

Human Body as a Medium for Communication

P.Lakshmi Narayana¹, B.Meena Bharghava², P.Lakshman kumar³

¹KL University, Electronics and communication engineering,
Green fields, Vaddeswaram, Guntur, India
Lakshman5.pothakamuri@gmail.com

²KL University, Electronics and communication engineering,
Green fields, Vaddeswaram, Guntur, India
meena.bharghava@gmail.com

³Aurora's engineering college, Electronics and communication engineering,
Bhongir, Nalgonda, India
Akhil15shasha23@gmail.com

Abstract: Technology is making many things easier. We can say that this concept is standing example for that. So far we have seen LAN, MAN, WAN, INTERNET & many more but here is new concept of "RED TACTON" which makes the human body as a communication network by name HAN (Human Area Network). Red Tacton is a new Human Area networking technology that uses the surface of the human body as a safe, high speed network transmission path. Red Tacton uses the minute electric field generated by human body as medium for transmitting the data. The chips which will be embedded in various devices contain transmitter and receiver built to send and accept data in digital format. In this paper we will discuss about red tacton, and its working states, and applications of red tacton various fields. And we will compare our red tacton with the other technology for data transmission and know about human area network.

Key words: electric field, human body, data transmission, Communication, HAN.

1. Introduction

We may have imagined the feature as a place crawling with antennas and emitters, due to the huge growth of wireless communications. And it seems that the current means of transferring data might already have a very serious competitor none other than the human body. The concept of intra body communication, which uses the minute electric field propagated by the human body to transmit information, was first proposed by IBM[2] and Nippon Telegraph and Telephone Corporation (NTT, in Tokyo) has developed an innovative Human Area Networking (HAN) technology called RedTacton (Red = warm color, Touch + action = Tacton) that safely turns the surface of the human body into a data transmission path at speeds up to 10 Mbps between any two points on the body, giving peer-2-peer a whole new meaning. Communication is possible using anybody 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. [1]

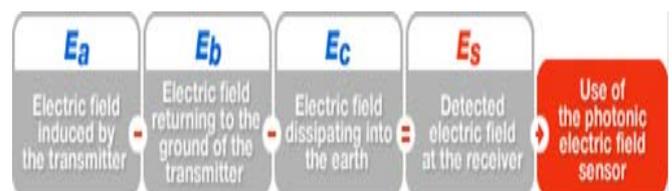
2. Red tacton:

The name RedTacton was chosen for this technology because "touch-act-on" meaning "action triggered by touching". Red Tacton is a new Human Area Networking

technology that uses the surface of the human body as a safe, high speed network transmission path. Red Tacton uses the minute electric field emitted on the surface of the human body. Technically, it is completely distinct from wireless and infrared. A transmission path is formed at the moment a part of the human body comes in contact with a Red Tacton transceiver. Physically separating ends the contact and thus ends communication. Using Red Tacton, communication starts when terminals carried by the user or embedded in devices are linked in various combinations according to the users. Communication is possible using anybody surfaces, such as the hands, fingers, arms, feet, face, legs or torso. Red Tacton works natural, physical movements.

2.1 Working principle:

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



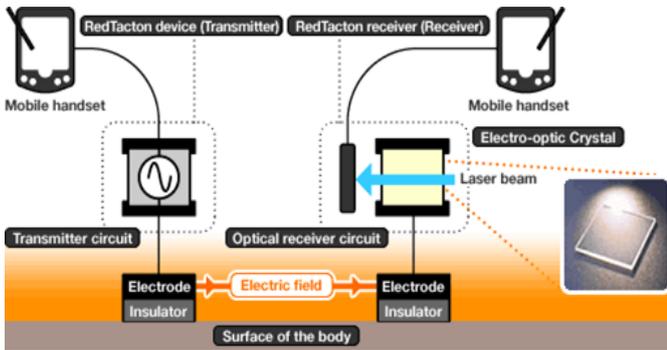


Fig.1 working principle

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

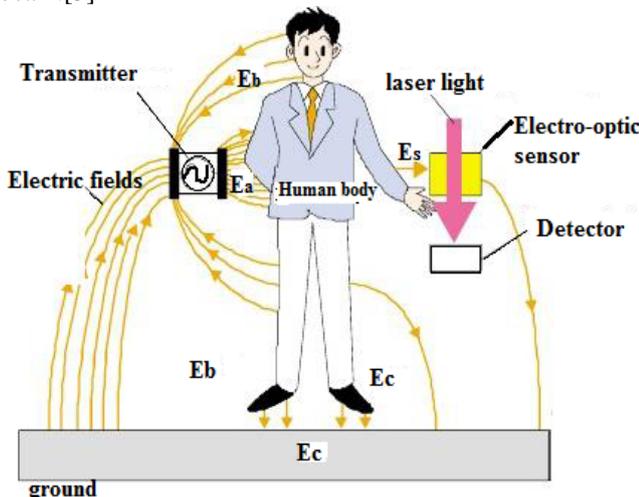
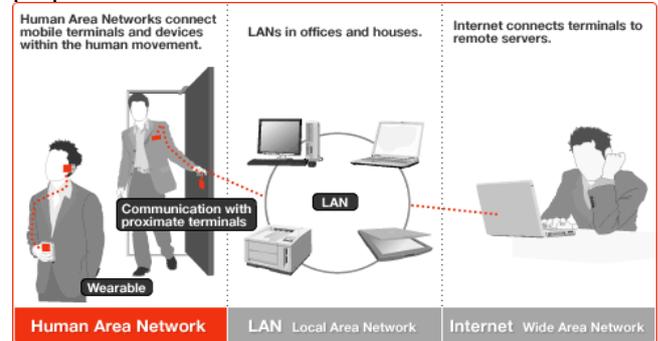


