Red Tacton

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Fig. 1: Red Tacton Device

ABSTRACT: Red Tacton is a Human Area Networking technology, which is under development 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. Red Tacton enables the first practical Human Area Network 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. Red Tacton 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 Red Tacton.

KEYWORDS: NTT, Red Tacton, HAN, Packet.

INTRODUCTION:

At the end of 2002 the Japanese telecommunications group NTT had announced 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 Red Tacton the company has now scarcely 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 viable Human Area Network (HAN) device, enabling fast data transfer between devices using the human body as a conduit. NTT reckons this latest advance on the wireless Personal Area Network concept - dubbed Red Tacton- can transmit data over the surface of the skin at up to 2Mbps. Where it differs, though, from previous offerings, is that a Red Tacton-enabled device does not have to be in direct contact with the skin - only within about 20cm.

The main problem with these sort of transmission is the **'Packet Collision'**, which has been a huge problem in the industry today. With this Packet Collision there has been lot of disturbances and time delays in the packet movement. The traffic from nodes and routers is not properly managed thereby leading to disturbances and dissatisfaction among users. So, there has been a need to develop a new technology.

'Tacton' means an action that happens due to the touch.'T' refers to Touch and 'acton' refers to the action and consequences that happens due to the touch.'Red' is a color which conveys the meaning of warmth.

Human society is entering an era of ubiquitous computing, when networks are seamlessly interconnected and information is always accessible at our fingertips. Red- Warmth, T-Touch, Acton-Action stands for Red Tacton. Instead of relying on electromagnetic waves or light waves to carry data, Red Tacton uses weak electric fields on the surface of the body as a transmission medium. Nippon Telegraph and Telephone Corporation (NTT) is pursuing research and development of an innovative Human Area Networking technology called Red 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. Using a novel electro-optic sensor, NTT has already developed a small PCMCIA card-sized prototype Red Tacton transceiver. Red Tacton enables the first practical Human Area Network 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. Red Tacton 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 Red Tacton. NTT is committed to moving Red Tacton out of the laboratory and into commercial production as quickly as possible by organizing joint field trials with partners outside the company.

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FEATURES:

Red Tacton has three main functional features:

- 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.

- 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.

- 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.
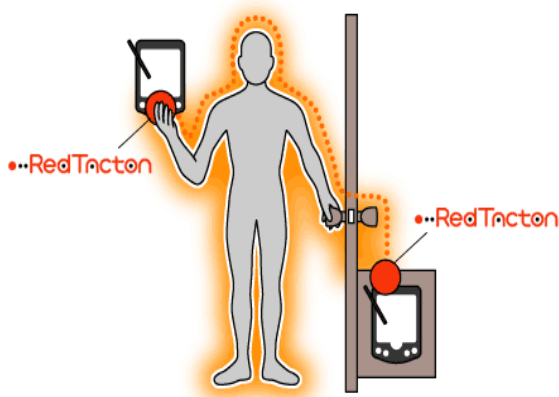
WORKING:

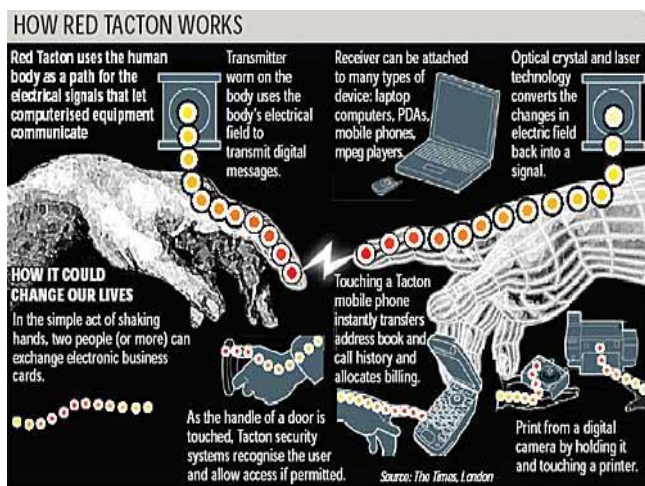**Fig. 2: A Person Opening A Door With The Help of Red Tacton**

Fig. 3: Working of Red Tacton

CONCEPTS:

However, they 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

- 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 when a part of the human body comes in contact with a Red Tacton transceiver. Physically separating ends the contact and thus ends the communication.

