

UNBOXING BLOCKCHAIN





INTRODUCTION

Blockchain is a decentralized and distributed digital ledger technology that allows multiple parties to have a synchronized and tamper-evident record of transactions or information without the need for a central authority or intermediary.

A Blockchain consists of a chain of blocks that contain information in a digital format, such as transactions, contracts, or data. Each block is verified by a network of nodes or participants using cryptographic algorithms and consensus mechanisms, and once validated, it is added to the chain in a permanent and immutable way.

This means that any change or tampering with a block would require the consensus of the network and the modification of all subsequent blocks, which makes Blockchain extremely secure and transparent. Blockchain can be used for a variety of applications, including cryptocurrency, supply chain management, identity verification, voting systems, and more.

Blockchain works by creating a decentralized and distributed digital ledger that allows multiple parties to have a synchronized and tamper-evident record of transactions or information without the need for a central authority or intermediary.

Blockchain is useful because it offers several advantages over traditional centralized systems, such as decentralization, security, transparency, efficiency, programmability and innovation. Generally, Blockchain is useful because it provides a secure, transparent, and efficient way to manage transactions and information, without the need for a central authority or intermediary.

Blockchain is a digital ledger that records transactions in a secure, transparent, and decentralized manner. Think of it as a database that is spread across many computers (or nodes) instead of being stored in one central location. Whenever a new transaction occurs on the Blockchain, it is validated by the network of computers. Once it is validated, it is added to a block of transactions.

Each block is linked to the one before it, creating a chain of blocks - hence the name "Blockchain." What makes Blockchain so secure is that once a block is added to the chain, it cannot be changed or deleted.

This is because each block contains a unique code called a hash that is based on the transactions in the block. If someone tries to tamper with a block, it changes the hash, which would be immediately detected by the other nodes on the network.

Because the Blockchain is decentralized and every computer on the network has a copy of the ledger, it is nearly impossible for any one person or entity to manipulate or control it.

This makes Blockchain a highly secure and trustworthy technology for recording and transferring data, whether its money, digital assets, or even voting records.

Blockchain is a decentralized and distributed digital ledger technology that allows multiple parties to have a synchronized and secure record of transactions or information without the need for a central authority. Let's unbox the concept of blockchain and its layers.

MYSTERY SOLVED



L1: Data Layer:

At the core of a blockchain, we have the data layer. It consists of a chain of blocks, where each block contains a set of transactions or information. These blocks are linked together using cryptographic hashes, creating an immutable and tamper-resistant chain of data.



L2: Network Layer:

The network layer facilitates the communication and consensus among participants in the blockchain network. It enables nodes (computers or devices) to connect and share information with each other. The network layer may use peer-to-peer protocols or a combination of different network architectures.



L3: Consensus Layer:

The consensus layer is responsible for achieving agreement among network participants on the validity and order of transactions. It ensures that all nodes in the network have a consistent view of the blockchain. Various consensus algorithms, such as Proof of Work (PoW), Proof of Stake (PoS), or Practical Byzantine Fault Tolerance (PBFT), are used to establish trust and prevent malicious activities.



L4: Smart Contract Layer:

Smart contracts are self-executing agreements with predefined rules encoded into the blockchain. The smart contract layer allows for the creation and execution of programmable contracts, which automate processes and eliminate the need for intermediaries. Ethereum is a prominent example of a blockchain platform that supports smart contracts.



L5: Application Layer:

The application layer is where developers build decentralized applications (DApps) or services on top of the blockchain infrastructure. These applications can leverage the underlying blockchain's security, transparency, and immutability features to enable various use cases such as financial transactions, supply chain management, voting systems, and more.



Each layer plays a crucial role in the overall functioning of a blockchain. The data layer provides the foundation by storing transactional information, while the network layer enables communication between participants. The consensus layer ensures agreement on the state of the blockchain, and the smart contract layer allows for the execution of programmable agreements.

