

Blockchain in air cargo: digital disruption in the supply chain

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“Managing today’s supply chains—all the links to creating and distributing goods—is extraordinarily complex. [...] Due to the complexity and lack of transparency of our current supply chains, there is interest in how blockchain might transform the supply chain and logistics industry.”¹

Forbes, March 2018

Executive summary

Did you know nearly two thirds of the world's largest corporations are considering deploying their own blockchain application?² Many organisations in the air cargo industry are currently testing the technology with the intention of building their own blockchain ecosystem. With overall savings estimated at around \$38 billion³, the expected business value of blockchain in the travel and transportation industry is substantial.

Today, the key players in a supply chain are separate organisations, with different priorities and ways of working, operating across different countries. Yet they frequently need to exchange information with one another. Airlines rely on the data they receive and need to trust the parties they pass data onto. They have a legal responsibility to share the right data, with the right organisation, at the right time.

However, the current system is often vulnerable, inefficient and costly. Despite some digitalisation attempts, 30–200 documents are still being processed manually for every shipment. If an incident occurs or something changes, stakeholders struggle to keep track and cargo are sometimes delayed or even disappear—or at least, it seems that way according to the paperwork. Consequently, dispute resolution for shipment delays and damaged or lost goods cost cargo companies billions of dollars in lost revenue.

These issues stem from two root causes: lack of visibility and lack of trust. Blockchain technology is an effective antidote, as it has the power to establish visibility, consensus and trust across the entire supply chain. A shared, distributed, permissioned and trusted ledger, which records the entire history of transactions, making it faster, easier and safer to exchange relevant information.

Blockchain is also a key enabler of the One Record vision advocated by the International Air Transport Association (IATA) to promote data standards and consistency.

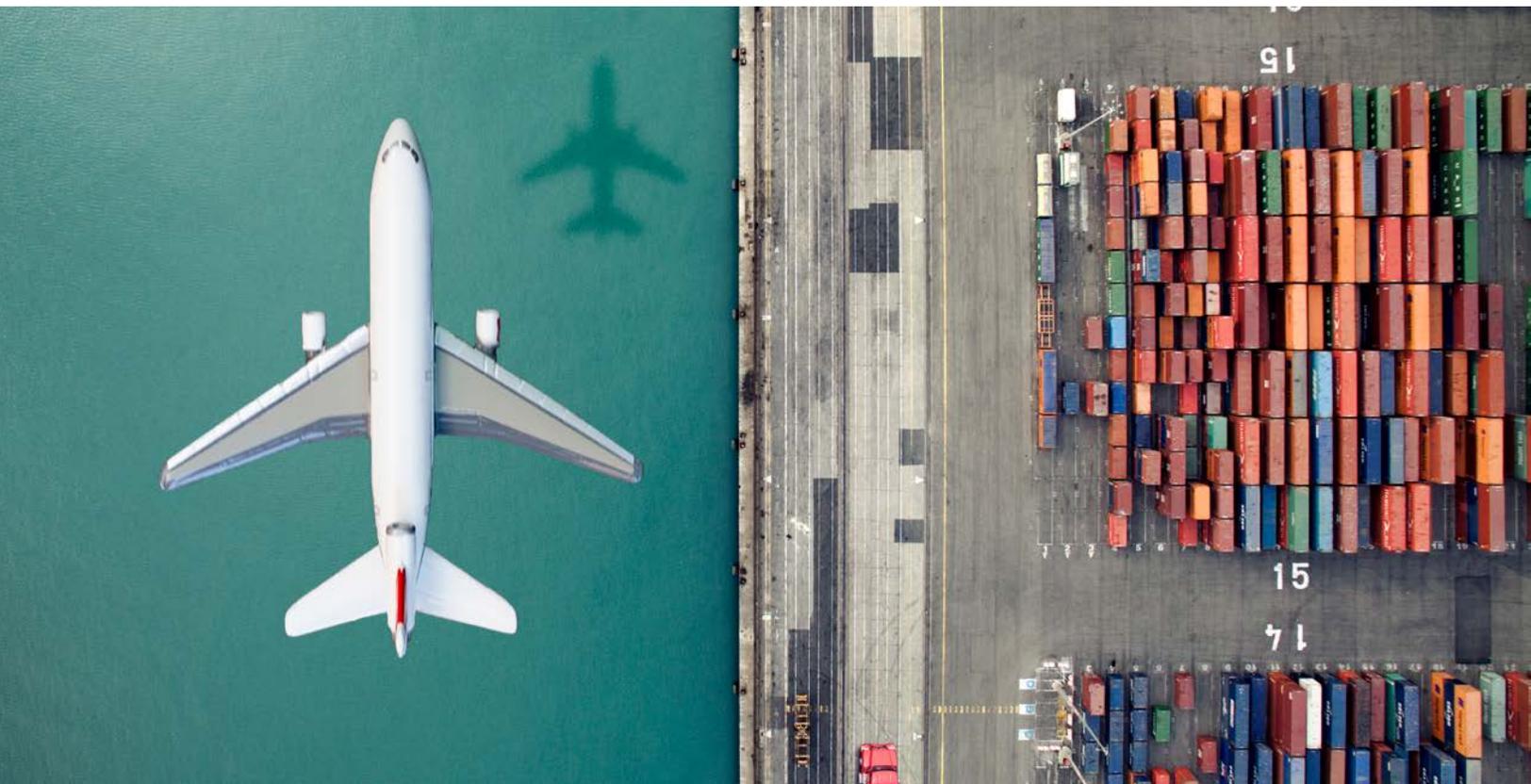
Going forward, industry leaders are optimistic that blockchain will solve many of the key business challenges that air cargo is currently facing and ultimately drive digitisation in the industry.

