

RED TACTON – A Human Area Networking Technology

Bharti Gokhale^[1], Poonam Dongre^[2]

Electronics And Telecommunication Department

S. B. Jain institute Of Technology Management And Research, Nagpur

gokhale.bharti9@gmail.com

poonam.kartika@gmail.com

Abstract-- So many technologies for networking are known and are in use. These technologies connect people, objects and other networks together so as to share data and thus make information ready for access. 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. A new networking technology called RedTacton was announced by NTT labs in 2005, which makes use of human body surface as communication medium when exchanging data among people, objects and networks. RedTacton has innovated a new patterns of behaviour which defines different application areas of the technology. With this new technology ubiquitous computing services is enhanced .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- Red Tacton, Human Area Networking.

Introduction

In today's world, people can communicate anytime, anywhere and with anyone over a cell phone. Also, through internet people can download large quantities of quality data from remote locations. These technologies facilitate far-away communication for the users. Most electronic devices including personal digital assistants (PDA's), pocket video games and digital cameras have reduction in size, so that they can be carried around and

used at the instance of requirement. These are used to carry various personal or public information and communications in everyday activities. However, user friendly ubiquitous services involve more than just networking between remotely located terminals. Communication between electronic devices on the human body (wearable computers) and ones embedded in our everyday environments such as illustrated in fig.1 is also critical, so this has driven extensive research and development on human area networks. Wired connections between electronic devices in human area networks are cumbersome and can easily become entangled. Short range wireless communication systems such as Bluetooth and wireless local area networks (IEEE 802.11b, etc.) have some problems. Throughput is reduced by packet collisions in crowded space such as meeting rooms and auditoriums filled with people and communication is not secure because signals can be intercepted. The principle drawback of infrared communication (IrDA) is the tight directionality of beams between terminals is needed for the system to be effective.



Fig.1

The ultimate human area network solution to all these constraints of conventional technologies is "intra body" communication, in which the human body serves as the transmission medium. **RedTacton** is a new and the first realistic Human Area Network(HAN) that uses human body surface as a safe, high-speed network transmission

path and PCs and other network devices that are in an environment triggered by some natural human actions. These human actions can be by touching, stepping, swiping, holding or walking on a surface among others.

Ubiquitous computing means completely connecting computing devices in a manner that they are regularly available and are everywhere. Examples of technologies of the future in this drive are wearable computers, smart homes, smart buildings etc. RedTacton innovation was brought by NTT (Nippon Telegraph and Telephone Corporation), Japan in 2005.

BACKGROUND

Intra-body communication was proposed for the first time by IBM in 1996 and was eventually appraised and reported by several research bodies on the globe. However, many of these reported technologies were prone to shortfalls including operating range (of tens of centimetres) and speed, which is only 40 bits/s. Similarly, technologies such as infra red, bluetooth and Radio Frequency ID System(RFID) are in use and were proposed to address what is termed “last meter” connectivity problem. But shortcomings such as the sudden decrease in speed of transmission especially in multi-user environment leading to network congestion were peculiar to them.

The solution to all these problems is therefore RedTacton which is an implementation of ubiquitous network services among other two connectivity levels (WAN and LAN) for connectivity to personal information, media and communication devices in a sphere of ordinary daily activities(achieving the last one meter)³. This condition of network system is thus termed HAN.

BASIC PRINCIPLE

The basic principles of RED TACTON are

1. The Red Tacton transmitter induces a weak electric field on the surface of the body.
2. The Red Tacton receiver senses changes in the weak electric field on the surface of the body caused by the transmitter.
3. 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.
4. 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.

Fig.2.1 Figure shows the working of the RED TACTON device over the surface of our body. The transmitting RED TACTON device changes the electric field on the surface of our body. This is sensed by the electric field sensor and the variations are given to the receiving RED TACTON device

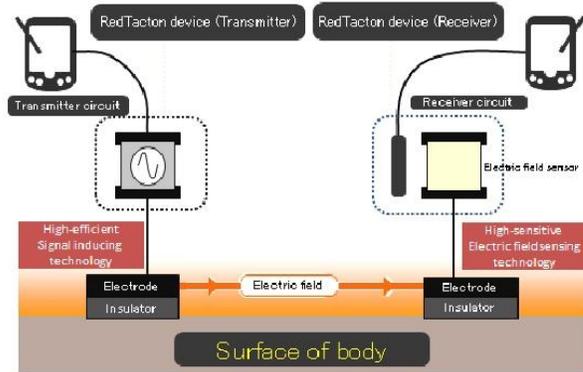


Fig.2.1

MECHANISM OF RED TACTON

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.