Finally, the application layer brings real-world use cases and user interfaces to interact with the blockchain. It's worth noting that different blockchain platforms may have variations in their layering structure and implementation details, but the fundamental concept of a distributed and secure ledger remains consistent across most blockchain systems.



UNBOXING PATENT TRENDS IN BLOCKCHAIN

Patent Status

Currently, there are 95240 patented inventions on Blockchain technology among which approximately 28174 patents are granted, 57266 patents are pending, 4348 are revoked, 68 patents are expired. Further, a graphical representation of this data is depicted in Figure 1.

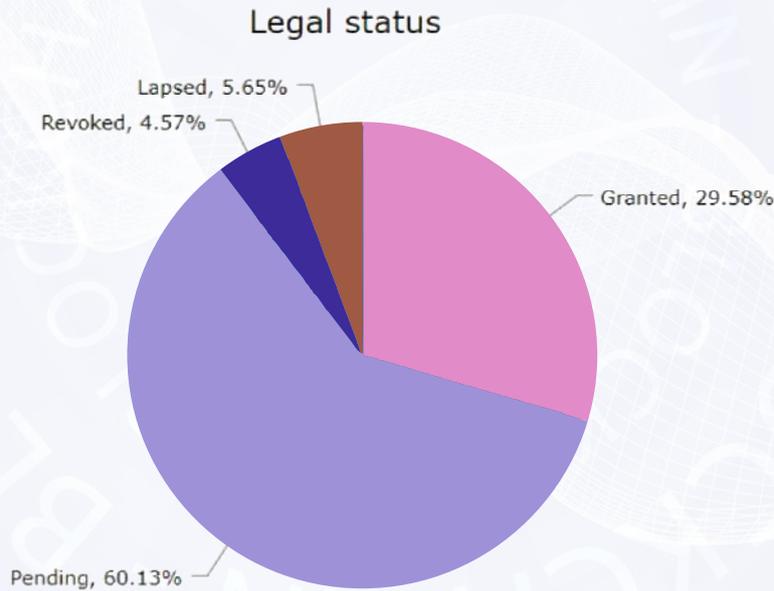
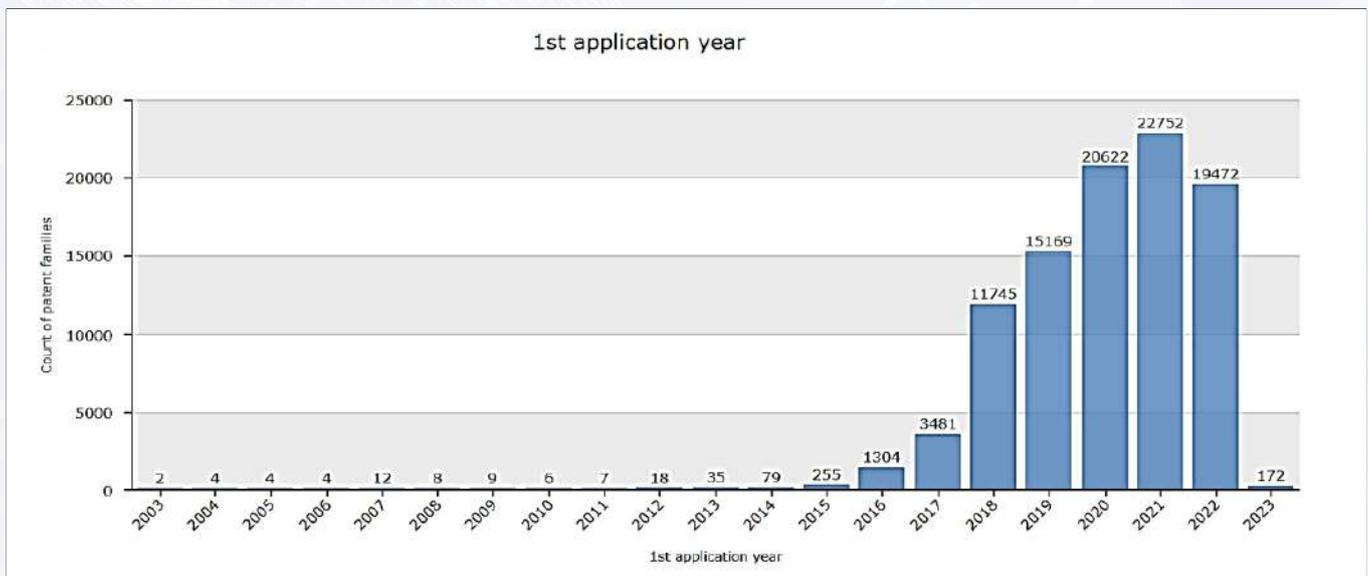


