



# Amazon Sidewalk: A Comprehensive Guide

## Introduction of Amazon Sidewalk

Imagine a network that seamlessly and effortlessly connects your devices to the internet for free—from nearly anywhere. This isn't a vision of the future; it's already here, and it's called Amazon Sidewalk. Offering connectivity that extends beyond the range of standard Wi-Fi and at a fraction of the cost of cellular networks, Amazon Sidewalk is revolutionizing how we think about smart devices. From helping you track shipments intelligently to finding lost pets and even detecting smoke from wildfires remotely, the possibilities are expansive. Currently, Amazon Sidewalk covers more than 90% of the U.S. population, providing a reliable, secure network for a myriad of devices.

## What is Amazon Sidewalk?

At its core, Amazon Sidewalk is a shared network that allows compatible devices to connect to the internet and communicate with each other over long distances. By leveraging the power of Amazon's vast network of devices, such as Echo and Ring products, Amazon Sidewalk creates a robust network with coverage reaching farther than individual homes, blanketing entire neighborhoods, cities, and beyond.

Amazon Sidewalk is a low-bandwidth, long-distance wireless network developed to extend internet connectivity across a broader range than traditional Wi-Fi can offer and at a significantly lower cost than cellular networks. It uses a combination of BLE (Bluetooth Low Energy), 900MHz FSK, and CSS/LoRa protocols to connect devices in a way most appropriate for the application. While initially launched in the U.S., Amazon has plans to expand Sidewalk globally.

The cornerstone of Amazon Sidewalk is its ability to provide a free community network that provides connectivity for low-power devices that may be located in hard-to-reach places, such as sensors in a garden or a mailbox at the end of a driveway. This opens up numerous possibilities, such as Package Tracking, Environment Monitoring, etc.

By bridging the connectivity gaps left by traditional network technologies, Amazon Sidewalk paves the way for not just enhancing current device functionalities, but also enabling the invention of new types of smart devices designed for both urban and rural settings.



Image courtesy of Amazon

## Why Amazon Sidewalk?

In today's increasingly connected world, reliable and affordable IoT connectivity is more important than ever. However, traditional Bluetooth and Wi-Fi connections often fall short in range, while cellular solutions can be complex and drain power quickly, especially for battery-operated devices. In contrast, long-range, low-power protocols like LoRaWAN typically require dedicated infrastructure. Amazon Sidewalk bridges these gaps by utilizing a combination of three different radio technologies: BLE, FSK, and CSS, making it a versatile and cost-effective option. Here are some key points that make Amazon Sidewalk an unmissable opportunity:

- **Extensive Coverage:** By leveraging existing Amazon devices like Echo and Ring, Sidewalk creates a vast, overlapping network that spans entire cities and regions,

covering over 90% of the US population. As more devices join, the network grows stronger and more resilient.

- **Long Range and Low Power:** Amazon Sidewalk-enabled devices can communicate over distances over half a mile to an Amazon Bridge, while consuming minimal energy. This allows devices to operate efficiently over greater distances, making it perfect for applications that require extensive coverage without frequent power replenishment.
- **Cost-Effective and Scalable:** Sidewalk piggybacks on existing Amazon devices, eliminating the need for expensive dedicated networks or cellular data plans. This makes it highly cost-effective and easy to scale, especially in expanding urban and industrial areas.
- **Seamless Integration:** Amazon Sidewalk integrates seamlessly with common Amazon devices, facilitating quick deployment of new IoT solutions without extensive hardware investments. This ease of integration encourages the development of innovative applications across various sectors.
- **Robust Security and Privacy:** With multi-layer encryption, secure protocols, and regular data deletions, Amazon Sidewalk ensures robust protection and privacy. This makes it reliable for sensitive deployments and fosters trust among users.
- **Innovative Use Cases:** Sidewalk supports a wide range of applications previously limited by connectivity issues. From smart city technologies and improved home security to remote environmental monitoring and advanced logistics, the possibilities are endless.

## **How does Amazon Sidewalk Work?**

Amazon Sidewalk revolutionizes device connectivity over long distances through a mesh network of Amazon Sidewalk-enabled devices and bridges. Here's how it operates:

## **Amazon Sidewalk Enabled Devices/Endpoints**

These include low-power smart devices like lights, sensors, and locks, designed for efficient operation within the Amazon Sidewalk network.

## **Amazon Sidewalk Bridges/Gateways**

Endpoints connect to the internet through Amazon Sidewalk Bridges, such as Amazon Echo and Ring Spotlight Cam Wired, which share a portion of their bandwidth with the Amazon Sidewalk community.

