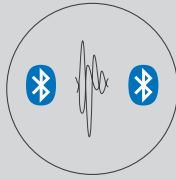


# What we do



Channel Sounding uses the wavelengths and phases of many radio waves and the speed of light to measure the distance between Bluetooth devices.

**The waves bounce, like liquid waves in a channel, making constructive and destructive interference.**

Lambda:4 technology finds the shortest path that the radio waves took to measure the distance between devices.

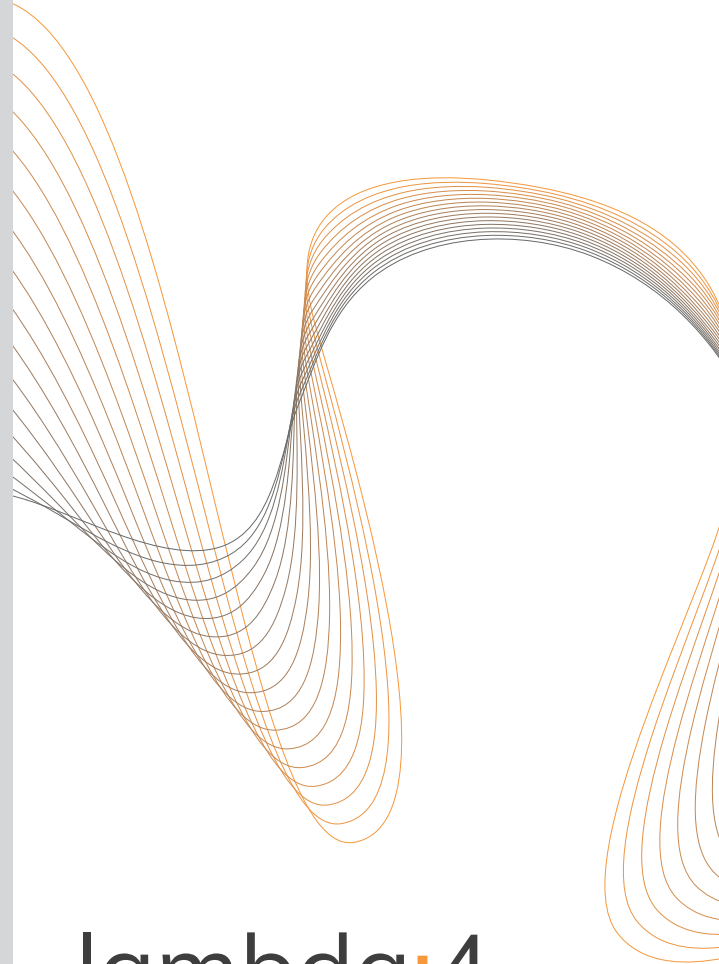
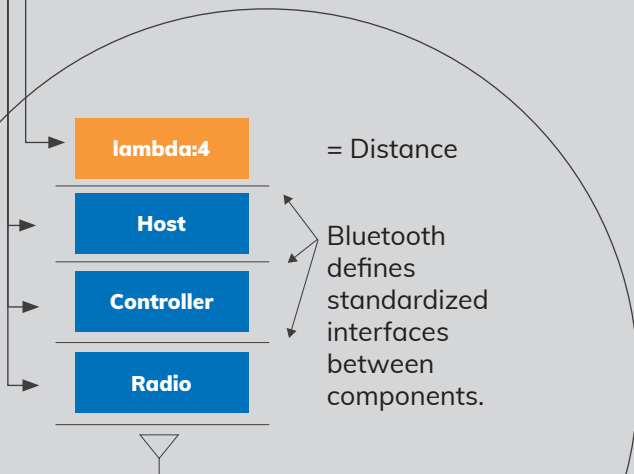


Bluetooth member companies compete with their implementations of the standard.

A ranging algorithm is always required to turn the radio wave patterns into distance.

Our launch product is our Bluetooth cs:Lib Ranging Library.