Figure 1: Patents related to Blockchain Technology

EVOLUTION OF APPLICATIONS OVER TIME:

Figure 2 indicates the dynamics of inventiveness of the portfolio related to Blockchain technology. Further from the Figure 2 it is observed that from year 2016, there has been continuous development in the field of Blockchain. In year 2020, more than 20,000 patents were filed and in year 2021 more than 22,000 patents were filed.



Source: Questel Orbit

Figure 2: Evolution of applications over time

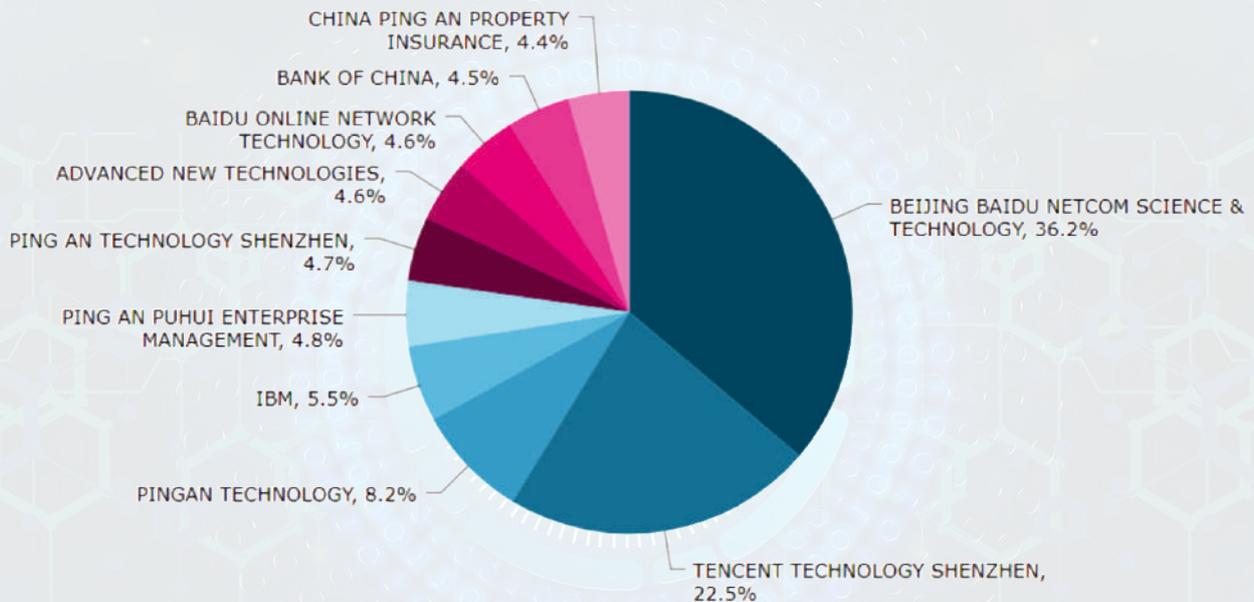
Top 10 players:

Figure 3 and Table 1 depicts top 10 players or Applicant filing the maximum number of patents in the field of Blockchain. From the figure it is clearly observed that Beijing Baidu Netcom Science and Technology has filed maximum number of patents. "Beijing Baidu Netcom Science & Technology Co., Ltd.", commonly known as "Baidu", is a Chinese technology company that specializes in internet-related services and products. Baidu is one of the largest internet companies in the world, and its services include a search engine, online advertising, artificial intelligence, and cloud computing, among others.

