IoT and Block Chain driven Disruption in Logistics

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Abstract: - As the technology dependencies are increasing day by day in human work-life culture and the advancement in the number of electronic home appliances devices, auto companies and number of other platforms and applications are connected to the Internet of Things (IoT) and becoming more and more rapid increase in data consumption and the security and privacy of customer data cannot be comprised and the block chain domain perfectly allows to secure the customer data and it can be easily overlaps with the Internet of Things (IoT). This paper will focus the Internet of Things (IoT) and block chain architecture and platforms and how effectively it can be integrated into automotive industries and other use cases. We conclude that the Internet of Things (IoT) and block chain combination is a good combination and can cause most key revolutions across different industries and effective management, security and privacy of the customer confidential information also providing helpful guidance and reference for future research works.

Key Words — Block Chain, IoT layers architectures, IoT architectures, IoT- Transport, Security, Privacy.

I. INTRODUCTION

First and fore most we should try to understand about what an Internet of Things (IoT), the Internet of Things (IoT) will inter-connect not only multiple personal computers or Laptops and mobile devices other smart home devices, buildings, campus, cars, and cities [1]. Internet of Things (IoT) is forecasted as a very robust approach that delivers any service over the Internet by allowing communications through the interconnection of various devices and systems [2] and asset management across multiple industries. It is able to combine clearly and flawlessly a very immense number of different and several end systems to interconnect each other effectively [3]. Basically, in Internet of Things (IoT) a Devices or entities or objects with built-in sensors are attached to the Internet of Things (IoT) platform, which incorporates data from the different devices or objects and applies analytics to share the most valued information with applications built to address exact needs [4]. It can also be used efficiently in health-care domain, where a patient heart monitor or other health parameters can be monitored and analyzed without any manual help or intervention, when objects or devices can be themselves digitally, they can be controlled and monitored from anywhere.

As the devices are interconnected, it helps to capture more and more data, ensuring more ways of growing efficiency and improving Internet of Things (IoT) security [5].

The second most thing is to understand about block chain domain concepts, a block chain or Distributed ledger technology, is a continuously growing digital file of encrypted transactions called "blocks" that are scattered or copied to a peer-to-peer (P2P) network of computer [6]. The block chain is the fundamental technology of bitcoin cryptocurrency [7]. It's a distributed database which maintains a continuously growing data structure blocks which hold sets of specific transactions of the user. Each block comprises a timestamp and information link which points to a previous block [8]. The advantage of the block chain is, we can achieve the transparency, and reduced transaction costs as its organization to organization transactions to be finalized without the need for a third party involvement, and faster transaction settlements and Decentralization [9]. The block chain domain day by day it's becoming much popular and widely used in different application areas, one such example is financial or banking services for the asset management, insurance claims processing [10].

Finally, the integration block chain or distributed ledger provides security for the Internet of Things (IoT). With millions or billions of devices linked together, and the security is most important feature [10]. Enter the distributed or block chain ledger system that safeguards that information is only accepted and released to trusted parties. Block chain enables device self-rule or smart contract and reliability of data by removing technical bottlenecks, and the deployment

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operation costs the Internet of Things (IoT) can be significantly cheap through block chain domain [11].

II. IOT BUILDING BLOCKS AND LAYERS ARCHITECTURE

There are four vital building blocks or components of the Internet of Things(IoT) system that are applications, gateways, processors, sensors [12].
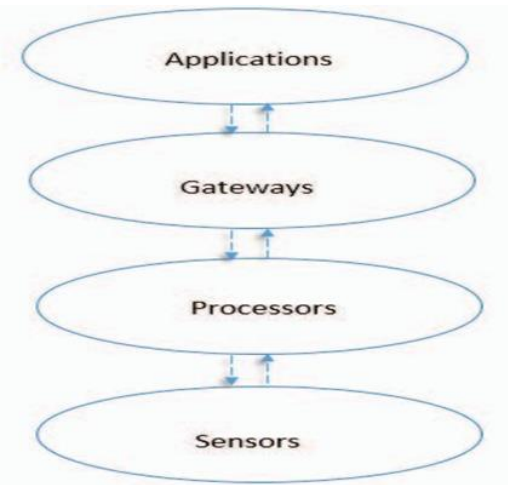

Fig.1.Basic building blocks of the Internet of Things

Applications: The application block is needed for proper utilization of all the collected data [12].

Gateways: The Gateways are responsible for transmitting of processed data and send it to the appropriate location so that data is correctly utilized and it provides the network connectivity to the data, and the network connectivity can be in the form of LAN, PAN, WAN etcetera [12].

