Red Tacton - A Human Area Networking Technology

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ABSTRACT: **Now a day's electronic devices become smaller and lower in power Requirements, and they are less expensive. we have begun to adorn our bodies with personal information and communication appliances. Such devices include cellular phones, pagers and personal digital assistants and many more. But currently there is no such method for these kinds of devices to share data. Networking these kinds of devices can reduce functional I/O redundancies and allow new Conveniences and services. Human society is entering an era of modern computing, when networks are smoothly interconnected. The implementation of ubiquitous services requires three levels of connectivity: Local Area Networks (LAN), Wide Area Networks (WAN), and Human Area Networks (HAN) for connectivity to personal information, share data, media and communication appliances within the much smaller areas for communication. RedTacton is a technology that uses the surface of the human body as a high speed and safe network transmission path. So in this paper we are explaining the unique new functional features and enormous potential of RedTacton as a Human Area Networking technology. Here, the human body acts as a transmission medium supporting half duplex communication at 10Mbit/s.**

Keywords: RedTacton, Electric field sensing

I. INTRODUCTION

Red Tacton technology is an electronic future where information can be accessible whenever and wherever needed at our finger tips. Some of the communication equipment that is required to Provide this immediate access to information will be Incorporated into our attire. Justas a quick look at today's wristwatch saves a trip to the nearest clock; a glance at tomorrow's wristwatch will replace finding a terminal to check e-mail. RedTacton is a new Human Area Networking technology which was introduced by Nippon telegraph and Telephone Corporation (NTT's) that uses the human body surface is a high speed and safe network transmission path. RedTacton is a Break-through technology that enables reliable high-speed HAN for the first time. In the past, infrared Communications (IrDA), Bluetooth, radio frequency ID systems (RFID),and other technologies have been Proposed to solve the "last meter" connectivity problem. However, those technologies 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.

What is RedTacton?

RedTacton Technology was introduced by Nippon Telegraph and Telephone Corporation (NTT). TACTON- meaning "action triggered by touching" and RED - It is an auspicious color according to Japanese culture for warmth. It is a technology that uses the surface of the human body as a safe, high speed network transmission. The study of Human Area Networking

i.) RedTacton uses the minute electric field emitted on the surface of the human body. It is completely distinct from wireless and infrared.

ii.) A transmission path is formed at a part of the human body which comes in contact with a RedTacton transceiver. Physically separating ends the contact and thus ends communication.

iii.) Using RedTacton, communication starts when terminals carried by the user are linked in several combinations according to the user's natural, physical movements.

iv.) Communication is possible using any body surfaces, such as the hands, fingers, feet, face, legs, skin or torso. Red Tacton works through shoes and clothing as well.

B. *Features*

RedTacton Technology has three main functional features:

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

ii.) Broadband & Interactive: Bandwidth does not deteriorate even with duplex operations and also simultaneous access by many users. Duplex, interactive communication is possible at a maximum speed of 10Mbps. This is because the transmission path is on the surface of the body; transmission speed of red tacton does not deteriorate in congested areas Where many people can communicate at the same time.

iii.) Any media: In addition to the human body, there are various conductors and dielectrics can also be used as transmission media. Conductors and dielectrics may also be used in combination.

Previous Work on Electric Field Sensing

Human Area Network(HAN) development grew out of a meeting between Professor Mike Hawley's Personal Information Architecture Group and Professor Neil Gershenfeld's Physics and Media Group, both at the MIT Media Laboratory. Professor Hawley's group needed a interconnect body-borne information appliances, and Professor Gershenfeld's group had been applying electric field sensing to position measurement.

RedTacton Transceiver:

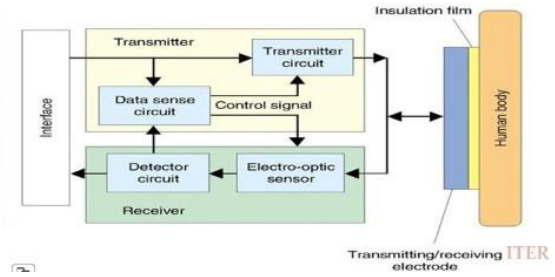

Fig. Block diagram of RedTacton Transceiver

Transmitter consists transmitter circuit that has electric fields towards the body and a data sense circuit, which distinguishes transmitting and receiving modes by detecting both transmission and reception data and outputs control signals corresponding to the two modes to enable two way communication.

