

Advanced communication Through Fleshredtacton

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Abstract— Our body could soon be the backbone of a broadband personal data network linking your mobile phone or MP3 player to a cordless headset, your digital camera to a PC or printer, and all the gadgets you carry around to each other. RedTacton is a new; it is completely distinct from wireless and infrared. A transmission path is formed at the moment a part of the human body in contact with a RedTacton transceiver. Physically separating ends the contact and thus ends communication. Human Area Networking technology that uses the surface of the human body as a safe, high speed network transmission path. Uses the minute electric field emitted on the surface of the human body .Technically according to the user's natural, physical movements. Communication is possible using any body surfaces, such as the hands, fingers, arms, feet, face, legs or torso. RedTacton works through shoes and clothing as well. Here, the human body acts as a transmission medium supporting half-duplex communication at 10Mbit/s. The key component of the transceiver is an electric-field sensor implemented with an electro optic crystal and laser light.

I. INTRODUCTION

NTT, the Japanese telecoms group, and the team of scientists that invented the Red Tacton system. "Tacton" because with this technology, communication starts by touching (Touch), leading to various actions (Act on). We then added the color red to convey the meaning of warmth in communication. Combining these phrases led to the name, "RedTacton". Human society is entering an era of ubiquitous computing, when networks are seamlessly interconnected and information is always accessible at our fingertips. The practical implementation of ubiquitous services requires three levels of connectivity: Wide Area Networks (WAN), typically via the Internet, to remotely connect all types of servers and terminals; Local Area Networks (LAN), typically via Ethernet or Wi-Fi connectivity among all the information and communication appliances in offices and homes; and Human Area Networks (HAN) for connectivity to personal information, media and communication appliances within the much smaller sphere of ordinary daily activities-- the last one meter. NTT's RedTacton is a break-through technology that, for the first time, enables reliable high-speed HAN. In the past, Bluetooth, infrared communications (IrDA), radio frequency ID systems (RFID), and other technologies have been proposed to solve the "last meter" connectivity problem. However, they each have various fundamental technical limitations that constrain their usage, such as the precipitous fall-off

in transmission speed in multi-user environments producing network congestion. RedTacton takes a different technical approach. Instead of relying on electromagnetic waves or light waves to carry data, RedTacton uses weak electric fields on the surface of the body as a transmission medium. A RedTacton transmitter couples with extremely weak electric fields on the surface of the body. The weak electric fields pass through the body to a RedTacton receiver, where the weak electric fields affect the optical properties of an electro-optic crystal. The extent to which the optical properties are changed is detected by laser light which is then converted to an electrical signal by a detector circuit.

II. FUNCTIONING

Using a new super-sensitive photonic electric field sensor, RedTacton can achieve duplex communication over the human body at a maximum speed of 10 Mbps.

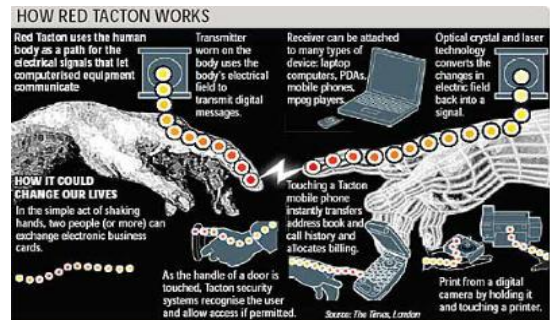


Fig: functioning

1. The RedTacton transmitter induces a weak electric field on the surface of the body
2. The RedTacton receiver senses changes in the weak electric field on the surface of the body caused by the transmitter.
3. RedTacton relies upon the principle that the optical properties of an electro-optic crystal can vary according to the changes of a weak electric field.
4. RedTacton detects changes in the optical properties of an electro-optic crystal using a laser and converts the result to an electrical signal in a optical receiver circuit.

Note that RedTacton transceivers which integrate transmitters and receivers are also available.

III. MECHANISM

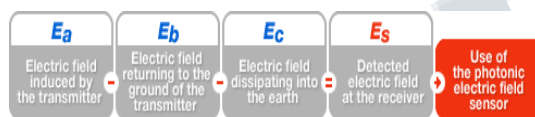
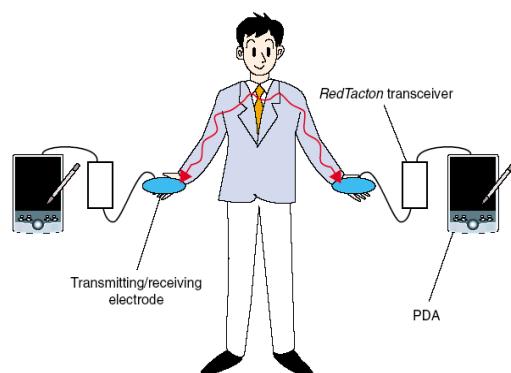


Fig: mechanism

The transmitter sends data by inducing fluctuations in the minute electric field on the surface of the human body. Data is received using a photonic electric field sensor that combines an electro-optic crystal and a laser light to detect fluctuations in the minute electric field.



