RED TACTON :A REVIEW

Reena Antil, Pinki, Mrs. Sonal Beniwal

Abstract— "REDTACTON" gives a whole new meaning to the term "networking".It makes the human body as a communication network. HAN(Human Area Network). Body sensor networks are currently not very intuitive and not very reliable. In the last couple of years body coupled communications has been rediscovered after a period of disinterest.In this paper an overview of recent research into body coupled communications is given. It is a new personal areas network technology which uses weak electric fields on the surface of the human body, as a safe data transmission path, at speeds up to 10 Mbps. RedTacton involves initiating communication with a touch that could result in a wide range of actions in response. It 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 we consider about red tacton, its working, principle ,different applications and future development of red tacton.

Index Terms— Red Tacton,Working,NTT

1. INTRODUCTION

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. It is completely distinct from wireless and infrared technologies as it uses the minute electric field emitted on the surface of the human body.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 [1]

.Using Red Tacton enabled devices, music from a digital audio player in your pocket would pass through your clothing and shoot over your body to headphones in your ears. Instead of fiddling around with a cable to connect your digital camera to your computer, you could transfer pictures just by touching the PC while the camera is around your neck. And since data can pass from one body to another, you could also exchange electronic business cards by shaking hands, trade music files by dancing cheek to cheek, or swap phone numbers just by kissing.Touch and action gives Tacton, and word Red a warm colour to emphasize warm and cordial communications.This technology was developed by Japanese Company Nippon Telegraph and Telephone Corporation.

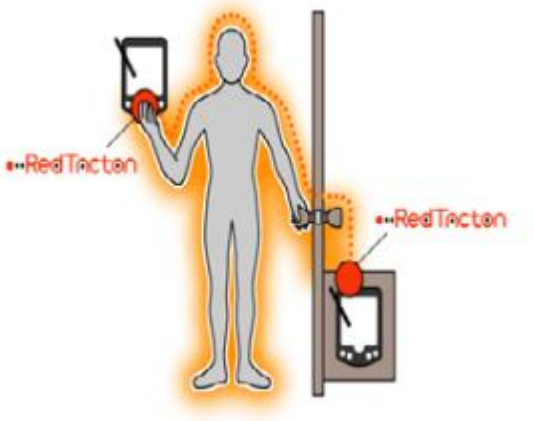

Fig.1

2. HOW RED TACTON WORKS?

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. 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[2] 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.

Electro-Optic field sensor combined with Electro-Optic crystal and laser light [2].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

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changes in the optical properties of an electro-optic crystal with a laser beam.