Read on to find out:

- What blockchain is and why it is called blockchain
- Which business challenges blockchain can help you solve
- The value of blockchain and who benefits
- How blockchain supports the International Air Transport Association initiative
- How companies are using IBM Blockchain to solve their biggest challenges
- How you can get started with blockchain in your organisation

Why is blockchain called blockchain?

Each block contains a hash, which is a digital fingerprint or unique identifier, time-stamped sets of recent transactions and the hash of the previous block. New information is recorded in a new block, and each block is based on the previous block. Updates will not delete or change the original information. This immutability is the very foundation of blockchain technology.



What is blockchain?

What exactly is blockchain and what makes it unique?

What blockchain is:

a shared record of everything that needs to be shared, tracked and visible.

a network which enables organisations in the supply chain to exchange information.

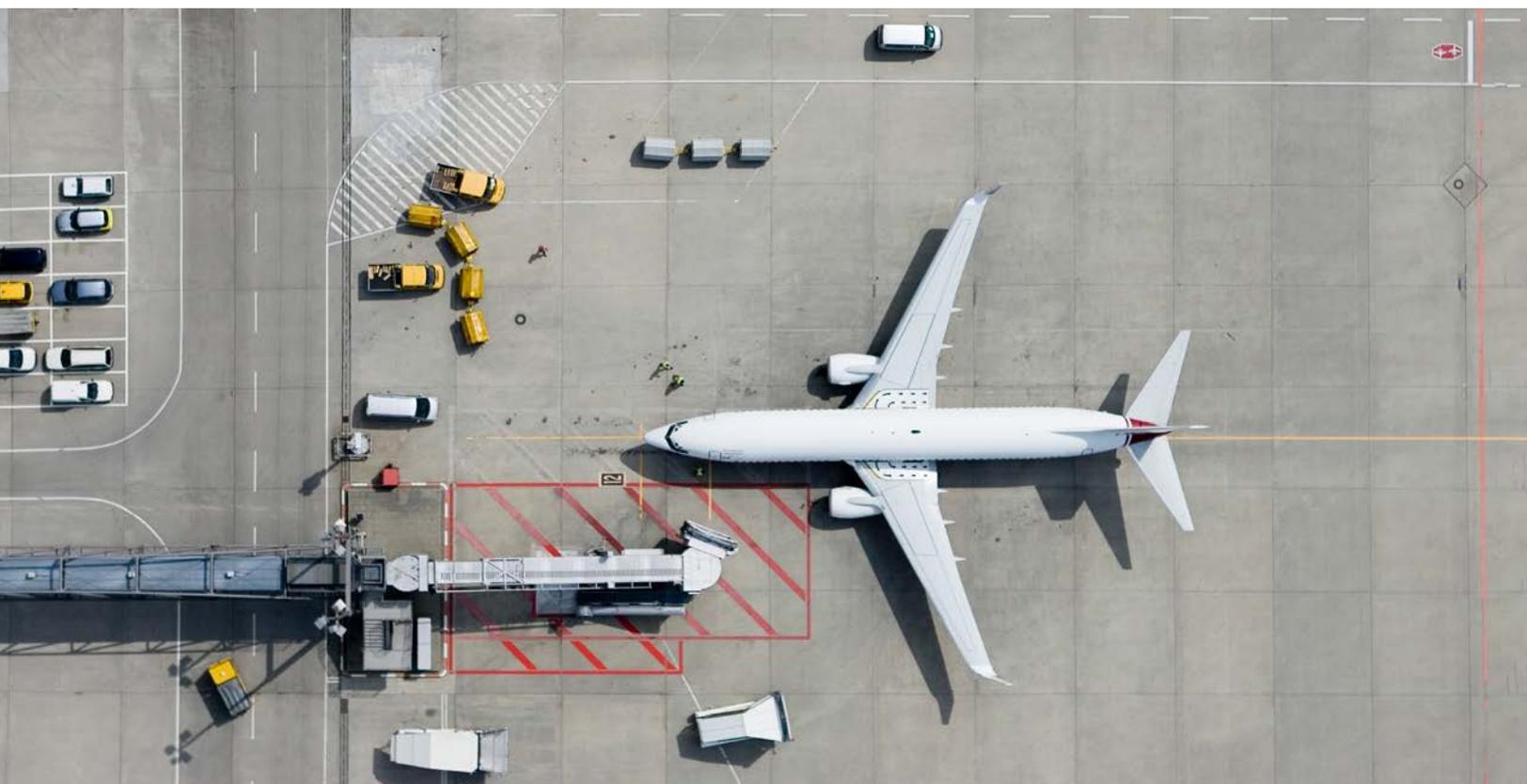
a single source of truth, trusted and agreed upon by all parties.

What blockchain is not:

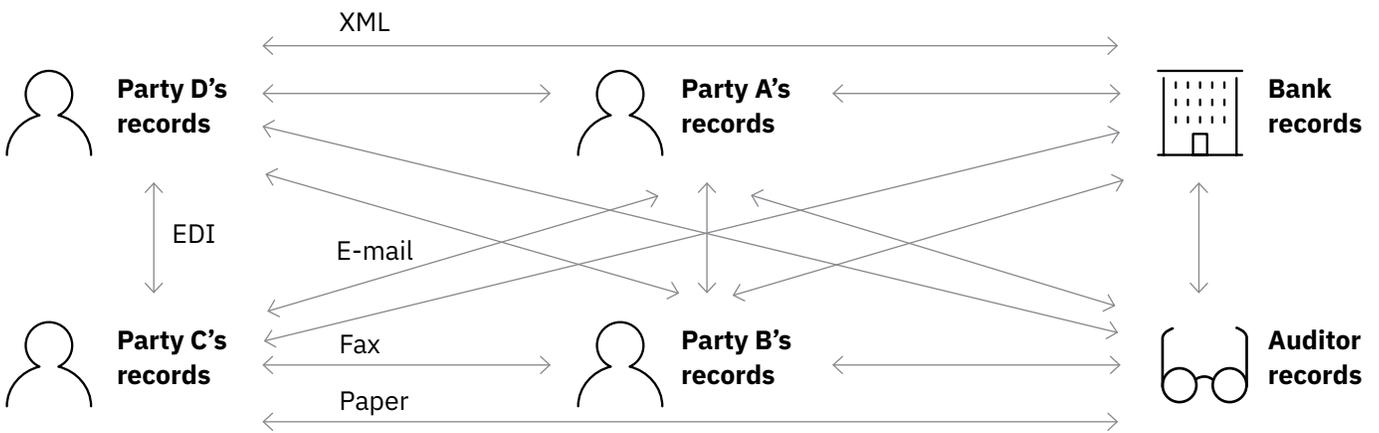
a database. Unlike databases, blockchain is distributed and immutable.