- Using Red Tacton, communication starts when terminals carried by the user or embedded in devices are linked in various combinations according to the user's natural, physical movements.

- Communication is possible using any body surfaces, such as the hands, fingers, arms, feet, face and legs. Red Tacton works through shoes and clothing as well.

BASIC PRINCIPLE:

The basic principles of Red Tackton are:

- 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.

- 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.
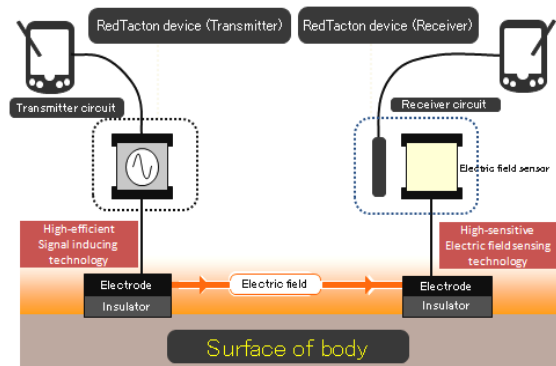

Fig. 4: Working of Red Tackton Device over the surface of Human Body

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MECHANISM:

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.
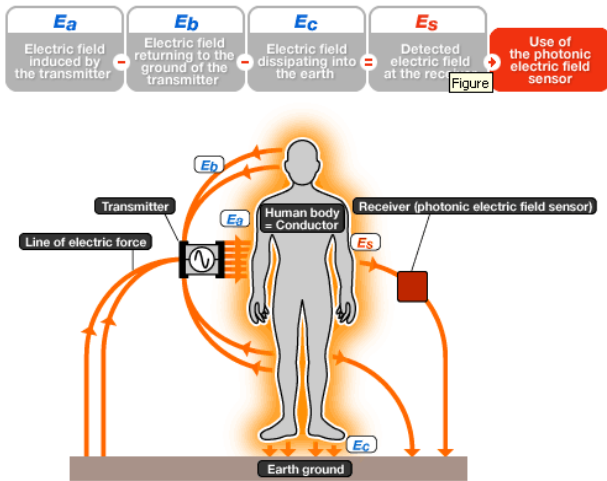

Fig. 5: Various Electric Fields on the Human Body Induced by Red Tacton Device

HUMAN NETWORKING:

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.
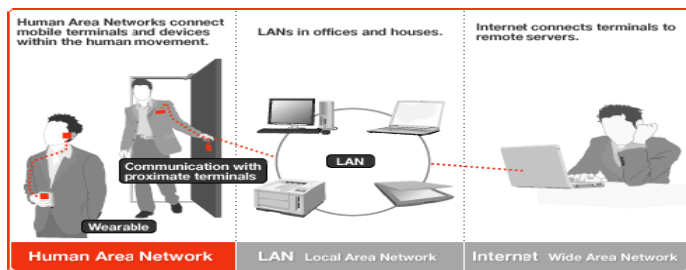
Fig. 6: Red Tacton Network (HAN) along with LAN and other Internet sources

APPLICATIONS:

- 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.

- 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. 7: A simple handshake can transfer data.

- 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.

- 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.

- 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.
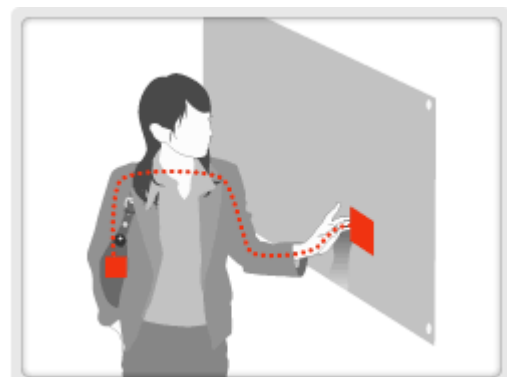

Fig. 8: A customer touching the advertising panel and getting information about that advertisement through RED TACTON device

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- 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. The transmitting and receiving electrodes of the RedTacton transceiver are completely covered with insulating film. 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 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.

- 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.

- 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".

- 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

- 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.

- 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.

- 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.

- 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.

- RedTacton uses the electric field that occurs naturally on the surface of the human body for communication. Transmitter and receiver electrodes are covered with an insulating films. No current flows into the body from the Red Tacton transceiver.