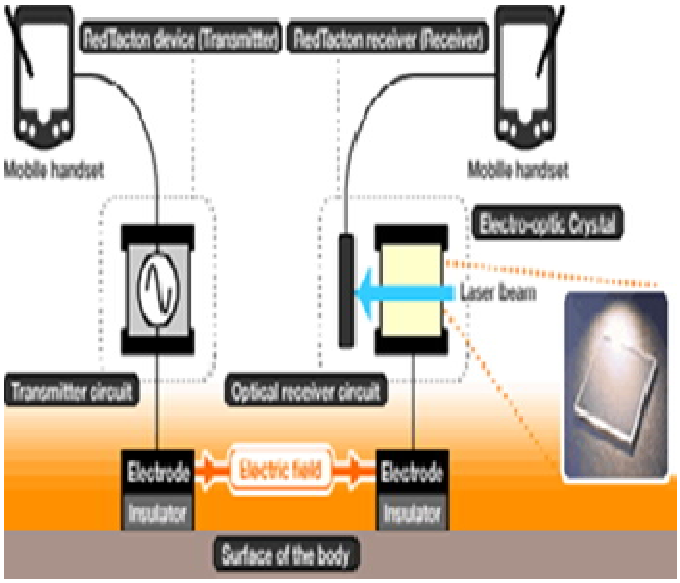


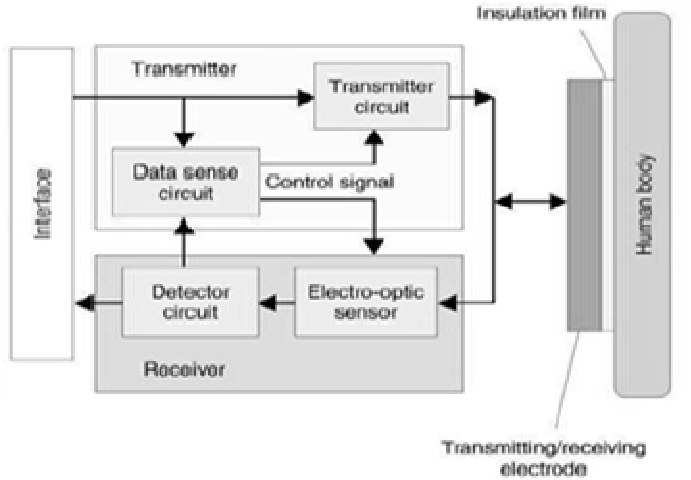
Fig. 2

3. Transmission Steps

- The Red Tacton transmitter induces a weak electric field on the surface of the body.
- The Red Tacton receiver senses changes in the weak electricfield on the surface of the body caused by the transmitter.
- It relies on the principle that the optical properties of the electro-optic crystal varies according to the changes in the weak electric field.
- It detects the changes in the optical properties of an electrooptic crystal using a laser beam and converts the result into an electrical signal in a detector circuit.

4. Red Tacton Transceiver

The block diagram of a Red Tacton Transceiver shown in Fig 3



The signal from the interface is sent to the data sense circuit and the transmitter circuit.The data sense circuit senses the signal and if the data is present it sends control signal to the transmitter which activates the transmitter circuit. The transmitter circuit varies the electric field on the surface of our body. This change in the electric field is detected by the electro-optic sensor. The output of the electrooptic sensor is given to the detector circuit, which in turn given to the interface of the receiving red tacton device.

5. FEATURES OF REDTACTON

RedTacton has three main functional features:-

5.1 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.

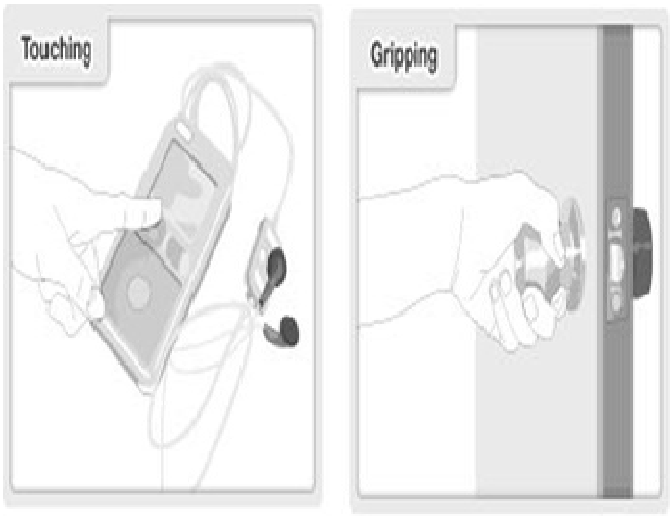


Fig 4

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.

5.2 Broadband And 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. Communication speed can deteriorate in crowded spaces due to a lack of bandwidth. Device drivers can be downloaded instantly and executable programs can be quickly sent.Fig:5

5.3 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.

