Discussion on Red Tacton - Technology for communication through Human body

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ABSTRACT

Nowadays, receiving data is more complicated because the strength of the electric field involved is very low, so we need advanced technology for transmission. RedTacton is a new innovative Human Area Networking technology that uses the surface of the human body as a safe, high speed network transmission path at speed up to 10 Mbps between any two points on the body. It is completely distinct from wireless and infrared technologies, it emit minute electric field on the surface of the human body. In this paper, we discuss the working principle, features, and applications of redTacton.

Keywords: RedTacton, Human Area Network, NTT, Photonic Electric Field

I.INTRODUCTION

NTT's (Nippon Telegraph and Telephone Corporation) labs, Japan has announced new technology called "Red Tacton, which was developed by Robin Gaur Jind, It is a Perfect networking technology that transfers data to devices through people's bodies [1] with high speed. Communication is possible using any body surfaces, such as the hands, fingers, arms, feet, face, legs or toes. It works through shoes and clothing as well. When the physical contacts get separated, the communication is separated. [3]

Using RedTacton, the electric fields generated by the human body work as a medium for transmitting the data. The chips which will embedded in various devices contain a transmitter and receiver built to send and accept data in digital format. The chips can take any type of file such as mp3 music file, or mail and convert in to the digital format that can be passed and read through a human being as electric field .The chip in receiver devices reads these tiny changes and convert the file back into its original format. NTT developed super sensitive Photonic electric field sensor for detecting minute electric field emitted on the surface of the human body.

Features

RedTacton has three main functional features [3]:

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.

Fig1. Shows some of the touch methods from which communication starts.

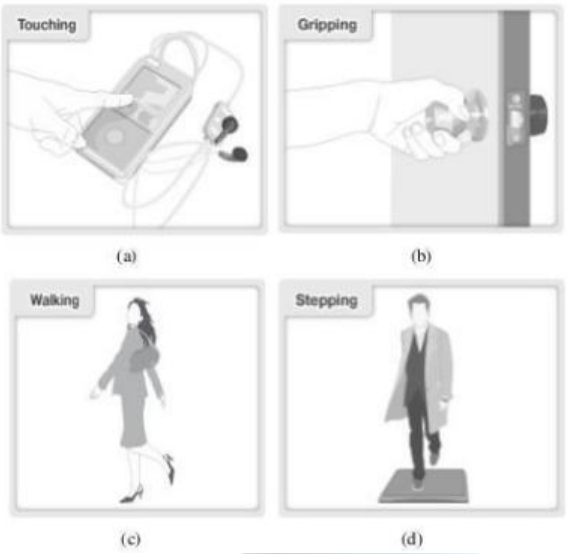

Fig1.Touch Figures

Broadband and Interactive - Duplex, interactive communication is possible at a maximum speed of 10Mbit/s. Because the transmission path is on the surface of the body, transmission speed does not weaken in congested areas where many people are communicating at the same time. In fig 2(a), the communication speed can be reduce in crowded spaces due to lack of bandwidth. But in case of RedTacton, the device drivers can be downloaded instantly and executable programs can be sent, there by taking the advantage of its speed.

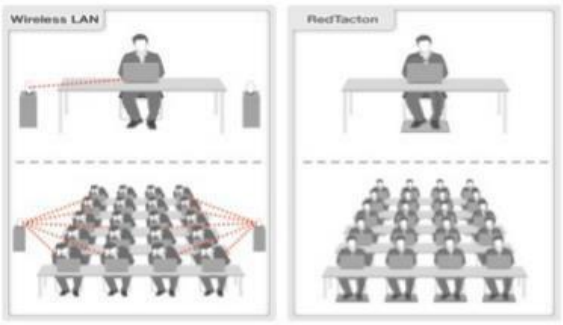

Fig2. Broadband and Interactive

Any media - In addition to the human body, various conductors (water) and dielectrics (glass, walls, wood) can be used as transmission media. Conductors and dielectrics may also be used in combination.

