

# FUTURE BELONGS TO RED TACTON

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## ABSTRACT

*RedTacton is a Human Area networking technology, which is under process that uses the surface of the human body as a safe, high speed network transmission path. It is completely different from wireless and infrared technologies as it uses the minute electric field release on the surface of the human body. RedTacton enables the first practical Human Area Network between disinterred electronic devices and PCs or other network devices embedded in the environment via a new generation of user interface form on totally natural human actions such as touching, holding, sitting, walking, or stepping on a particular spot. RedTacton can be used for self generated operation of computer-based systems in daily life, temporary one-to-one nonpublic networks form on personal handshaking, device structure, security, and a host of other applications placed on new behavior patterns enabled by RedTacton.*

**Keyword:** Red Tacton, Human Area Network Technology, Electro Sensor

## 1. INTRODUCTION OF HUMAN AREA NETWORK

At the end of 2002 the Japanese telecommunications group NTT had declared that it would develop a new data transmission technology that uses the conductive properties of the human body to exchange information between electronic devices. With RedTacton the company has now perform two and a half years later presented its first prototype of a Human Area Network (HAN). Japanese company Nippon Telegraph and Telephone Corporation (NTT) claims to have developed the first feasible Human Area Network (HAN) device, sanctioning fast data transfer between devices using the human body as a flue. NTT suspect this latest advance on the wireless Personal Area Network concept - called RedTacton- can transmit data over the surface of the skin at up to 2Mbps. Where it differs, though, from previous offerings, is that a RedTacton-enabled device does not have to be in direct contact with the skin - only within about 20cm.



**Figure 1.1 RED TACTON Device.**

Human society is entering an era of ubiquitous computing, when networks are altruistically interconnected and information is always available at our fingertips. Red- Warmth, T-Touch, Acton-Action stands for Redtacton. Instead of depend on electromagnetic waves or light waves to carry data, Redtacton uses weak electric fields on the surface of the body as a transmission medium. Nippon Telegraph and Telephone Corporation (NTT) is following research and development of an original Human Area Networking technology called Redtacton 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. Using a novel electro-optic sensor, NTT has already developed a small PCMCIA card-sized prototype Redtacton transceiver. Redtacton enables the first practical Human Area Network between body-gait electronic devices and PCs or other network devices embedded in the environment via a new generation of user interface based on totally natural human actions such as touching, holding, sitting, walking, or stepping on a particular spot. Redtacton can be used for intuitive operation of computer-based systems in daily life, temporary one-to-one private networks based on personal handshaking, device personalization, security, and a host of other applications based on new behavior patterns enabled by Redtacton. NTT is committed to moving Redtacton out of the laboratory and into commercial production as quickly as possible by organizing joint field trials with partners outside the company.

A human area networking technology uses the surface of the human body as a data transmission path. The intra-body communication technologies are developing in support of ubiquitous services. It focuses on the three main features of the technology, promising applications, and an enabling transceiver technique.

The concept of Intra Body communication was first proposed by IBM in 1996[1]. This communication mechanism was later measured and reported by several research groups around the world. This method suffered from few disadvantages. NTT from Japan overcame this and introduced their own version of Human Area Network which overcame the limitations

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 closer and easier for people to use as shown in Figure 1.1.

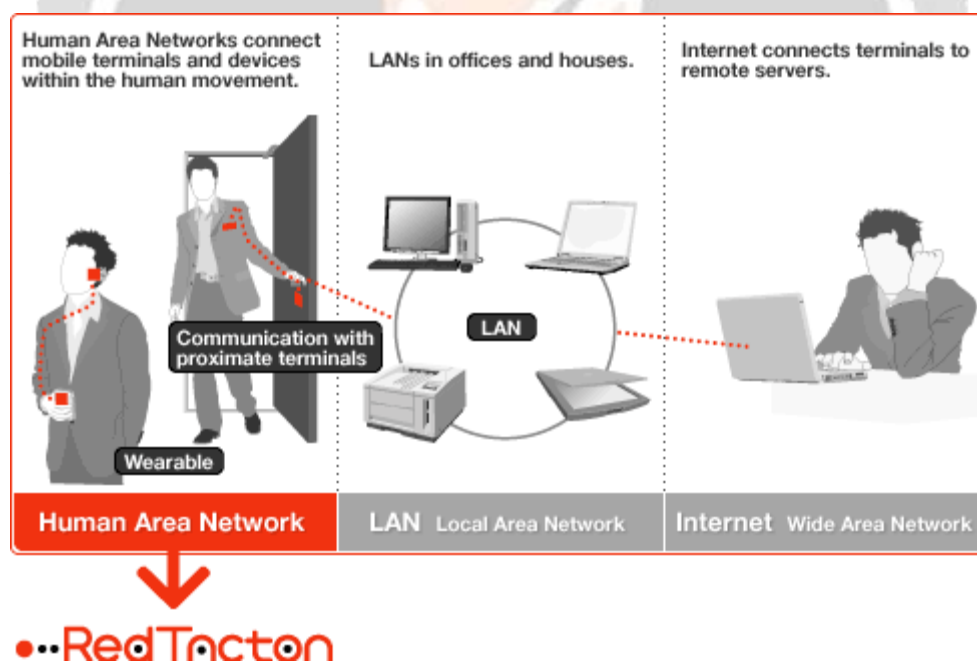


Figure 1.1: Comparison of HAN, LAN, WAN

## 2. LITERATURE SURVEY

P. Lakshmi Narayana, B. MeenaBharghavaand P. Lakshman Kumar [3],The concept of intra-body communication was first proposed by IBM in 1996. This communication mechanism was later evaluated and reported by several research groups around the world. All those reported technologies had two limitations.