Fig:7

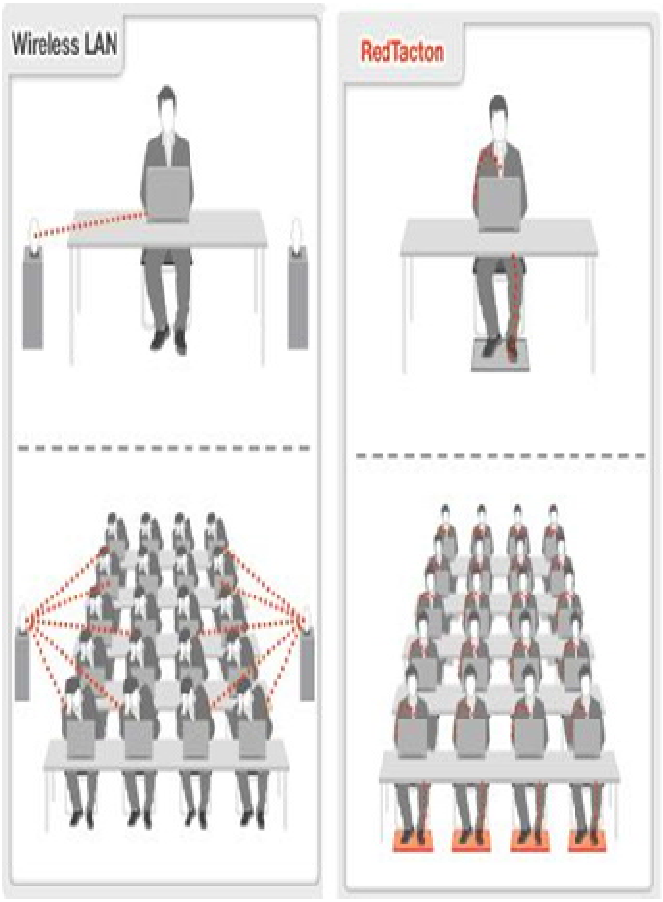


Fig 5

6. PRINCIPLES AND STRENGTHS OF THE TECHNOLOGY

A model of the distribution of the electric field around the human body is shown fig 6(A) Here, the human body is standing above the earth ground, and both the transmitter and receiver have signal and ground electrodes. An AC field can be transmitted to the body's surface if the transmitter is capacitively coupled to the body Fig 6(B) so the electrode is isolated with an insulating layer. If the AC signal is in the 5–10 MHz band, the body can be treated essentially as a conductor, and for the most part, the AC electric field induced by the transmitter does not radiate into the region of space around the body, but is transmitted over the body's surface and escapes to the earth ground. Communication is achieved in the receiver by detecting this AC electrical field before it escapes to the earth ground.

However, part of the AC electric field induced on the body returns to the ground on the transmitter, and a significant part escapes directly to the earth ground. The field distribution also changes continuously as the person moves, so the receiver must detect a signal that is very faint and unstable, which is a challenge for ensuring stable communications. First, we describe the key factors for the transmitter and receiver with reference to a simple equivalent circuit model.

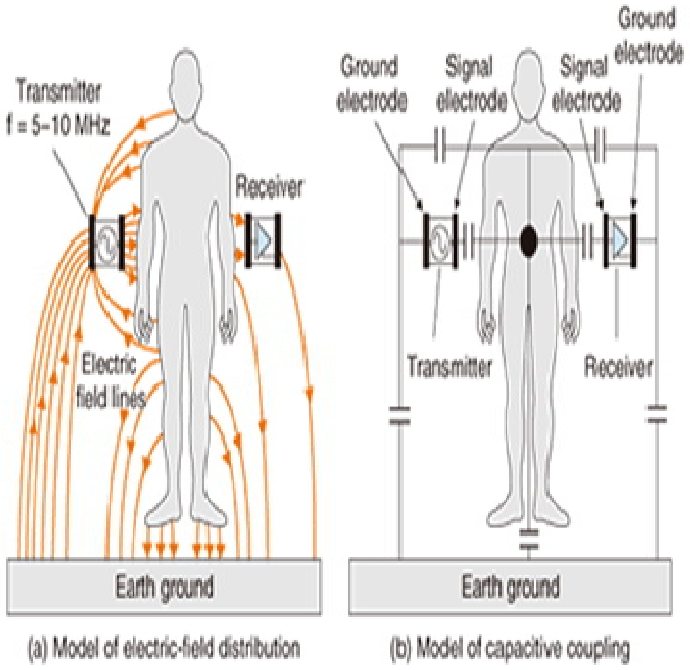


Fig 6 (A) 6 (B)

