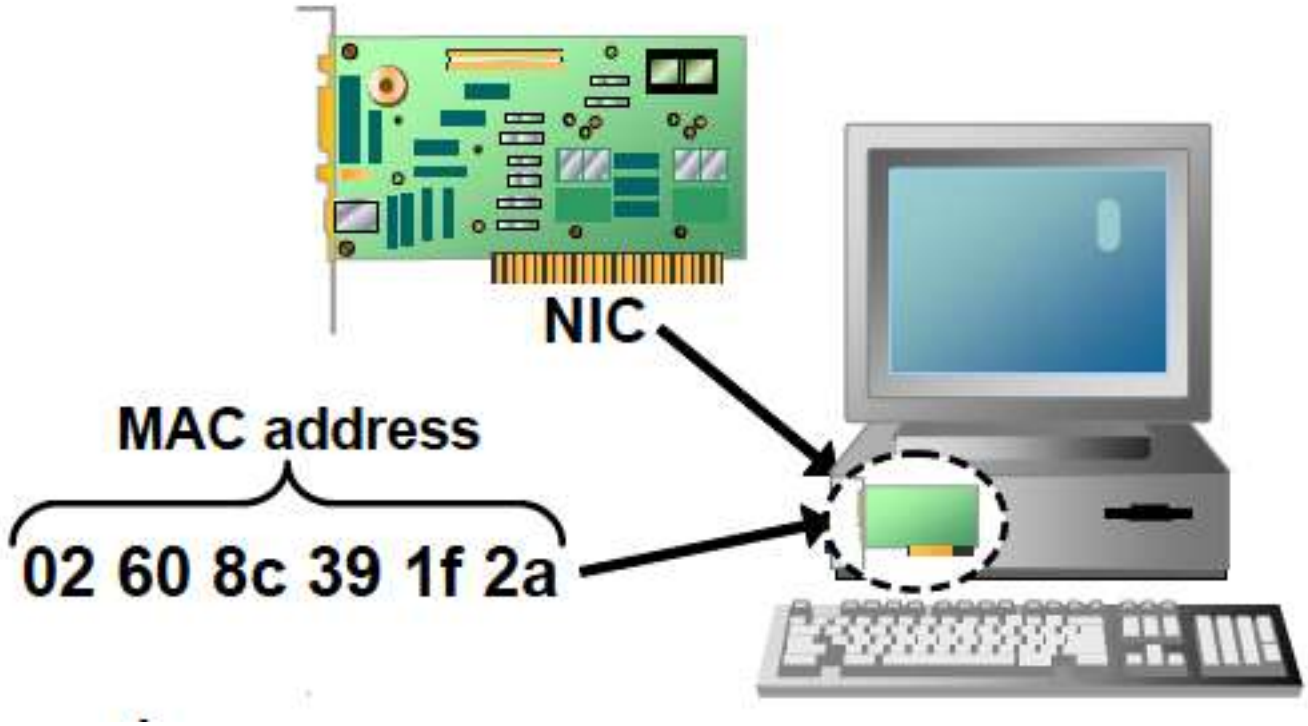
MAC IDs & Crystallography

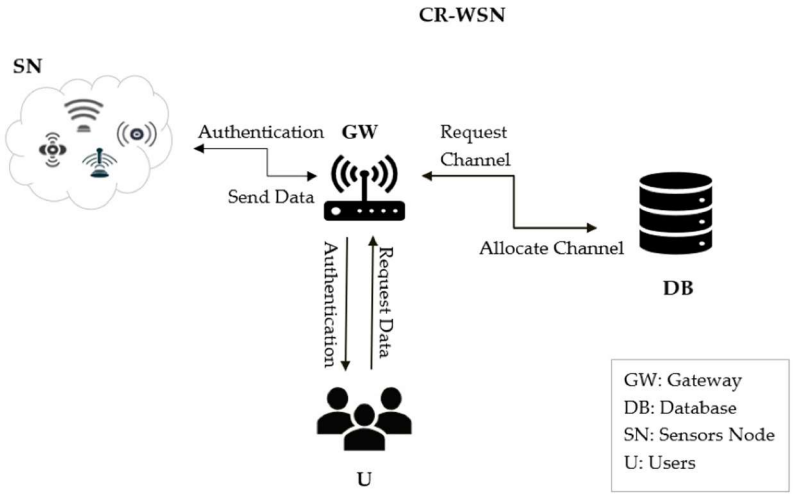
MAC addresses (Media Access Control) are roughly as old as Ethernet technology, with the first standards established in the early 1980s. Based on the Xerox Network Systems and IEEE 802 specifications, these 48-bit, 6-byte, or 6-octet hardware identifiers **have been in use for over 40 years** to uniquely identify network interfaces.

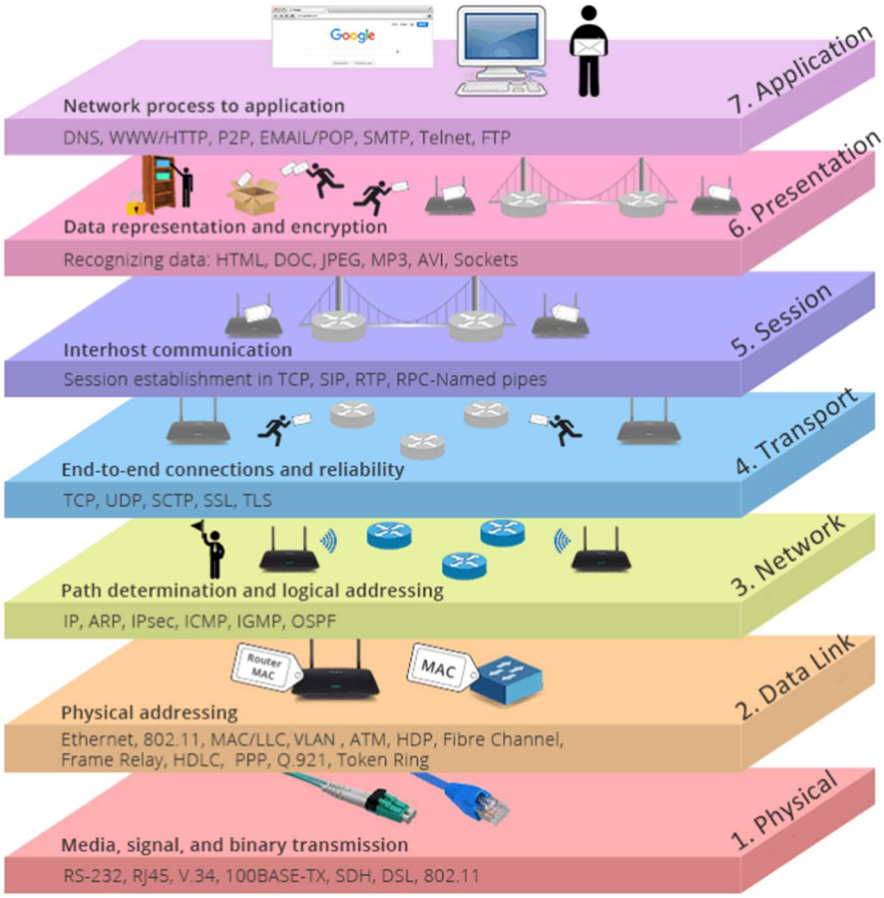


https://www.geeksforgeeks.org/computer-networks/mac-address-in-computer-network/

To communicate or transfer data from one computer to another, we need an address. In computer networks, various types of addresses are introduced; each works at a different layer. A MAC address, which stands for Media Access Control Address, is a physical address that works at the Data Link Layer.

https://www.mdpi.com/1424-8220/23/4/2015



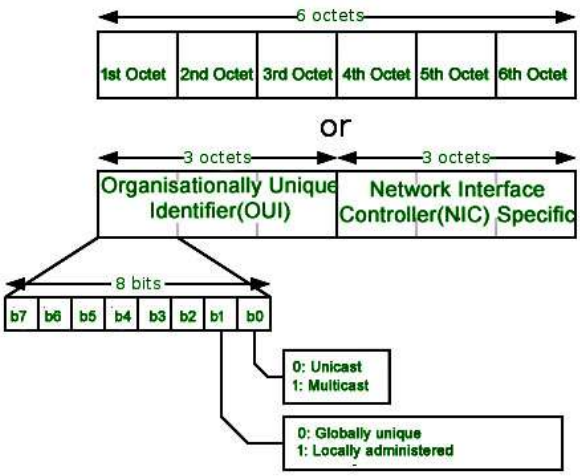


What is MAC (Media Access Control) Address?

