How the development of Blockchain affected cybersecurity

A U Mentsiev¹, V S Magomadov¹, M Z Ashakhanova¹, A U Mentsiev¹ and M T Alams²

¹ Faculty of information technology, Chechen State University, 32 Sheripov Street, Grozny, 364024, Russia
² University of Jos, P M B 2084 Jos, Plateau State, Nigeria

E-mail: a.mentsiev@chesu.ru

Abstract. This research gives a brief insight into one of the most widely used technologies known as Blockchain. The paper lays the groundwork of how Blockchain functions and how it has quickly become a network with millions of users throughout the world. This study discusses the most important use of Blockchain technology, which is the enhancement of the cybersecurity industry. Blockchain has revolutionized the cyber-security industry by introducing a system which is not bound to any four walls and is widely distributed all around the world, seeking refuge on millions of user servers. This decentralized system helps Blockchain defend cyber networks against security threats and attacks such as malware, phishing attacks, and DDoS.

1. Introduction
The Internet has grown at a very rapid rate in the last decade and with it, the number of threats and cyber-attacks have also exponentially increased. In the modern-day, it is becoming more and more difficult with each passing day to surf the internet safely and not come across any kind of malware or a cyber-attack planned by hackers. In the past, these attacks used to be simple but they have evolved a lot and are becoming sophisticated each day. But with this shift in technology, cyber analysts and security teams have also been improving their ways to combat these attacks. Many new ways have been invented to prevent these attacks and the biggest invention till date is Blockchain.

Blockchain has been around for years now, but it has not always been used as a way to enhance cyber-security, in fact in the start, Blockchain was only seen as a way to transfer and store cryptocurrency but with the widespread use of technology around the world, Blockchain also grew fast and started getting used in a number of ways to benefit businesses and industries. The number one use to this day is a means to enhance cyber-security [1].

1.1. What is Blockchain?
Blockchains are distributed networks that connect millions of users around the world with each other. All the data that is added by each user to the Blockchain is secured through the use of cryptography. Every member of the Blockchain contributes towards the security of the Blockchain by verifying every single piece of data being uploaded to the Blockchain. This is done via a system that uses three keys, i.e. private key, public key, and the receiver’s key. This not only allows Blockchain users to verify the originality of data but also helps them confirm who the data is coming from.
1.2. How is it formed?
Blockchain formation is a complex process and a piece of information cannot just be added to a Blockchain, in fact, to do so, the piece of data has to be first converted into a block. In order to do so, the Blockchain users have to make the use of their keys and powerful computing engines to run algorithms that solve complex problems. When a user successfully solves a problem, a block is created and is added to the Blockchain where it exists forever and cannot be changed or removed [2].

2. Blockchain as a technology to improve cybersecurity
Hackers use many different ways to infiltrate a cyber-network, this may be a phishing attack in which the hackers imitate a Wi-Fi network or a program and prompt the employees of an organization to log in and give them their credentials. Or they can simply break into a weakly guarded network. No matter what kind of cyber-attack they plan, it is always due to the fact that all the data is stored and gathered at one central location and once hackers have access to that central location, they can either steal the data, manipulate it or overtake it to use it for their benefit. Blockchain technology changes this whole narrative by making data storage decentralized [3].

There are a number of ways in which Blockchain is changing the whole dynamic of preventing our cyber-networks against threats and attacks from hackers. The research will go through these, one by one, and discuss them.

2.1. Decentralization
The main thing that Blockchain does in order to ensure that the data is decentralized and cannot be gathered at one point and hacked or destroyed by hackers is instead of storing data in huge data farms full of servers or even storing it in huge cloud storages, Blockchain breaks every piece of information, or a data transaction into small chunks and then distributes it all over the network. As discussed before there are millions of users attached to this huge network, this means that Blockchain at a single time has millions of servers or as they are called ‘nodes’. Each node stores one chunk of a data transaction and in order for a data transaction to happen, these nodes come together to form a complete piece of information. So in a situation, if some of these nodes were hacked or taken down, it would not affect the data because it will still be intact [4].

2.2. Peer to Peer Sharing
Another most important thing that Blockchain does in data transactions is peer to peer sharing. This means that the data is shared by one user and received by one user by making the use of millions of nodes present in the network and the keys assigned to both Blockchain users. What this peer to peer sharing does is make sure there is no gathering or passing of data through one single channel. Peer to peer sharing allows Blockchain to take the middle man out of the sharing process. You no more have to rely on service providers for your transactions to go through, everything exists in a decentralized and a permanent ledger. One user shares it with the widely distributed network of Blockchain and the receiver receives it using his unique key, without any third person knowing about it. This not only makes the process faster but also increases the security of the files being shared by ten folds [5].

