

Communication Using RedTacton - A Human Area Network Technology

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Abstract - "RED TACTON" is the new innovative technology used in human body as a communication network. It gives a whole new meaning to the term "networking". It is an user-friendly persuasive technology that establishes a communication between people and objects in an closer proximity. This paper proclaims model of an human area networking technologies that enables communication by means of "Touching" and an overview of recent research into body coupled communications. Redtacton technology was implemented to overcome the weak radio signals, data speeds and security -risks on unwanted signal interceptions. Here, human body is the transmitting medium supporting IEEE 802.3 half-duplex communication at 10 Mbits/s. Redtacton does not rely on electromagnetic or a light wave to transmit data. Technically, it is completely distinct from wireless and infrared. Using a new super-sensitive photonic electric field sensor, it can achieve duplex communication over human body. In, this paper it implies that RedTacton technology is based on the principal of Human Area Networking.

Key Words: Body Coupled Communications, RedTacton, IEEE 802.3, Human Area Networking

1.INTRODUCTION

Red Tacton technology is a Human Area Networking (HAN) which was introduced by Nippon telegraph and Telephone Corporation (NTT) that uses the human body surface as an high speed and safe network transmission path. RED - It is an auspicious color according to Japanese culture for warmth/TACTON- meaning "action triggered by touching". A transmission path is formed at the moment a part of the human body comes in contact with a Red Tacton transceiver. Communication is possible using any body surfaces, such as the hands, fingers, arms, feet, face, legs or torso. Red Tacton works through shoes and clothing as well. When the physical contact gets separated, the communication is ended. 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. Finally, all limitations were overcome by NTT (Nippon Telegraph and Telephone Corporation) located in Tokyo,

Japan by using photonic electric field sensors and finally came up with a human area networking technology called RedTacton.

1.1 COMPARISON OF REDTACTON WITH OTHER NETWORK TECHNOLOGIES

1)The chart displayed in figure (1) shows the exact position of RedTacton with the other network technologies that are available today. RedTacton actually is helpful in short distance communication. When compared with a wi-fi communication, this technology seems advantageous. In wi-fi, there is no need of any physical connections. Thus communication is established as soon as the signals arrive. But, when it comes to security reasons, wi-fi is a problem.

2) As the signals can be easily hacked by others, extra security measures have to be included. Also, when compared with wired transmission, RedTacton is more advantageous. Here physical connection is required at a high rate for data transmission. With more and more users trying to retrieve data from a single source, the physical connections become a problem. But, there will not be many problems with security. So, we can confirm that RedTacton technology comes right in between wireless and wired connection.

3) It can provide maximum security as well as data transfer without the use of physical connections. The security will be maximum as the data transfers can occur only between two contact points. Take a look at the figure below to know the exact comparison between all the technologies.

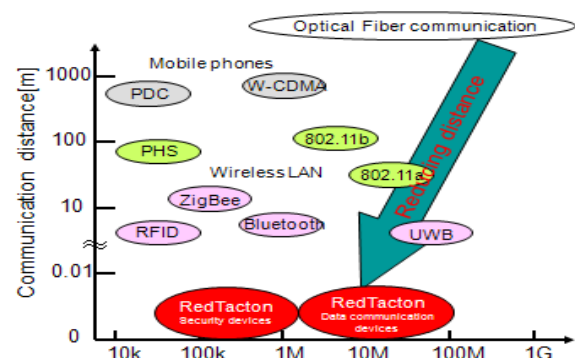


Fig. 1. RedTacton Comparison with other network technologies

1.2 REDTACTON MECHANISM

RedTacton transmitter induces a weak electric field on the human body surface. The RedTacton depends on the proposition of the optical properties of an electro optic crystal which varies according to the changes in the weak electric field. RedTacton detects the changes in the optical properties of an electro-optic crystal using a laser and converts the result into an electrical signal in a detector circuit.

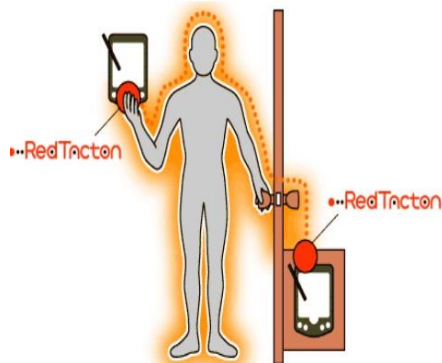


Fig. 2. Mechanism of Redtacton

Photonic electric field sensor

$$E_a - E_b - E_c = E_s$$

E_a is Electric field induced by the transmitter

E_b is Electric field returning to the ground of the transmitter

E_c is Electric field at the receiver

E_s is Detected electric field at the receiver

2. 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.

3. RED TACTON TRANSCEIVER

A. Working of RedTacton Transceiver

The signal from the connecting point is sent to both the circuits such as data sense circuit and transmitter circuit. Circuit of data sense intellects the signal from the interface and if the data is present means it passes the control signal to the transmitter which stimulates the transmitter circuit. The transmitter circuit changes the electric field on the surface of our human body. This change in the electric field from the transmitter circuit is detected by the electro-optic

sensor and laser beam technology. The outcome of the electro optic sensor is assumed by the detector circuit; finally it reaches the receiving Red Tacton device.