MAC Addresses are unique **48-bit** hardware numbers of a computer that are embedded into a network card (known as a **Network Interface Card**) during manufacturing. The MAC Address is also known as the **Physical Address** of a network device. In the IEEE 802 standard, the data link layer is divided into two sublayers:

1. Logical Link Control (LLC) Sublayer
2. Media Access Control (MAC) Sublayer

The MAC address is used by the Media Access Control (MAC) sublayer of the Data-Link Layer. MAC Address is worldwide unique since millions of network devices exist and we need to uniquely identify each.



Reason to Have Both IP and MAC Addresses.

The reason for having both IP and MAC addresses lies in the way the Internet works, specifically in the structure of the OSI Model. This model is a conceptual framework that describes how data is sent and received over a network. It's divided into seven layers, each performing specific functions.

- **Layer 2** uses **MAC addresses** and is responsible for packet delivery from **hop to hop** .
- **Layer 3** uses **IP addresses** and is responsible for packet delivery from **end to end** .

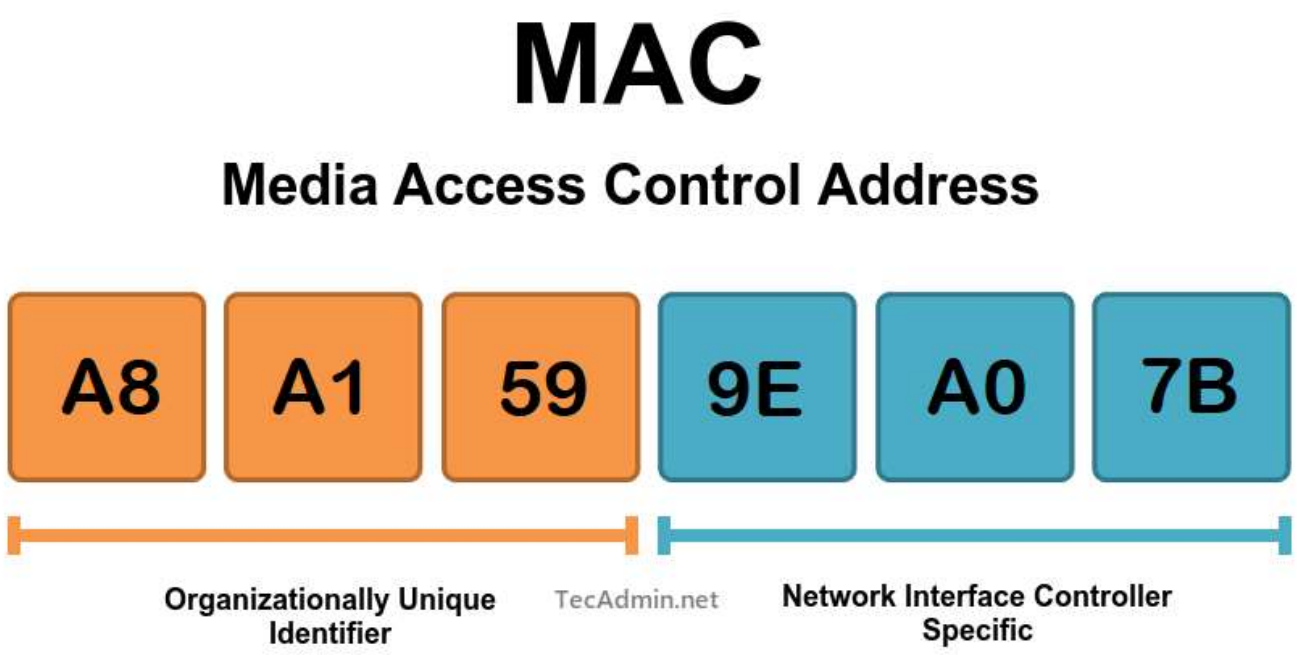
https://tecadmin.net/media-access-control-address/

Understanding the function and importance of MAC addresses is essential for anyone dealing with computer networks, be it a home network or a complex business setup.

What is a MAC Address?

A MAC address (Media Access Control address) is a globally unique identifier assigned to a network interface controller (NIC) for communications on the physical network segment. These addresses are used in most network technologies, including Ethernet, Wi-Fi, and Bluetooth.

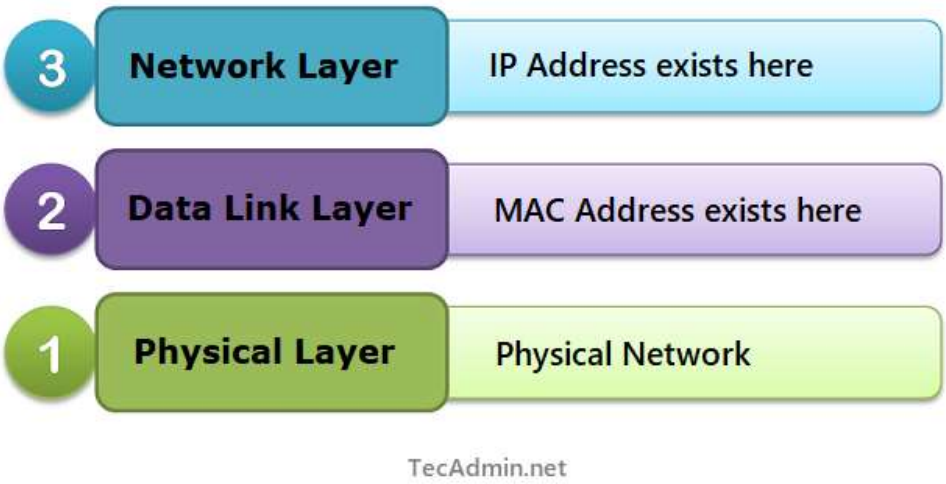
A MAC address comprises six groups of two hexadecimal digits, separated by colons, hyphens, or no separator. The first three groups (24 bits) often represent the manufacturer identification number, while the remaining three groups (24 bits) represent the device's unique identifier assigned by the manufacturer.



How does MAC Addresses Work?

MAC addresses play a crucial role in the data link layer (Layer 2) of the Open Systems Interconnection (OSI) model. This model is a conceptual framework that standardizes the functions of a communication system into seven distinct categories or “layers.”

