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A Review on IoT Security with Blockchain

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Abstract - Blockchain indicates a large potential inside the coming destiny. It is a technology that provides the possibility of generating and sharing transaction ledgers that are tamper proof. Use instances of Blockchain are enlarging in numbers and width in more than one region like, net of factors (IoT), finance and security. Even though many public and personal sectors are introducing this generation, it remains a fear to others because of their loss of familiarity and the factor of it no longer taking any massive function in any main safety organizations until now. In this paper we will provide an explanation for what's a blockchain and outline its traits, blessings, and the differences between them. And assist in choosing the appropriate kind that accommodates your needs. Then we gift the immutability thing of Blockchain and its benefits and examine it with a traditional database. And sooner or later, we are able to talk blockchain safety (For public and personal blockchains) and examine it with a fashionable cyber safety environment and discuss each of them in unique cyber-attack scenarios.

Index Terms – Blockchain; IoT; Cyber Security.

INTRODUCTION

A pocket book page is an excellent example of a Blockchain block, records is written at the page precisely like information is stored at the block. The block can store any facts together with scientific information or belongings agreements. This block is chained to a preceding block by using embedding it from the preceding one. This hyperlink will glaringly smash if some thing interfered with the facts everywhere on this chain which offers security and immutability [1]. loads of recent gadgets utilized in IoT networks are lightweight and using low electricity. Such gadgets should publish most people of their processing and electricity to carry out middle functionalities of the application, which makes protection aid and privateness cheaply hard. IoT methods of conventional cyber safety are very luxurious with regards to consumption of strength and high-level computation. moreover, maximum of protection frameworks in a conventional surroundings are thoroughly centralized and accordingly compulsory desirable enough for IoT as a result of scale issue, site visitors nature of many-to-one, and a single fault factor [2][3]. Many still have the fear of alternate, in particular when it’s something new and something now not all people is acquainted with like Blockchain. In truth, Blockchain era is believed to be an extraordinary experimental innovation due to its absence in taking a prime part in any diagnosed statistics safety studies [4]. This is moreover sustained through the facts security panorama, who have been concentrated on Bitcoin, and Blockchain as an monetary system that is cryptographic [5][6][7]. The Blockchain consists of 8 special components; each element has its personal particular overall performance. The ledger is a ancient file that is immutable and distributed and the blockchains purpose is to create this ledger [eight]. A peer community stores the ledger, updates it, and maintains it. a duplicate of this ledger is maintained via every node of this community. Coming to an agreed concord on every update content is the task of this community. This ensures the identicality of all copies of the ledger without the need of an authentic ‘‘centralized’ ledger reproduction [nine]. Club offerings are accountable for authorization, authentication, and identification management of person.