-The naturally occurring electric field induced on the surface of the human body dissipates into the earth. Therefore, this electric field is exceptionally faint and unstable.

- The photonic electric field sensor developed by NTT enables weak electric fields to be measured by detecting changes in the optical properties of an electro-optic crystal with a laser beam.

IV. MAIN FEATURES

RedTacton has three main functional features.

1. TOUCH:

Touching, gripping, sitting, walking, stepping and other human movements can be the triggers for unlocking or locking, starting or stopping equipment, or obtaining data.

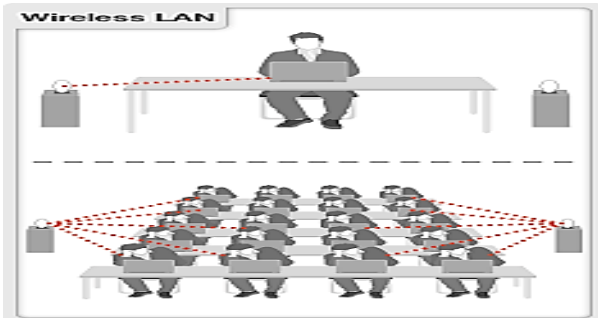


Using RedTacton, communication starts when terminals carried by the user or embedded in devices are linked in various combinations through physical contact according to the human's natural movements.

2. BROADBAND & INTERACTIVE:

Duplex, interactive communication is possible at a maximum speed of 10Mbps*. Because the transmission path is on the surface of the body, transmission speed does not deteriorate in congested areas where many people are communicating at the same time.

-Maximum communication speed may be slower than 10Mbps depending on the usage environment.



Communication speed can deteriorate in crowded spaces due to a lack of bandwidth.

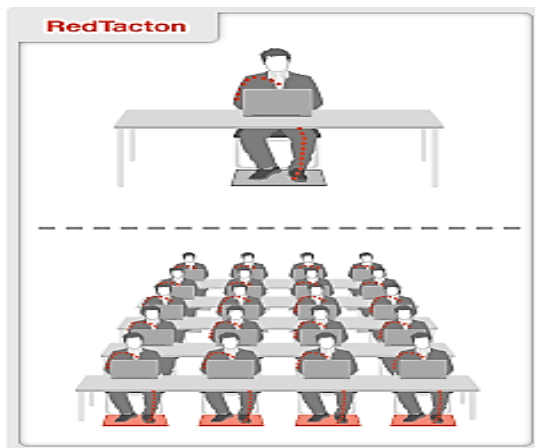


Fig:interactionby RED TACTON

Device drivers can be downloaded instantly and executable programs can be quickly sent. Taking advantage of this speed, device drivers can be downloaded instantly and execute programs can be sent.

3. ANY-MEDIA:

In addition to the human body, various conductors and dielectrics can be used as transmission media. Conductors and dielectrics may also be used in combination*.

- signals travel along the surfaces of materials
- signals pass through materials.
- combinations of travel along and passing through materials

The examples for conductor & dielectric mediums are:



Surface of the body and shoes/clothing



Water



-in which signal traveling along and passing through materials

A communication environment can be created easily and at low-cost by using items close at hand, such as desks, walls, and metal objects.

V. APPLICATIONS

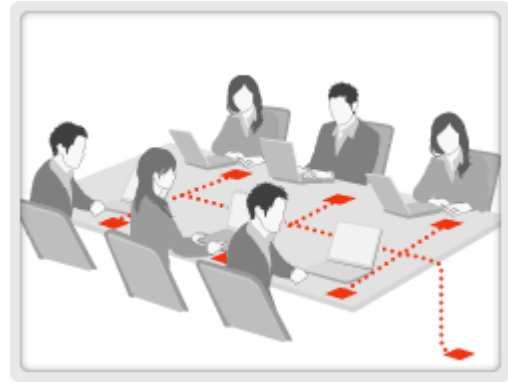
Red Tacton has many applications some of them are:

- Touch a printer to print



-Print out where you want just by touching the desired printer with one hand and a PC or digital camera with the other hand to make the link.

-Complicated configurations are reduced by downloading device drivers "at first touch".



-An electrically conductive sheet is embedded in the table.