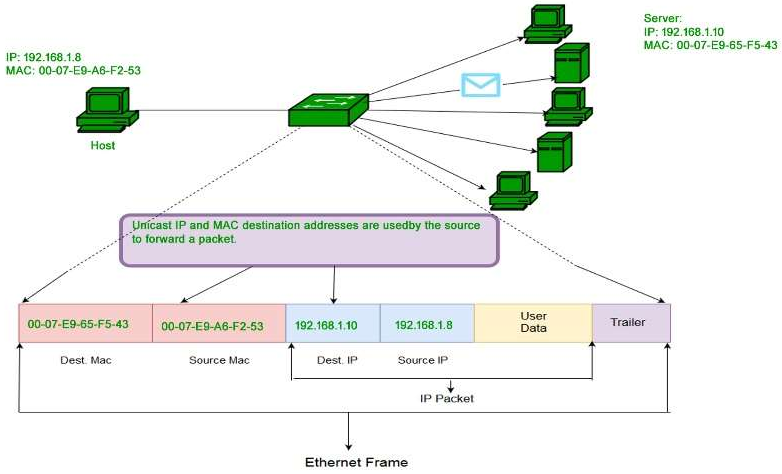
When a device wants to communicate with another on the same network, it uses the MAC address to locate and identify the intended recipient. In this way, MAC addresses function like a house’s street address: they tell devices where to find and send the information.



MAC Addresses Types

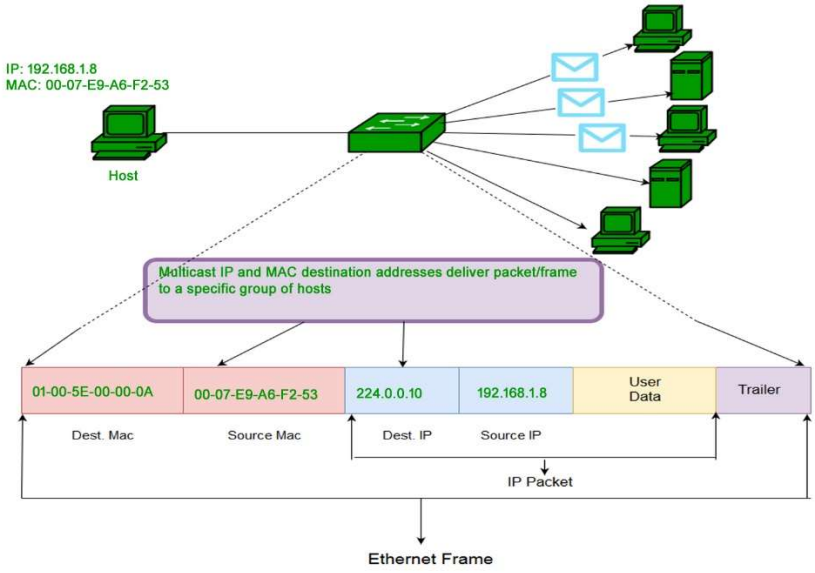
1. Unicast MAC Address

Unicast MAC addresses are unique identifiers assigned to individual network interface cards (NICs). When a frame is sent to a unicast address, it is only delivered to the interface associated with that address. This is the most common type of MAC address and the one most people refer to when discussing a device’s MAC address. It’s the physical, or hardware, address for a device on the network.



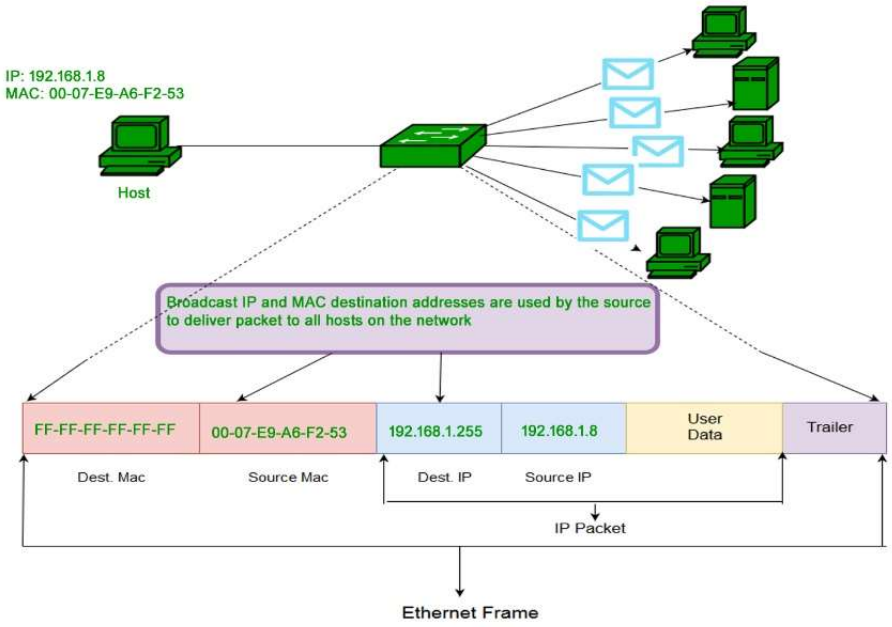
2. Multicast MAC Address

Multicast MAC addresses are used when a single packet is to be sent to a group of devices, not to all devices on the network, but only to those that belong to the multicast group. Multicast addresses in Ethernet, Wi-Fi, and Bluetooth are distinct from unicast addresses as they have the least significant bit of the first octet in the address set to 1. This is useful for optimizing network traffic when sending the same data to multiple recipients, such as streaming video or performing operating system updates on a network.



3. Broadcast MAC Address

The broadcast MAC address is a special type of MAC address that allows data packets to be sent to all devices on a network segment. In an Ethernet network, the broadcast address is all binary ones, represented as FF:FF:FF:FF:FF:FF in hexadecimal form. Broadcast addresses are typically used when a device needs to send a packet to every device on the network, such as during the initial DHCP process when a device is requesting an IP address.



Why are MAC Addresses Important?

- **Device Identification**: Each device on a network must have a unique identifier. For most hardware, this unique identifier is the MAC address. It helps to accurately route packets of data from their source to their destination.
- **Security**: Network administrators can use MAC addresses for security purposes. For instance, they can restrict network access to specific MAC addresses (a technique known as MAC filtering) or track a device's network activities.
- **Troubleshooting**: MAC addresses are invaluable in network diagnostics. They can help identify problematic devices, understand network traffic patterns, and resolve connectivity issues.

Conclusion

Understanding MAC addresses is integral to understanding how devices communicate and interact on a network. These unique identifiers are crucial for routing data correctly, enhancing network security, and diagnosing connection issues. As we continue to connect more devices to networks—ranging from computers and smartphones to IoT devices—the importance of the humble MAC address only grows.

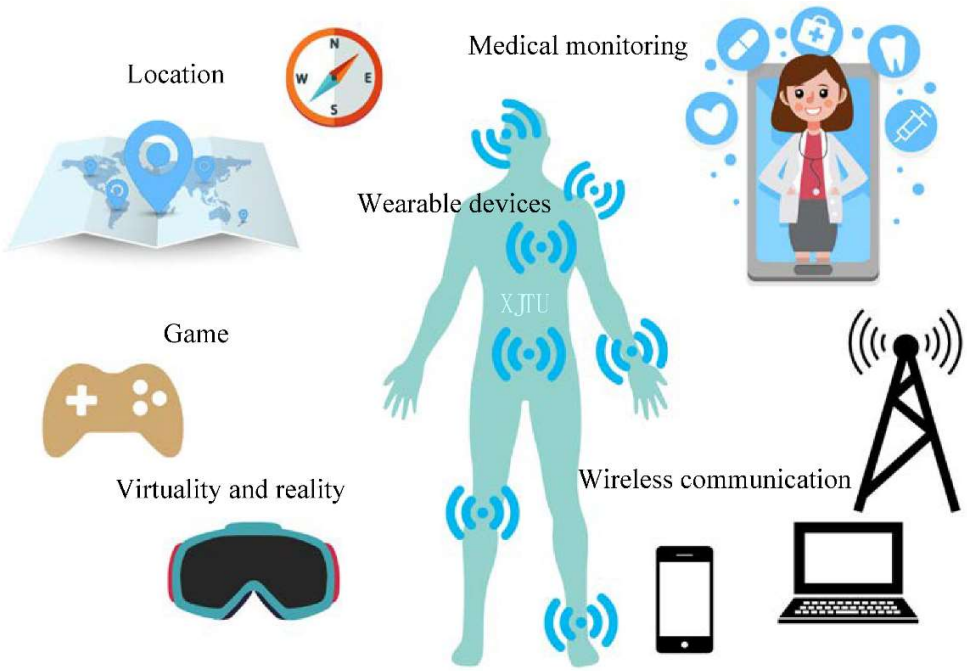
https://euro.ecom.cmu.edu/resources/elibrary/ebus/ieee-802-15-6.pdf