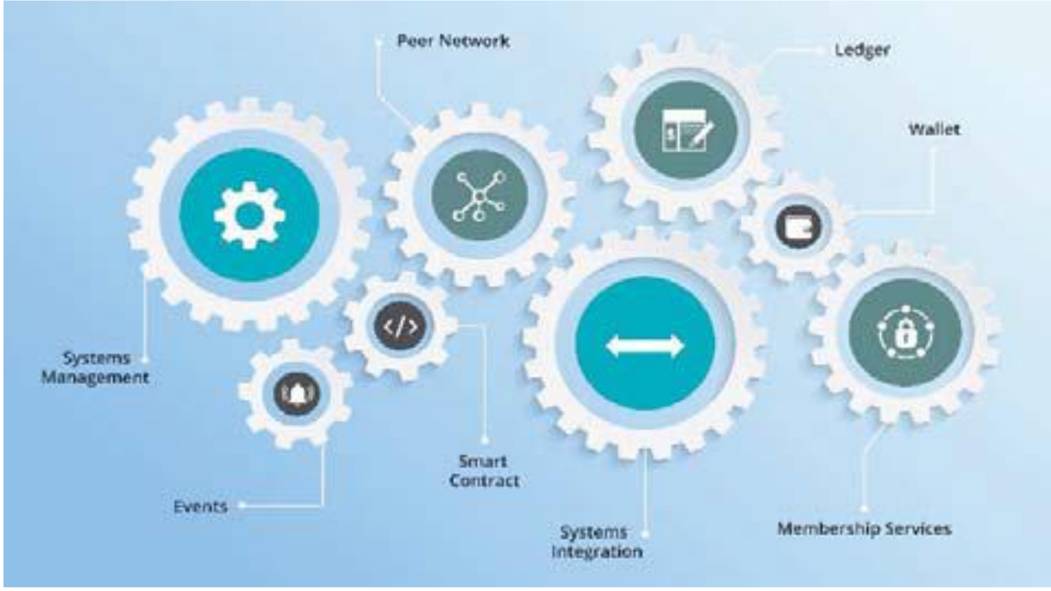

Figure 2: Blockchain Components

Every person can be part of a public blockchains peer community and all members have equivalent authority and power. A permission blockchain desires authorization for joining. This membership provider is answerable for authorization, authentication, identity management of blockchain users [10]. A clever agreement is a blockchain jogging software. The layout of the unique blockchain became as easy as permitting the performance of financial transactions on a historical ledger and storing them there with restricted allowed configurations. In recent times, the evolution of blockchain made a few entirely fully functional computers distributed anywhere. Smart contracts are blockchain walking packages that permit user interactions in a similar way as another program on any popular computer [nine]. The pockets shops credentials of customers. Tracking user’s digital assets together with any data related to the user’s account. In addition to storing the consumer’s credentials [eleven]. Occasions are moves and updates notifications. The ledger and the peer network are continuously up to date through occasions. activities consisting of a brand new transactions introduction during the peer network and the relationship of a brand new block in addition to smart agreement notifications [8]. System control is chargeable for introduction, monitoring, and modification of components. To meet the consumer's needs, the gadget control can create, monitor and adjust the components of a blockchain [12]. And eventually, gadget Integration, they may be external systems of blockchain. Due to the evolution of blockchain and the regular capability growth. It have become greater handy to combine blockchain ‘‘generally the usage of smart contracts’’ with further external systems [eight].

II. LITERATURE REVIEW

There are two types of blockchains, a public blockchain and a private one. A Public blockchain is permission less blockchain. Anyone can join it successfully and productively. They can engage by viewing or inputting within the blockchain. This public chain does not have a single unit controlling it over the network because they are decentralized. Which means once the data on the blockchain is validated it can't be changed. This public blockchain is beneficial because within it the user can openly input and view data, the ledger is not centralized, and it is distributed, it is immutable to avoid any tampering with data attempts, and it is secure because of the 51% rule ‘‘no one can obtain dominant power on this network’’ [13]. On the other hand, a private blockchain: is a permissioned blockchain. Only someone permission can join it and each member has restricted participations depending on the authorisations given by the network. This private chain is beneficial because within it the resources, data, and access are controlled by the enterprise, performance can be much faster with less participants on a ledger. The ability to add services and nodes when needed gives a better scalability to the enterprise, the option of having compliance support ‘‘adhere requirements’’ while having infrastructure control, and more efficient consensus ‘‘less nodes’’ [13]. They are both similar in the way they are structured and how they function, yet they differ in the authorization point. As shown in the previous table. Bitcoin is only a use case of Blockchain. In fact, Blockchain is usually utilized for services of decentralization purposes which by far have been supplied by trusted enterprises that are centralized. However, Bitcoin still holds the position of Blockchain's most common application used till this very day [14]. In [15], it is demonstrated that the majority of the peers that are known to the network of Bitcoin, peers inhabit in its independent system. Meaning that the peer-to-peer network is not competently linked which could cause relay difficulties of new created blocks on the Blockchain. In [16], the authors here display that when many nodes are controlled by an attacker that may or may not have high computational power, this could result in reaching a fraction that is considered high compared to the total power of computation in a Blockchain with not many miners and that is considered a small system. In such a case, the systems integrity could be threatened due to the ability of the attacker to cause forks intentionally. The selfish mining attack was introduced in [17], in such an attack, a harmful mining pool chooses to keep the blocks it finds unpublished. Which results in fork creation in the Blockchain. One of the branches is the public branch with the miners and the other one is the private branch with the harmful pool. It continues to mine on the private branch until both branches meet in length then it publishes it. In this way it could become the longest branch and other miners may choose to accept it. After a while, the public branch may be discarded along with all the data it contains. Indicating with the miner's ratio between both branches, the harmful pool may obtain advantage over the public branch using this type of attack. The authors in [18] pointed yet another attack called history-revision attack. In such an attack, the attacker has way much computational power than the other nodes. Then he is able to create a fork and a harmful branch and bypass the original branch by Proof of Work's hard terms. Then other miners may accept it, and this will result in a history conversion of the Blockchain. An attacker can hold up transactions or blocks delivery to further nodes peer-to-peer network of Bitcoin. Which could lead to further selfish mining advantages. If the attacker has the ability to prevent block delivery to a part of the network from other miners, this could lead to Denial-of-Service (DoS) if the attacker is in control of multiple nodes. As the authors showed in [19]. Stubborn mining is a development of selfish mining that is addressed in [20]. It is shown in the results that it could eventually be much more harmful than selfish mining. The strategies of stubborn mining are able to overtake (by 25%) selfish mining with no need of any attacks of network level to assist with leveraging.