Table 1: Top 10 Players in the Blockchain Field

ASSIGNEES	COUNT OF PATENT FAMILIES
Beijing Baidu Netcom Science & Technology	6626
Tencent Technology Shenzhen	4120
Pingan Technology	1503
IBM	1015
Ping an Puhui Enterprise Management	876
Ping an Technology Shenzhen	857
Baidu Online Network Technology	833
Bank of China	830
China Ping an Property Insurance	804

Patent families by Assignees



Source: Questel Orbit

Figure 3: Top 10 players

TOP JURISDICTIONS IN THE FIELD OF BLOCKCHAIN

Figure 4 depicts a map which represents that maximum number of patents are filed by China, United States, Europe and Korea. Meanwhile India has filed approximately 2585 patents belonging to the field of Blockchain. There had been a significant increase in the number of Blockchain-related patent applications filed in India in recent years, reflecting the growing interest in Blockchain technology in the country.

In addition, the Indian Patent Office has issued several patents related to Blockchain technology, including patents for Blockchain-based systems for supply chain management, smart contracts, and digital identity management, among others.

It's worth noting that the patenting of Blockchain technology is still a relatively new area, and there may be ongoing debate and discussion regarding the scope and patentability of Blockchain-related inventions in India and around the world.

Patent families by Protection country



UNBOXING THE LATEST TRENDS & DEVELOPMENTS IN BLOCKCHAIN

Blockchain technology has rapidly become one of the most talked-about and transformative technologies of the 21st century. From its early days as a decentralized ledger for cryptocurrencies like Bitcoin, Blockchain has evolved to become a secure and transparent platform for a wide range of applications, from supply chain management to voting systems. As the technology continues to mature, the latest trends and developments in Blockchain are driving innovation and reshaping industries across the board.

Some of the latest applications of the Blockchain are listed below who are changing the game:

Supply chain management: Blockchain can be used to create secure and transparent supply chains, allowing companies to track products from the manufacturer to the end consumer. This can help improve efficiency, reduce fraud, and increase trust among supply chain partners.

Autonomous vehicles: Blockchain can be used to create a decentralized network for autonomous vehicles, allowing them to communicate with each other and make decisions in real-time. This can help improve safety and efficiency on the road.

Freight tracking and logistics: Blockchain can be used to track freight and logistics data, allowing companies to manage inventory, optimize routes, and reduce shipping costs.

Digital identity verification: Blockchain can be used to create secure and decentralized digital identities for drivers and passengers, allowing for more efficient and secure identity verification processes.

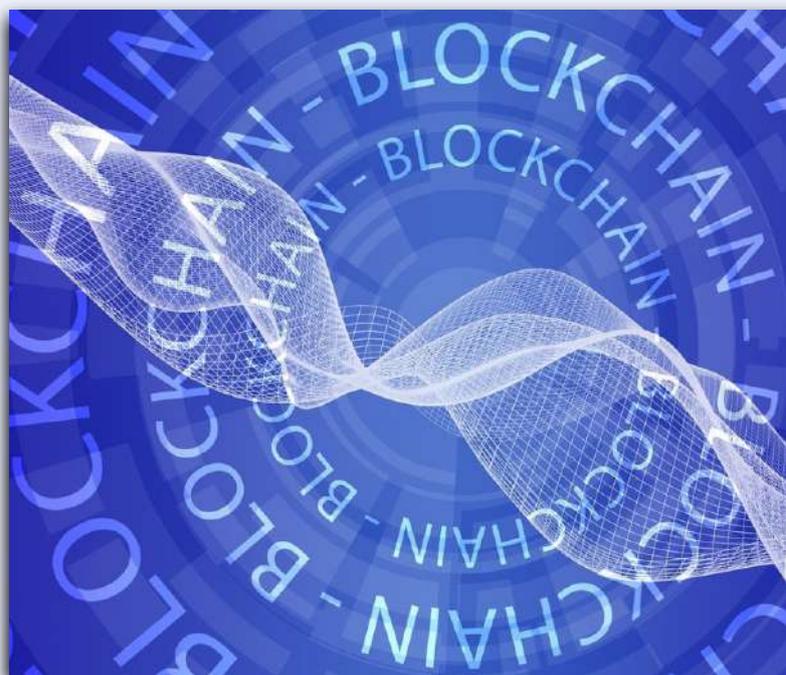
Smart contracts: Blockchain can be used to create smart contracts, which are self-executing contracts with the terms of the agreement between buyer and seller being directly written into lines of code. This can help automate payment and settlement processes in the transportation industry.