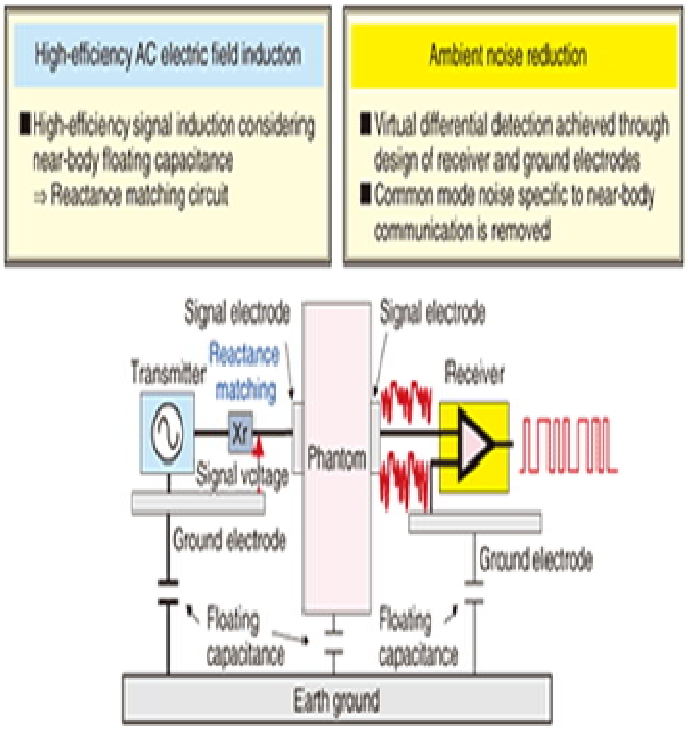


Fig. 7

For the transmitter, it is important to somehow efficiently induce a stable AC electric-field signal on the body's surface. Both the body and the transmitter are floating with respect to the earth ground and are loosely coupled to it through this floating capacitance. This capacitance tends to attenuate the AC signal induced by the transmitter, and the value of this

floating capacitance changes continuously with body movements. To get efficient induction of a stable AC electric field, we need to control the effects of this floating capacitance. We introduced a variable reactance circuit into the output stages of the transmitter: when there is resonance between the floating capacitance and the reactance circuit, the induced signal is maximized. We also added a function enabling the reactance circuit to follow changes in this floating capacitance as the body moves, resonating with it. Similar to the transmitter, the receiver is electrically floating with respect to the earth ground, as shown in Fig. 8. If common mode noise is introduced, it has a strong effect because the impedance balance between the signal and ground lines is poor. To detect the weak AC electric field arriving at the receiver electrode, it is important to somehow control common mode noise. To do this, we created a differential structure in the initial stage amplifier of the receiver and developed technology with a careful design from the receiver electrode to the positive input of the initial stage low-noise amplifier and from the ground electrode to the negative input terminal to achieve an equivalent differential structure. In this way we were able to reliably remove common-mode noise at the initial-stage amplifier and improve the signal-to-noise ratio, creating a highly sensitive architecture able to amplify the weak signal.

Using the basic technologies described above, we were able to efficiently modulate the near-body electric field and implement a receiver that can reduce ambient noise to develop a near-body quasi-electric-field communications technology that achieves the quality required to offer communications services and operates at a minimal transmission power level.