III. BLOCKCHAIN SECURITY

''The future of computing'' is typically what blockchains are known as nowadays. It's miles a technology that uses a distributed ledger on a peer-to- peer network and it tactics processing and statistics storages pretty exceptional. In truth, one of the primary variations between cybersecurity on blockchain and in surroundings of conventional computing is the surroundings itself in addition to its skills of what's it designed to do and not to do. A conventional computing environment community of an organisation for the most component is administrated through body of workers of laptop safety within that business enterprise. Even though quite a few groups are switching to environments which might be cloud based totally, they nonetheless acquire most people of configurations and security in the course of their structures. These conventional networks are substantially centralized, and their cybersecurity is specifically targeting permissions. The complete machine along with customers who gather government on this type of community are semi depended on if no longer fully trusted, that ends in the main intention of removing outside attackers from tampering with the community [21]. The layout of blockchain is concentrated on decentralization, and machine distribution that runs on untrusted devices. conventional environment's safety is designed to put data in an area and barricade it by means of partitions, even as blockchain protection is primarily based on protecting data from tamper through dispensing copies of that records to as many viable places for infeasibility. Availability and integrity are what blockchains offer in line with its layout. on the other hand, the infrastructure of a traditional surroundings is based on integrity and confidentiality [21][22]. Of route, both environments have their own issues in relation to safety. In severa scenarios, the possibility of having the identical attack on each environment arise, however it differs within the implementation information. As an example, Denial-of-service (DoS). While the gadget turns into unable to serve the customers as it is in the beginning designed to due to an assault. This will be precipitated via making use of a device’s illness and is accomplished through executing prison moves swiftly faster and higher than the system can typically deal with. DoS usually target the weakest spot of the device. In traditional surroundings, DoS attacks cognizance on an employer’s web server denying customers from offerings and get admission to. This can be triggered through overloading the server with extra connection requests than the capability of the server to guide. Equal as in blockchain, a DoS attack calls for overloading the blockchain via executing greater transactions than its capability. And considering most of blockchains have blocks created with a fixed fee and length then allotted, the attacker can overload and exceed the maximum storage of the blockchain which then makes it unusable [three][23]. In terms of endpoint protection, blockchain and traditional infrastructure have their differences as properly. Endpoints in a blockchain are nodes and can be absolutely equal. Endpoints in a conventional cyber are all underneath the enterprise’s control and the level of authority differs from one another. This distinction among endpoints will be a chance because it offers an attacker similarly possibility in locating a vulnerable vulnerable factor to make use of, while the equivalency between users approach a illness in one factor of the gadget is a disorder in the entire gadget [23]. Blockchain additionally differs from traditional cyber within the agree with stage of the organisation’s software code. In blockchain, smart contracts may be written by means of anyone and all people could make a flaw in a smart contract or inside the base platform code that may result in big distributed outcomes. In traditional cyber, the code is written through the organisation and the publicity may be originated simplest from the organization-controlled code. Thus far, the single hack ever achieved towards the community of Bitcoin changed into exploited via overflowing integers which was a disorder in its protocol. An attacker managed to assign such a lot of Bitcoins to himself, more than the supposed amount to ever be created. Bitcoin had to overcome this situation through dismissing the basics and developing a hard fork and editing the historical ledger via it. in the event that they haven’t done that, the fee of Bitcoin could have dropped and have become worthwhile. A code has to be blanketed inside the utility earlier than it could be edited and such hacks makes it a massive danger which any Bitcoin user has to accept [24]. Each environments are vulnerable to intentional misuse assaults. In blockchain, proof of work systems encourage miners to do plenty. The number one illness of proof of work is the insecurity of a blockchain when a collection controls extra than half of ‘‘51%’’ of the processing electricity to the mining network. Proof of work encourages miners to achieve control of as a whole lot as they are able to of processing energy for rewards however obtaining the whole thing is some thing they don’t want. In traditional cyber, DoS is an exact form of intentional misuse [25]. Each of those environments has a distinctive purpose than the alternative. In blockchain, facts is shared and disbursed, and anyone is based on the blockchain to grant availability and integrity. In conventional cyber, records is contained and siloed, with owner managed confined get entry to, which places the provision, integrity, and confidentiality of the information on them [26].