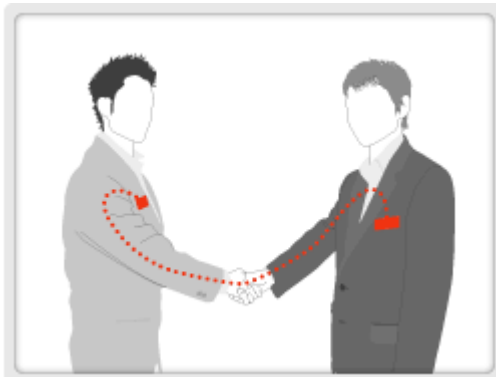
-A network connection is initiated simply by placing a lap-top on the table.

-Using different sheet patterns enables segmentation of the table into subnets.

A conductive metal sheet is placed on top of a table. Laptop computers could be connected to the Internet by simply placing them on such a table. Even different networks could be supported,

such as an enterprise LAN and Internet access, by providing separate metal sheets for each network.

● Just sitting in the seat triggers the car to load all its presets, just the way you like.



-By shaking hands, personal profile data can be exchanged between mobile terminals on the users. (Electronic exchange of business cards)

-Communication can be kept private using authentication and encryption technologies.

● Connect to the network just by putting a lap-top on the table



-The seat position and steering wheel height adjust to match the driver just by sitting in the car. The driver's home is set as the destination in the car navigation system. The stereo plays the driver's favorite song.

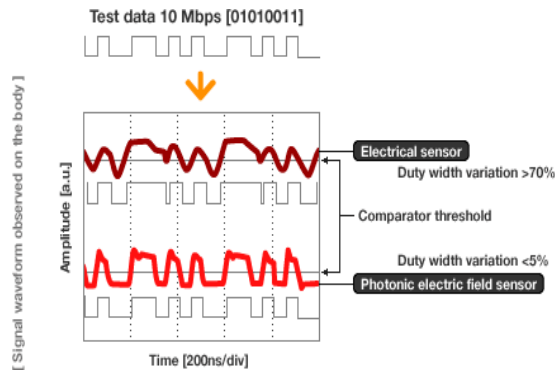


Fig: transmission of information

On the other hand, photonic electric field sensors used in RedTacton can measure stand-alone contacts without being influenced by grounds. As a result, the received waveform is not distorted, regardless of the receiver location. This makes long-distance and high-speed body surface transmission possible. RedTacton does not require the electrode be in direct contact with the skin. High-speed communication is possible between two arbitrary points on the body.

PROTECTION

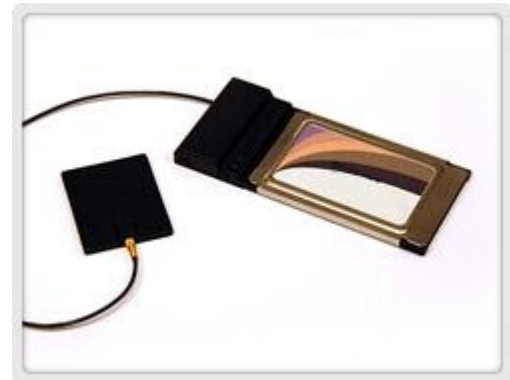
-RedTacton uses the electric field that occurs naturally on the surface of the human body for communication. Transmitter and receiver electrodes are covered with an insulating film. No current flows into the body from the RedTacton transceiver.

-There is no current flowing from the RedTacton transceiver; however, the body indirectly receives a minute electric field. This causes electrons already present inside the body to move, creating a minute displacement current. This displacement current is similar to those occurring in everyday life.

--RedTacton is in conformity to the "Radiofrequency-exposure Protection RCR standard (RCR STD-38)" issued by the Association of Radio Industries and Businesses (ARIB).

PROTOTYPE

RedTacton transceiver (PC card type)



Communication speed: 10 Mbps
Communication methods: Half-duplex

RedTacton transceiver (hub type)



Communication speed: 10 Mbps
Communication methods: Half-duplex

NTT plans to develop transceivers with an emphasis on portability that are more compact and less power consumption. Through field testing, NTT will continue to investigate and improve the robustness of Human Area Networking and human body surface communication applications.

VI. CONCLUSION

Human body networking is more secure than broadcast systems, such as Bluetooth, which have a range of about 10m. With Bluetooth, it is difficult to rein in the signal and restrict it to the device you are trying to connect to. You usually want to communicate with one particular thing, but in a busy place there could be hundreds of Bluetooth devices within a range. As human beings are effective in

aerials, it is very hard to pick up stray electronic signals radiating from the body. This is good for security because even if you encrypt data it is still possible that it could be decoded, but if you can't pick it up it can't be.

In the near future, as more and more implants go into bodies, the most important application for body-based networking may well be for communications within, rather than on the surface of, or outside, the body. An intriguing possibility is that the technology will be used as a sort of secondary nervous system to link large numbers of tiny implanted components placed beneath the skin to create powerful onboard or in-body computers. So we can conclude that this technology will change the future of wireless communication.

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