Fig.2 overview of Red tacton

The transmitting and receiving electrodes of the RedTacton transceiver are completely covered with insulating film, so the body of the person acting as the transmission medium is completely insulated. This makes it impossible for current to flow into a person's body from the 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. The levels produced by RedTacton are well below the safety limit specified by this standard.

2.2 Human area network

In addition to the WANs (Internet) and LANs, there are applications best served by Human Area Networks (HANs) that connect the last meter. Human society is entering an era of ubiquitous computing, where everything is networked. By making Human Area Networks feasible, RedTacton will enable ubiquitous services based on human-centered interactions and therefore more intimate and easier for people to use.



RedTacton

Fig.3 comparison of HAN, LAN, WAN

2.3 feature of red tacton:

Red Tacton has three main functional features:

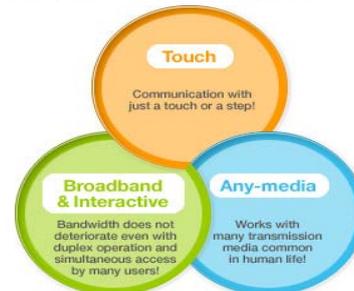


Fig.4 Features of Red tacton

2.3.1. Touch:

Communication with just a touch or step. 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.

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

Table.1 comparison

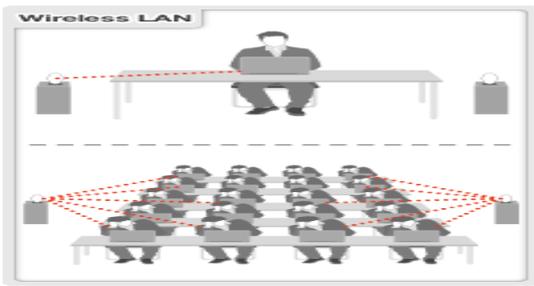


Fig.5 (a) wireless LAN

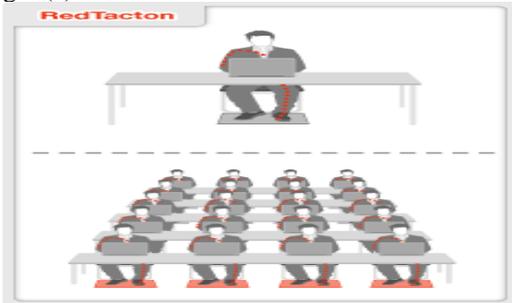


Fig.5 (b) Red Tacton

2.3.3 Any Device

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.

DIELECTRIC

(Signals pass through materials)



Fig.6 (a) example of dielectric

CONDUCTORS

(Signals travel along surface)



Fig.6 (b) example of conductor



Fig.6 (c)



Fig.6 (d)

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

Communication speed can deteriorate in crowded spaces due to a lack of bandwidth (wireless LAN)	Device drivers can be downloaded instantly and executable programs can be quickly sent.(RED TACTON)
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walls, and metal objects. But there is one limitation on the length of the conductor to be propagated, on installation locations, and on the thickness of the dielectric to be passed through.

3.Application fields:

Many application using Red Tacton are introduced. Some are [5]:

3.1 An Alarm sounds automatically to avoid accidental medicine ingestion



Fig.7 (a) Alarm

Red tacton devices embedded medicine bottles transmit information on the medicines' attributes. If the user touches the wrong medicine, an alarm will trigger on the terminal he is carrying. The alarm sounds only if the user actually touches the medicine bottle, reducing false alarms common with passive wireless ID tags, which can trigger simply by proximity.

3.2 Touch Advertising and Receive information

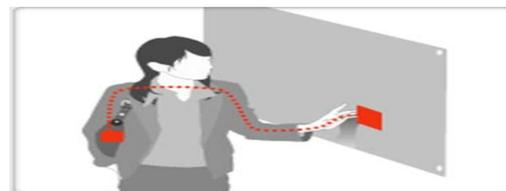


Fig.7 (b) touch advertising

When a consumer stands in front of an advertising panel, advertising and information matching his or her attributes is automatically displayed. By touching or standing in front of items they are interested in, consumers can get more in-depth information.