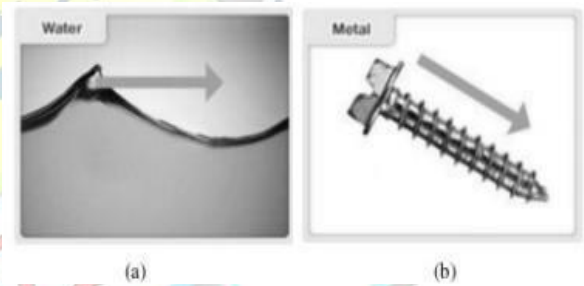

Fig3(a).Conductors

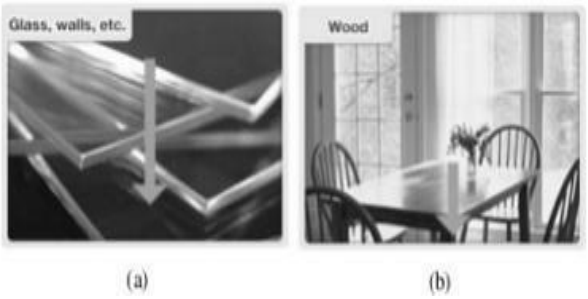

Fig 3(b).Dielectrics

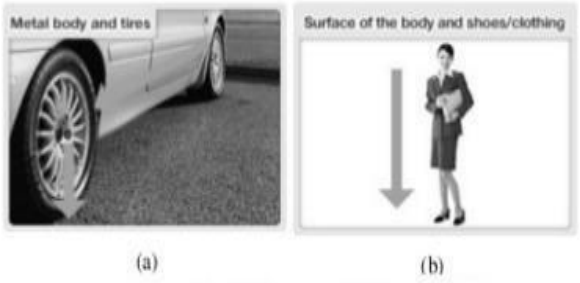

Fig 3 (c).Conductor+Dielectrics

How RedTacton works?

Similar to any other technology, RedTacton Technology, will also have a transmitter and a receiver. A brief working Principle of Red Tacton is shown in Fig 4.

It includes electrodes, insulators, electro optic crystal and transmitter/receiver circuits. Photonic electric field sensor is used with an electro-optic crystal and laser light to detect changes in minute electric field. The naturally occurring electric field is induced on the surface of human body which then gets dissipated into earth. Thus this electric field is very weak and unstable. NTT developed photonic electric field sensor is used to detect this weak electric field by detecting changes in optical properties of electro-optic crystal with laser beam.

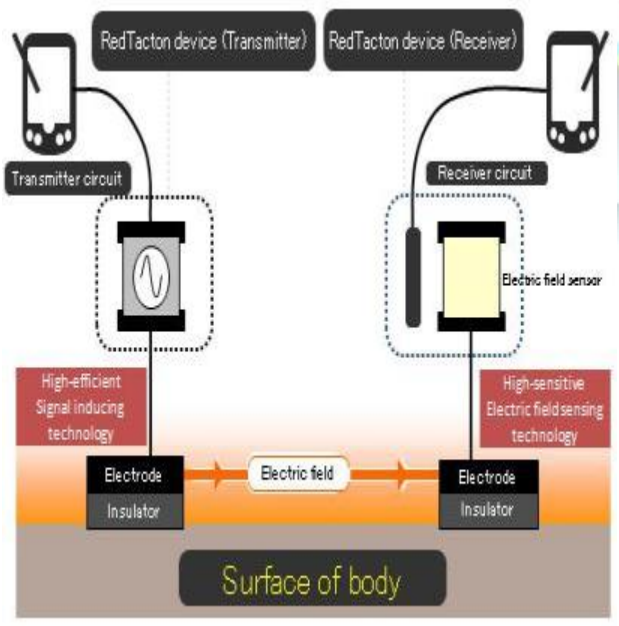

Fig 4.Working Principle[7]

II.REDTACTON TRANSCEIVER

In practical implementation a RedTacton device must act both as a transmitter and a receiver (i.e. like a transceiver). Fig 5 shows the block diagram of a RedTacton transceiver [3].