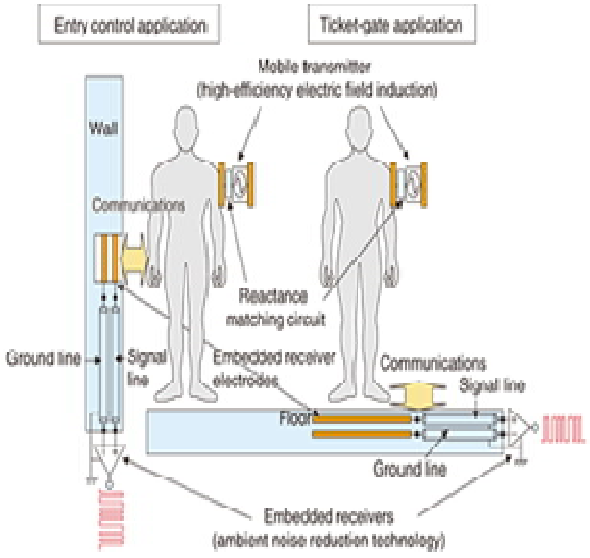


Fig 8

A prototype portable card transmitter and a receiver that can be built into environments such as doors or floors are shown in Fig. 9. The system uses a carrier frequency of 5 MHz and binary phase shift keying (BPSK) modulation and achieves transmission speeds of 200 kbit/s. In some typical applications including entry control and ticket gate systems, with the transmitter carried in a jacket breast pocket or trouser pocket transmitting an ID, we achieved communication with a packet error of rate of less than 10–3. The transmitter can operate for approximately one year using a single CR3032 button-type lithium-ion battery.

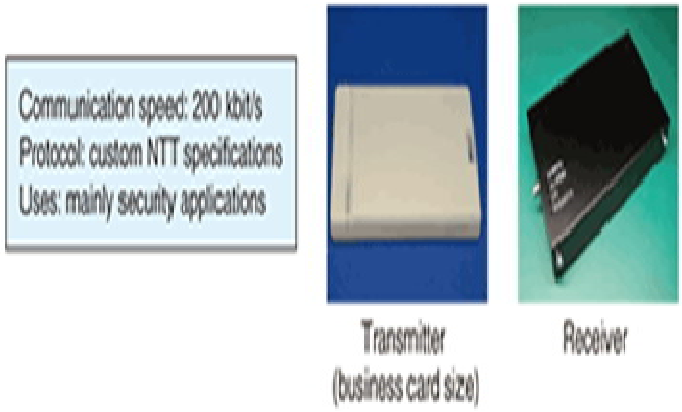


Fig 9

7. Applications of Red Tacton

There are many applications of red tacton in different fields. This technology will widely used in daily working schedule and provide convenience to people.

7.1 One-To-One-Services

An 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 as shown in Fig.10

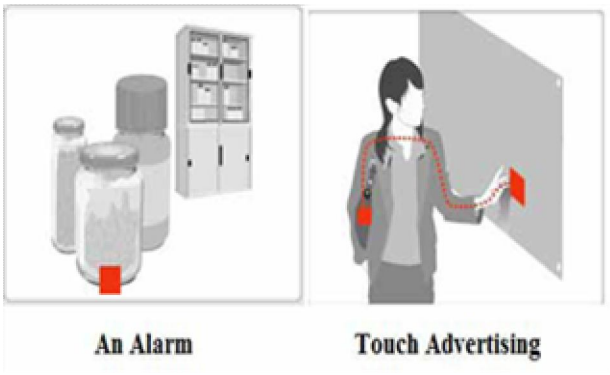


Fig 10

Fig. 10 shows an alarm sounds automatically to avoid accidental medicine ingestion in the first application on the left side of fig. Right part of fig. 8 describes touch advertising and receive Information.

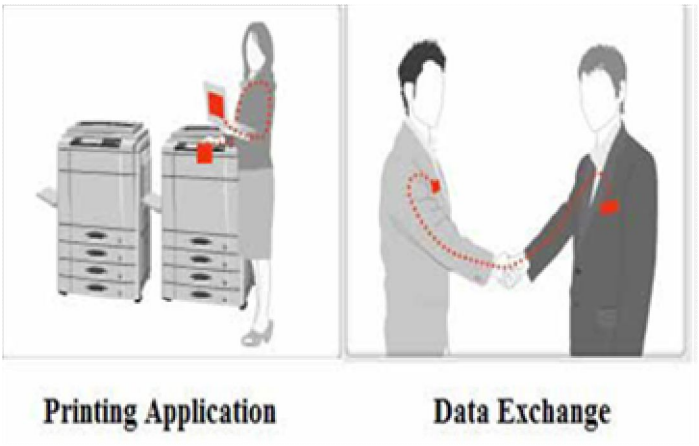
Touch Advertising

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

7.2 Intuitive Operation

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" as you see in fig.11 Intuitive Operation