Healthcare: Blockchain can be used to create secure and transparent health records, enabling patients to manage and control their own medical data while also improving data accuracy, privacy, and security.

Real estate: Blockchain can be used to create transparent and secure property ownership records, reducing fraud and improving transparency in real estate transactions.

Energy: Blockchain can be used to create peer-to-peer energy markets, enabling households and businesses to buy and sell energy directly to each other, reducing costs and increasing efficiency.

Voting systems: Blockchain can be used to create secure and transparent voting systems, enabling voters to cast their ballots securely and anonymously while ensuring the integrity of the voting



process.

Gaming: Blockchain can be used to create decentralized gaming platforms, enabling players to earn and trade in-game assets securely and transparently.

Decentralized Finance (DeFi): DeFi is an emerging trend in the Blockchain space that aims to provide financial services in a decentralized and transparent manner, without the need for traditional intermediaries such as banks.

Non-Fungible Tokens (NFTs): NFTs are unique digital assets that are stored on a Blockchain and provide proof of ownership and authenticity for a variety of digital media, including artwork, music, and video.

Central Bank Digital Currencies (CBDCs): CBDCs are digital versions of fiat currencies that are issued and backed by central banks, and are designed to be used as a secure and efficient means of payment.

Blockchain Interoperability: Interoperability is a key challenge for the Blockchain industry, as different blockchains are often incompatible with each other. Projects that aim to solve this problem by enabling communication and interoperability between different blockchains are currently trending.

Sustainability and Green Blockchain: With growing concerns over the environmental impact of Blockchain technology, there is a trend towards developing sustainable and environmentally-friendly Blockchain solutions, such as those that use renewable energy sources or have low energy consumption.

Intellectual Property: Blockchain is used to create a secure and transparent platform for the registration and transfer of intellectual property rights, such as patents and trademarks.

These are just a few examples of the latest applications of Blockchain technology across industries. As the technology continues to evolve, we can expect to see even more innovative and game-changing applications emerge.

Some of the trending topics of Blockchain technology are depicted in Figure 5 and Figure 6.



UNBOXING THE INSEPARABLE LINK BETWEEN CRYPTOCURRENCY AND BLOCKCHAIN

Cryptocurrency and Blockchain technology are closely related, as cryptocurrency is one of the most well-known and widely-used applications of Blockchain.

In simple terms, a cryptocurrency is a digital currency that uses cryptography and a Blockchain network to ensure secure and transparent transactions. The Blockchain technology is used to create a decentralized and distributed ledger of all cryptocurrency transactions, which is maintained by a network of computers around the world. This makes it possible for users to send and receive payments without the need for a central authority such as a bank.

Cryptocurrencies use Blockchain technology to ensure the integrity and security of their transactions. The transactions are verified by the network of computers, which use complex algorithms to validate the transactions and ensure that they are legitimate.

While cryptocurrency is perhaps the most well-known application of Blockchain technology, it's worth noting that Blockchain has a wide range of potential use cases beyond cryptocurrency, such as supply chain management, digital identity verification, and voting systems, among others.