## **Amazon Sidewalk Wireless Protocols**

Amazon Sidewalk employs several protocols:

- BLE (Bluetooth Low Energy): For short-range communication, handling registration, time sync, and data management.
- FSK (SubG-FSK or HDR): Medium range, maintaining connection using beacons with adjustable power profiles.
- CSS/LoRa (SubG-CSS or LDR): Long-range communication focusing on minimal data throughput with different power profiles.

## **Communication on the Amazon Sidewalk Network**

Devices must register using specific manufacturing keys, after which they can communicate through frames that manage connections or send data to the cloud.

## **Amazon Sidewalk Network Architecture**

### Network Components

- User Interface: Allows users to interact with their devices via apps or web interfaces.
- Cloud: Central entity that manages communications and stores endpoint data.
- Amazon Bridges/Gateways: Provide connectivity and route traffic from endpoints to the cloud.
- Amazon Sidewalk-Enabled Devices (Endpoints): Function-specific devices that rely on bridges for internet access.

### Network Modes

- Wide Area Network (WAN): Amazon Sidewalk Bridges from different owners cooperate to extend network coverage.
- Personal Area Network (PAN): Involves devices and gateways from a single user, using BLE for communication with set data limits and prioritization.

### Security and Privacy

- Encryption: Employs multi-layer encryption across all communications to secure user data.

- **User Configuration:** Users can configure device settings through a secure interface, ensuring they maximize network benefits while controlling their privacy and data-sharing preferences.
- **Privacy Measures:** Implements features like routine data deletion and anonymous connectivity to protect user information and enhance trust.

Through this sophisticated infrastructure, Amazon Sidewalk provides a scalable, secure way to enhance IoT connectivity across vast areas.

## **What Can You Do with Amazon Sidewalk?**

Amazon Sidewalk's unique capabilities enable a host of innovative applications across various industries and sectors. Here are some compelling use cases that highlight its versatility:

### Smart Home Automation

- **Security Enhancements:** Extend the range of cameras and sensors for comprehensive property coverage.
- **Smart Lighting:** Manage outdoor lighting across larger areas effortlessly.

### Healthcare

- **Remote Patient Monitoring:** Monitor health metrics from home, sending real-time data to doctors.
- **Elderly Care:** Equip homes or facilities with systems to monitor and ensure the safety of the elderly.

- Product Improvement: Utilize Amazon Sidewalk in medical devices to collect anonymous & essential usage data and performance metrics to improve healthcare solutions and better patient outcomes.

## Retail and Logistics

- Asset Tracking: Improve goods tracking from warehouses to delivery with extended connectivity.
- Inventory Management: Update stock levels instantly across large retail spaces.

## Smart Cities

- Environmental Monitoring: Place sensors to track air quality and other factors across cities without heavy infrastructure.
- Public Safety: Enhance emergency response with widely connected fire detectors and alert systems.

## Agriculture

- Crop and Soil Monitoring: Use sensors to check soil moisture and crop health over large areas.
- Livestock Tracking: Manage livestock health and movement efficiently across rural expanses.

These examples illustrate how Amazon Sidewalk can revolutionize connectivity and functionality in various sectors, leading to smarter homes, safer communities, and more efficient industrial operations.





## Getting Started with Amazon Sidewalk

Setting up Amazon Sidewalk is straightforward. Devices that support Amazon Sidewalk can automatically connect to the network, allowing users to manage them through their existing Amazon accounts, with no additional fees for network access. When developing solutions with Amazon Sidewalk, here are the essential steps and considerations:

### Manufacturing Process

- **Security Credentials:** Embed each device with keys and certificates in the manufacturing phase to ensure secure authentication and communication with the Amazon Sidewalk network.

### Device Identification and Registration

- **Identification:** Use a unique Wireless Device ID for each device on AWS.

- Registration: Devices must be registered via BLE (Bluetooth Low Energy), with FSK (Frequency Shift Keying) support planned for the future.

### Time Synchronization and Network Joining

- Time Synchronization: Sync device time with the Amazon Sidewalk Cloud upon activation and at regular intervals.
- Network Joining: Initiate a secure command exchange involving a join-request Message and a join-response Message to connect devices to the network.

### Additional Considerations

- Data Privacy Compliance: Ensure compliance with data privacy laws relevant to device operation locations.
- Continuous Firmware Updates: Plan for regular firmware updates to enhance security and add new features.
- Scalability Planning: Design systems with scalability in mind to handle potential expansions in device numbers and network load.

By focusing on these key areas, companies can build robust, secure, and effective solutions using Amazon Sidewalk, paving the way for innovative IoT applications.

## **Amazon Sidewalk Security & Privacy**

In the development of Amazon Sidewalk, security, and privacy considerations are at the forefront to ensure user trust and network integrity. Here's how Amazon Sidewalk maintains high standards of security and respects user privacy:

## **Data Encryption**

Amazon Sidewalk uses multiple layers of encryption to safeguard data transmitted across the network. This robust encryption protocol ensures that communication between devices and through the cloud is secure, preventing unauthorized access and maintaining data integrity.

