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Process and system for calculating distances between wireless nodes

A novel procedure to calculate distances between wireless nodes that do not require hardware customization has been developed. This procedure and the system associated with it allow location systems to be easily developed using almost any technology (e.g. IEEE 802.11). Partners to further develop the system and/or to establish commercial agreements with technical cooperation are sought.

The Challenge

Location techniques based on multilateration require measuring the distance between the target node and several landmarks, which position is known. Distances are frequently estimated from the time-of-flight of a signal sent by the target node to these landmarks. However, most of the network protocols do not support time measurements with the accuracy required for location purposes. Then, hardware specially developed for this purpose is used. The main challenge is to provide accurate enough time-of-flight measurements without customizing the hardware or modifying the network interface drivers.

The Technology

The technology consists of two software modules that are run in the wireless nodes to be positioned. These modules are associated with a specific network interface among the available in the node. The node will use that interface to perform a ping process, i.e., send a packet (or frame or cell) and wait for a response (two-way TOA approach). The purpose of these modules is to compute the time-of-flight of the packets sent by the node to the landmarks. Thus, one of the nodes traps all the network traffic, associates a time-mark with each packet/frame/cell and builds a local database with this information. The second module matches the pair of packets associated with the same ping process, computes the time-of-flight of the packets and cleans the local database.

Innovative advantages

- Do not require hardware customization
- Software already running in the wireless node is not modified (transparent for the rest of services running in the wireless node)
- Applicable to any technology using a two-way TOA approach
- No need for maintenance: hardware and software modifications do not impact on the location capabilities
- Suitable for location systems running indoors

Current stage of development

A proof-of-concept of this technology has been implemented in an IEEE 802.11 device and tested in depth.

Applications and Target Market

This technology can be implemented in any location system, but it is especially interesting in the case of indoor location applications, such as health care, indoor navigation, parcel/person tracking, emergency stuff (e.g. fire brigades), etc.

Pure software solution for new and already developed location techniques
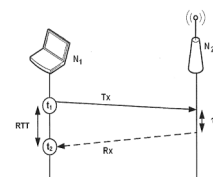
No hardware customization

Transparent to hardware/software evolution

Suitable for indoor positioning

Business Opportunity
Technology available for licensing with technical cooperation

Patent Status
PCT and USA patent applications

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