Implementation of receive-first half-duplex communication scheme that sends only after checking to make sure that there is no data to receive in order to avoid packet collisions. RedTacton takes advantage of the long-overlooked electric field that surrounds the human body.

II.WORKING:

RedTacton takes a different technical approach. Instead of depending on electromagnetic waves or light waves to carry data. RedTacton using weak electric fields on the surface of the body as a transmission medium as shown in figure.

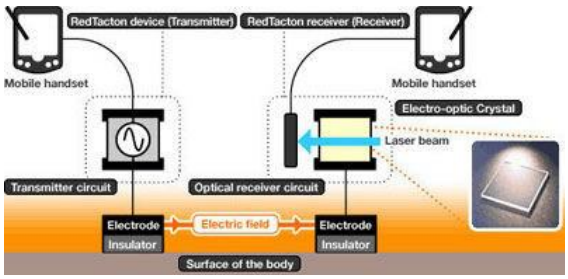

Fig. Block diagram of RedTacton working

i.) The RedTacton transmitter induces a weak electric field on the surface of the body.

ii.) The RedTacton receiver senses changes in the weak electric field on the surface of the body caused by the transmitter.

iii.) 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.

iv.) 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.

Multiple transceivers can be used simultaneously. The reason is RedTacton uses a proprietary CSMA/CD (Carrier Sense Multiple Access with Collision Detection) protocol that allows multiple accesses with the same medium from multiple nodes.

Mechanism of Communication with RedTacton

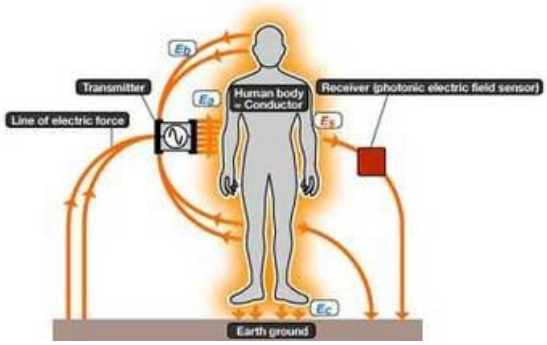

Fig.communication with RedTacton

The naturally occurring electric field induced on the surface of the human body dissipates into the earth as shown. Therefore, this electric field is exceptionally faint and not stable. 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.

Human Safety

The transmitting and receiving electrodes of the RedTacton transceiver are completely covered with insulating film, so the body of the person acting as transmission medium is completely insulated. This makes impossible for current to flow into a person's body from the transceiver. When communication takes place, displacement current is generated by the electrons in the body because the body is subjected to minute electrical fields. Such type of displacement currents are very common everyday occurrences to which we are all subjected. RedTacton conforms to the "Radio frequency-exposure Protection standard (RCR STD-38)" issued by the Association of Radio Industries and Businesses (ARIB).

III. APPLICATIONS

RedTacton has wide range of applications, in those some of the applications are as follows:

One to One Services

- Enable one-to-one services designed to the User's situation and tastes.
- Attribute information recorded in the RedTacton device is sent to the objects that are in contact with it.
- The appropriate service is provided based on the information received by the RedTacton receiver.

1) Elimination of human error:

Fig. Elimination of human error.

RedTacton devices embedded medicine bottles transmit information on the medicines attributes. Whenever the user touches the wrong medicine, immediately an alarm will trigger on the terminal he is carrying. The alarm sounds only whenever the user actually touches the medicine bottle, it reduces false alarms common with passive wireless ID tags, which trigger simply by proximity.

Avoidance of risk at construction sites. (An alarm sounds only if special equipment is handled by anyone other than supervisors)

2) *Marketing Applications*

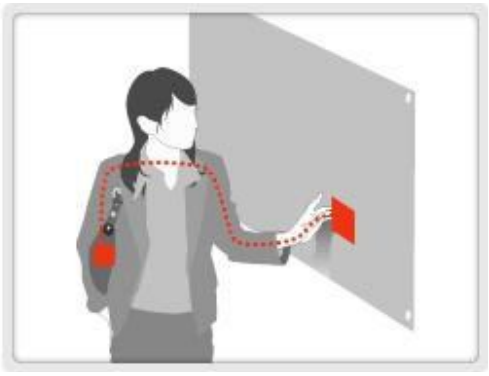

Fig. Marketing applications

When a consumer stands in front of an advertising panel, information matching and advertising his or her attributes is automatically displayed. By standing in front of items they are interested in and also touching it, consumers can get more related information. Inside a shop, shoppers can view related information on their mobile terminals immediately after touching a product.

