

Block Chain Technology Driven Healthcare System

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Abstract— Block chain technology is a distributed transaction technology that is open but secure and public but - at same time -private. It is initially created to provide a distributed ledger of financial transactions whereas every new transaction needs to be authenticated to be added to the chain. This technology has been extended to multiple transaction. This technologies has been extended to multiple transactions involving activity such as legal matters, medical records, insurance billing, and smart contracts. One of the most important thing is that block chain technology is important to healthcare professionals in such a way so they can revolutionize medical database interoperability. This interoperability can help improve access to medical records, imaging archives, prescription databases. It is used to describe the medical history of patient's for better medicine purpose, block chain technology has an ability to make dramatically changes in health care. This paper describes about the current issues of health care in India and how block chain technology can useful for patient's to improve the healthcare system in India.

Key words: Block Chain Technology, Healthcare System

I. INTRODUCTION

Block chain technology is a distributed transaction technology that is open but secure and public but - at same time -private.

- It works on three main principles
 - 1) The transaction is opened on the network.
 - 2) The ledger is distributed to ensure there is always a copy of the ledger.
 - 3) Every new transaction needs to be authenticated to be added to the chain.
- It was built from the three technologies
 - 1) Private Key Cryptography,
 - 2) P2P network and
 - 3) Program (the blockchain protocol).

The private key cryptography provides a powerful ownership tool that fulfills authentication requirements. Possession of a private key is ownership. It also spares a person from having to share more personal information than they would need to for an exchange, leaving them exposed to hackers. Authentication is not enough so, Authorization - having enough money, broadcasting the correct transaction type, etc. - needs a distributed, peer-to-peer network as a starting point. A distributed network reduces the risk of centralized corruption or failure.

II. CURRENT HEALTHCARE SYSTEM IN INDIA

A. Urban & Rural Division

While getting the opportunity to enter the market is very interesting, India still spends only around 4.2% of its national GDP towards healthcare goods and services (compared to 18% by the US) Additionally, there are wide gaps between the rural and urban populations in its healthcare system which

worsen the problem. A staggering 70% of the population still lives in rural areas and has no or limited access to hospitals and clinics. Whereas, the rural population mostly relies on alternative medicine and government programmes in rural health clinics because of govt. program such as National Urban Health Mission which pays individuals for healthcare premiums, in partnership with various local private partners, which have proven ineffective to date.

B. Effective Payment Mechanisms is required

Besides the rural-urban divide, another key driver of India's healthcare landscape is the high out-of-pocket expenditure (roughly 70%). This means that most Indian patients pay for their hospital visits and doctors' appointments with straight up cash after care with no payment arrangements. According to the World Bank and National Commission's report on Macroeconomics, only 5% of Indians are covered by health insurance policies (such a low figure).

C. Demand for Basic Primary Healthcare & Infrastructure

India faces a growing need to fix its basic health concerns in the areas of HIV, malaria, tuberculosis, and diarrhea. Additionally, children under five are born underweight and roughly 7% (compared to 0.8% in the US) of them die before their fifth birthday (Sadly, only a small percentage of the population has access to quality sanitation). For primary healthcare, the Indian government spends only about 30% of the country's total healthcare budget. One way to solve this problem is to address the infrastructure issue... by standardizing diagnostic procedures, building rural clinics, and developing streamlined health IT systems, and improving efficiency. The need for skilled medical graduates continues to grow, especially in rural areas which fail to attract new graduates because of financial reasons

D. Growing Pharmaceutical Sector

According to the Indian Brand Equity Foundation (IBEF), India is the third-largest exporter of pharmaceutical products in terms of volume. Around 80% of the market is composed of generic low-cost drugs which seem to be the major driver of this industry

E. Underdeveloped Medical Devices Sector

The medical devices sector is the smallest piece of India's healthcare pie. However, it is one of the fastest-growing sectors in the country like the health insurance marketplace. Recently, the government has been positive on clearing regulatory hurdles related to the import-export of medical devices, and has set a few standards around clinical trials. According to The Economic Times, the medical devices sector is seen as the most promising area for future development by foreign and regional investors; they are highly profitable and always in demand in other countries.

III. HOW BLOCK CHAIN CAN BE USEFUL FOR HEALTHCARE

Healthcare providers mean a higher probability of accurate diagnoses, more effective treatments, and the overall increased ability of healthcare organizations to deliver cost-effective care.

Block chain technology can allow various stakeholders in the healthcare value-chain to share access to their networks without compromising data security and integrity, by allowing them to track data provenance as well as any changes made.

It provide a new way to healthcare by by making electronic medical records more efficient, disintermediated, and secure.

IV. BLOCK CHAIN PROCESS FLOW IN HEALTHCARE

Each participant connected to the block chain network has a secret private key and a public key that acts as an openly visible identifier.

The pair is cryptographically linked such that identification is possible in only one direction using the private key.

As such, one must have the private key in order to unlock a participant's identity to uncover what information on the block chain is relevant to their profile.