1. The operating range through the body was limited to a few tens of centimeters.

2. The top communication speed was only 40 bit/s!! These 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'.

Mitsuru Shinagawa, Katsuyuki Ochiai, Hideki Sakamoto and Toshiaki Asahi [5], RedTacton is a new Human Area Networking technology that turns the surface of the human body as a safe, high speed network transmission path. Communication is possible using any body surfaces, such as the hands, fingers, arms, feet, face, legs or toes. RedTacton works through shoes and clothing as well. RedTacton uses the minute electric field emitted on the surface of the human body for data transmission. NTT developed super sensitive Photonic electric field sensor for sleuthing minute electric field emitted on the surface of the human body.

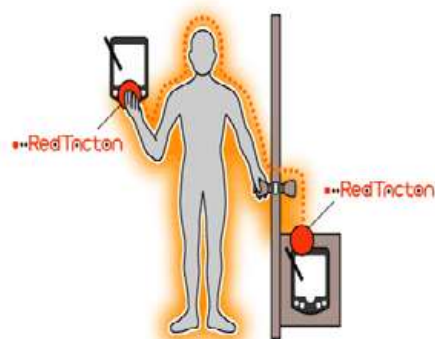
P. Lakshmi Narayana, B. Meena Bhargava and P. Lakshman Kumar [3], The concept of intra body communication, which uses the minute electric field propagated by the human body to transmit information, was first proposed by IBM and Nippon Telegraph and Telephone Corporation (NTT, in Tokyo) has developed 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.

Hao Wang, Xian Tang, Chiusing Choy and Gerald Sobelman [1], Body Area Network (BANs) have become an highly active research topic in modern advanced communication techniques. This is due to the growing number of wearable devices attached to the human body, especially for applications in medical treatment and biomedical sensors. Intra-Body Communication (IBC) uses the human body as a signal transmission channel. It can be used for transference biomedical signals, such as Electrocardiography (ECG), blood pressure, neural recording, etc., and it can also support real time data exchange among various wearable devices. IBC has the advantages of low air radiation, low power, small size and privacy as compared to other stogy near-field wireless technologies.

### 3. RED TACTON

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 as shown in Figure 3.1. Communication is possible using anybody surfaces, such as the hands, fingers, arms, feet, face, legs or torso. Red Tacton works natural, physical movements [3].

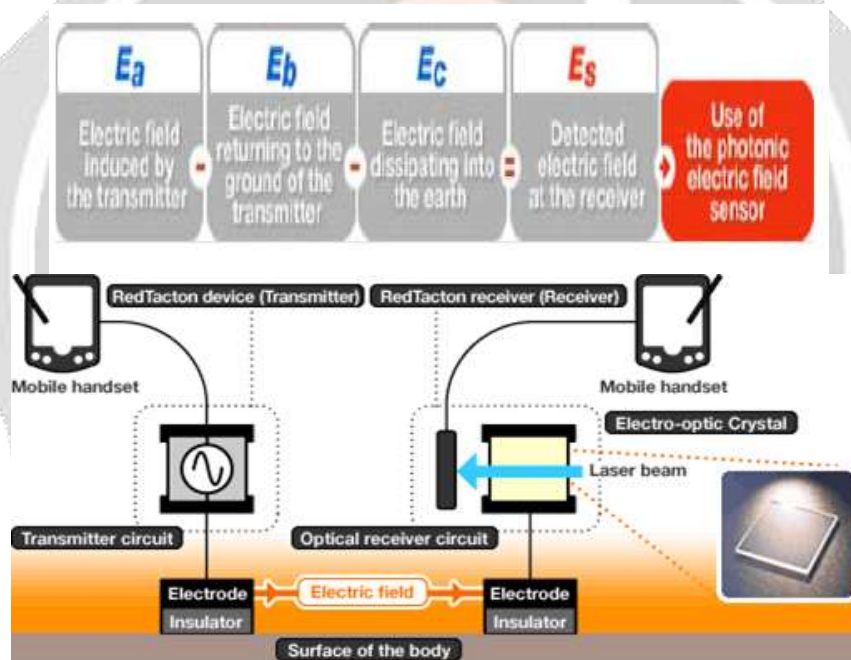
Using Red Tacton enabled devices, music from a digital audio player in your pocket would pass through your clothing and shoot over your body to headphones in your ears. Instead of fiddling around with a cable to connect your digital camera to your computer, you could transfer pictures just by touching the PC while the camera is around your neck.



