wave LR certification is part of Z-Wave Plus V2
- Certification is mandatory for all products

works with by SILICON LABS

Amazon Sidewalk – Overview



What is Sidewalk?

- A shared community LPWAN network operated by Amazon.

Network Topology:

- Distributed star network – multiple neighbors' Sidewalk Bridges create overlapping coverage.

Ownership Model:

- Community/Cloud-owned – users opt in to share a small portion of their home internet via their Sidewalk Bridge - capped at 500MB/month.
- Amazon manages the network backend. Device traffic is tunneled through Amazon's cloud to the device owner's services.

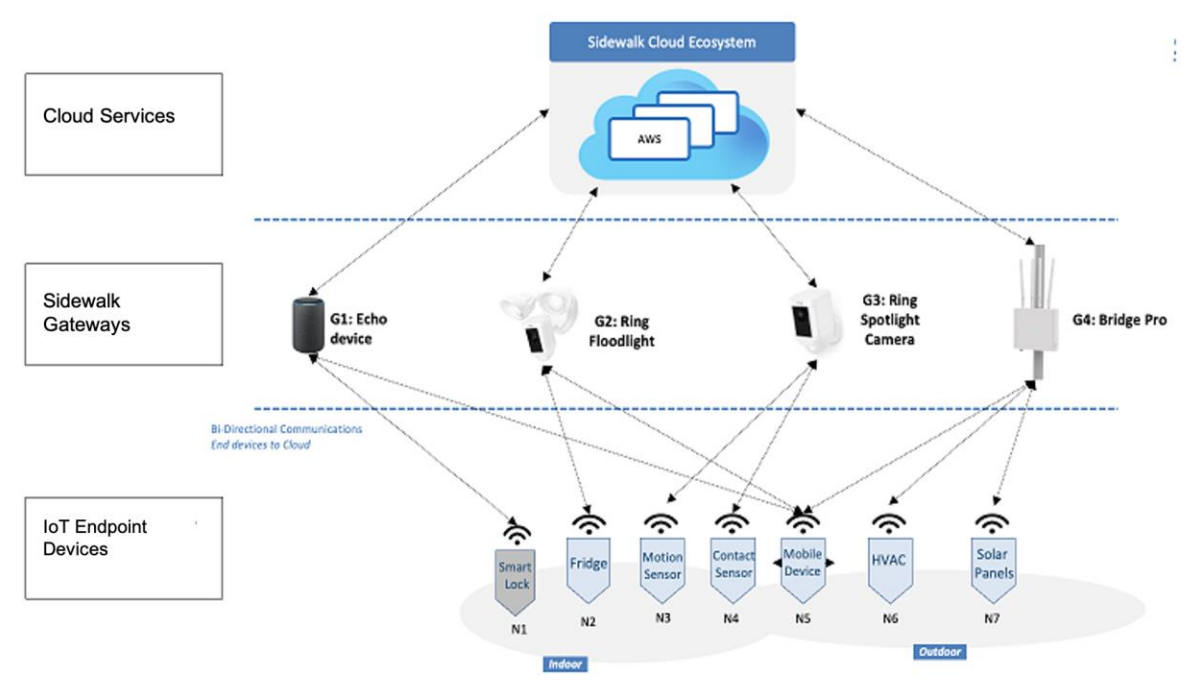
Coverage:

- Already covers 90%+ of the U.S. population as of 2023.

Role in IoT:

- Provide free-to-connect (no cellular or Wi-Fi setup needed), always-on ambient connectivity for IoT gadgets.

Amazon Sidewalk Key Specifications and Features:



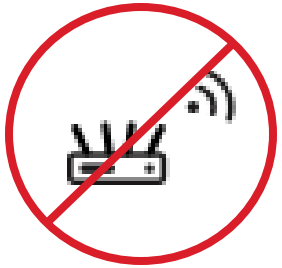
Bluetooth Low Energy	Sub-GHz FSK	LoRa
1 Mbps **data rate** +20 dBm TX power GFSK Modulation	**80 kbps** **data rate** Up to +20 dBm TX power DSSS OQPSK Modulation	**2 kbps** **data rate** Up to +20 dBm TX power CSS Modulation
<30 m **range (LoS)** Coverage for short range to hub	**~250 m** **Range (LoS)**	**~750 m** **Range (LoS)**
Nodes no set limit Only limited by the bridge's bandwidth and radio capacity	**Nodes no set limit**	**Nodes no set limit**

Amazon Sidewalk – Advantages

Wide-Area Coverage & Roaming:

Long Range, Low Power

Secure and Private



No Dedicated Gateway Needed

Free Connectivity (No Cellular Fees)