a new data exchange standard. But it can support all standards, including newer ones such as the Uniform Resource Identifier and Electronic Air Waybill.

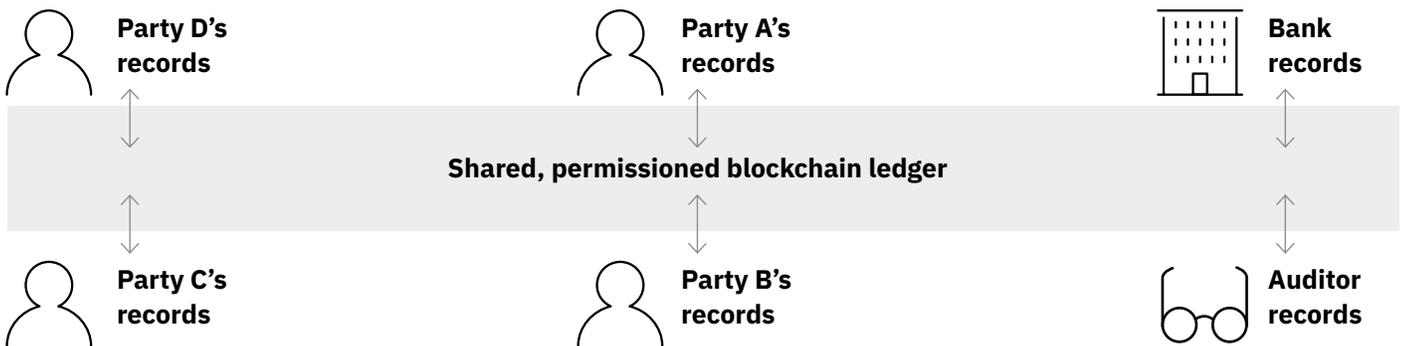
a new ERP system. However, it can connect to existing Enterprise Resource Planning systems via APIs.



How companies in the supply chain share information today



How companies can establish a single version of the truth with blockchain



Which business challenges does blockchain help solve?

The current method of sending documents back and forth is inefficient and prone to errors. Frequently, the documentation does not progress at the same rate as the cargo, resulting in cargo being left behind while stakeholders launch a time-consuming investigation into what really happened.

This all causes errors, longer transaction times and inaccurate records—and even worse, it can lead to disputes and long-term lack of trust. Blockchain has the potential to solve many of these problems by creating a single source of truth.

Use case

Limited visibility

Cargo changes hands multiple times on its path from manufacturer to consumer. However, no one can reliably track its whole journey. This means that neither the carrier nor the shipper has a complete overview of the end-to-end process.

How blockchain can help

Blockchain can allow for complete consolidation of air cargo records, with verification, in an effort to create an interconnected, decentralised network of information, optimize efficiency, and provide the option for data sharing. Blockchain is not a new ERP system. However, it can connect to existing Enterprise Resource Planning systems via APIs.

Damaged goods

Fragile and perishable goods such as flowers or medicine require specific conditions to ensure quality upon arrival. Even a slight temperature drop might damage the goods, incurring costs for the airline. The lack of shared information, makes it hard to prevent and react to these kinds of incidents and causes disputes regarding liability.

Blockchain technology is the single source of truth and ensures that relevant and up-to-date information about the cargo is always readily available and can be acted upon.

Lost goods

As stakeholders struggle to keep track of changes and complete the required documentation, cargo is sometimes delayed or disappears. Paper documentation can easily be lost and it is not unusual for cargo and documentation to be physically separated. Investigating what really happened is costly and time-consuming.