2.3. Encryption and Validation
Two of the most important parts of the cybersecurity net is encryption and validation. Blockchain offers both. First of all, the data present on Blockchain is encrypted and encoded and it is possible for the user to decode this data using their system of keys which is only exclusive to them. To build on that is an added layer of security which gives you validation that your data has not been stolen, altered or compromised. Blockchain provides you the ability to check file signatures on all the records from the nodes that are present on the network. This way you can make sure that those signatures are original and have not been altered [6].
2.4. Blockchain can be Both Private and/or Public
While the most popularly used Blockchain is the private one which gained the early headlines. Anyone can have access to private Blockchain which is still very secure but there is a way that you can limit this access to the general public. Blockchain technology now allows you to create your own private Blockchain network. Of course, this network would be much smaller than the private one which would have millions of nodes. In this case, the only number of people who’ll have access to this network would be the ones in your company or the ones you yourself grant access to. All of these people will serve as nodes in your private network. While this network is a lot smaller than the public Blockchain network but it is much more secure since no one else would even have access to these nodes and thus eliminates any chance of decoding even a small chunk of data [7].

2.5. Prevention against Fraud and Theft
The Blockchain is virtually impossible to be hacked by hackers who would easily get into a system with weak or even stronger security. The secret lies in the name itself. Blockchain means that it forms blocks of data and then distributes it amongst the nodes or the users connected to the network.

In order to destroy or alter this complex chain of blocks, a hacker would theoretically have to destroy each and every node that is connected to this network which is impossible for them to do, because this literally means they will have to hack millions of computers to hack this data. Let’s say if the hackers do manage to attack a few computers at the same time and destroy a few nodes. This would still not make any difference because Blockchain makes multiple copies of each block or chunk of data and then distributes it amongst the other nodes [8].

The added advantage of this decentralization is the fact that this security of the data present on Blockchain is continuously increasing with every passing day making it difficult for the hackers to get in. A public Blockchain network which has a huge number of users connected to it is much less prone to any cyber-attack. The more the number of users keeps getting added to the network, the more the impossibility of it being hacked increases. This is one reason, why biggest companies around the world are jumping on the Blockchain bandwagon and do not want to be left out and with every business and company joining, the network becomes stronger [9].

2.6. Preventing DDoS Attacks
A DDoS attack means Distributed Denial of Service, these type of attacks are very easy to start and hackers usually do these attacks when they are unable to penetrate a network. What happens during a DDoS attack is that a hacker starts sending fake traffic towards a website? At first, the website sees a huge surge in the traffic, but soon this traffic becomes out of control and the site can no longer keep up with these requests. This attack keeps on going until the websites is overwhelmed with crashes and fake requests generated by the hacker. DDoS attacks can sometimes become inevitable and even companies like Twitter, Spotify, and SoundCloud have suffered through DDoS attack and there was nothing they could do to prevent these.

Not many solutions have been made possible that can prevent a DDoS attack, this is mainly due to the difficulties presented by domain name system or DNS which is a partially decentralized one to one mapping system and maps names against domains. Blockchain has been the only possible solution for DDoS as of now and it is one of the biggest reason why tech giants have opted Blockchain for their security purposes. What Blockchain does is makes the network highly decentralized and functioning on millions of nodes in which case when a hacker tries to overwhelm the network by sending excessive requests, the network instead of dealing with these requests one by one distributes these requests between its nodes thus decreasing the load on the network. In this way no matter how many requests a hacker can send, the network will always have extra nodes to send these requests to [10].
3. Conclusion
Blockchain technology has a proven track record when it comes to the enhancement of cybersecurity which is why it is now being used at the biggest tech companies in the world, ranging from Google, Facebook to almost any other company you can name. It is due to its highly decentralized system that Blockchain solves many of the problems that were unsolved in the past. It also provides high end to end encryption making Blockchain one of the best technology to be used in B2B and B2C services.

More and more businesses are converging towards Blockchain technology for its radical changes that it has brought to the cyber-security industry. As Blockchain technology continues to grow and evolve, it is going to make the security of cyber-networks much stronger and better.

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