The interface sends data signal to both Data sense circuit and transmitter circuit. If the data is present, the data sense circuit senses the data and a control single are generated and send control signal to the transmitter hence, transmitter circuit is triggered.

Transmitter circuit generates the electrical signals that are to be inducted into the human body and is sent to the transmitting/receiving electrode. Since, the electrode capacitively coupled to the human body, transfer of electrical signal takes place.

Whenever a connection is established by touching, the electrode present at the receiver side detects the signal and feeds it to the electro-optic sensor circuit.

In the absence of the control signal from the data sense circuit, output is fed into detector circuit this distinguishes transmitting and receiving modes to enable two way communication. Finally, the output of the detector circuit is sent to the interface.

Multiple REDTACTON transceivers can be used at once because it owns the CSMS/CD (Career Sense Multiple Access with

Collision Detection) protocol that sends only after checking the medium, to make sure that there is no data to be received in order to avoid packet collisions.

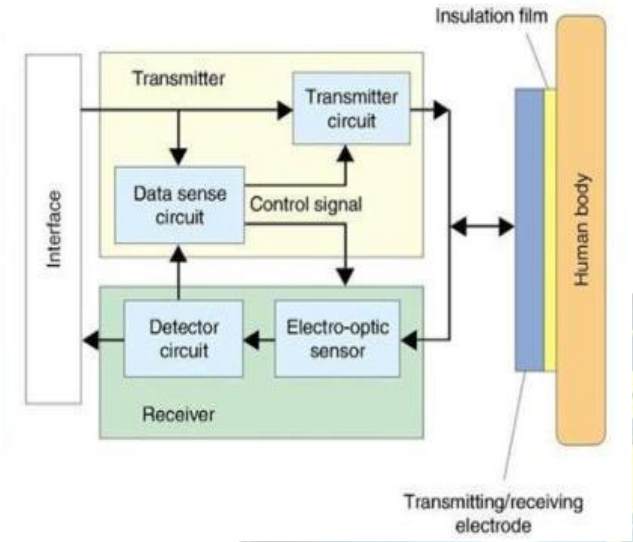

Fig 5.Block diagram of a RedTacton transceiver [7]

III.COMPARISON WITH OTHER NETWORK TECHNOLOGIES

Factors of RedTacton over Bluetooth and RFID (Radio-frequency identification)

1. No traffic and network congestion when it comes to RedTacton. Here congestion decreases with increase in number of users joining the network.

2. Power consumption and cost of transmission media under usage is reduced.

3. The data transfer rate is more and ranges up to 10 Megabits per second.

4. Human body becomes the swipe card which can be applied for security purposes in varies domains. Fig 6.shows few more advantages of RedTacton over RFID and Bluetooth

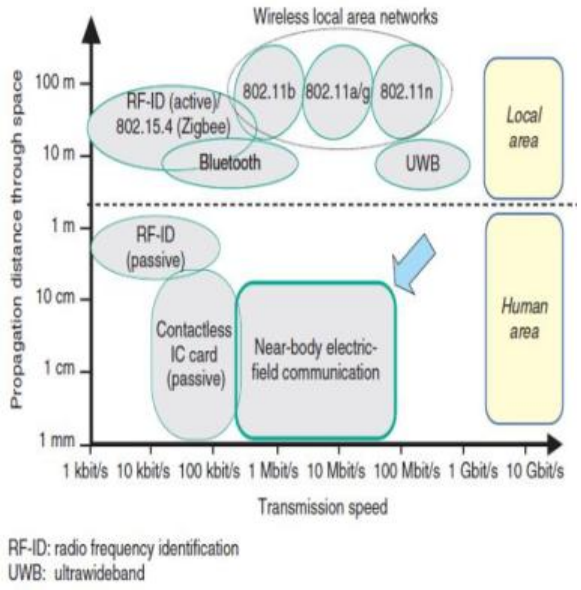

Fig 6.Comparison of RedTacton with RFID, Bluetooth, UWB [4]

IV.POTENTIAL APPLICATIONS

There are many application of RedTacton in different fields. This technology will widely used in daily working schedule and provide convenience to people. [5]

One-to-One services

With the ability to send attribute data from personal information devices worn on the body to computers embedded in the environment, one-to-one services could be implemented that are tailored to the individual needs of the user.