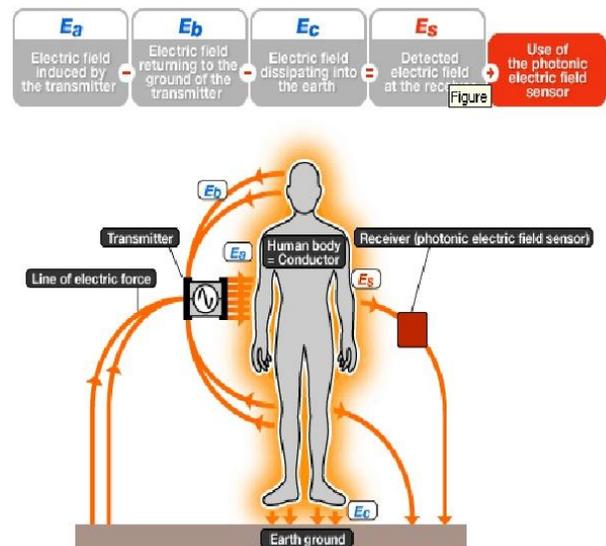


Fig.2.2

Fig.2.2. Figure shows the various electric fields on the surface of our body induced by the RED TACTON device. Only a portion of the induced electric field is sensed by the receiving RED TACTON device. The remaining electric fields are dissipated to the ground.

RED TACTON TRANSCEIVER

Figure below shows the block diagram of a RED TACTON transceiver. 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 electro-optic sensor is given to the detector circuit, which in turn given to the interface of the receiving RED TACTON device.

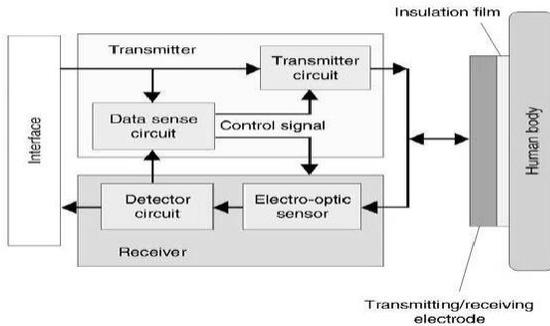
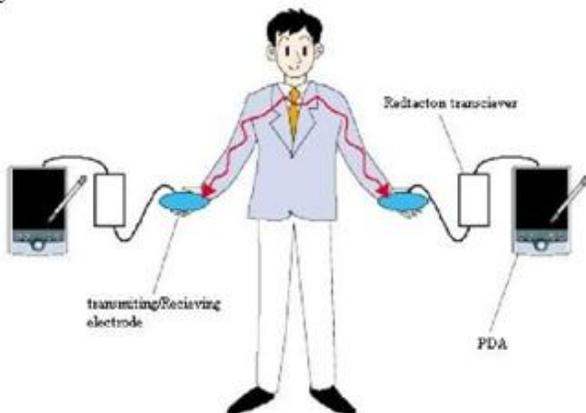


Fig.3. Block diagram of Red TACTON transceiver.

Red Tacton Radio Transmitter and Receiver

The figures below show transmitting and receiving operating mechanism of Red Tacton:



The transmitter receives the data signals from the interface. The transmitter circuit is invoked upon signal perception from the data sense circuit. The electro-optic

sensor thus detects the changes in the electric field of the body.

FEATURES

Red Tacton has three main functional features. :

1. Touch

Touching, gripping, sitting, walking, stepping and other human movements can be the triggers for unlocking or locking, starting or stopping or connecting and disconnecting the equipment, or obtaining data.



Fig 4. illustrating that RED TACTON device can be triggered by touching and gripping.

2. Broadband & Interactive

Bandwidth does not deteriorate even with duplex operations and simultaneous access by many users! 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.

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 .5. Any type of medium (metal, water, etc) can allow flow of signal.

APPLICATIONS

1. One to one services

With the ability to send attribute data from personal information devices worn on the body to computers embedded in the environment, one-to-one services could be implemented that are tailored to the individual needs of the user.

2. Intuitive operation of personal information

Communication is triggered by totally natural human actions and behavior, so there is no need to insert smart cards, connect cables, tune

frequencies, or any of the other inconveniences usually associated with today's electronic devices



Fig.5 A simple handshake can transfer data.