V. KEY CHALLENGES IN ADOPTION OF BLOCKCHAIN IN HEALTHCARE

A. Some players aren't willing to share

A classic example of this is how insurance payers and hospitals actively try to not share data. It is a competitive advantage for hospitals to keep cost data to themselves. If they are forced to share with insurance companies, they might get different rates for different patients. It is difficult to share data in an environment in which these entities are for-profit.

B. Healthcare is distributed

A distributed, secure access to patient health data across the distributed ledger. It shares data enables real time updates across the network.

C. Fragmented Data

- Decentralized storage using computer network for patients data
- Share the data across the network and nodes
- Decentralized source of Internet of Things (IoT) data,

D. Cost Effectiveness

- It reduced the transaction cost and real time processing to make the system more efficient.

VI. BENEFITS OF BLOCK CHAIN IN HEALTHCARE

A. Data Security

Block chain delivers access control via a shared public chain and a private chain; so for instance, only the patient would have access to their medical data using the private chain piece. If malicious parties wanted to gain access, the hackers would need to simultaneously breach every participant in the network, not just one.

B. Data Privacy

Block chain also supports data privacy when data updates are applied and during data transfer. For example, when a doctor prescribes a new medication for a patient, his or her records are updated, and the public ledger notes when the transaction or change was made. An encrypted link to the patient's record is created for doctor and patient access only.

C. Data Exchange & Interoperability

It could enable the health data exchange systems that are irrevocable and cryptographically secured. And this would ultimately enable seamless access to real-time patient health data, and eliminate the cost and burden of data reconciliation. Recently, Guard time, the data-centric security company, has partnered with Estonian eHealth Foundation to secure the health data of over one million Estonian citizens using KSI (Keyless Signature Infrastructure). Now this is a good example of use of Block chain in Healthcare sector.

D. Transparent Billing Management

Even in this digital era, 5-10% of healthcare costs are fraud, resulting from billing unperformed services. In the U.S. alone, medicare fraud caused around \$30 million in losses in 2016. In fact, the U.S. Department of Justice charged three individuals for \$1 billion medicare fraud and money laundering scheme. But, with block chain applications and

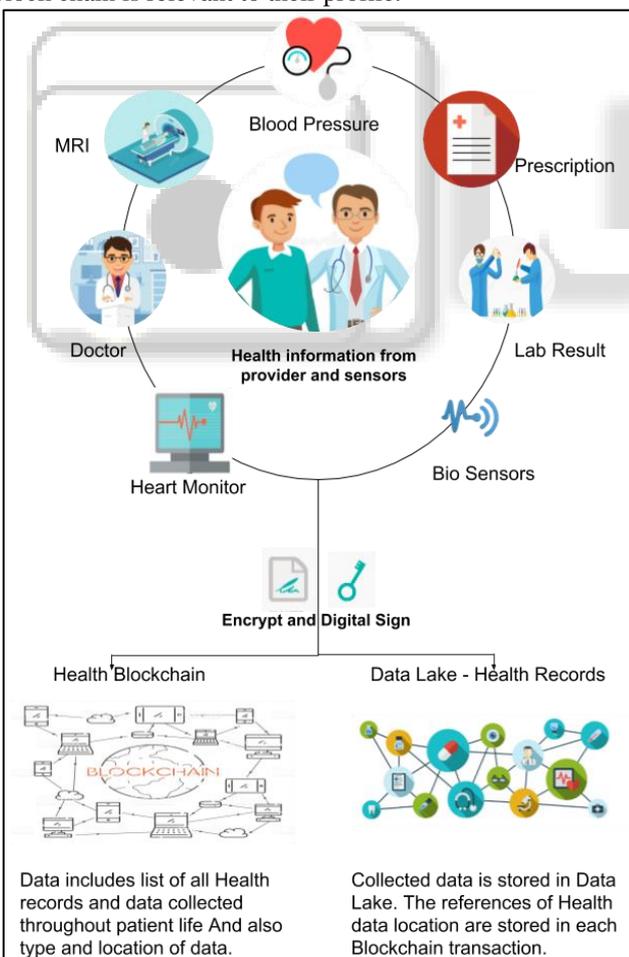


Fig. 1: Show overall Process of Block Chain Technologies on Healthcare

systems, it is now possible to provide realistic solutions to minimize these kinds of frauds. By automating the bill processing activities, Blockchain Technology could help to remove the need for intermediaries and decrease the administrative costs.

E. Patient-Generated Data

Personal health devices, “wearables”, “Internet of Things” (IOT) devices, and patient-reported outcomes are just some examples of patient-generated data that could leverage the block chain for security and sharing.

VII. MAJOR ADVANTAGES OF BLOCK CHAIN ON HEALTHCARE DOMAIN

- Data Provenance and Integrity
- More Secure Standards
- Data Transparency

VIII. CONCLUSION

With block chain-based technology like bitcoin taking up news headlines, awareness and excitement about other potential uses for block chain is increasing. One of the best use cases for block chain may end up being healthcare and medical records. By having a distributed database for healthcare-related information, healthcare providers can benefit from increased accessibility, accuracy, and safety, all of which will result in better healthcare outcomes for all.

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