An Overview of IEEE 802.15.6 Standard

This paper explains the most important features of the new IEEE 802.15.6 standard. The standard defines a Medium Access Control (MAC) layer supporting several Physical (PHY) layers. We briefly overview the PHY and MAC layers specifications together with the bandwidth efficiency of IEEE 802.15.6 standard. We also discuss the security paradigm of the standard.

https://encyclopedia.pub/entry/6588

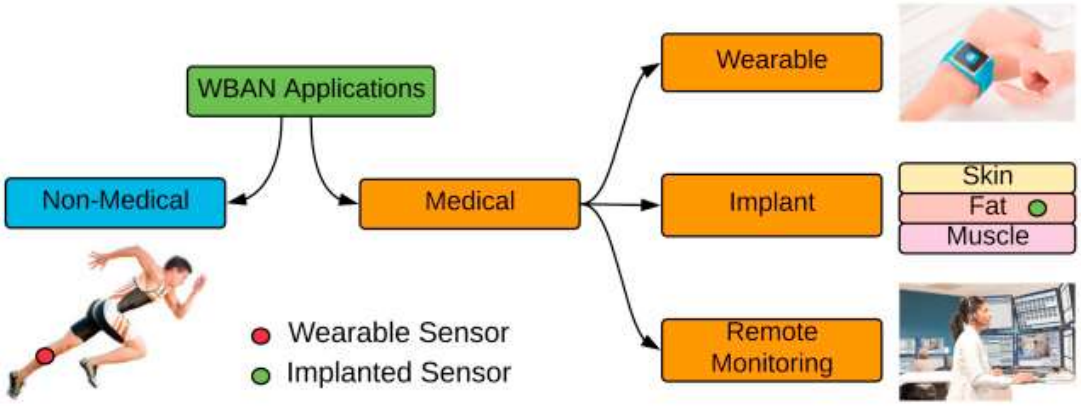
Meta-Wearable Antennas



https://www.sciencedirect.com/science/article/abs/pii/S1084804519302218

A comprehensive review of wireless body area network

One of the most important services is monitoring of remote patients, that enables the healthcare providers to observe, diagnose and prescribe the patients without being physically present. The advantage of miniaturization of sensor technologies gives the flexibility of installing in, on or off the body of patients, which is capable of forwarding physiological data wirelessly to remote servers. Such technology is named as Wireless Body Area Network (WBAN). In this paper, WBAN architecture, communication technologies for WBAN, challenges and different aspects of WBAN are illustrated. This paper also describes the architectural limitations of existing WBAN communication frameworks. blueFurthermore, implementation requirements are presented based on IEEE 802.15.6 standard. Finally, as a source of motivation towards future development of research incorporating Software Defined Networking (SDN), Energy Harvesting (EH) and Blockchain technology into WBAN are also provided.



MAC IDs in a Body Area Network (BAN) are typically assigned through a combination of manufacturer-hardcoded hardware addresses (burned-in addresses) and dynamic assignment by a central hub or coordinator node upon joining the network. The coordinator assigns short (e.g., 16-bit) addresses to individual nodes to save energy and bandwidth.

Key Aspects of MAC ID Assignment in WBANs:

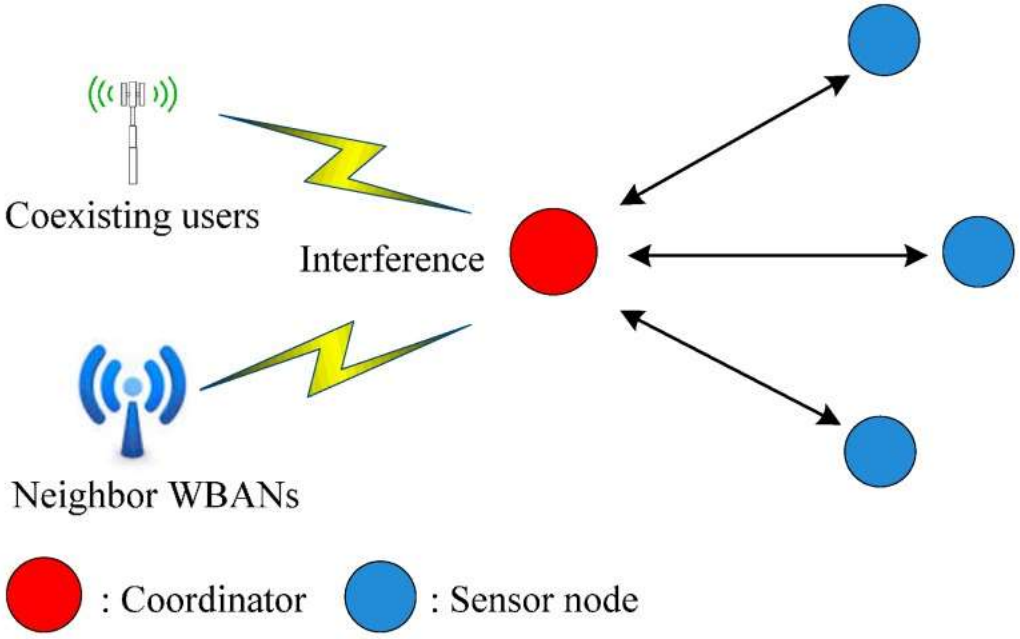
- **Manufacturer Assignment:** Similar to standard networking, devices may come with a 48-bit (EUI-48) or 64-bit (EUI-64) MAC address burned into their hardware.
- **Coordinator Allocation:** Due to the need for low power and high efficiency, a central hub (like a smartphone or dedicated hub) assigns shorter, local identifiers to sensor nodes when they connect.
- **Standards-Based:** WBANs often utilize IEEE 802.15.4 (Zigbee) or IEEE 802.15.6 (specifically for human-body communication) standards for MAC layer protocols, which define how nodes identify themselves to the coordinator.
- **Dynamic and Short:** To reduce power consumption and improve communication speed for medical data, these addresses are often shorter than standard MAC addresses and are managed dynamically.

In short, while the device has a permanent, manufacturer-assigned MAC address, the BAN coordinator often overrides or maps this to a shorter, local ID for efficient, on-body communication.

https://pmc.ncbi.nlm.nih.gov/articles/PMC4431186/#:~:text=6%20standard%20%5B2%5D%20defines%20the,and%20healthcare%20products%20and%20services.

A Survey of MAC Protocols for Cognitive Radio Body Area Networks

A cognitive radio body area network (CRBAN) is a CR-enabled WBAN. Unlike other wireless networks, CRBANs have specific requirements, such as being able to automatically sense their environments and to utilize unused, licensed spectra without interfering with licensed users, but existing protocols cannot fulfill them. In particular, the medium access control (MAC) layer plays a key role in cognitive radio functions, such as channel sensing, resource allocation, spectrum mobility and spectrum sharing.