3. Device personalization

Setup, registration, and configuration information for an individual user can all be uploaded to a device the instant the device is touched, eliminating the need for the device to be registered or configured in advance.

4. New behavior patterns

Tables, walls, floors and chairs can all act as conductors and dielectrics, turning furniture and other architectural elements into a new class of transmission medium. For example, a user could have instant access to the Internet merely by placing a laptop onto a conductive tabletop.

5. Marketing applications

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.

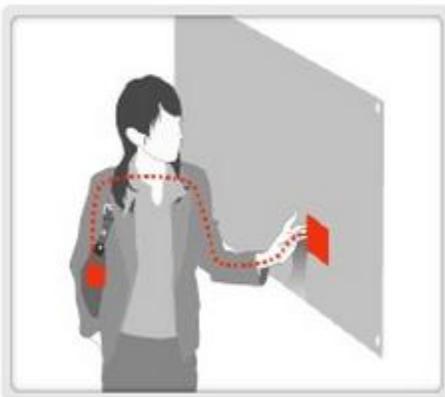


Fig.6 A customer touching the advertising panel and getting information about that advertisement through RED TACTON device

6. Security applications

Red Tacton could be installed on doors, cabinets and other locations calling for secure access, such that each secure access could be initiated and authenticated with a simple touch. At the same time, all the transaction details and relevant user attributes (personal identity, security clearance, etc.) could be logged by the security system.

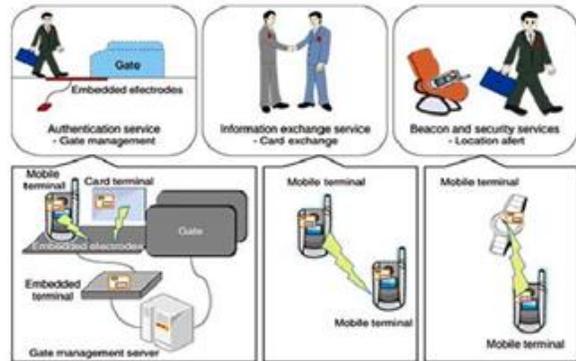


Fig. 7. A few services enabled by RedTacton.



Fig. 8. Automation in Locking I



Fig. 9. Medicine analysis



Fig.10. Automation in Locking II

The following are examples of Red Tacton ubiquitous services found under above application areas:

1. Touch a printer to print.
2. Touch advert and access information.
3. Alarm buzz automatically to prevent accidental medicine ingestion..
4. Instantaneous private network through personal handshake.
5. Connect to the network just by putting a lap-top on the table.
6. User authentication and unlocking with just a touch.
7. Just sitting in the seat triggers the car to load all the presets, anyhow it is liked.

8. Confidential documents management.
9. Touching a phone turns it your own.
10. Wireless headphone connectivity.
11. Diabetes treatment etc.

issue no.1., 2011

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.

DISADVANTAGES

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

CONCLUSION

This technology definitely stands out with perfection, when transfer of data is fast, feasible and more importantly reliable. Red Tacton is an exciting new technology for human area networking. A transceiver that uses a human body as a data transmission medium based on electric field sensor that uses an electro-optic crystal and laser light can be a useful technology in future.

REFERENCES

- 1) S. Gurpreet and S. Jaswinder (2011), Red Tacton. International Journal of Comp. Sc. and Tech. Vol.2, Issue 3. Available at <http://www.ijct.com>
- 2) Red Tacton: An innovative Human Area Networking Technology. NTT, 2005. [Online]. Available: <http://www.ntt.co.jp/news/news05e/0502/050218.htm>
- 3) S. Lavanya and S. Kusuma, REDTACTON. Yuva Engineers (2010).
- 4) J. A. Prakash, "RedTacton: An Innovative Human Area Networking Technology," ADDM vol.1, No. 2, ISSN 2166-2916, 2012.
- 5) H. Goromaru, M. Ikeda and Y. Hosoda (2010), Firmware Technology for Human-body Near-field Communication. NTT Technical Review. Vol. 8 No.3.
- 6) A. Kumar and N. Kumar, Redtacton. IJCCIS vol 3 No 1 ISSN: 0976-1349 pp. 3-10.54, Jan-Jun 2012.
- 7) J.P. Thomas, REDTACTON, 2012.
- 8) Srilatha, "Pervasive Computing", TECHGYAN vol 3