3.3 Touch a Printer to Print



Fig.7 (c) Printing application

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".

3.4 Instantaneous private network via personal handshake

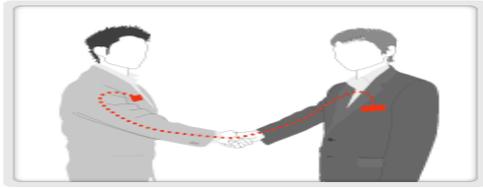


Fig.7 (d) Data exchange

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.

3.5 Just Touching a Phone makes it your own



Fig.7 (e)touching application

Your own phone number is allocated and billing commences. Automatic importing of personal address book and call history.

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



Fig.7 (f) automobile application

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...

3.7 Connect to the network just by putting a Lap-top on the Table

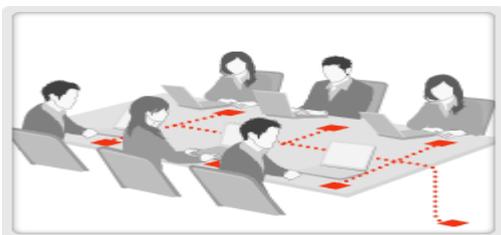


Fig.7 (g) Conference system

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.

3.8 Wireless Headset

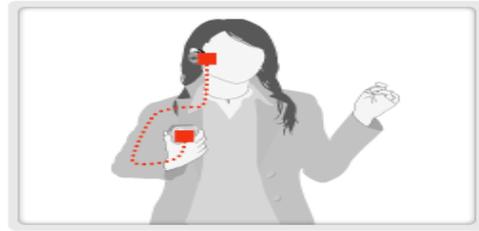


Fig.7 (h) wireless head set

Red Tacton can carry music or video between headsets, mobile devices, mobile phones, etc. Users can listen to music from a Red Tacton player simply by putting on a headset or holding a viewer.

3.9 User verification and unlocking with just a Touch



Fig.7 (i) Security application

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.

4. Prototype

NTT has made three types of prototypes.

Table.2 Prototypes

	<p>Red tacton Transceiver(PC card type)</p> <p>Communication speed:10Mbps Protocols:TCP/IP Communication method -Half-duplex Interface: PCMCIA</p>
	<p>Red tacton transceiver(Hub type)</p> <p>Communication speed:10Mbps Protocols :TCP/IP Communication method : Half-duplex Interface: RJ45</p>
	<p>Red tacton device(box type)</p> <p>Under construction</p>

5. Comparison with other technologies

Networking technology [8]. It will have many future applications such as walkthroughticket 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.

Conclusion:

The performance of Red Tacton is better as compared to othertechnologies. It is best to connect network within short distances. There is no any type of problem of hackers as our body itself is the transmission media. Today main issue is speed; it is solved by Red Tacton by providing very high speed of 10 Mbps within short distances. 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, and wireless transmission by applying different actions. This could get as simple as two people equipped with Red Tacton devices being able to exchange data such as text files as well as business cards just by shaking hands.

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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Table.3 Comparison with other technologies

Evaluation criteria	Wireless				Infrared data communication	RED TACTON
	Wireless LAN	Close range wireless	Contact les IC cards	Passive wireless ID tag		
Transfer speed	E	P	P	P	P	E
Performance deterioration during periods of congestion	E	P	P	P	P	E
Duplex data transfer	E	E	E	P	E	E
Data configuration at initiation of communications	E	E	P	P	E	E
Tasks required at time of each communication	E	E	P	E	P	E
Synchronization with user behavior	P	P	E	E	P	E

E=EXCELLENT, P=POOR [7]

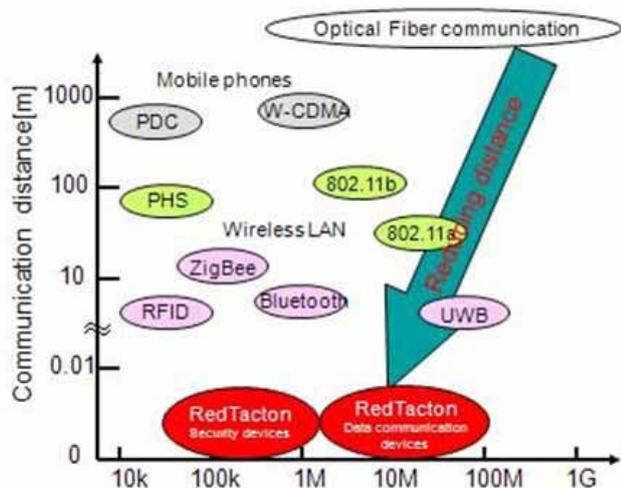


Fig.8 comparison with other networks

6. Future Development:

Red Tacton has a wide range of unique new functional features and enormous potential as a Human Area