

the case for Bluetooth mesh

Selecting the right low-power wireless mesh network technology can make or break a new product in the market. Choose carefully.

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1.0 what is Bluetooth mesh

Bluetooth^{*} technology, the global standard for simple, secure wireless connectivity, now supports mesh networking. The new mesh capability enables many-to-many (m:m) device communications and is optimized for creating large-scale device networks. It is ideally suited for building automation, sensor network, asset tracking, and any solution that requires tens, hundreds or thousands of devices to reliably and securely communicate with one another.

1.0 What is Bluetooth Mesh



Selecting the right low-power wireless mesh technology to power your new building automation or assettracking solution can be a make or break decision. That decision can play a significant role in determining the ultimate success of any new product you launch in today's demanding markets.

Bluetooth has a 20-year track record of delivering lowpower wireless technology that enables simple, secure device connectivity. Bluetooth SIG member companies work hard to add new valuable capabilities to Bluetooth that have played a significant role in creating several major markets.

- Bluetooth Basic Rate/Enhanced Data Rate (BR/EDR) with its point-to-point network topology is the wireless audio market.
- Bluetooth Low Energy (LE) with its point-to-point topology is the connected device market.
- Bluetooth LE with its broadcast topology is the rapidly growing beacon market.

Adding a mesh topology option for Bluetooth LE builds on this track record of success and positions Bluetooth technology to help new markets flourish. To make this happen, Bluetooth SIG member companies that developed the new mesh networking specifications went to great lengths to ensure Bluetooth mesh meets the demanding requirements of these new markets.

2.0 industrial-grade solution

Bluetooth mesh uniquely meets the reliability, scalability and security requirements of commercial building and factory automation markets that demand true industrial-grade solutions.

2.0 Industrial-grade Solution

Reliability

The reliability of a mesh network is judged on its ability to deliver a message from one device to another. Bluetooth mesh networks use peer-to-peer communications and multipath message relay to ensure uninterrupted message delivery.

- **Peer-to-peer:** With Bluetooth mesh, all nodes communicate directly with one another. There are no centralized hub or routing nodes, and therefore no single points of failure.
- **Multipath:** Bluetooth mesh uses a managed flood message relay architecture that, in addition to simple deployment and management, is inherently multipath and self-healing for reliable message delivery.

Scalability

Bluetooth mesh allows thousands of devices to communicate with each other while meeting commercial and industrial performance requirements.

- Large: Bluetooth mesh is specified to support up to 32,000 nodes per network, and is currently deployed in networks exceeding 1,000 nodes. In commercial and industrial environments, where high-density lighting and sensor deployments are common, networks can quickly scale in size. Bluetooth mesh is tailor-made for these large-scale network demands.
- **Fast:** The high-speed radio and small packet size of Bluetooth combine to enable messaging that is faster than the speed of sound. This allows a single light switch to control hundreds of lights on a factory floor at the same time.
- **Multicast:** The managed flood message relay architecture, combined with its publish/subscribe approach to group messaging, makes Bluetooth mesh uniquely suited to handle the significant amount of multicast messaging traffic that occurs in building automation solutions. Commercial and industrial lighting are great examples of deployment scenarios where Bluetooth mesh is an ideal solution.

Security

Bluetooth mesh adopts a security architecture that is designed to address the security concerns of companies deploying large-scale wireless device networks.

- **Government grade:** Devices added to a network can be provisioned using 256-bit elliptic curves and out-of-band authentication. All mesh communication is secured using AES-CCM with 128-bit keys, ensuring all mesh messages are encrypted and authenticated.
- **Multi-level:** Encryption and authentication are implemented at two layers, the network layer and the application layer. All nodes in a network can help relay messages at the network layer without reading its contents. Content is secured with a separate application key to provide true end-to-end security.
- **Privacy:** Each mesh packet is obfuscated to remove any identifying information from the message. This prevents others from tracking mesh devices, especially when those devices move within range of other networks.



3.0 proven, global interoperability

Only Bluetooth mesh delivers the proven multi-vendor interoperability that enables markets to flourish and assures that products from different vendors across the globe work together.

3.0 Proven, Global Interoperability

Full-stack Solution

Bluetooth technology leverages a unique full-stack approach that defines everything from the low-level radio to the high-level application layer, ensuring all levels of the technology are fully specified.

Interop-centric Specification Approach

- In the Bluetooth mesh specifications, models define the behavior of nodes on a network and are immutable. This means once a model is adopted it can never change. By making models immutable, it ensures a light switch purchased this year can still control a light bulb purchased 30 years from now.
- Interoperability testing is completed prior to specification release, not after. In the development of Bluetooth mesh networking specifications, 15 interoperability testing events were conducted over a two-year period with more than 1,400 test-case passes.

Time-tested Tools and Processes

The Bluetooth SIG has a 20-year history of delivering the qualification tools and processes necessary to ensure true multi-vendor interoperability. Upon launching a new product supported by Bluetooth technology, you can count on global interoperability.



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4.0 mature, trusted technology

The value-added capabilities, mature ecosystem and global brand awareness that Bluetooth wireless technology provides enable the creation of much richer solutions with a faster time to market.

4.0 Mature, Trusted Technology

Value-added Services

Bluetooth technology capabilities go well beyond mesh networking to ensure significant added value for your product. If you're adding Bluetooth mesh networking support, you can also use the same Bluetooth chip as a beacon for providing localized information and assettracking and way-finding services.

Mature Ecosystem

Over the last 20 years, a cultivation of wireless innovation has grown around the Bluetooth SIG. You can easily find the best enabling technology at the right cost while gaining access to the development and test tools and services you need to bring your product to market.

Global Brand Awareness

Bluetooth is a trusted global brand that stands for simple, secure, wireless connectivity. For most consumers, knowing your product includes Bluetooth technology can positively impact purchasing decisions.



Choosing Blue

To ensure the success of any new product, it's important you select the right technology to power your innovation. A mesh topology built on Bluetooth wireless technology helps you establish many-to-many device communications so you can create the large-scale network you need to support your design.

Only Bluetooth mesh networking brings the proven, global interoperability and mature, trusted ecosystem associated with Bluetooth technology to the creation of industrial-grade device networks.