

Bluetooth Transmission Range Test

Revision History

Date	Version	Description
March 2025	V1	First release

Induction :

When purchasing Bluetooth products, the product description will usually include some usage precautions, such as the maximum transmission distance of Bluetooth, recommended installation height, etc. However, Bluetooth signals are easily interfered by a variety of external factors. Therefore, in actual life applications, it is necessary for designers to conduct additional tests based on the actual environment on site to determine the most appropriate installation distance.



1. Overview of Bluetooth signal interference factors

As a Bluetooth Low Energy signal, like any other radio signal, the strength of the Bluetooth signal can be weakened or blocked by multiple factors. Physical obstacles like metal - made walls and furniture, along with human body blocking, attenuate the signal. In the wireless spectrum, WiFi, other Bluetooth devices, and 2.4GHz-band home appliances such as microwave ovens cause interference due to overlapping bands. Environmental electromagnetic interference from industrial equipment, hospital devices, and thunderstorms also matters. Therefore, performing a communication range test between devices can provide more reliable results for obtaining the actual communication range between Devices.

2. Bluetooth node distance test method one

2.1 Test Preparation

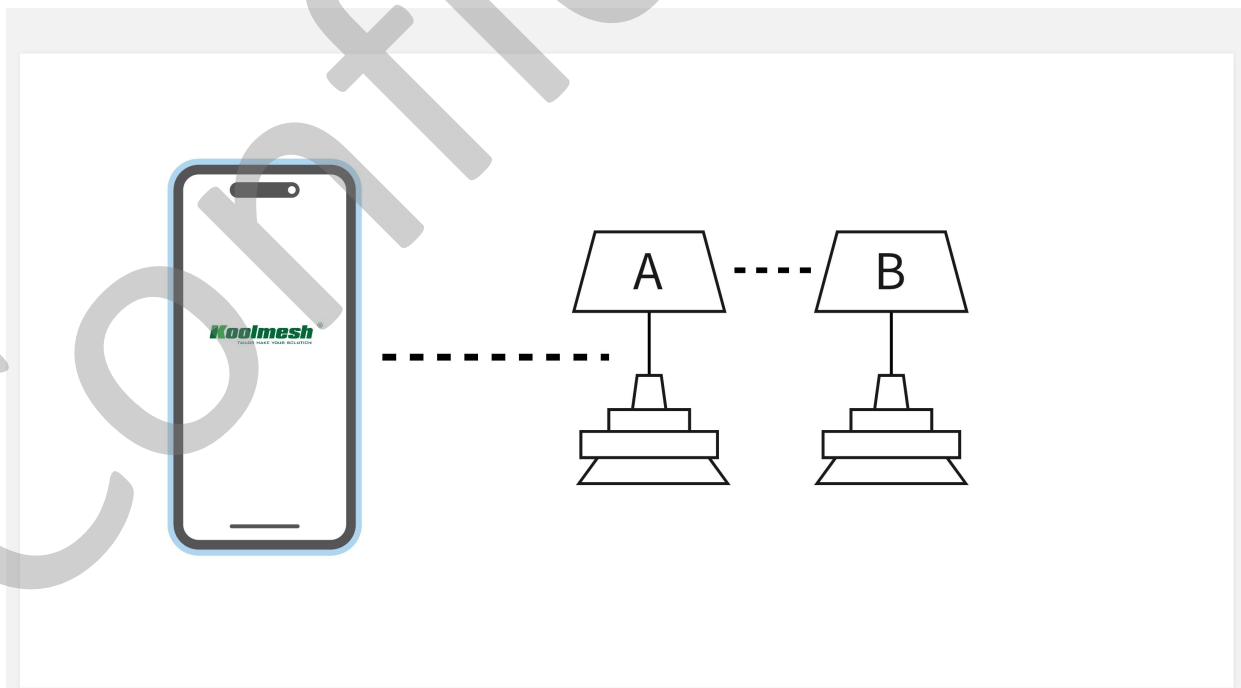
Prepare two identical product samples, assuming they are lamps, and name them Device A and Device B respectively.

2.2 Network creation and device adding

Create a new Koolmesh network and add both Device A and Device B to it.

