Blockchain in the Telecom Industry

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Abstract. *This article looks at the introduction of Blockchain technology in the telecoms industry. Blockchain is one of the disruptive technologies that is rapidly entering all sectors of the industry, economy and life. This article examines some scenarios in the telecommunication sector and the first case of application. The topic is too new and hot and will soon begin to explore the positive and negative trends of Blockchain effects.*

Introduction

Telecommunications generate every year around 6 Trillion Dollars revenue including internet data voice communications and broadcasting, but not limited. The rapidly changing environment of telecommunication businesses has forced them to change the old fashioned limited business models and to adapt the latest technological trends so can meet the current market trends and requirements. Based on a survey (by IBM) of C-suite executives from the telecommunications industry, a significant percentage of CSP-organizations are already considering or actively engaged with blockchains. Eighty-seven percent of surveyed executives said the customer is an important role affecting their ability to move forward with blockchain at a commercial scale.[1]
The blockchain in telecom market size is expected to grow from USD 46.6 million in 2018 to USD 993.8 million by 2023, at a Compound Annual Growth Rate (CAGR) of 84.4% during the forecast period.[2]
As much as the term blockchain used it is widely misunderstood. In its mid-term reality exists a lot of implications and cases for using blockchain in telecom industry, but mostly not in wide-speared way who people think. It challenges the general assumption for trust and even ways to store, share and access data, and perform efficient transactions.

Blockchain in kernel

Distributed Ledger Technology refers to a novel and fast-evolving approach to recording and sharing data across multiple data stores (or ledgers). This technology allows for transactions and data to be recorded, shared, and synchronized across a distributed network of different network participants.

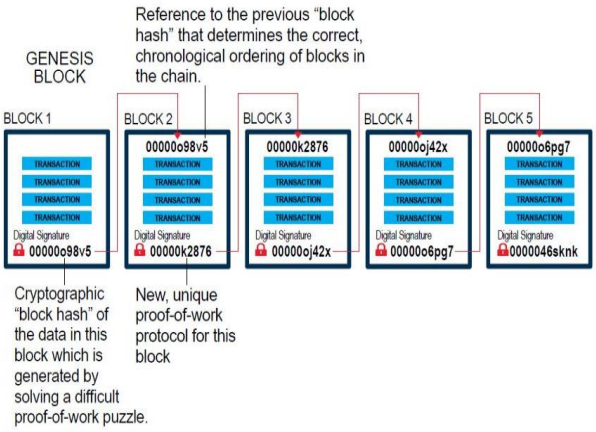
A ‘blockchain’ is a particular type of data structure used in some distributed ledgers which stores and transmits data in packages called “blocks” that are connected to each other in a digital ‘chain’. Blockchains employ cryptographic and algorithmic methods to record and synchronize data across a network in an immutable manner. Three features of DLT that are generally considered key to the technology are outlined below: the distributed nature of the ledger, the consensus mechanism, and cryptographic mechanisms [3].

Distributed ledger technology (DLT) is the symbiotic operation of technological infrastructure, using cryptographic algorithms executed by software programs via protocols and allows multiple entities from various locations to access validate and update records in an immutable manner. It is also called Blockchain, because of the chain of blocks which the ledgers create. Every ledger consists of components which create trust and secure its rigidity. In the core of Blcokchain architecture are hashes, digital signatures, private and public keys. Every participant generates private/ public key pair, as private key is also called secret key which is visible only for its holder. A digital signature is a function of a message and the secret key, and it can’t be copied, because with the new message the secret key changes. The verification

of signature validation is made together with the message and the public key, where it confirms or rejects that the digital signature is produced for the same message with the private key from the initially generated pair of private/public key. The possibilities to guess a secret key together with known public key is 2^{256}. Other important component of Blockchain technology is the usage of cryptographic hash functions for assuring the content of a ledger/block [4]. Cryptographic hash function is infeasible to compute in reverse direction.

The ledger is a collection of transactions which works through distributed consensus mechanism among every node within the system. Ledger's validation is made by Proof of Work, PoW (ledger ID), the most common used consensus mechanism, which proves that a particular list of transactions is associated with a large amount of computational effort. If only a single bit has been changed in the ledger it would completely change the hash value. Figure 1 refers to a part of structural model of distributed ledger technology. This architecture is a core base of the blockchain platforms, the technological lowest level of the ecosystem.