Intuitive operation of personal information devices

Communication is triggered by totally natural human actions and behavior, so there is no need to insert smart cards, connect

cables, tune frequencies, or any of the other inconveniences usually associated with today's electronic devices.

Device personalization

Setup, registration, and configuration information for an individual user can be uploaded to a device, by instant the device is touched, eliminating the need for the device to be registered or configured in advance.

New behavior patterns

Tables, walls, floors and chairs can all act as conductors and dielectrics, turning furniture and other architectural elements into a new class of transmission medium. For example, a user could have instant access to the internet merely by placing a laptop onto a conductive tabletop.

Security applications

RedTacton could be installed on doors, cabinets and other locations calling for secure access, such that each secure access could be initiated and authenticated with a simple touch. At the same time, all the transaction details and relevant user attributes (personal identity, security clearance, etc.) could be logged by the security system.

V.DATA TRANSMISSION DEVICES

NTT has made 3 type of Prototype for data transmission

PC Card Transceiver (PC Card Type):

Communication Speed :10Mbps
Protocols:TCP/IP
Communication Method : Half –duplex
Interface :PCMCIA

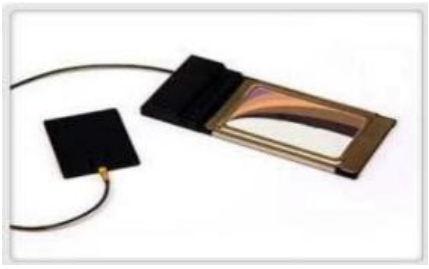

Fig 7. PC Card Transceiver

Embedded Transceiver (Hub Type):

Communication Speed :10Mbps
Protocols:TCP/IP
Communication Method : Half –duplex
Interface :RJ45

Fig 8. HubType Transceiver

USB Transceiver(Box Type) :

Fig 9. Box Type Transceiver

A type of connection between a computer and a peripheral device like a printer or a camera. The original USB could transfer data at a rate of 12Mbps (million bits per second), a new USB2.0 now transfers at a rate of 480 Mbps[8].

VI.FUTURE SCOPE

RedTacton has a wide range of unique new functional features and enormous potential as a Human Area Networking Technolgy.NTT is committed to quickly identifying and opening up those application areas with the most commercial promise for RedTacton, a business development process to be coordinated under NTT's Comprehensive producer function program.[5] Fig 10 shows few of the applications presently used and those which are to be implemented in the future.

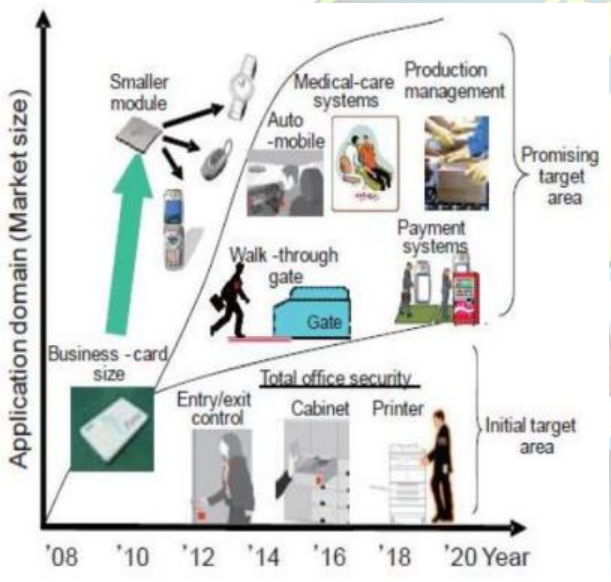

Fig 10 .Present and Future Directions [6]

VII.CONCLUSION

The performance of RedTacton is better, when compared with other technologies. High speed communication is possible with 10 Mbps. RedTacton Body-based networking is more secure than broadcast systems, such as Bluetooth. Network congestion due to fall in transmission speed in multiuser environment is avoided.

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