Instant private data exchange

By shaking hands, personal profile data can be exchanged between mobil terminals on the users. (Electronic exchange of business cards Communication can be kept private using authentication and encryption technologies

7.3 Personalization

There are many applications under personalization. Some applications are shown in fig. 12

Just touching a phone makes it your own

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

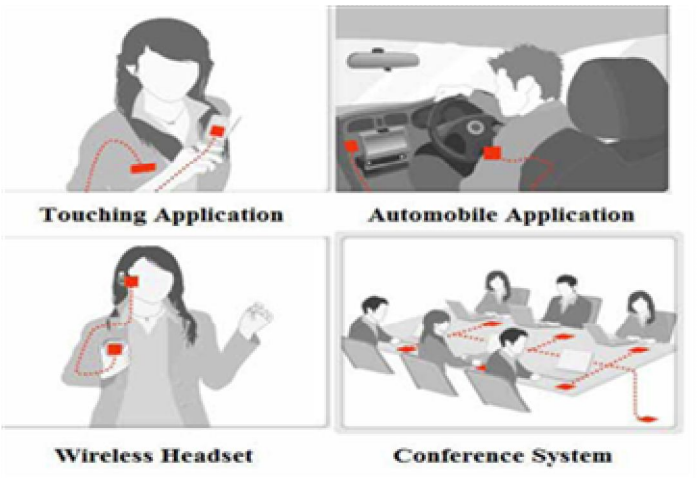


Fig 12 Personalisation

Personalisation of Automobiles

The seat position and steering wheel height adjust to match the driver just by sitting in the car [6]. The driver's home is set as the destination in the car navigation system. The stereo plays the driver's favourite song.

Wireless Headset

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.

Conference

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.

7.4 Security Applications

Red Tacton is very secure in all respects such as authenticity, authorization and verification as well as unlocking as we see in fig. 13

User verification and unlocking with just a touch

Carrying a mobile Red Tacton 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.

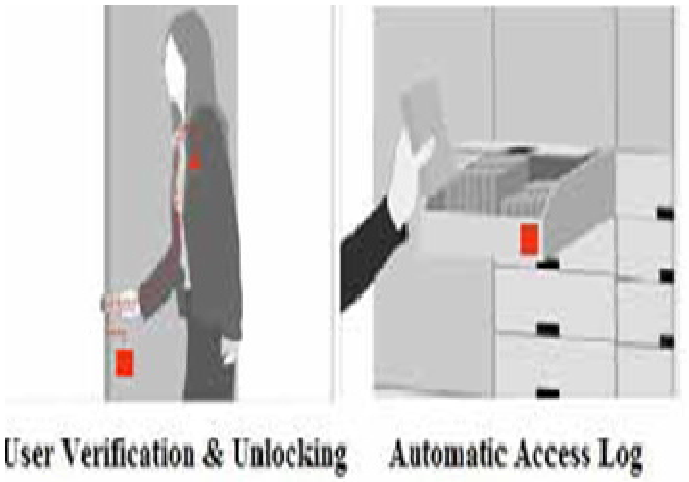


Fig 13

Automatic access log

There is also a facility to access automatic log for confidential document storage. These access logs contain database info mation in the form of log files.

7.5 Other Applications

Red Tacton has many applications. So, it is not easy to explore all the applications. Some additional applications as shown in fig. 14

Under Water Communication

Red Tacton allows communication in outer space and in water where the speech constraints are very high and thus enables a highly efficient means of expression of speech which is beyond the purvey of human.