The categorization of Blockchain permission model defines who and what kind of access has. It can be open (permission-less) and permissioned [5]. The network categorization requires whether the access to the blockchain data itself is public or private [6]. The permission-less network is used to Bitcoin. Permission refers to the authorization for verification, and anybody can join the network to be a verifier without obtaining any prior permission to perform such network tasks.



Фиг.1. Blockchain Structure source: Distributed Ledger Technology (DLT) and Blockchain FinTech Note1/ World Bank Group

Blockchain use cases in Telecoms

The blockchain could have enormous impact referring to the telecom industry, especially because of the industry's large customer bases, complex internal processes, multiparty transactions, long value chains, and presence of intermediaries, as well as high incidence of roaming fraud and associated costs.[7]
The variety of potential applications of blockchain in the telecom space is numerous, from voice settlement to mobile number portability. In these sections will be presented the most notable use cases of blockchain in the telecom industry.

Roaming fraud prevention

Revenue leakages and frauds are the results of the porosity of the traditional ecosystems, fraud loss was estimated close to $40 billion in 2017. Despite the partial "innovations", the industry has not found a sustainable method to mitigate fraud.

Blockchain has fundamentals and high capacity to reduce, at least, two main types of frauds – roaming fraud and compromised identity. Blockchain links a device to the user's identity, leading to the case that, if a user's identity is compromised, it can affect not just the device, but every service associated with the subscriber's identity.

Blockchain eliminates the frauds by implementing a permissioned blockchain between every pair of operators that have a roaming agreement. Every time a subscriber triggers an event in a visiting network, a smart contract and the terms of the agreement between the roaming partners are executed. This allows instantaneous and verified authorization as well as settlement to occur in real-time – reducing drastically costs and frauds.[8]
The 2017 Global Fraud Loss Survey estimated that revenue fraud costs telecoms US$29.2 billion annually.[9] By using blockchain, telecoms could mitigate losses from fraud while unlocking new revenue streams for identity. With subscriber profiles and real-time connectivity to every customer through their smartphones, telecoms can play a more central role in digital identity. Such services could include data marketplaces for users to manage and monetize their personal information—or restrict it accordingly.[10] (How can telecom, media, and entertainment find the value in blockchain? Chris Arkenberg, Nakul Lele, Jeff Loucks, Karthik Ramachandran)

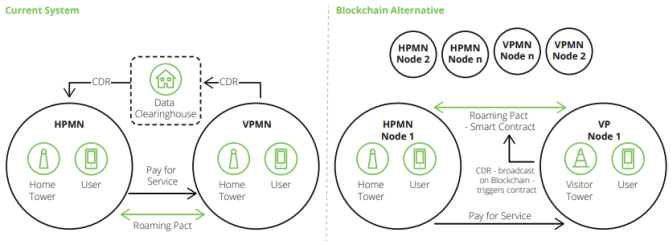


Fig. 2 Roaming Fraud prevention illustrative presented

Identity-as-a-service and Data Management

Blockchain can help create new revenue streams by providing data management and identity authentication solutions to improve the user base of operators. CSPs can use their relevant data for their clients to provide a dynamic identity transaction platform (digital signature). Operators can develop identity management tools available for organizations, devices, and applications.

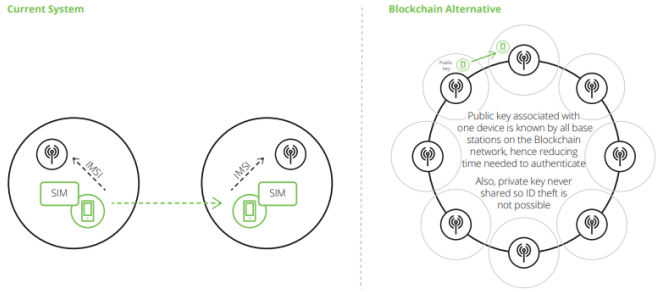


Fig. 3 Subscription identity illustrative

5G enablement

Smart contracts, which are one of the key features of blockchain technology, are used to automatically implement rules and agreements between access points and to ensure the availability of real-time network resources. Networking and real-time networking rules are the current issues that need to be addressed before mass adoption of 5th generation networks. The blockchain platform allows new generation of access and management technology for network selection. It supports the activation of 5G network potential and provides a common platform with seamless connectivity. 3GPP and non-3GPP can be implemented using block blocking, and operators can connect to devices on multiple local hotspots and Wi-Fi based on permission. With the search for improvements in the telecommunication network and the deployment of the 5G network, the connectivity network is expected to grow with the highest CAGR.