- There is no current flowing from the Red Tacton transceiver; however, the body indirectly receives a minute electric field. This causes electrons already present inside the body to move, creating a minute displacement current. This displacement current is similar to those occurring in everyday life.

COMPARISON WITH OTHER NETWORKS:

The figure below shows 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. 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
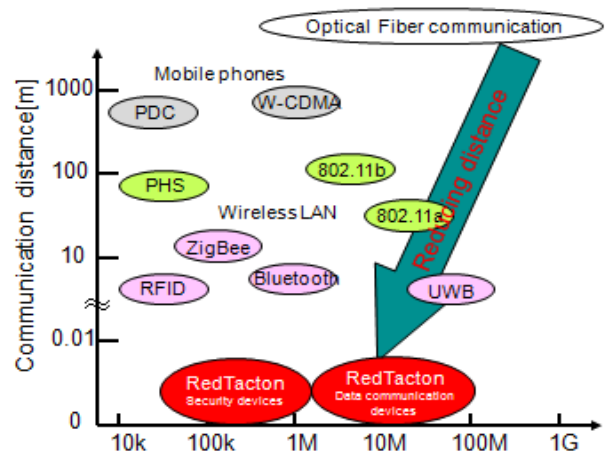

Fig. 9: Comparison of Red Tacton Device with other networks with respect to distance

ADVANTAGES OVER BLUETOOTH:

The system envisioned by NTT, utilizes a conversion method which takes digital data into a stream of low-power digital pulses. These can be easily transmitted and read back through the human electric field.

While it is true that similar personal area networks are already accessible by using radio-based technologies like Wi-Fi or Bluetooth, this new wireless technology claims to be able to send data over the human skin surface at transfer speeds of up to 10Mbps, or better than a broadband T1 connection. Receiving data in such a system is more complicated because the strength of the pulses sent through the electric field is so low. Red Tacton solves this issue by utilizing a technique

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called electric field photonics: A laser is passed though an electro-optic crystal, which deflects light differently according to the strength of the field across it. These deflections are measured and converted back into electrical signals to retrieve the transmitted data.

According to Tom Zimmerman, inventor of the IBM personal networking system, body-based networking is more secure than broadcast systems, such as Bluetooth, which have a range of about 10m.The issue is that with Bluetooth, it is difficult to rein in the signal and restrict it to the device you are trying to connect to. But in a busy place there could be hundreds of Bluetooth devices within range. Moreover, body-based networking seems to allow for more natural interchanges of information between humans, as only when you are in true proximity you can make this system work. There are some specific applications that would appear as being ideal matches for Red Tacton-like technologies.

• RED TACTON Technology is making many things easier.

• Nippon Telegraph and Telephone Corporation (NTT, headquartered in Chiyoda-ku, Tokyo. President and CEO, Norio Wada) is pursuing research and development of an innovative Human Area Networking technology called "Red Tacton".

• RED TACTON 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.

• RED TACTON uses the minute electric field emitted on the surface of the human body.

• RED TACTON enables the first practical Human Area Network between body-centered electronic devices and PCs or other network devices embedded in the environment .

• RED TACTON 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 are enabled by the Red Tacton.

DRAWBACKS:

• It has no compelling applications that aren't already available.

• Too costly.

• It can be useful within few centimeters.

FUTURE SCOPE:

Red Tacton has a wide range of unique new functional features and enormous potential as a Human Area Networking technology. NTT is committed to quickly identifying and opening up those application areas with the most commercial promise for Red Tacton, a business development process to be coordinated under NTT's Comprehensive Producer Function program.

Red Tacton, which looks remarkably like a big pot of kryptonite is said to allow over 200kbps of data through the 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.

As data travels 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.

CONCLUSION:

The need for artificial body implants to communicate with each other as well as to report back to a portable device could have quite some value. In fact, according to other researchers, the most important application for body-based networking may well be for these type of communications within, rather than on the surface of, or outside, the body.

Red Tacton technology is expected to dominate Bluetooth technology in the future. Red Tacton technology could put the use of cables to an end. The problem faced by the Red Tacton technology is the cost of development. This technology brings a new dimension of communication which effectively links the user to anyone he wants to communicate. Since it provides high speed communication, it can provide seamless service wherever, whenever and whoever uses it.

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