IV. FUTURE OF BLOCKCHAIN

There is a whole lot of thrilling capacity possibilities in blockchain. It’s miles a generation that tends to be mentioned and fits the criteria of many different thrilling rising technology. Together with IoT, AI, smart gadgets and self-riding automobiles. It could as well be an enabling layer to all those stated technology and extra [27]. Examine the concept of a smart fridge that would mechanically report ‘‘more Milk’’ as it starts offevolved to expire. The majority get frightened and scared from such an idea when discussing such an implementation because of the fear of security and the manner to shield it. And what ensures the security and immutability of the used statistics within the device. Some other point that needs to be referred to be the decreasing cost of gadgets and the growth want of computing energy every day [28]. Blockchain offers all that. it's far already concerned in many rising technology and with the aid of developing it opens the door for new technology to emerge as it’s making things viable increasingly more every day.

Blockchain
(Use Cases)
Decentralized patient records management
Proof of ownership for digital content
Digitizing assets improves anti-counterfeit measures
Provides digital identity that protects consumer privacy
Decentralized IoT
Escrow/Custodian service

V. CONCLUSION

Lots of interest nowadays is directed to cyber safety and mainly to IoT protection, both from an educational and a commercial prospective. One of the essential blessings of blockchain is its functionality of recuperating from many threats and attacks. It additionally offers a terrific amount of stepped forward attributes along with reliability, fault tolerance, operation time, and scalability. When figuring out between the 2 kinds of blockchain and which ought to be used, it's miles vital to keep in mind diverse elements along with governance, how is the occurrence of the utility oversight? Or Integration, How can your current application work with blockchain? And will the usage of clever contracts be applied? As well as clever settlement functionality, are clever contracts meant to be utilized by the employer? Even cryptocurrency requirement, it is typically not utilized by companies of their blockchains – an statistics to help with the selection. Consensus set of rules, a special algorithm can be used relying at the form of the blockchain (employer nodes vs miners). And eventually, the cost of the model. The value load may be all weighted at the agency or dispensed among many entities

References

[1]. Yuan, Yong, and Fei-Yue Wang. "Blockchain: the state of the art and future trends." *Acta Automatica Sinica* 42.4 (2016): 481-494.

[2]. Ezema, Ernest, Azizol Abdullah, and Nor Fazlida Binti Mohd. "Open Issues and Security Challenges of Data Communication Channels in Distributed Internet of Things (IoT): A Survey." (2018).

[3]. Biswas, Kamanashis, and Vallipuram Muthukkumarasamy. "Securing smart cities using blockchain technology." *2016 IEEE 18th international conference on high performance computing and communications;*

[4]. Morisse, Marcel. "Cryptocurrencies and bitcoin: Charting the research landscape." (2015).

[5]. Beck, Roman, et al. "Blockchain-the Gateway to Trust-Free Cryptographic Transactions." *ECIS*. 2016.

[6]. Glaser, Florian. "Pervasive decentralisation of digital infrastructures: a framework for blockchain enabled system and use case analysis." (2017).

[7]. Bott, Jürgen, and Udo Milkau. "Towards a framework for the evaluation and design of distributed ledger technologies in banking and payments." *Journal of Payments Strategy & Systems* 10.2 (2016): 153-171.