Fig. 4 5G Enablement illustrative

IoT Connectivity

Applications for IoT devices include a smart city, intelligent home, connected car, connected cars, smart farming, smart entertainment and much more. There is no doubt that this list will grow further in the near future. Frost and Sullivan predict that by 2020 the market for smart cities will reach $ 1 trillion. It is estimated that there will be 200 billion connected devices by 2020, which may increase the likelihood of devices being vulnerable to attacks.

Separate hardware challenges (such as longevity), the core elements in the development of IoT devices are Connectivity, Privacy, Compatibility, and Security.

The current ecosystem for IoT is highly centralized and completely relies on the internet for any sort of communication amongst connected devices which makes it highly vulnerable if security is not prioritized. Traditional systems are subject to several points of failure such as Packet loss, Cloud services Interoperability issues, Single point of failure…. etc. Blockchain provides a secure dynamic peer-to-peer distributed network solution through the utilization of nodes which can be represented by embedded IoT sensors that verify every block being captured into a real-time monitoring system for IoT systems. With the implementation of blockchain technology in IoT ecosystem, the Centralized model can be replaced by Distributed Digital Ledger (DDL) for all the transactions, makes extremely secure peer-to-peer self-managed network which overcomes some of the IOT challenges.

Benefits	Challenges
A blockchain's 'enabled' trust improves coordination between various partners, due to a shared view of transactions and liabilities. This in turn permits the elimination of third parties, resulting in cost savings.	Since a blockchain retains all historical data, the size of an established blockchain at each node might become unsustainable. Instead, a mechanism to archive historical data needs to be looked at. Several alternatives are currently being explored in this regard by various players in the blockchain ecosystem.
Facilitates a single view of data instead of the need for consolidation across various disparate systems. Also allows for reliable audit trails due to the history of all transactions being available in the ledger	Conforming to existing data standards in terms of both structure and transport for sharing of information could prove to be an initial hurdle.
Implementation of smart contracts in roaming and other cases allows for near-instantaneous charging, thus leading to improved revenue assurance and fraud reduction.	Clear regulatory frameworks need to be defined for the implementation of agreements as digital, smart contracts
Potential to facilitate new business models for revenue generation for Communication Service Provider who are looking for new avenues to increase both top and bottom lines.	
A blockchain can act as the ledger that enables, for example, an M2M economy to prosper based on the common platform available, in which M2M transactions can be recorded. It can thus act as the enabler for an IoT ecosystem	

Table 1: Benefits and challenges

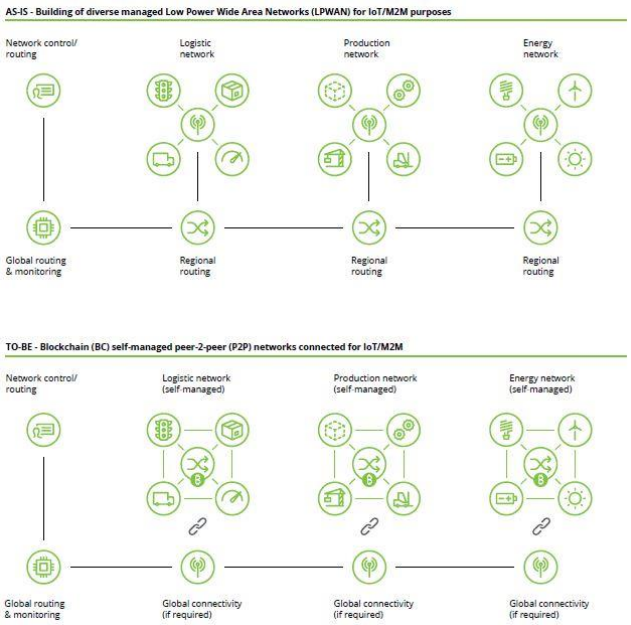


Fig. 5 IoT Connectivity illustrative

The presented use cases for blockchain technology implementations are just a small but valuable part of the variety of possibilities which blockchain provides to telecom industry. Fig. 6 shows an unified representation of this diversity.