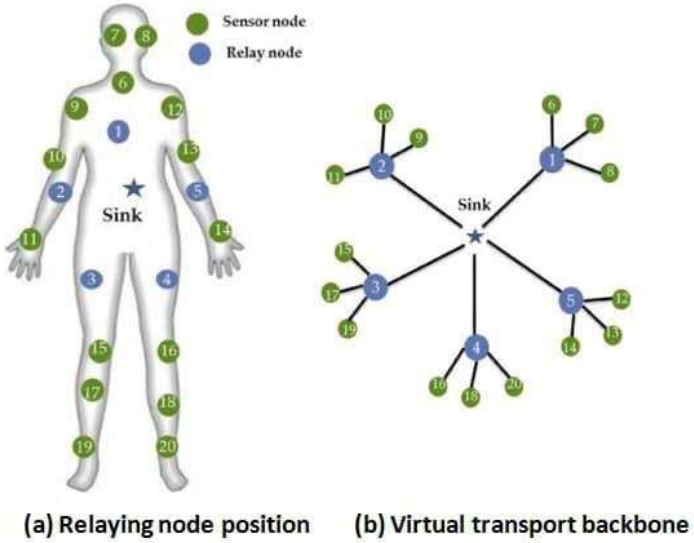


A Wireless Body Area Network (WBAN) can typically support up to **256 nodes** (sensors/actuators) connected to a single central controller or hub, according to IEEE 802.15.6 standards. While the maximum capacity is 256, practical implementations often utilize smaller networks, such as around 50 devices or smaller, for optimized performance, power, and medical monitoring.

https://www.researchgate.net/figure/A-WBAN-based-relaying-virtual-backbone_fig4_308850533

Dynamic channel allocation for interference mitigation in relay-assisted wireless body networks

We focus on interference mitigation and energy conservation within a single WBAN. We adopt two-hop communication scheme supported by the the IEEE 802.15.6 standard (2012). In this paper, we propose a dynamic channel allocation scheme (DCAIM) to mitigate node-level interference amongst the coexisting regions of a WBAN.



This means mac id generation captured with an app on your phone could be for anything commercial. Government or healthcare data will NOT be available to downloadable or proprietary software apps on your phone.

Why can't I drink away my mac ids?

No liquid can effect a magnetic, electromagnetic, optical or rf signal. The missing graphene will easily be changed out for the next hop in the mac id protocols for intra body communication and then corona routing protocols for 1906.1.

Mac ids are often ad hoc – wsn – so they can be quickly changed with software defined networking, sosa/mosa/osa style.

A piconet is a small, ad hoc wireless network, typically based on Bluetooth technology, that connects two or more devices (up to 8 active nodes) within a short range (usually 10 meters). It operates with one master device synchronizing with up to seven active slave devices, often used for connecting peripherals like headsets or mice to phones or laptops.

Key Characteristics of Piconets

- **Structure:** Comprises one master device (primary) and up to seven active slave devices (secondaries).
- **Capacity:** In addition to active devices, up to 255 inactive or "parked" nodes can exist in the network, which the master can wake up
- **Communication:** All devices share the same channel, synchronized to a common clock and frequency-hopping sequence.

https://www.sciencedirect.com/topics/computer-science/piconets

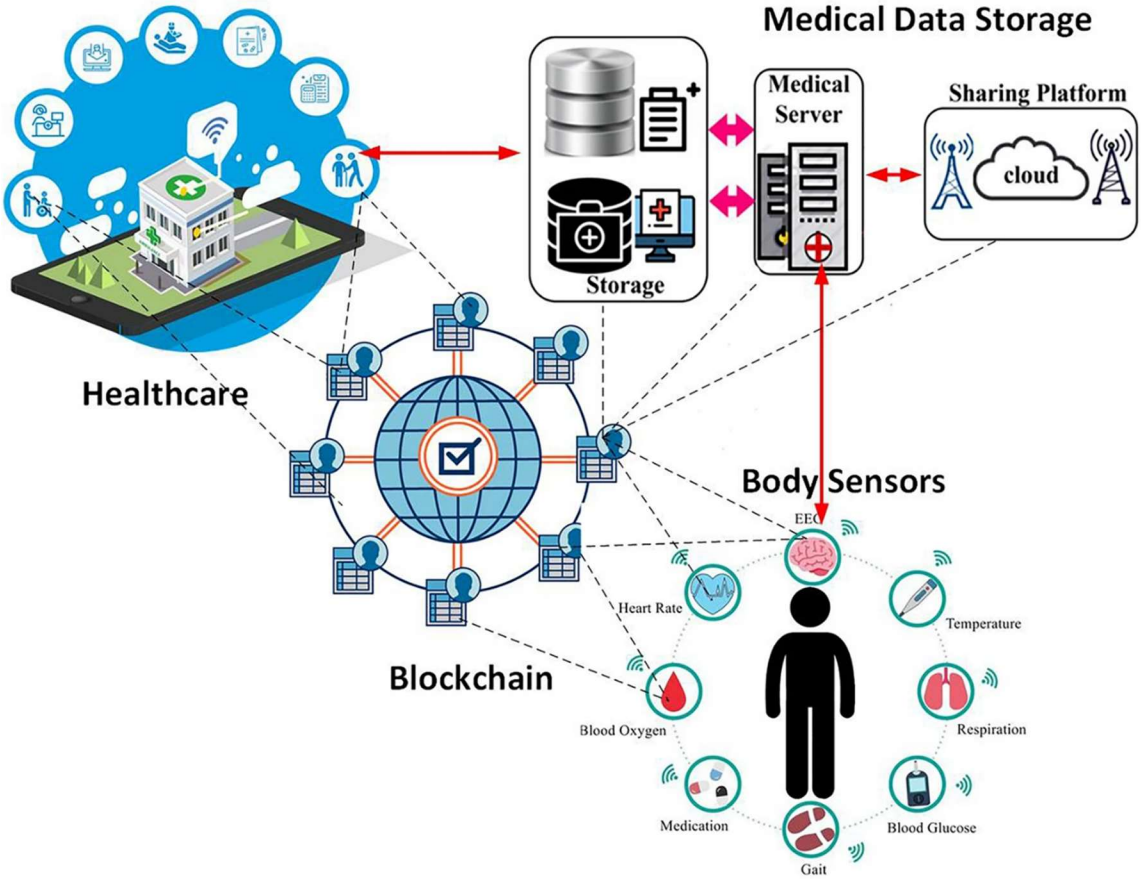
A central controller in a Body Area Network (BAN) can operate as the **master node (or controller) of a Bluetooth piconet**. In this architecture, the central node—often called a Body Control Unit (BCU), personal server, or hub—manages the communication with up to seven active sensor nodes that act as slaves.

Here is how a BAN controller operates as a piconet:

- **Master-Slave Architecture:** The central controller (master) synchronizes the clocks and manages the timing (time division multiplexing) of all connected sensors (slaves).
- **Ad-Hoc Network:** It forms an ad-hoc network for short-range communication, allowing for quick, secure data exchange on the body.
- **Scalability:** A single piconet can support up to 7 active sensors, but the controller can also manage up to 255 parked/inactive devices, allowing it to swap them in and out of active status.

- **Beyond 7 Nodes (Scatternet):** If a BAN requires more than 7 active devices, the controller can create a "scatternet" by connecting multiple piconets, although this is more common in classic Bluetooth than in low-power BLE scenarios.