Processors: The processors can be denoted as the brain of the Internet of Things (IoT) systems and the processors are accountable for securing the data and perform proper encryption and decryption of the data, the vital role of the processors is to process the data captured by the sensors [12].

Sensors: The front end of the IoT devices are sensors, and the key intentions of this sensors are to collect the data from its nearby other devices or sensors or to share the data to its nearby actuators. Each device is assigned a uniquely identifiable IP address so that it can be easily distinguishable over a bigger set of networks and the sensors collect the real-time data, for example, weather forecasting sensor, air quality sensor, soil quality sensor [12].

As shown in figure 2 [13], it indicates the four-layer architecture of the Internet of Things (IoT) and each layer are explained in points wise.

Application Layer: Application layer implements the final management of data, the application layer presents the data in the form of smart home, smart transportation or smart education, smart health-care and other different kinds of smart applications [14].

Management Layer: This layer will support device modeling, configuration, performance, security management and it's also in charge of security. control, information analytics and device management activities and the data management task are also performed such manages the data information flow and integration and control of the data [15, 16].

Network Construction Layer: Networking support and Data Transfer over wired and wireless networks. It will support large bulks of IoT data produced by wireless sensors and smart devices and other devices [17, 18].

Sensing and Identification or Device Layer: It consists of sensors and wireless sensors networks or Integration with Hardware such as RFID, sensors, actuators, camera, GPS, RFID tags lie in this layer [15, 16].

Fig.2. Four-layer architecture of the Internet of Things

III. USING IOT AND BLOCK CHAIN FOR LOGISTICS

Before let us take an example case studies, one of the Automobile auctioneering company is using a low-power wide area network(LPWAN) based (IoT) system to keep track of vehicles at car lots.

This solution is known as Cox2M, it's been designed for asset management, and used across several industries, and it's also used in automotive industry division to keep track of vehicles

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as they are received, test-driven and sold in large lots. And the other advantages of (IoT) based connectivity and sensors to provide to find cheap fuel nearby filling station and analysis the car wheel tire pressure [17].

The integration of the block chain with the Internet of Things (IoT), allows a much-secured way of the transaction and all the details can be tracked and monitored and securely protected. As shown in figure 3, it shows how the block chain and Internet of Things (IoT) integrated for automotive assets and Logistics management, the intelligent transportation systems on car will assist the driver in collision warning, blind spot obstacle detection, automated vehicles, In-vehicle signs and warnings, driver condition monitoring [18].
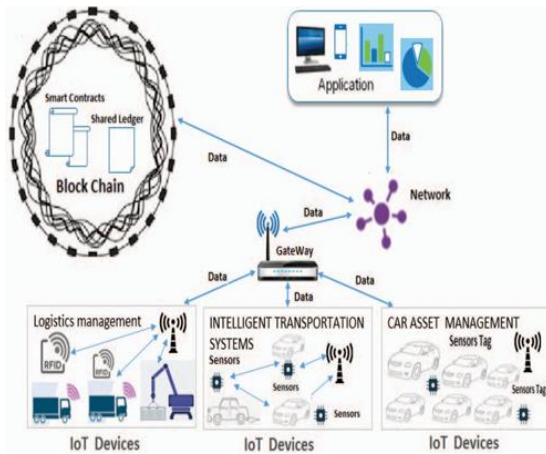

Fig.3. Block Chain and Internet of Things Architecture Platform for the automotive industry.

The Intelligent Transportation System is the combined advanced technologies using the electronics devices and sensors and communication devices; this provides travelers real-time data that make the user travelers safer journey and flexible and short travel distances [19].

The application of block chain domain for the automotive industry will make cars safer and cheaper, and keeping track of car in parking lots is simpler and less time consuming and lower car maintenance costs, and the user can take advantage of car purchase in easier process and maintenance processes [20]. The block chain enables the car to become more and more smart asset among the Internet of Things(IoT) because it can auto-manage services such as car insurance, highway toll payment, and parking fees [21].

The smart contracts are business rule programs that execute exactly as they are set up to by their smart contracts code

developer or creator [22], or it's also called auto enforced code which is included in the block chain. When it comes to automotive industry, the smart contracts can be encoded into manufacturing block chains to automatically trigger the purchase orders at certain stages of the manufacturing process [23].

IV. CONCLUSION

The Internet of Things is soon to conquer all parts of different industries, and transportation is no exception. As smart sensors are increasingly used to not only monitor traffic conditions, monitor weather temperature, and it is extensively used to monitor each part of the car components for effective functioning, and the integrating of block chain with Internet of Things gives an added advantage. Unfortunately, as still both the block chain and IoT (Internet of Things) is still in the infant stage, and more and more research needs to be conducted to overcome certain security issues, and it needs to be addressed in more effective way.

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