In cryptocurrency, Blockchain technology is used to create a decentralized and secure ledger of all transactions. Here's a general overview of how Blockchain works in cryptocurrency:

1. A user initiates a cryptocurrency transaction, such as sending funds to another user.
2. The transaction is broadcast to the network of nodes (computers) that make up the Blockchain.
3. The nodes verify the transaction by confirming that the sender has sufficient funds and that the transaction is valid and not a duplicate.
4. Once the transaction is verified, it is added to a new block on the Blockchain. Each block contains a number of transactions, as well as a unique code (hash) that links it to the previous block, creating a chain of blocks (hence the name "Blockchain").
5. The new block is then broadcast to the network, and each node updates its copy of the Blockchain to include the new block.
6. The transaction is complete, and the recipient now has access to the cryptocurrency funds.

Because the Blockchain is decentralized and distributed across many different nodes, it's extremely difficult to tamper with or manipulate the ledger. This makes it a secure and transparent way to conduct transactions without the need for a central authority like a bank.



DECRYPTING THE LEGAL STATUS OF CRYPTOCURRENCY

The legal status of Blockchain varies from country to country and depends on factors such as the regulatory environment, government policies, and the specific application of Blockchain technology. In general, Blockchain technology is not illegal anywhere in the world, but its legal status varies depending on its application.

In some countries, such as Malta and Switzerland, there are regulatory frameworks in place to support Blockchain and cryptocurrency businesses. These countries have adopted a "pro-innovation" stance, recognizing the potential of Blockchain technology to drive economic growth and create new opportunities.

In other countries, such as China and India, there are restrictions on the use of cryptocurrencies and Blockchain technology. In China, for example, the government has banned cryptocurrency exchanges and initial coin offerings, while in India, the government has taken a cautious approach to Blockchain and cryptocurrencies, with the Reserve Bank of India banning banks from dealing with cryptocurrency-related businesses.

Overall, the legal status of Blockchain is still evolving, and many countries are still developing regulatory frameworks to govern the use of Blockchain technology.

In recent years, there has been a significant shift in the global perception of cryptocurrencies. Despite the term "cryptocurrency" being somewhat misleading, many countries now recognize digital currencies as commodities, and some even consider them to be legal tender.

The below table provides insights into the approaches of major countries regarding cryptocurrency regulations,



COUNTRY	CRYPTOCURRENCIES	EXCHANGES	INITIAL COIN OFFERING
Australia	Legal; treated as property	Legal, must register with AUSTRAC	Regulated
Switzerland	Legal; generally accepted as payment	Legal, regulated by SFTA	Regulated
Malta	Not legal tender	Legal, regulated under the VFA Act	Regulated
Estonia	Not legal tender	Legal, must register with the Financial Intelligence Unit	Regulated
Gibraltar	Not legal tender	Legal, must register with the GFSC	Regulated
Luxembourg	Not legal tender	Legal, must register with the CSSF	Regulated
Canada	Not legal tender; some retailers accept as payment	Legal, regulation varies by province; final federal regulations expected late 2019	Regulated
Mexico	Legal, accepted as payment in some contexts	Grey area; first crypto exchange in opened mid 2019	Regulated
Lithuania	Not legal tender	Legal, must register with the Lithuanian Finance Ministry	Grey area
United States	Not legal tender; some retailers accept as payment	Legal, regulation varies by state; SEC expected to publish updated crypto regulations late 2019	Grey area
UK	Not legal tender; considered assets	Legal, registration requirements with FCA	Grey area
Russia	Not legal tender	Grey area; regulations to be determined by the end of 2019	Grey area
Japan	Legal; treated as property	Legal, must register with the Financial Services Agency	Grey area
Nigeria	legal	Grey area; regulations upcoming from Central Bank of Nigeria	Grey area
Singapore	Not legal tender	Legal, no registration required	Grey area
South Korea	Not legal tender	Legal and regulated, must register with FSS	Banned
India	Not legal tender; digital rupee may be in the works	Effectively illegal, but global and federal regulations being considered	Banned
China	Bitcoin considered property; all other cryptocurrencies banned	Illegal, but a global regulatory framework being considered	Banned