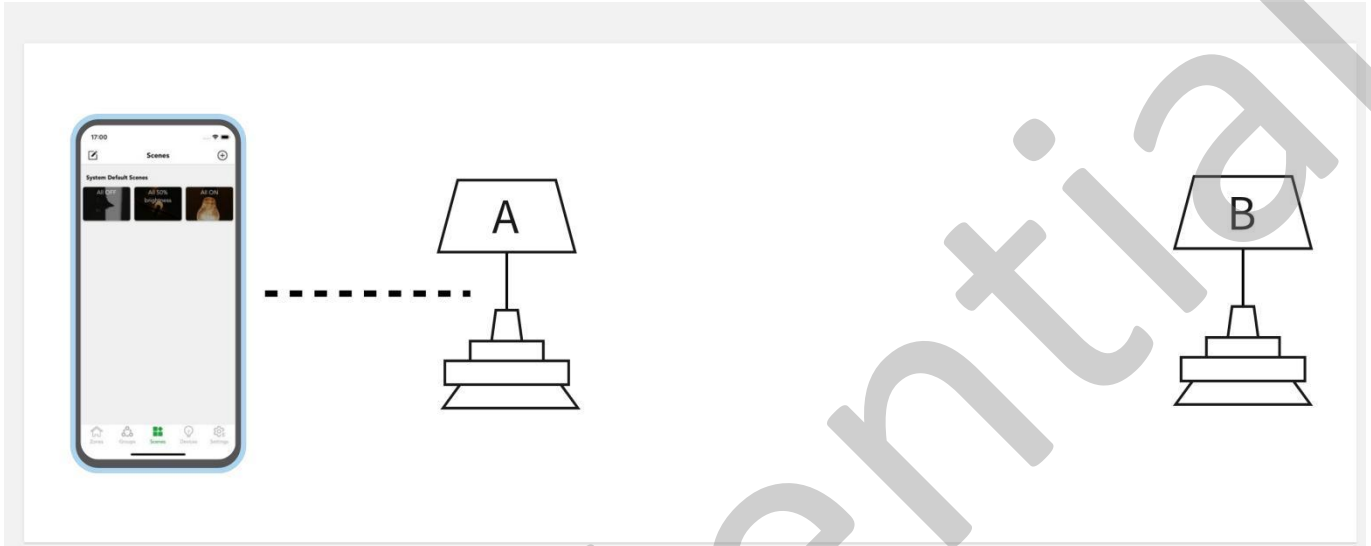
- Turn off the power to Device A and Device B.
- Turn on the power of Device A first and wait for the Koolmesh app to successfully connect to Device A.
- Then turn on the power of Device B.

At this point, it can be ensured that the mobile device only communicates directly with Device A (bridge) , while Device A communicates with Device B.



2.3 Distance test process

- Place the mobile device close to Device A and start moving Device B gradually away from Device A.
- In the scene , repeatedly click “ ALL ON ” “ ALL OFF ”. As Device B moves, fixtures A and B will turn on and off in sync. When Device B is out of communication range, it will eventually stop responding to actions.