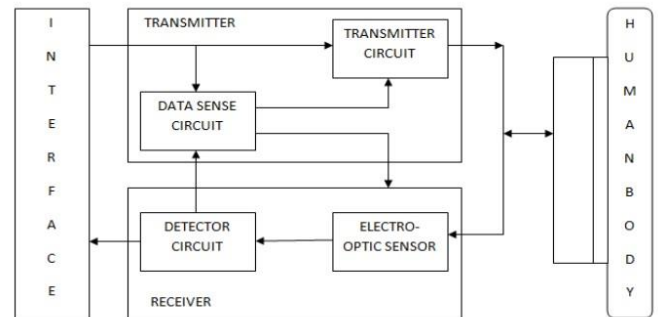


Figure 3 RedTacton Block Diagram

B. Human Safety

Investigating the effects of Red Tacton technology on human health, which is obviously an important issue the transmitting and receiving electrodes of the Red Tacton receiver are completely covered with insulating film, so the body of the person acting as a transmission medium is completely insulated. This makes it possible for current to flow into a person’s body from a transceiver. When communication occurs, displacement current is generated by the electrons in the body because the body is subjected to minute electrical fields. However, such displacement currents are very common everyday occurrences to which we are all subjected. Red Tacton conforms to the “Radio Frequency-Exposure Protection Standard (RCR STD-38)” issued by the association of Radio industries and business (ARIB). The levels produced by Red Tacton are well below the safety limit specified by this standard.

4. FEATURES OF RED TACTON

RedTacton has a wide range of unprecedented new functional features and enormous potential as a Human Area Networking technology. The RedTacton is a big achievement given by NTT to people. The RedTacton has three main functional features as shown in figure(4)

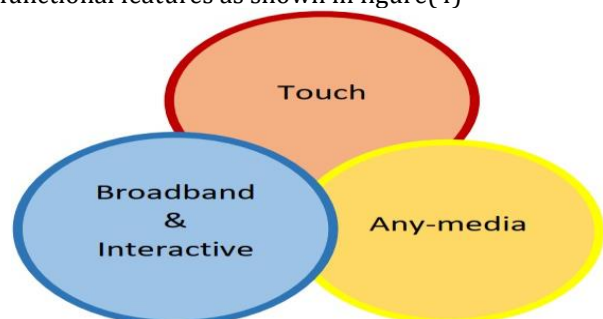


Figure 4 Features of RedTacton

A. Touch

This is the prime feature of RedTacton. A communications path can be created with a simple touch, automatically

initiating the flow of data between a body-centric electronic device and a computer that is embedded in the environment. For example, a simple handshake between people having RedTacton device, sitting, stepping on something and so on.

B. Broadband and Interactive

The second feature is about little interference or no interference. The RedTacton reliance communication between two points on the body, regardless that the communication must be confined to the surface of the body, but can travel through the user's clothes, shoes and so on to the RedTacton device. The dissimilar wireless technologies, the transmission speed does not vary even in the presence of large crowds of people all communicating at the same time in meeting rooms, auditoriums or stores. The duplex, interactive communication is possible at a maximum speed of 10Mbps. Therefore 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. Hence the body surface is the transmission path, increasing the number of connected users directly increases the available number of individual communication channels.

C. Any Media

The third feature is any media meaning that the transmission medium is not immobile. A wide variety of materials can be used as the transmission medium, meanwhile the material is conductive and dielectric, which includes water and other liquids, various metals, certain plastics, glass. The ordinary structures such as tables and walls that are familiar and readily available, one could easily construct a consolidated communication environment at very low cost using RedTacton.

5. ADVANTAGES AND DISADVANTAGES

Advantages

1. Data transfer is faster and easier through this technology
2. Data loss during transfer is minimum.
3. Use of minimum amount of power.
4. Security is more.

Disadvantages

1. It is been used only within a few centimeters.
2. Cost is more.

6. APPLICATIONS OF REDTACTON

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

A. One to One Services

1) 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: - 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.

B. Intuitive Operations

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

2) 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.

C. Personalization

1) Personalization of Mobile Phones: - Your own phone number is allocated and billing commences. Automatic importing of personal address book and call history. The PCs are configured to the user's specifications simply by touching the mouse.

2) 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.

D. New Behavior Pattern

1) 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 enable 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

2) 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.

7. FUTURE SCOPE AND DEVELOPMENT

Red Tacton has a wide range of unique new functional features and enormous potential as a Human Area Networking technology. Red Tacton is a big achievement given by NTT to people. NTT is committed to quickly identifying and opening up those application areas with the most commercial promise for a business development process to be coordinated under NTT's Comprehensive Producer Function program. Nippon Telegraph and Telephone Corp (NTT) is planning a commercial launch of a system to enter rooms that frees users from the trouble of rummaging in their pockets or handbags for ID cards or keys. Data will travel through the user's clothing, handbag or shoes, anyone carrying a special card can unlock the door simply by touching the knob or standing on a particular spot without taking the card out. It will have many future applications such as walkthrough ticket gate, a cabinet that opens only to authorized people and a television control that automatically chooses favorite programs. The system also improves security. It ensures that only drivers can open their cars by touching the doors if the keys are in their pockets, not people around them.

8. CONCLUSIONS

Red-Tacton technology is better when compared with other technologies; it is well-known for its data transmission at 10 Mbps within a shortest distance. The limitations of various wireless network technologies such as data security, data speed, etc., can be overcome by RedTacton. So This technology definitely stands out with perfection, when transfer of data is fast, feasible and more importantly reliable. RedTacton technology is expected to overcome the Bluetooth technology in the future. The evolution of Red Tacton technology is a big achievement, which will likely be targeted for use in applications such as wireless headset, medical application, security applications, wireless transmission by applying different actions. page.

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