ROAD AHEAD: UNBOXING THE POTENTIAL AND POSSIBILITIES OF THE FUTURE OF BLOCKCHAIN



Based on current trends and developments in the field, here are some possible scenarios for the future of Blockchain technology:

Continued growth and adoption: Blockchain technology is expected to continue to grow and be adopted in a wider range of industries, as more businesses and organizations recognize its potential for increasing efficiency, transparency, and security.

Emergence of new use cases: As Blockchain technology evolves, it is likely to find new use cases beyond its current applications in areas such as cryptocurrency and supply chain management. For example, it could be used in healthcare to improve data privacy and security, or in voting systems to increase transparency and prevent fraud.

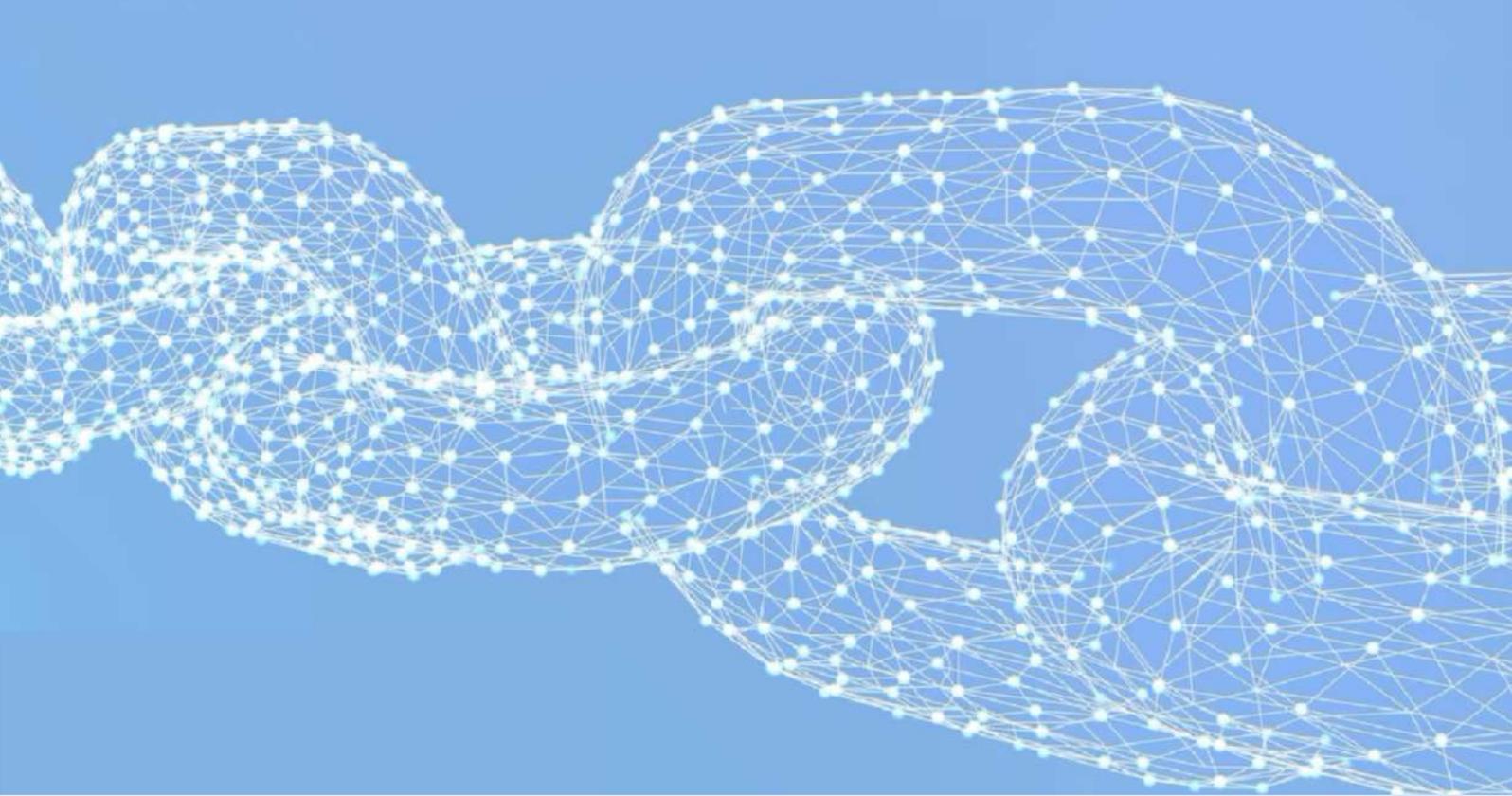
Greater focus on interoperability and standardization: As the number of Blockchain networks and applications grows, there is likely to be a greater focus on creating standards and interoperability protocols to facilitate communication and data exchange between different systems.