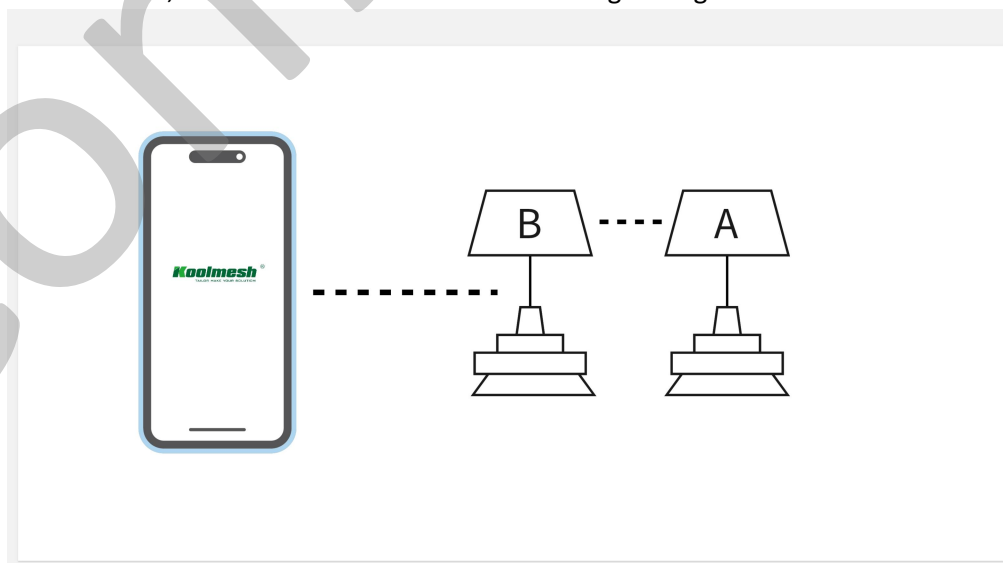


2.4 Test results explanation

Since the test process is not an absolutely precise scientific measurement, it is recommended to reserve a certain tolerance when measuring the distance. For example, if the communication distance between Device A and Device B reaches about 30 meters, the actual range that can be specified is 25 meters.

2.5 Special Cases

If there are no identical products, it is recommended to test the communication range from product A to product B and from product B to product A separately, because the results in these two directions may be different. The specific operation is to repeat the above test process for Device A and Device B, and then swap the start-up order, that is, turn on Device B first, and then turn on Device A for testing. See figure below.



3. Bluetooth node distance test method two

3.1 Test Preparation

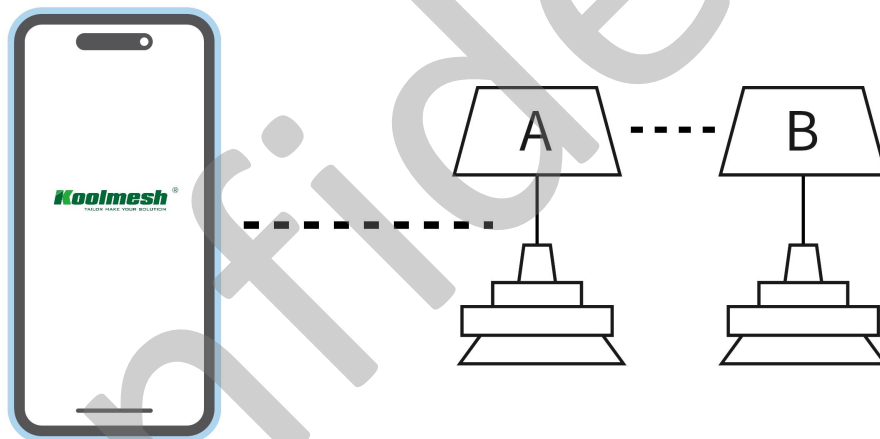
Prepare two identical product samples, assuming they are lamps, and name them Device A and Device B respectively.

3.2 Network creation and device adding

Create a new Koolmesh network and add both Device A and Device B to it.