## **Privacy Protections**

Amazon Sidewalk is designed with several privacy-enhancing features:

- **Routing Data Deletion:** Amazon commits to deleting routing data every 24 hours, reducing the likelihood of privacy breaches.
- **Connection Anonymity:** While users can see that their devices are connected, the specifics of which gateways are used remain undisclosed. This helps in preventing tracking and maintaining user anonymity.
- **Endpoint-Gateway Privacy:** Gateway owners do not have access to information about which specific endpoints are connected to their devices, ensuring private and secure communication.

## **Data Caps**

To manage network resources efficiently and prevent congestion, Amazon Sidewalk implements measures such as maximum upload limits and bandwidth caps. These not only help in maintaining optimal network performance but also ensure that no single user or device can monopolize network bandwidth, which is crucial for maintaining the collective efficacy and security of the network.

# Amazon Sidewalk Benefits & Limitations

Amazon Sidewalk introduces a range of advantages for both consumers and businesses, along with some limitations to consider. Here's an overview:

## Benefits

- **Cost Efficiency:** Significant reduction in infrastructure costs. By leveraging existing devices as bridges, Amazon Sidewalk minimizes the need for additional hardware, lowering both setup and maintenance costs.
- **Extended Connectivity:** Amazon Sidewalk can extend device connectivity up to half a mile, far surpassing typical Wi-Fi networks, without the cost of cellular networks. This extended range is ideal for ensuring seamless device operation in more remote or extensive properties.
- **Simplified Device Commissioning:** With Bluetooth Low Energy, device setup and commissioning are streamlined, making it easier for users to connect new devices to their network.
- **Device Longevity:** Amazon Sidewalk's low power consumption extends the lifespan of devices by minimizing battery drain, which reduces the need for frequent battery replacements. Additionally, its robust design and reliable connectivity contribute to an overall increase in device durability and longevity.

## Limitations

- **Data Bandwidth:** While Amazon Sidewalk is excellent for low-bandwidth applications, it is not suited for high data throughput needs. The network supports a monthly data cap of 500MB, which could restrict usage for more data-intensive applications.

- **Application Scope:** Given its design for low-power, low-bandwidth tasks, Amazon Sidewalk might not be suitable for applications requiring real-time or high-speed data transfer, such as video streaming or large-scale industrial IoT operations.
- **Vendor Lock-In:** Amazon Sidewalk requires integration with AWS services, which may limit vendors to AWS infrastructure and restrict flexibility.
- **Coverage:** Presently, Amazon Sidewalk's network coverage is limited to the USA and Puerto Rico, making it less suitable for global solutions.
- **User Opt-In:** Device connectivity via Amazon Sidewalk bridges relies on user participation. If bridge owners opt out, it can significantly reduce network coverage and connectivity.
- **Lack of Location Tracking:** Prioritizing security and privacy, Amazon Sidewalk on its own does not support mechanisms for collecting device location data, which may limit its utility in applications requiring geolocation without incorporating additional mechanisms.

## **Oxit's Wireless Module is Certified "Works with Amazon Sidewalk"**

The OxTech Multi-Connectivity Module (MCM) is a versatile and innovative solution, certified for use with Amazon Sidewalk and designed to connect devices to both LoRaWAN and Amazon Sidewalk Networks. This integration ensures maximum network coverage and flexibility, making it ideal for a wide range of applications.

The MCM operates in network co-processor mode, efficiently offloading networking tasks. It can either run application business logic on a host MCU or handle both networking and business logic directly on the module. This flexibility accelerates the

deployment of devices across diverse applications, including automation sensors, gas and water leak detection, utility metering, and asset tracking.

Featuring low-bandwidth and extensive range capabilities, the module uses Bluetooth® for short-distance connections and LoRa® for longer distances, covering several miles. For detailed information on features, specifications, and benefits, please visit our product page: OxTech Multi-Connectivity Module.

<https://oxit.com/oxtech-multi-connectivity-module/>.

## **Conclusion**

In summary, Amazon Sidewalk is transforming connectivity with its innovative network, addressing the challenges of traditional technologies and enabling smarter, more connected environments. Ideal for a variety of applications—from smart home devices to urban infrastructure—Amazon Sidewalk uses existing devices to extend coverage and enhance IoT functionality. Its strong security protocols and straightforward integration appeal to both businesses aiming to boost efficiency and consumers looking to enhance their tech experiences.

Interested in the potential of Amazon Sidewalk for your projects or operations? For more details and to discuss how Amazon Sidewalk can elevate your solutions, please reach out and share your contact information. Let's explore the possibilities together with Amazon Sidewalk.