**The 40,000 member companies that make Bluetooth products are our potential customers.**



# lambda:4

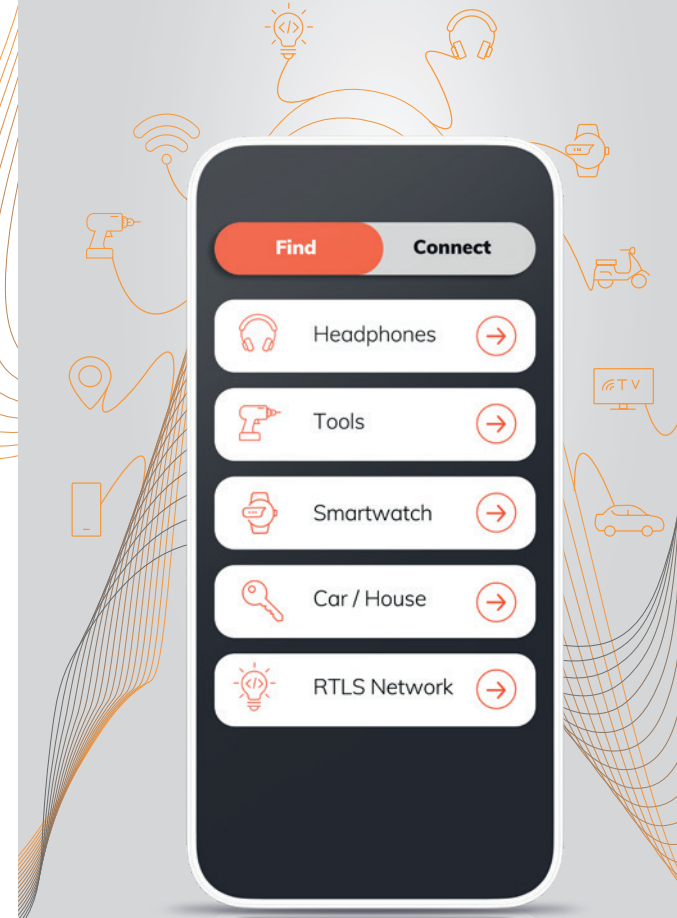
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# lambda:4

## Making our stuff location aware



## Use Cases



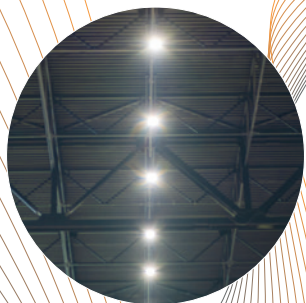
### Keyless entry



### Microlocation of everything



### Electronic shelf labels



### Lighting / RTLS networks

## Algorithm

We have been developing advanced high-resolution algorithms since 2007. The Channel Sounding algorithm comes with several improvements over standard FFT or MUSIC algorithms, such as higher accuracy, better robustness, and more security features. It provides information about:

- the distance between two nodes
- expected deviation from true distance
- the relative velocity between two nodes
- rating of the complexity of the near multipath environment
- the level of disturbances (Wi-Fi, etc.)
- information on the signal security / proximity verification
- in addition to distance measurements the algorithm is also able to synchronize the nodes in a coherent network

**ROBUST** Handles multipathing and disturbances

**ACCURATE** Leading accuracy of up to 0.1m (line of sight) and 0.3m (none line of sight)

**SECURE** The ranging results can be protected using round trip time (RTT) to avoid man-in-the-middle attacks

**FLEXIBLE** Configuration with memory models to support different hardware, from low end to high end

**FUTUREPROOF** The algorithm can take full advantage of coherent ranging, thus reducing measurement time and power consumption

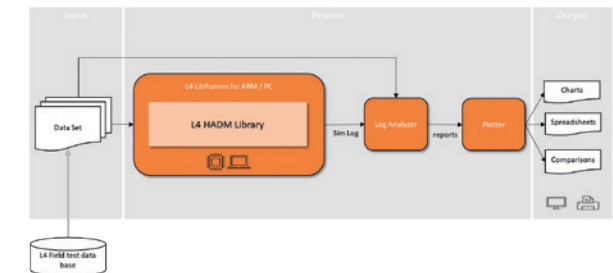
## Services

When integrating our algorithm, we offer additional services in the form of:

- data analysis
- hardware reviews
- feasibility studies
- antenna design support
- porting to custom hardware
- and configuring the algorithm to the special requirements of the use case

### Simulation Tool Chain

The simulation tool chain is an essential PC based tool to get the best out of our channel sounding algorithm. The tool chain is a collection of tools for the PC that enables quick and reproducible testing of different algorithm configurations as well as validation of software updates.



### Benefits of the Simulation Tool Chain:

- database of 1M+ test measurements
- performance analysis
- trade-off analysis
- security validation