Blockchain provides a high level of visibility and transparency, enabling all ecosystem participants to keep track of cargo, where it is and its documentation. This significantly reduces the likelihood of goods going missing.

Use case**How blockchain can help**

Workflow optimization

Airlines receive confirmation of a booking 24–72 hours in advance. Until then, they have no details about the product or destination and are then left scrambling to execute the logistics.

Blockchain accelerates the exchange of information, thus giving airlines the necessary time to optimise their workflow.

Low cargo utilisation

The average capacity utilisation across air cargo is only 44%⁴ as there is no utilisation overview and no marketplace for the available space. Current sales channels focus mostly on price and not utilisation.

Blockchain could facilitate the marketplace and provide the necessary data for a utilisation overview which updates in real-time, enabling air carriers to maximise their space—and revenues.

Disputes

As each member of the supply chain ecosystem has their own version of what happened, this can create costly and time-consuming disputes.

Invoice disputes would occur less frequently and could be settled more smoothly, if everyone had a shared view of the truth.

Compliance

Dangerous goods, such as lithium batteries, are subject to strict regulations. Air carriers must cooperate or run the risk of losing their operating licence and being shut down.

If the details of a booking come in at the last minute, it can be difficult to ensure compliance. As blockchain expedites the exchange of information and in general digitalises the compliance process, air carriers are better positioned to make the necessary compliance arrangements.

The value of blockchain**Blockchain is highly secure.**

Blockchain applications can be designed to offer encryption (which protects data when it is stored) and the protocol Transport Layer Security (which protects data while it is being transferred). This provides a high level of data security at any given time.

Blockchain is tamper-proof.

Since the blockchain is distributed across several computers and not contained in a single central location, information cannot be changed from a single computer and does not have a single point of failure. This principle, known as immutability, makes the data more trustworthy.

Blockchain is compatible with every data format.

Airlines are striving to establish common data exchange standards. Today, though, many different data formats still exist. Blockchain circumvents this issue, since an Application Programming Interface (API) can connect any data source in any format to the blockchain.

By creating a neutral layer above the existing data, blockchain delivers a common, visible version of the current information.

Blockchain

Receives the data via a specific API. All data can be read into the blockchain. Blockchain can receive data from multiple sources but makes it visible in just one place for all relevant parties to access and read.

API/Connection**Data source**

Data from a party A
Format: XML

Data from party B
Format: URI

Blockchain is future-proof.

As organisations leverage new technologies, the ability to plug in APIs and parse any data format will be a competitive advantage. Smart wearables, connected devices, and cognitive computing generate masses of data in various formats—but they will all be compatible with blockchain.

Who benefits from blockchain?

All participants in the business ecosystem will benefit from blockchain to some extent. However, the value they can realistically expect to gain depends on their role and contribution. For best results, individual incentives and shared value in the blockchain ecosystem should be mapped out early in the process.

Manufacturers

Manufacturers stand to benefit the most from blockchain. Ultimately, it is their cargo that gets shipped quicker and more efficiently, resulting in reduced lead times and higher volumes shipped for the same cost.

Shippers

As shippers are usually unable to track their shipments end-to-end, they are highly dependent on the rest of the network. The ability to locate containers and cargo more easily would be highly beneficial for them. Consequently, they are likely to become paying participants in the blockchain business network.

Air carriers

Carriers stand to gain considerable value from blockchain. They will achieve a more efficient and lean supply chain as well as greater visibility in the overall shipment process. Moreover, blockchain enables carriers to offer new products and services and the added simplicity encourages initiatives to develop blockchain applications for the industry.

Consumers

Consumers are increasingly demanding real-time visibility into the delivery of their goods. Carriers, together with IBM, are making efforts to develop blockchain applications to address customers concerns and improve satisfaction.

Existing communities

The blockchain business network can draw value from existing data sharing communities, by including them in the loop and collaborating instead of trying to replace them. Existing communities that can add value to blockchain solutions are TradeLens, IBM Watson Supply Chain, Food Trust™, airport communities and data sharing platforms.