Intuitive Operations

A) Natural movements and actions are the trigger (touch).

B) RedTacton transceivers embedded in two terminals can communicate not only data but also the control or configuration instructions needed to operate devices (broadband & interactive).

1) Intuitive Operations:

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. When user feel complicated, configurations are reduced by downloading device drivers at first touch. They can transfer songs to portable music players from notebook PCs with just a touch.

Fig 6. Intuitive operations

2) *Instant Private Data Exchange:*

Fig. Instant private data exchange

By shaking hands, personal profile data can be exchanged between mobile terminals on the user. (Electronic exchange of business cards) Communication can be kept private using authentication and encryption technologies. Group photos taken by digital cameras are instantly transferred to individual's mobile terminal. Diagrams drawn on white boards during meetings are transferred to individual's mobile terminals on the spot.

Personalization

1) Digital lifestyle can be instantly personalized with just a touch.

2) A pre-recorded configuration script can be embedded in a mobile terminal with built-in RedTacton transceiver.

3) When another device with RedTacton capabilities are touched, personalization data and configuration scripts can be downloaded automatically.

1) Personalization of Mobile Phones:

Fig. Personalization of mobile phones

Your own phone number is allocated and billing commences.

Automatic importing of personal address book and call history. The PC's are configured to the user's specifications simply by touching the mouse.

2) Personalization of Automobiles:

Fig. *Personalization of Automobiles*

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.

New Behavior Pattern

- Various conductors and dielectrics can be used as RedTacton communication media and this has the potential to create new behavior patterns. Walls and partitions can be used as communication media.

1) *Conferencing System*

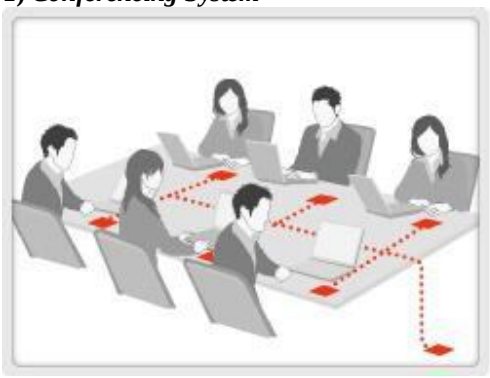

Fig. *Conferencing System*

An electrically conductive sheet is embedded in the table. A network connection is initiated simply by placing a laptop on the table. Using different sheet patterns enables segmentation of the table into subnets. Walls and partitions can be used as communication media, eliminating construction to install electrical wiring. Ad hoc networking using conductive liquid sprays is possible.

Security Applications

- Automatic user authentication and log-in with just a touch.
- ID and privileges are recorded in a mobile RedTacton device.
- Corresponding RedTacton receivers are installed at security check points.
- The system can provide authentication and record who touched the device.

User Verification Management:

Carrying a mobile RedTacton-capable device in one's pocket, ID is verified and the door unlocked when the user holds the doorknob normally. Secure lock administration is possible by combining personal verification tools such as fingerprint ID or other biometric in the mobile terminal.

IV. ADVANTAGES

i.) RedTacton does not require the electrode to be in direct contact with the skin.
ii.) High-speed communication is possible between any two arbitrary points on the body.
iii.) Body-based networking is more secure than other broadcast systems, such as Bluetooth which have high range of about 10m.
iv.) Network congestion due to fall in transmission speed in multiuser environments is avoided.
v.) Superior than Infrared technology
vi.) Superior than Wi-Fi.

V. DISADVANTAGES

i.) It has no compelling applications that aren't already available.
ii.) It is very costly.

VIII. CONCLUSION

This technology definitely stands out with perfection, when transfer of data is fast, feasible and more importantly reliable. So, in few years from now everything is going to fall under this super technology. And, finally I conclude,

"FUTURE BELONGS TO RED TACTON"

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