- **Wide-Area Coverage & Roaming**
  - 90%+ U.S. population covered
  - Devices connect to any nearby Bridge for roaming
- **No Dedicated Gateway**
  - Works with Echo/Ring already in homes
  - Cuts cost and complexity — out-of-the-box ready
- **Long Range, Low Power**
  - FSK & LoRa for range; BLE and FSK for setup
  - Multi-year battery for sensors & trackers
- **Free Connectivity**
  - No SIMs, no cellular fees
  - Only minimal AWS IoT Core costs
- **Secure & Private**
  - End-to-end encryption & authentication
  - Data only accessible via AWS
- **FFS & Zero-Touch Provisioning**
  - Fast, seamless onboarding through Amazon's Frustration-Free Setup
  - Devices auto-connect securely with no manual setup
- **OEM Data Without User Setup (No Wi-Fi needed)**
  - Devices auto-connect via Sidewalk
  - Manufacturers still receive telemetry, even if users never register their device

Amazon Sidewalk Use Cases & Applications

IN THE HOME

Reliable Connectivity

Backup & Resilience

Simplified Setup

Energy Efficiency

BEYOND THE FRONT DOOR

Extended Property Coverage

Neighborhood Sensing

Community Sharing

Easy Outdoor Deployment

BEYOND THE FRONT FENCE

Wide-Area Tracking

Smart Infrastructure

Public Safety Monitoring

Utility & City Services

works with by SILICON LABS

The Silicon Labs Amazon Sidewalk IoT Solution

Stack

- Full Amazon Sidewalk SDK integrated into SiSDK
- Low Power Multi-Protocol radio stack
- Out-of-the-box connectivity to AWS IoT Core via Sidewalk APIs

Hardware

- SoCs, Modules and Dev Kits
- Secure Vault- key storage and crypto acceleration
- Pre-certified Pro Kits

Development Tools

- Simplicity Studio IDE with Sidewalk SDK integration
- Energy Profiler
- Pro kit reference designs pre-flashed and AWS ready
- End-to-end developer journey

Certification

- On-device key generation and secure provisioning
- On-device Certificate Generation - Production Device Provisioner (PDP)
- Reference “SoC Qualification” apps to accelerate approval

Comparison – Key Technical Details

Category	Z-Wave LR	Amazon Sidewalk
Topology & Control	Private star network, private hub controls devices (local control).	Public/community network, devices connect via shared Bridges to Amazon cloud (roaming, cloud-dependent).
Range	~1 mile LOS (1.6 km @ 14 dBm); hundreds of meters indoors. Limited by hub placement.	~1 mile LOS (0.8–1+ km via LoRa); hundreds of meters indoors. Multi-hop via neighbors' Bridges extends coverage.
Data Rate	~100 kbps, all local.	Up to 80 kbps per Bridge; LoRa links often a few kbps with cloud overhead.
Capacity	Up to 4000 devices per hub (ample for single site).	Cloud-scaled, virtually unlimited; single Bridge supports dozens of endpoints.
Security	S2 AES-128, device-to-hub, local.	End-to-end + link-layer encryption; secure even over untrusted relays.

Comparison – Deployment and Use Case Considerations

Category	Z-Wave LR	Amazon Sidewalk
Smart Home Deployment	Self-managed hub, local network, works offline. Ideal for pro installs & security systems.	No extra hub; uses Echo/Ring. Great for consumer gadgets needing community coverage.
Mobility & Roaming	Fixed to hub's range, suited for static installations.	National roaming via Bridges, ideal for trackers, bikes, packages.
Scale of Deployment	One hub supports up to 4000 devices (e.g., large apartment). Localized to single site.	Cloud-based, scales city-wide or multi-site, no hubs per site (if coverage present).
Data Control	Local-first; cloud optional. Low latency, data privacy, continues offline.	Data always routed via AWS (good for IoT integration, but adds dependency).
Ecosystem	Mature device catalog (sensors, switches, thermostats). LR devices integrate with existing Z-Wave mesh.	Emerging ecosystem (focus on trackers/sensors), device availability still limited.

Conclusion – Z-Wave LR & Sidewalk: Two Paths, One Toolkit

Z-WAVE LONG RANGE

- Best for private, single-site networks
- Local control, offline capable
- Proven interoperability, rich device ecosystem
- Ideal: Smart homes, apartments, secured buildings

Z-WAVE amazon sidewalk

Complementary - *These protocols can coexist:*

Z-Wave LR = on-site building automation

Sidewalk = wide-area mobility & data

AMAZON SIDEWALK

- Best for distributed & mobile IoT
- Nationwide coverage, no hubs needed
- Roaming across neighborhoods/cities
- Ideal: Trackers, appliances, outdoor sensors, city-scale fleets

FUTURE OUTLOOK

- Z-Wave LR → Extending trusted ecosystem
- Sidewalk → Pioneering community coverage

SILICON LABS ROLE

- Multi-protocol Wireless Portfolio
- Full support: SoCs/Modules, SDKs, Dev kits
- Enabling solutions for whichever you choose

Use Z-Wave LR when you control the site

With Silicon Labs, you can confidently build both

Use Sidewalk when leveraging the network around you

works with by SILICON LABS

SILICON LABS

CONNECTED INTELLIGENCE