Increased regulation: As Blockchain technology becomes more widely used, it is likely to face increasing regulatory scrutiny from governments and other organizations. This could lead to more standardized practices and greater accountability, but could also stifle innovation and growth in the field.

Development of more sustainable and energy-efficient solutions: As the environmental impact of cryptocurrency mining becomes more widely recognized, there is likely to be a greater focus on developing more sustainable and energy-efficient Blockchain solutions. Overall, the future of Blockchain technology is likely to be shaped by a combination of technological advancements, regulatory developments, and shifting industry trends.

Further, the world has been experiencing a digital revolution in recent years, and Blockchain technology has the potential to revolutionize the country even further.

One of the most significant benefits of Blockchain is its ability to enhance document security. By using Blockchain, documents can be secured through encryption and tamper-proof features, ensuring that sensitive information is protected and cannot be manipulated. For example, Blockchain can be used to secure land records in India. By implementing Blockchain-based land records, individuals and organizations can be assured that their land records are secure, transparent, and cannot be tampered with.



WAY FORWARD

Another area where Blockchain can be used to enhance security is in transportation. Blockchain technology can be used to enable secure and transparent tracking of goods, reducing the risk of theft or fraud. For example, Blockchain-based supply chain management can help ensure the authenticity of products by creating an immutable record of every transaction in the supply chain.

This can be particularly useful in the pharmaceutical industry, where counterfeit drugs are a significant problem.

Another area where Blockchain can be integrated to improve transportation in India is roadside assistance.

By implementing a Blockchain-based system, roadside assistance providers can ensure that data regarding a vehicle's location, status, and service history is securely stored and accessible. This would enable quicker and more accurate assistance in case of breakdowns or accidents, reducing the time and cost associated with towing and repairs.

Moreover, Blockchain can also be used to enhance vehicle communication. By implementing blockchain-based vehicle-to-vehicle (V2V) communication, vehicles can securely share information such as location, speed, and road conditions.

This can lead to improved safety and efficiency on the roads, as vehicles can communicate with each other to avoid accidents and traffic congestion. Additionally, blockchain-based vehicle-to-infrastructure (V2I) communication can enable smart traffic management systems that can reduce congestion and improve traffic flow.

In conclusion, Blockchain technology has the potential to transform various industries in India and around the world. From enhancing document security and transportation to improving peer-to-peer communication and roadside assistance, Blockchain-based solutions offer greater transparency, security, and trust in these industries.

As the technology continues to evolve and become more widely adopted, we can expect to see even more innovative use cases and applications of Blockchain in the future.





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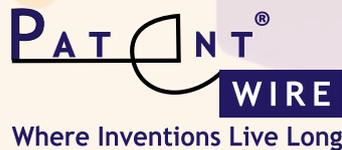


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