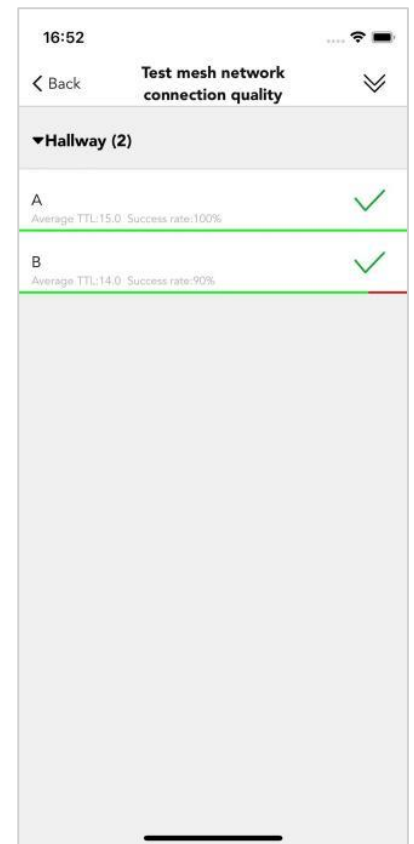
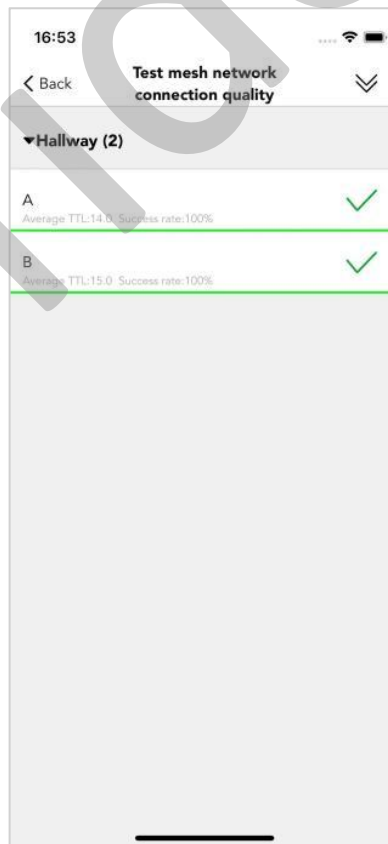
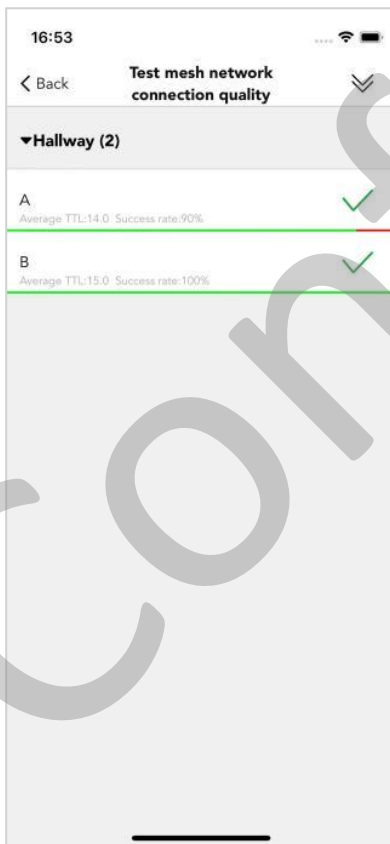
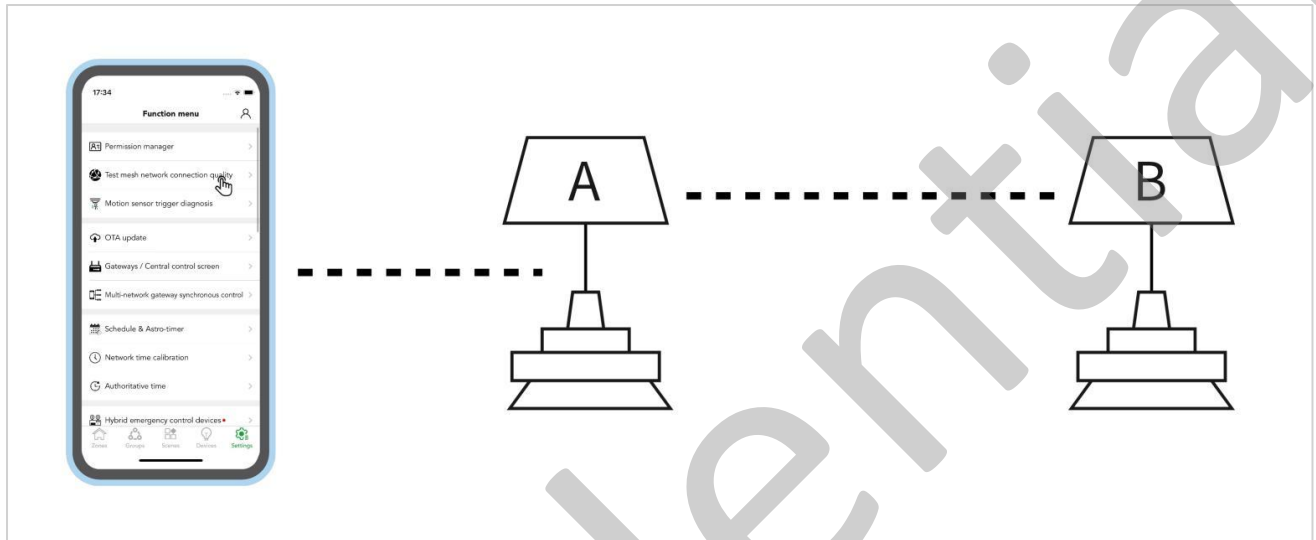
- Turn off the power to Device A and Device B.
- Turn on the power of Device A first and wait for the Koolmesh app to successfully connect to Device A.
- Then turn on the power of Device B.