**Figure 3.1:** Red Tacton

#### 4. WORKING PRINCIPLE

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

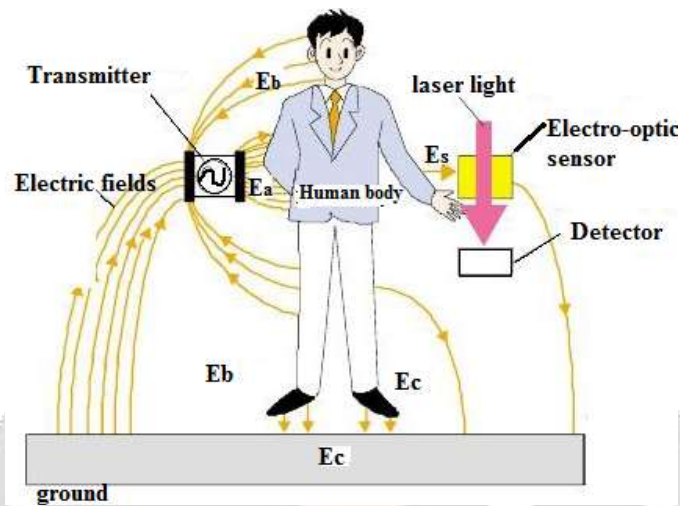


**Figure 4.1** Working Principle

The RedTacton transmitter induces a weak electric field on the surface of the body. The RedTacton receiver perceives changes in the weak electric field on the surface of the body caused by the transmitter [4]. RedTacton depend upon the principle that the optical properties of an electro-optic crystal can vary according to the changes of a weak electric field. RedTacton 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.

In Figure 4.2, The naturally occurring electric field elicited on the surface of the human body separates 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].



**Figure 4.2** 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 [6].

## 5. HUMAN SAFETY

1. 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 and does not harm the person's body.
2. When communication occurs, displacement current is generated by the electrons in the body because the body is refracted to minute electrical fields. However, such displacement currents are very common everyday occurrences to which we are all exposed.
3. RedTacton conforms to the "Radio frequency-exposure Protection standard (RCR STD-38)" issued by the Association of Radio Industries and Businesses (ARIB)[5].

## 6. ADVANTAGES

There are many advantages as listed below:

1. RedTacton does not require the electrode be in direct contact with the skin.
2. High-speed communication is possible between two arbitrary points on the body.
3. Body-based networking is more secure than broadcast systems, such as Bluetooth which have high range of about 10m.
4. Network congestion due to fall in transmission speed in multiuser environments is avoided.
5. High performance than Infrared technology
6. Outstanding than Wi-Fi.

## 7. DISADVANTAGES

1. It has no powerful applications that aren't already available.
2. It is very costly.



## 8. APPLICATIONS

There are number of applications of the developed system, some are given below:

### 1. Military Applications

- The critical success factors of this technology are that it must work or it will be inhabited for gun security. The last thing that the military wants is for soldiers not to be able to fire their weapons at the enemy because of a technical fault. The technology must provide the security that it is designed to provide. For example, the enemy or black marketers can't replicate the transceiver or defense program the transceivers for their use.
- Another critical success factor is that the technology is accepted by the soldiers whose life is on the line. They have to see the benefit of the security and they have to have faith in it and trust that it will work in all situations. For the technology to be adopted by the US population for gun control there will need to be a law passed that requires the technology.
- However it is possible that even without a law, a painstaking gun owner would elect to have the RedTacton technology installed on their gun to prevent a child or stranger from using the gun. The price of the RedTacton technology would need to be competitive for this to be possible.

### 2. Medical Applications

- One critical success factor of this technology in a medical application is it must work or it could create a life or death situation. If a death occurs that was caused by the technology not working properly, the negative publicity and paternity suit will force the technology to be deserted for a medical application.
- Another critical success parameter is that the cost must not exceed the goodness provided by the technology. Also, another factor is that the patients accept the technology.

### 3. Consumer Applications

- One important critical success factor in the Consumer applications arena is that RedTacton must obtain general approval in order for it to be useful and profitable. For this to happen, the technology will need to be competitively priced with competitive technologies. The product will grow in popularity quickly if more devices combine RedTacton technology.
- Additionally, consumers will need to be educated on the benefits and security features of RedTacton and how most importantly how it differs from current substitute that are being used such as Wi-Fi and Bluetooth.

## 9. CONCLUSION

Nippon Telegraph and Telephone in Tokyo, Japan is pursuing research and development of an original Human Area Network technology called RedTacton that safely turns the surface of the human body into a data transmission path at speeds up to 10mbps between any two points on the human body.

The Human Area Networking between body-centered electronic devices and PCs or other network devices embedded in the environment via a new generation of user interface based on totally natural human actions such as touching, holding, sitting, walking or stepping on a particular spot. It can be used for intuitive operations of computer based systems in daily life, temporary one-to-one services, device personalization, security and a host of other applications based on new behavior patterns [5].

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 this conclude,

***“FUTURE BELONGS TO RED TACTON”***

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