  While Bluetooth is a common, successful technology for this setup, other protocols like IEEE 802.15.6 (specifically designed for BAN) or ZigBee are also used for these types of networks



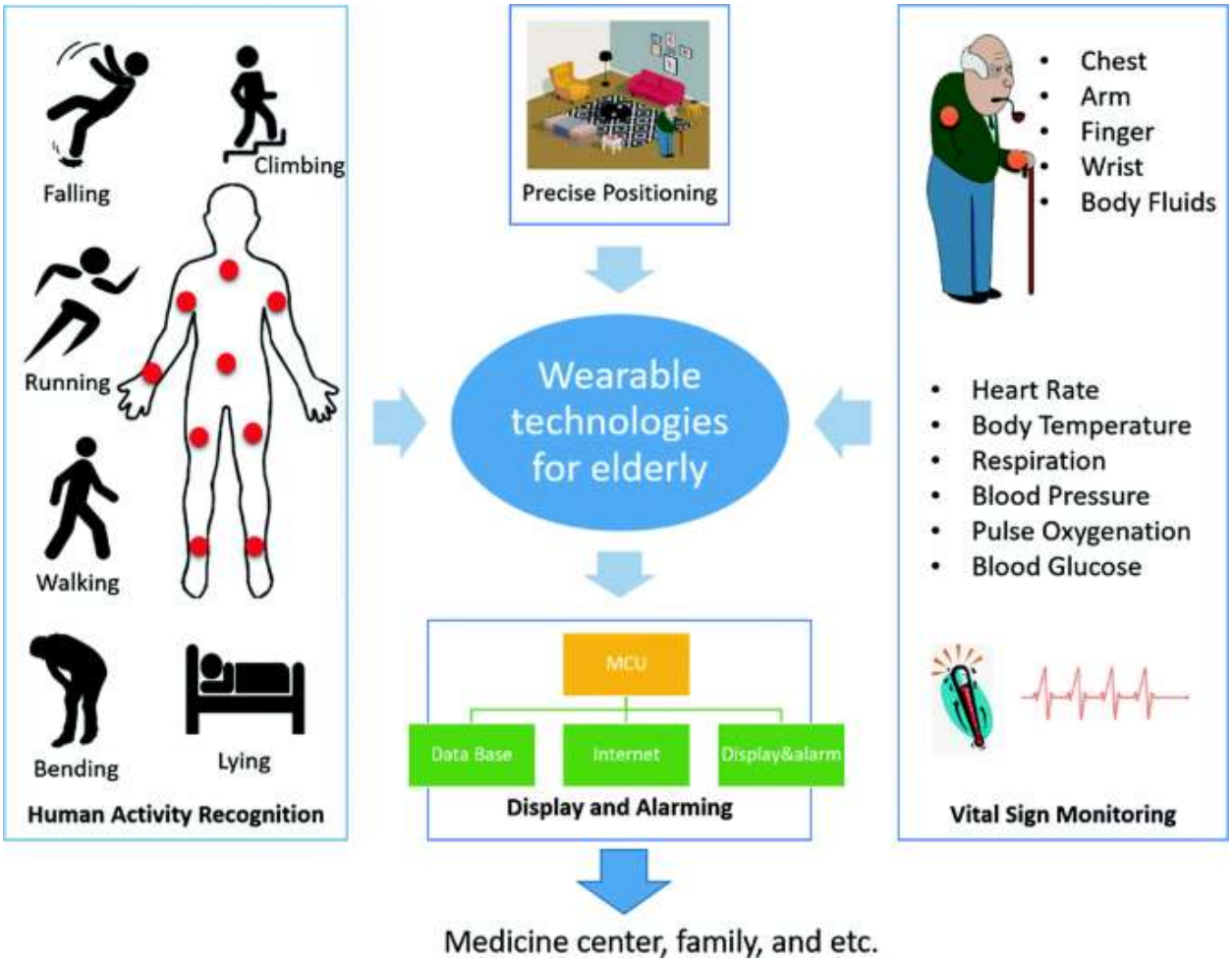
  MAC IDs in human body communication (HBC) are generally assigned following standard networking protocols like IEEE 802.15.6, where 48-bit or 64-bit addresses are hardcoded into the device's hardware by manufacturers. These addresses uniquely identify sensors, wearables, or implants, allowing the network coordinator to manage data, such as scheduling slots using CSMA/CA or TDMA.

- **Standardized Assignment:** Devices utilize IEEE 802.15.6 standards, designed for low-power, short-range, and high-reliability communication around or inside the body.
- **Hardcoded Identification:** Similar to traditional networking, many MAC addresses are "burned-in" to the device's read-only memory (ROM) during manufacturing.
- **Dynamic/Randomized Assignment:** For improved privacy, some modern wearable devices use randomized MAC addresses.
- **Network Addressing:** In a Wireless Body Area Network (WBAN), a central coordinator (e.g., a smartphone) often assigns temporary, shorter IDs to each node for efficient communication management.
- **Layer Structure:** The MAC layer, or Medium Access Control layer, uses these addresses to manage the physical layer (PHY), which utilizes the human body as a transmission medium

https://pmc.ncbi.nlm.nih.gov/articles/PMC3270832/

A Study of MAC Protocols for WBANs - 2009

The seamless integration of low-power, miniaturised, invasive/non-invasive lightweight sensor nodes have contributed to the development of a proactive and unobtrusive Wireless Body Area Network (WBAN). A WBAN provides long-term health monitoring of a patient without any constraint on his/her normal dailylife activities. This monitoring requires the low-power operation of invasive/non-invasive sensor nodes. In other words, a power-efficient Medium Access Control (MAC) protocol is required to satisfy the stringent WBAN requirements, including low-power consumption. In this paper, we first outline the WBAN requirements that are important for the design of a low-power MAC protocol. Then we study low-power MAC protocols proposed/investigated for a WBAN with emphasis on their strengths and weaknesses. We also review different power-efficient mechanisms for a WBAN. In addition, useful suggestions are given to help the MAC designers to develop a low-power MAC protocol that will satisfy the stringent requirements.

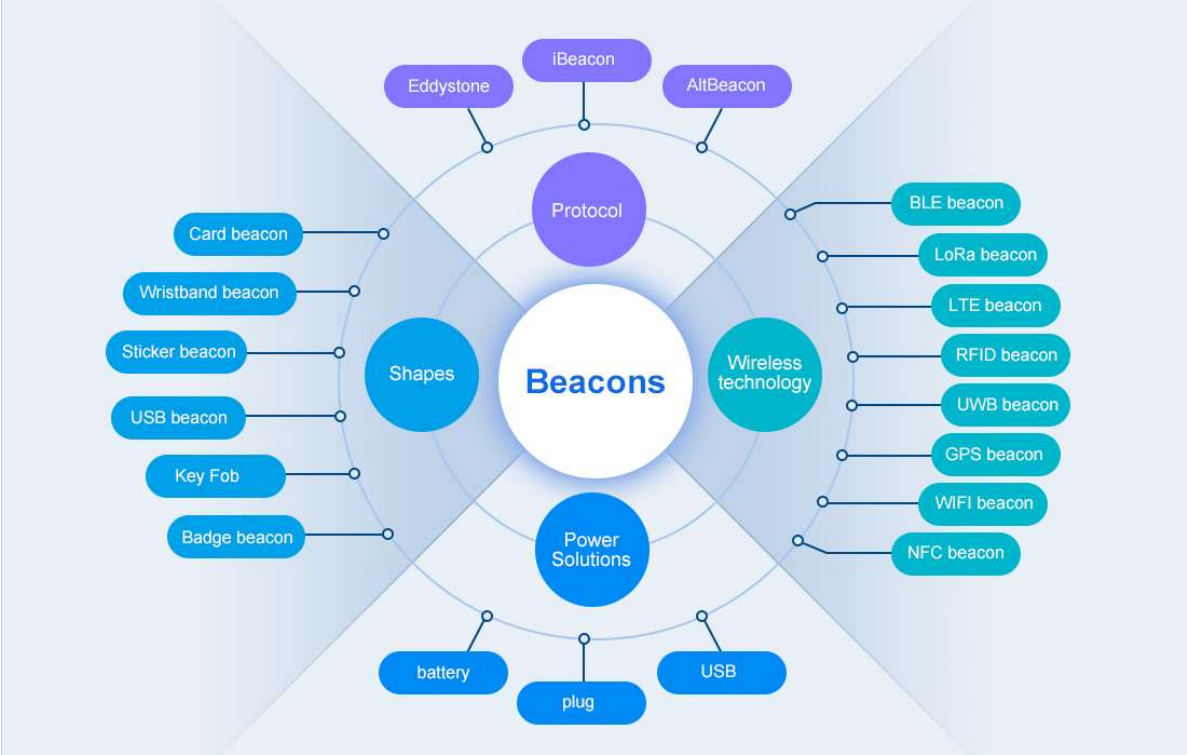


A beacon-enabled MAC ID refers to the unique 48-bit Bluetooth Low Energy (BLE) hardware address that identifies a, small beacon device used for proximity, tracking, or asset management. These fixed addresses are detected by apps to locate devices, though sometimes randomized for privacy.