At this point, it can be ensured that the mobile device only communicates directly with Device A (bridge) , while Device A communicates with Device B.



3.3 Distance test process

- Place the mobile device close to Device A and start moving Device B gradually away from Device A.
- When the distance reaches a certain level, click “Test mesh network connection quality” to view the test results of Device A and Device B. It is generally recommended to set the distance reference to the test distance when the test result success rate is greater than or equal to 90%.

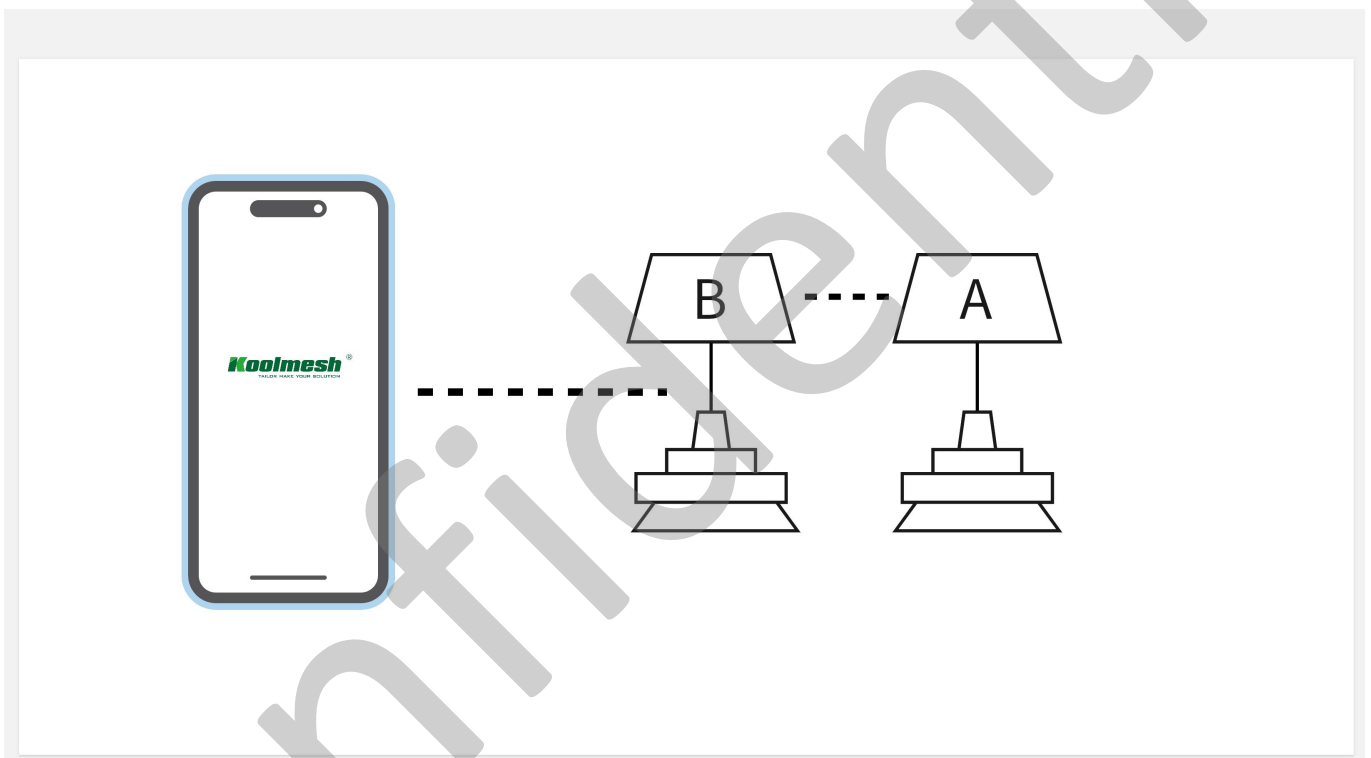


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4. Conclusion

In the design phase of hardware products, the communication distance between various products can be guaranteed to be consistent. However, in actual usage scenarios, due to the presence of a wide variety of interference factors, the communication distance may be affected. Therefore, it is highly recommended that a comprehensive test of the Bluetooth transmission range be carried out before the implementation of the actual project. All potential factors that may lead to poor communication quality should be identified and eliminated to avoid communication failures after installation, thereby ensuring the smooth progress of the project.