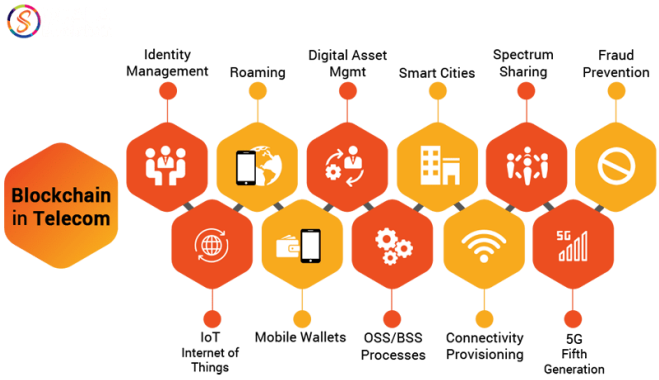


Fig. 6 Blockchain's use cases in Telecom

The adoption of blockchain technologies in telecom industry could have potentially benefits in three areas: Efficiency improvements; cost reduction; and fraud mitigation.

Efficiency improvements streamline multiparty transactions by automatizing and expediting the process while guaranteeing the accuracy of the settlements between parties (thus avoiding duplication of verification processes). The benefits can materialize in different forms depending on the type of industry and the type of interactions/transactions required. For industries with regular and low value interactions with

their customer base, such as telecom, blockchain can verify and automate transactions, with increased transparency for the end customer. The higher the number of low value transactions, the greater the potential of blockchain. The higher the number of players, the higher the number of cross-transactions, hence whenever multiple parties are involved, blockchain plays at its best. For example, in a telecom intercarrier settlement scenario with three players, blockchain with deliver 3X value vis-à-vis the two players only scenario.

The Cost reduction potential is linked to the capability to eliminate intermediaries and reduce labour intensive processes through automatization. This is higher in industries with complex and labour intensive internal processes, like banking. Middle men can be eliminated as verification of transactions is automated and guaranteed through blockchain. This applies to telecom international roaming transactions and resulting international voice settlement where blockchain can replace the expensive mediation of clearing houses.

Fraud mitigation is mostly associated to high delinquency ratio such as identity theft and similar fraud. The food industry can greatly benefit from blockchain by enabling trusted tracking of food life-cycle to ensure the integrity of the cold chain in transportation, helping reduce the high volume of fraud related to the sale of expired, contaminated or counterfeit food. Blockchain-addressable security related concerns are also related to long verification processes, as the longer the time, the more exposed the process is. International money transfers between banks is an area facing this problem and so too is roaming settlement between telecom players, which currently lose more than $38 billion annually in fraud costs, according to Deloitte.

Illustrated in table 1 benefits and presented advantages in the three core areas for telecom industry give another approval for the advantages of this technology no matter of industry it is disrupting. Table 1 gives a clear sign that using blockchains has more “pros” than “cons”. On other side even only three, the challenges which implementation of blockchain faces are time consuming, tough and complex and requires a lot of resources.

Conclusion

Given the importance of the trillion-dollar industry and its control under the hand of a few, makes the disruption of distributed blockchain technology a need of the day.

Blockchain is currently leading the way in telecom innovation and is changing the economic social landscape of digital communications worldwide. It accommodates telcos biggest need to make their service offerings elastic according to market changing demands.

Blockchain technology can resolve the telcos high pressure to cut down the cost, to enable new revenues streams, service efficiencies, and also keep a check on fraudulent practices while allowing a superior customer experience. It eliminates the traditional complex and long chain of inter-related operations that work jointly to deliver services to customers.

Being a decentralized technology, blockchain completely eliminates the role of expensive infrastructure as well as the need for central authorities or intermediaries. It increases the speed and efficiency of the digital exchange of data between people, departments and provides quicker, efficient and seamless transmission of information.

Blockchain looks instrumental in enabling interoperability between internal as well as external systems for telecom companies. This can bring down infrastructure as well as compliance. Blockchain has the potential to disrupt business models by increasing transparency and effectiveness in the telecom network and its processing. Blockchain decentralized ledger documents fully each transaction that occurs across a distributed or peer-to-peer network, either public, private or hybrid.

In addition, blockchain (recognized as a trusted technology) plays an important role in many areas that conventional systems are technically limited to resolve, such as Service convergence, Real-time transactions, Industry integration,

Usage of 5G capabilities, Internet of Things (IoT), Augmented Reality (AR), Virtual Reality (VR), Machine-to-Machine (M2M), Issues related to overabundance of contents, Data traffic explosion, Mobility, Security and many more… where devices connected to the internet automatically orchestrate their interactions

The usage of blockchain based-applications by the telecommunications industry is gaining momentum and eventually will become the norm. The clock is ticking.Авторите трябва да оставят e-mail и телефон, на който могат да бъдат търсени.

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