International Air Transport Association and blockchain

The International Air Transport Association (IATA) is striving for a standardised digital ecosystem, in which data is transparent and can be easily exchanged. Their vision, known as One Record, is designed to link the air cargo systems of tomorrow together.

Blockchain directly addresses these requirements and will be compatible with the new One Record standard as soon as it is implemented.

How does blockchain support the One Record vision?

- Blockchain is compatible with the One Record data standard and all other future digital supply chain platforms by the use of common APIs
- Blockchain ensures a single shipment record accessible to key stakeholders
- Data needs only to be shared once, eliminating duplication and errors
- Data can be shared with all participants of the supply chain, from shipper to consignee
- Security features such as encryption allow only authorised parties to access the data
- Permissioned blockchain technologies like Hyperledger Fabric enable data to be shared on a need-to-know basis

“There is an urgent need for digital logistics and transport where data is transparent and immediate for all stakeholders.”⁵

IATA workshop, 2017

The IBM Blockchain

IBM is an active member of the IATA One Record initiative and a founding member of the Linux Foundation Hyperledger project. As a result, IBM is strategically and technologically well-positioned to help air cargo organisations gain value from blockchain. IBM Blockchain delivers the cloud platform, industry knowledge, development capabilities and open source contributions to help organisations design and deploy their own blockchain application.

To date, IBM Blockchain supports more than 40 transacting consortia via the IBM Blockchain platform.⁶ IBM is currently working with numerous clients on over 500 blockchain projects, many of which are within the supply chain industry and help solve business challenges similar to those affecting airlines.

Maersk

IBM and Maersk are developing a global trade platform using blockchain technology to improve the cost of transportation, remedy the lack of visibility and eliminate inefficient paper-based processes.

Walmart

IBM is working with Walmart to build a blockchain platform which digitally tracks products from their source to the store, ensuring authenticity and safety.

Dnata, Emirates and flydubai

IBM, the ground handler Dnata, Emirates and the cargo flydubai have successfully designed a logistics platform that tracks supply chain transactions. The new system will enable cargo to be delivered smoothly, without paperwork, duplicate data or manual processes.

These three different solution platforms, developed by IBM to track shipments, add visibility and efficiency to the entire supply chain and deliver higher value to customers. The advantage is that these communities already consist of many participants in the supply chain ecosystem and air cargo carriers can create their own blockchain as well as join existing blockchain networks such as TradeLens and FoodTrust, to benefit from both.

Getting started

Ready to start your blockchain journey? It is likely that your organisation could benefit from blockchain in a number of ways, so start with big, bold ideas then focus on a single use case which solves a specific business problem. Then scale your solution fast. IBM offers support and expertise using Agile and Enterprise Design Thinking methodologies to build a Proof of Concept, deploy a blockchain pilot project and drive value once in production.

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- 1 Bernard Marr, “How Blockchain Will Transform The Supply Chain And Logistics Industry.” Forbes, March 23, 2018. (forbes.com/sites/bernardmarr/2018/03/23/how-blockchain-will-transform-the-supply-chain-and-logistics-industry/#475b90205fec)
- 2 “Nearly Two-Thirds of Large Enterprises Currently Aiming to Deploy Blockchain, Juniper Finds.” Juniper Research, September 11, 2018. (juniperresearch.com/press/press-releases/nearly-two-thirds-of-large-enterprises-currently)
- 3 “Digital reinvention in transportation.” IBM Institute for Business Value, Accidental agitators, 2017. (ibm.com/services/us/gbs/thoughtleadership/drtransportation)
- 4 “IATA Cargo Strategy.” IATA, 2018
- 5 “One Record workshop report.” IATA, 2017
- 6 Jerry Cuomo. “Understanding blockchain: Debunking the myths of enterprise blockchain.” May 31, 2018. (ibm.com/blogs/blockchain/2018/05/understanding-blockchain-debunking-the-myths-of-enterprise-blockchain)



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