- **Definition:** The 48-bit unique hardware identifier of a Bluetooth LE beacon.
- **Function:** Used to uniquely identify beacons, particularly in Real-Time Locating Systems (RTLS).
- **How it Works:** The beacon continuously advertises this address, which is detected by nearby smartphones or receivers to determine location and proximity.
- **Alternative Identification:** While MAC addresses are used, iOS devices often require the iBeacon UUID/Major/Minor fields for identification rather than the raw MAC address.

- **Tracking/Privacy:** Beacons can be used to track, for instance, customer movements in retail locations.
- **Usage:** These are often found in Retail, smart office, and security applications to identify specific devices, assets, or, individuals holding a beacon

https://www.mokosmart.com/types-of-beacons/



- Types of beacons protocols
  - iBeacon (Apple)
  - AltBeacon protocol (Radius Networks)
  - Eddystone (Google)
- Different shapes of Bluetooth beacon
  - Card beacon
  - Wristband beacon
  - Sticker beacon
  - USB beacon
  - Key Fob
  - Badge beacon
- A Beacon is a small Bluetooth device that transmits a signal repeatedly so that it can be seen by other devices such as smartphones. Every 1/10th of a second, the beacon sends a radio signal that consists of a mix of letters and numbers. All smartphones “see” the beacon when they receive the signal, just as sailors see the light from a lighthouse.

- Beacons provide advertising, facilitate navigation, and gather customer information. One of the best ways to interact with a customer in the real world is through beacons. Based on a person's location, they start and deliver proximity advertising to his or her phone. Beacons also boost client engagement and gather crucial information about consumer behavior.

- Beacons offer more precise location data than systems based on the Global Positioning System (GPS) and can be utilized for indoor locations. There are many different kinds of beacons, which can be categorized according to their types of Beacon protocol, shapes, power solution, location technology, and other factors.

MAC ID-enabled beacons, utilizing Bluetooth Low Energy (BLE), can be integrated into a wide range of devices for asset tracking, indoor navigation, and proximity marketing. Compatible products range from dedicated, small-form-factor BLE beacon hardware to smart, connected devices that can act as, or communicate with, beacons.

Beacon-enabled network jewelry integrates Bluetooth Low Energy (BLE) or NFC technology into wearable accessories—bracelets, necklaces, and rings—to provide smart notifications, personal safety alerts, and digital networking capabilities. These discreet devices connect to smartphones to trigger emergency SOS signals, display custom notifications, or act as digital business cards.

https://wholesale.mudlove.com/products/beacon-smart-product-custom-design-woven-bracelets?variant=41582208614448

Near-field (NFC) and Bluetooth-enabled smart jewelry, such as rings, necklaces, and bracelets, integrate technology for short-range data exchange or long-distance connection. Key applications include contactless payments, digital ID sharing via passive NFC chips, and vibration-based haptic communication for couples. These items, like {Link: BOND TOUCH 4} or {Link: Totwoo bracelets}, often use Bluetooth to pair with smartphones for instant communication.

Google fingers: nfc enabled resin pendants

Mac ids in heavy traffic areas?

No problem, use a wireless sensor network to hunt/target a wban:

https://ieeexplore.ieee.org/document/7033222

Abstract:

Wireless Sensor Networks are often large networks comprised of nodes that monitor through sensors interesting targets. Wireless Body Area Networks are always small networks that often monitor the health of a single human subject. Although WBANs are limited in size, the information they monitor is urgent and important. Information from a WBAN producer may be transmitted over a WSN to the intended consumer.

Published in: 2014 IEEE 19th International Workshop on Computer Aided Modeling and Design of Communication Links and Networks (CAMAD)

- Haptic gear is often using nano threads which go to 1906.1 in the routing
- All mitigations that involve nano particulate are watched
    - 1906.1 cisco dna (restconf, netconf etc.)
    - https://developer.cisco.com/yangsuite/
    - IIoMT – fda, fcc, NIST, arpa-h
- Mitigations will be rerouted to OTHER networks until they get where they are programmed to go.
    - Optical
    - Electro optical
    - Wi fi
    - Cellular

Mac ids are foundational to the internet. There are differences between mac ids and IP addresses; but the reason there are so many mac ids is due to all the entertainment and health biosignal products out there as much as all the IOEverything is connecting to your node coordinator to update itself constantly.

Wban blockchain

https://www.researchgate.net/figure/Blockchain-enabled-WBAN-architecture_fig2_342545417

ehr (electronic health records) – health level 7

https://en.wikipedia.org/wiki/HL7

https://www.fhir.org/

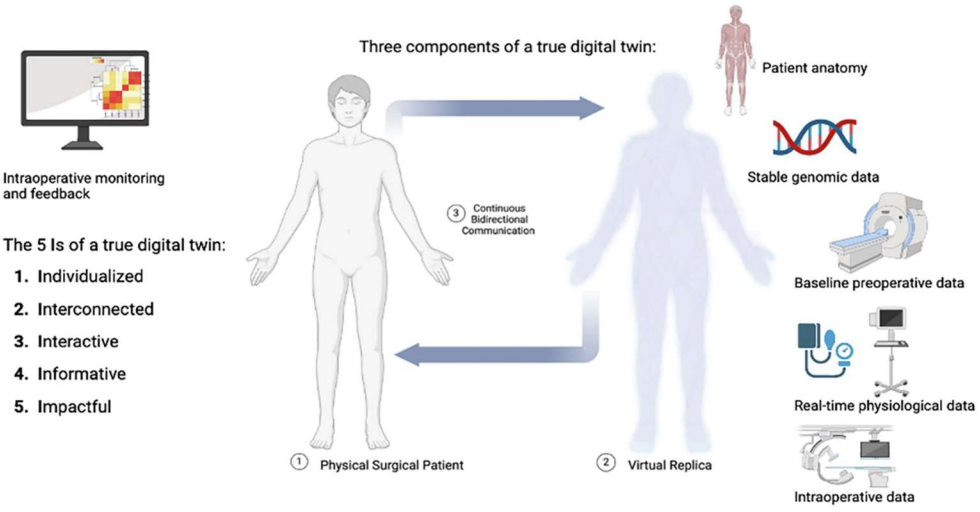
https://www.federalregister.gov/documents/2014/10/06/2014-23519/medical-body-area-network?s=09