[8]. Peters, Gareth W., and Guy R. Vishnia. "Blockchain Architectures for Electronic Exchange Reporting Requirements: EMIR, Dodd Frank, MiFID I/II, MiFIR, REMIT, Reg NMS and

T2S." *Handbook of Blockchain, Digital Finance, and Inclusion, Volume 2*. Academic Press, 2018. 271-329.

[9]. Dorri, Ali, et al. "Blockchain for IoT security and privacy: The case study of a smart home." *2017 IEEE International Conference on Pervasive Computing and Communications Workshops (PerCom Workshops)*. IEEE, 2017.

[10]. Androulaki, Elli, et al. "Hyperledger fabric: A distributed operating system for permissioned blockchains, 2018." *arXiv preprint arXiv:1801.10228* (1801).

[11]. Antonelli, Cristiano. *Localised technological change: towards the economics of complexity*. Routledge, 2008.

[12]. Ouaddah, Aafaf, Anas Abou El Kalam, and Abdellah Ait Ouahman. "Harnessing the power of blockchain technology to solve IoT security & privacy issues." *ICC*. 2017.

[13]. Zheng, Zibin, et al. "Blockchain challenges and opportunities: a survey." *International Journal of Web and Grid Services* 14.4 (2018): 352-375.

[14]. Coinmarketcap, Crypto-Currency Market Capitalizations; 2016. https://coinmarketcap.com/.

[15]. Feld, Sebastian, Mirco Schönfeld, and Martin Werner. "Traversing Bitcoin's P2P network: insights into the structure of a decentralised currency." *International Journal of Computational Science and Engineering* 13.2 (2016): 122-131.

[16]. Tschorsch, Florian, and Björn Scheuermann. "Bitcoin and beyond: A technical survey on decentralized digital currencies." *IEEE Communications Surveys & Tutorials* 18.3 (2016): 2084-2123.

[17]. Sapirshtein, Ayelet, Yonatan Sompolinsky, and Aviv Zohar. "Optimal selfish mining strategies in bitcoin." *International Conference on Financial Cryptography and Data Security*. Springer, Berlin, Heidelberg, 2016.

[18]. Sasson, Eli Ben, et al. "Zerocash: Decentralized anonymous payments from bitcoin." *2014 IEEE Symposium on Security and Privacy*. IEEE, 2014.

[19]. Kogias, Eleftherios Kokoris, et al. "Enhancing bitcoin security and performance with strong consistency via collective signing." *25th {USENIX} Security Symposium ({USENIX} Security 16)*. 2016.

[20]. Heilman, Ethan, et al. "Eclipse attacks on bitcoin's peer-to-peer network." *24th {USENIX} Security Symposium ({USENIX} Security 15)*. 2015.

[21]. Alkurdi, Fahad, et al. "Blockchain in IoT Security: A Survey." *2018 28th International Telecommunication Networks and Applications Conference (ITNAC)*. IEEE, 2018.

[22]. Zamyatin, Alexei, et al. "A wild velvet fork appears! Inclusive blockchain protocol changes in practice." *International Conference on Financial Cryptography and Data Security*. Springer, Berlin, Heidelberg, 2018.

[23]. Yaga, Dylan, et al. *Blockchain technology overview*. No. NIST Internal or Interagency Report (NISTIR) 8202 (Draft). National Institute of Standards and Technology, 2018.

[24]. Shackelford, Scott J., and Steve Myers. "Block-by-block: leveraging the power of blockchain technology to build trust and promote cyber peace." *Yale JL & Tech.* 19 (2017): 334.

[25]. Cochran-Smith, Marilyn, and Kenneth M. Zeichner, eds. *Studying teacher education: The report of the AERA panel on research and teacher education*. Routledge, 2009.

[26]. Klischewski, Ralf. "Blockchains zwischen Anarchie und Governance: Steuerungsansätze für die öffentliche Verwaltung."

[27]. Chiang, Mung, and Tao Zhang. "Fog and IoT: An overview of research opportunities." *IEEE Internet of Things Journal* 3.6 (2016): 854-864.

[28]. Singh, Sachchidanand, and Nirmala Singh. "Blockchain: Future of financial and cyber security." *2016 2nd International Conference on Contemporary Computing and Informatics (IC3I)*. IEEE, 2016.