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Hitachi, Ltd.

Success in the principle experiment of Sensor-net with ultra low-power consumption of 3 nanowatts when transmitting 1bit/second using UWB wireless communication

Demonstrating communication performance over a 10m transmission distance
at a 10Mbps transmission speed

Hitachi, Ltd. (Etsuhiko Shoyama, President and Chief Executive Officer/hereinafter "Hitachi"), has developed the principle experimental apparatus for UWB (Ultra Wide Band) wireless communication in cooperation with the YRP Ubiquitous Network Laboratory (Chairman: Ken Sakamura). The mechanism used is in line with the guidelines of the IEEE Standard(IEEE 802.15.4a), which is drawing an attention as a wireless communication technology for Sensor networking. In this experiment, we demonstrated wireless communications at an ultra low-power consumption of 3 nanowatts/bps (a nanowatt is 1/1 billion of a watt) over a transmission distance of 10m at a transmission speed of 10Mbps, as well as over the distance of 30m at 250kbps. We have also confirmed through simulations that we can accurately detect location to within 30cm.

In a ubiquitous society, it is thought that information on all objects will be detected automatically and that people will be able to exchange this information without being conscious of it. As the central mechanism for realizing such a society, sensor-net has been attracting attention in recent years. The sensor-net forms a network in which terminals with three functions of a sensor, signal processing and communication device (sensor nodes) are deployed and the detected information is communicated through a network. In order to place these sensor nodes in various objects in our environment, and to use them for a long period of time without maintenance, ultra low-power operation without worrying about battery life is needed. In particular, it is essential to reduce the power consumption of wireless communications, which is the major consumer of the power of the sensor-net.

Therefore, the UWB wireless communication system, which dramatically reduces the power consumption per bit while holding the large communication capacity, has been drawing attention.

The 802 committee working group 15 task group 4a (IEEE802.15.4a) of the U.S. IEEE (Institute of Electrical and Electronic Engineers), has been working on the standardization of a UWB wireless communication system, as the relatively slow-speed wireless PAN (Personal Area Network) system which realizes low-power consumption transmission and highly accurate ranging function. Both Hitachi and the YRP Ubiquitous Networking Laboratory have taken part in the standardization activity at IEEE802.15.4a and have evaluated the sensor-net system using UWB communication systems.

Currently, we have developed a communication principle experiment apparatus in order to evaluate the system proposed for the IEEE802.15.4a standards. The developed contents are as follows:

- (1) Development of a transmitter and receiver using UWB-IR (Ultra Wideband Impulse Radio) and demonstration of its communication function: we achieved 10Mbps at a transmission distance of 10 m, and 250Kbps at 30m.
- (2) Creation of a prototype of LSI (Large Scaled Integrated circuit) of RF (Radio Frequency) part using 0.18um CMOS (Complementary Metal Oxide Semiconductor) processing technology and confirmation of 3nW/bps for transmission as the minimum power consumption of the LSI.
- (3) Proposal of the technology to enable communication as well as the position detection using UWB technology and demonstration of a measurement accuracy of 30cm in a visible area (line of sight) through simulations .

We aim for the ongoing promotion of IEEE802.15.4a standardization and the early development of LSI for UWB communication based on the standards.

The details of this press release shall be presented at the Society Conference of the Institute of Electronics, Information and Communication Engineers to be held in Hokkaido from September 20.

Contact:

(Persons in charge: Uchida, Kinoshita) Hitachi, Ltd., Central Research Laboratory, Planning Division 1-280, Higashi-Koigakubo, Kokubunji-shi, Tokyo, Japan 185-8601
042-327-7777 (direct)

Media Contact:

(Person in charge: Takeuchi) Hitachi, Ltd., Corporate Communications Division, Corporate Communications Department
4-6, Kanda-surugadai, Chiyoda-ku, Tokyo, Japan 101-8010
03-3258-2056 (direct)