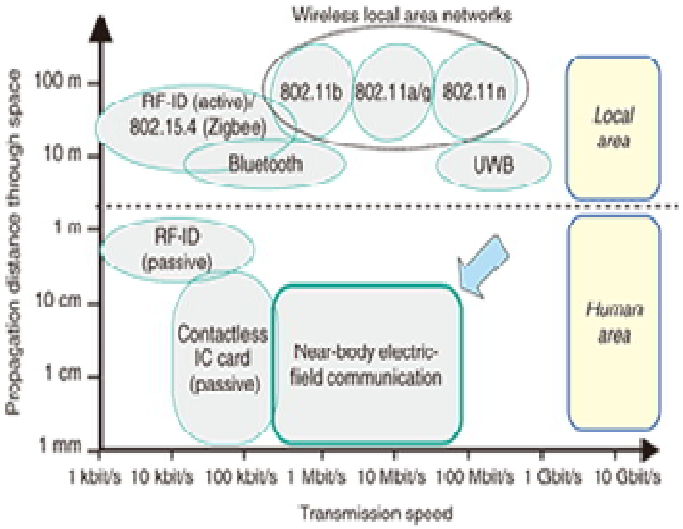
Fig 14 .

Communication inside body

Red Tacton is also used for the treatment. In human body, it is used to detect ailments such as abnormal growths, tumors and excrescences affected tissues and thus helps in curing different diseases.

Comparison with Other Networks

The positioning of Red Tacton with respect to existing communication technologies. The focus on ubiquitous service has brought about the shortening of distances in communication.
Fig 15 Comparison with other networks

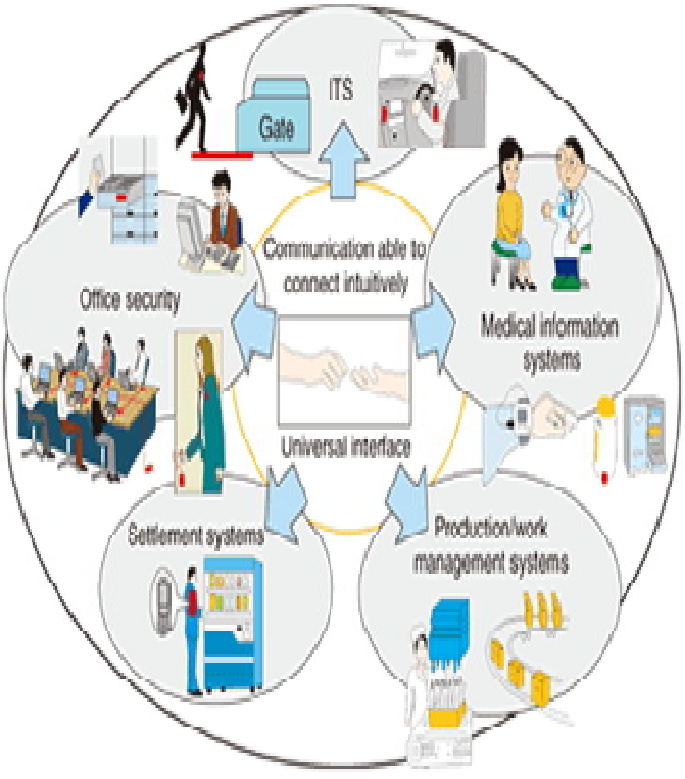


RF-ID: radio frequency identification
UWB: ultrawideband

Red Tacton is positioned as the last 1m solution to ultimate close-range communication. Wireless communication creates connections when signals arrive, allowing for easy connections because connectors are unnecessary. However, seen from another aspect, the arriving signals can be intercepted, so security becomes an issue. Several "human body communication"technologies using the human body as a transmission medium have been reported in the past. But Red Tacton employs a proprietary electric field/photonics method, which surpasses the other methods in terms of communication distance, transfer speed, and interactivity.

8. FUTURE DEVELOPMENT

Red Tacton has a wide range of unique new functional features and enormous potential as a Human Area Networking technology [6]. 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 Red Tacton as shown in fig. 9, a business development process to be coordinated under NTT's Comprehensive Product Function program shown in Fig. 16
Red Tacton looks remarkably like a big pot of kryptonite is said to allow over 200kbps of data through th10 human hands or feet. Telecom giant 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.
Fig. 16



CONCLUSIONS

The performance of Red Tacton is better as compared to other technologies. 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, 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.

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