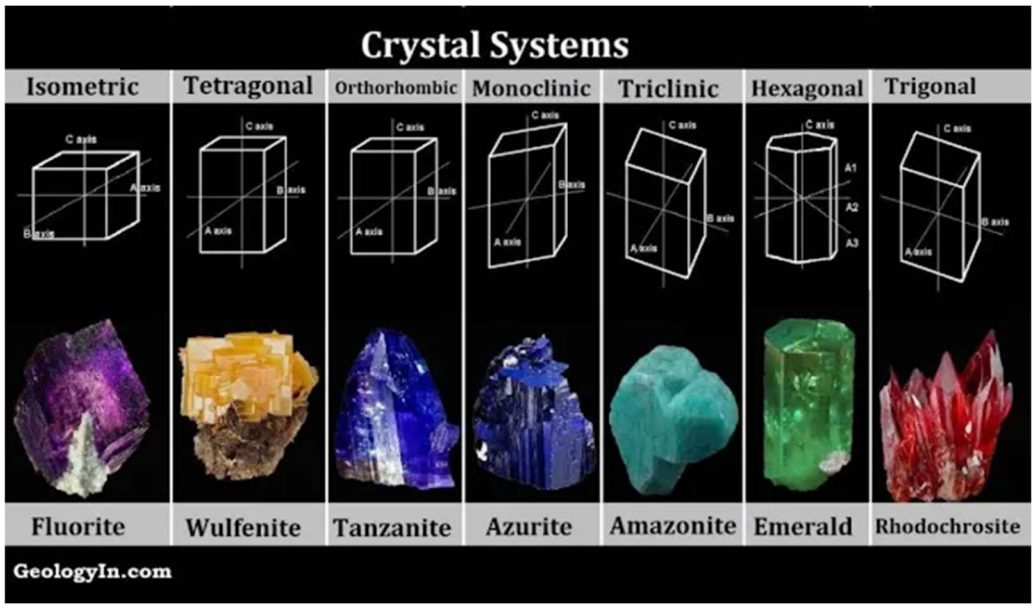
https://odysee.com/@Psinergy:a/FDAconsentcognitive:9

Why did they waive your right to consent to biosensing?

– precision ai healthcare is body area networks (1995) and remote patient monitoring (2012-2014)

<u>No need to be afraid of mac ids bc they have been ubiquitous since the 70s</u>





- Why use crystals to help stave off signals acquisition?
    - Refraction
    - Reflection
    - Shapes
        - Spheres are omnidirectional
        - Pyramids build energy in little lines bw each other and other shapes
        - Dual points extend range as much as transfuse
        - Placing stones on either side of the wand to drive energy outwords
        - Vortex energy that is natural harnessing SHAPE, SOUND, PRESSURE – biofield CONCURRENCE
        - ‘intention’ is YOUR cellular energy imprinted upon your will executed with physical molecular motion. Placing the stones specifically where they ‘vibrate’ with your body comfortably or joyfully is a conscious choice to secure your sacred temple and thus sacred space – anywhere and everywhere.
    - Concurrence with your placement of vibrating molecules of specific mineral or matrice densities can alter your epigenetics just like /their/ wsn can. Being aware of those little dings and signals so you can alter a pattern, change location, change what you’re eating/drinking and then being inside a CRYSTALLINE set of molecular geometry that vibrates for you and against other types of mineral densities.
    - All free space optical is using those wave forms and shaping like sound does to water and we do that naturally as the best quantum is bw our ears. Our neurons oscillate as does our biofield so as we elgonate the biofield and establish concurrence with other molecules we can ‘hear’ around us more accurately. This is just a practice as some ppl naturally feng shui intimately with their environment.
    - Symmetry between shapes; just like our cells do at the molecular level
        - Vibration is the geometry of sound
    - Experimenting with various protection methods in the form of
        - Mirrors
        - Frequency alteration with equipment like tesla or software all have back ends and over rides w the doe and natsec styled larger systems. Frequency

alterations concurred with OUR csf and primary nervous system will answer to us first; not software like a wsn. Thus, in order of operation on the digital twins as well, the system will have a delay and we will not.
    - Be aware of the products that promise removing you from algorithms and offer objects
  - Different makeups or matrices of crystals will effect different environments of soil, water (geo physical) differently.
- Practices
  - Biofield coherence (center and focus)
  - Biofield elongation directly to the crystalline matrice in front of you
    - Alternate bw two different stones, very different to you and then have a partner move them while blind folded w/ earbuds in to use ONLY your biofield to concur.
    - Building sacred spaces to anchor symmetry in your own air molecules to deflect or monitor back the air molecules on crack
    - Listening with more than your audio cortex (ears) – listen with your skin, your biophotons are faster through the fascia. Listen with your heart neurons in coherence to feel the authentic magnetism of the torque of the torsion fields around you.
  - Biofield elongation to 'feel' your environment is about practicing extending your awareness past your eyeballs or normal routine. It becomes natural to you in your environment to separate different types of signals and thus insulate your peace.

The internet of Everything is about all these little sensors using MAC IDs to connect, tether, disconnect, ping and track networks including bans. When you practice discerning your biofield reception consciously, you can deploy other practices beyond just relying on tesla coils, frequency, music etc to respond. You can elongate your biofield with piloerection and change amplitude of the wavelengths rising and falling around you and your toroidal field.

https://www.youtube.com/watch?v=YAtQFkEg5-w

Prof. Ian F. Akyildiz, Georgia Institute of Technology, Scientific Advisory Board for ARRC

Date: March 16, 2023

Talk Topic: TeraHertz Band Communication: An Old Problem Revisited & Research Directions for the Next Decade Abstract: TeraHertz (THz) band communications are envisioned as a key technology for 6G and Beyond. As a fundamental wireless infrastructure, THz communication can boost abundant promising applications. In 2014, our team published two comprehensive roadmaps for the development and progress of THz communication networks which helped the research community to start research

on this subject afterwards. In particular, this topic became very important and appealing to the research community due to 6G wireless systems design and development in recent years. Many papers are getting published covering different aspects of wireless systems using the THz band. In this talk, our aim is looking back at the last decade and revisiting the old problems and pointing out what has been achieved in the research community so far. Furthermore, still to be investigated research challenges for the THz band communication systems are presented by covering diverse subtopics such as from device perspectives, channel behavior, communication and networking problems, physical testbeds and demonstration systems. The presented key aspects will enable THz communications as a pillar of 6G and Beyond wireless systems in the next decade.

(This conference is how I built and tested the thz wsn for my own biofield practice. The order of block shock shunt and shield is built off vibration and the topology transition of molecules, not cognitive empathy neural networks of good feelings; actual cellular vibration and biofield coherence attenuation to muscle strata.)

Block shock shunt and shield metamaterials –

This is the order of operation on the metamaterials with their ultrasound wake up radio on the thz and the reshaping of their structures based on topology of a surface which is vibration. This is already a practice of sorting the signals and maintaining a healthy bioelectrical homeostasis. Adding in awareness of your environment can help buffer signal attenuation before it 'lands' with enough 'qos' to actuate.

How to pick stones to work with

What is resonant will natural generate a cognitive neurological response in the endocrine system at the level of connective tissue due to the biofield being an extension of the peripheral nervous system; therefore truly closing your eyes and using your left hand and whatever you touch first usually feels great – just like biofeedback – your cells, morphology in real time oscillation in your own biology; KNOW.

Different minerals and crystalline matrice structures will vibrate differently with your cells so experiment and look up what kinds of shapes and what kinds of mineral properties repeat in your choices.

https://odysee.com/@Psinergy:a/Psinergy-Crystalselfhealing:f

- ACTION ITEM
    - review all the phy/Mac options (routing protocols) proposed or introduced since 2020 plus all previous options that can be implemented in nano analogs. (It's a broad medical journal search with days of reading.)
    - pick a list of top 10 or 20 implementations for biomedical intra body networks.
    - Don't forget the network physiolome connectivity by body systems to the cyber physical
    - Draft a combined list of mac or phy layer protocols for all those network layers of connectivity available to all these teeny tiny networks.