Hedera™ Hashgraph

THE COUPON BUREAU

From Barcode to Public Ledger: Reducing Coupon Fraud with Hedera Hashgraph

HEDERA HASHGRAPH, LLC

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Everyone has interacted with a coupon. An image of a coupon cutter at a home kitchen table can quickly come to mind, or hunting online for a discount on your next purchase. While simple on the surface, coupons are complex. Each successful redemption involves alignment between the manufacturer, retailers, point of sale systems, and the savvy consumer.

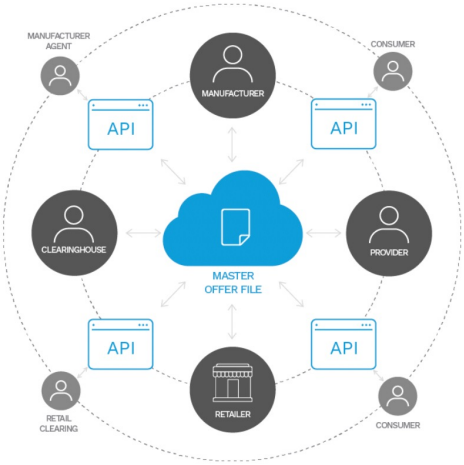
Coupons, and particularly manufacturer-issued paper coupons – coupons that can be redeemed at many locations – are a big business. In the United States, approximately 1.5 billion coupons are created each year, with an estimated $100M in fraudulent results. To mediate this growing problem, a group of industry organizations created The Coupon Bureau, as a non-profit organization dedicated to aligning all participants to make the process from creation to redemption of coupons as frictionless and fraud-free as possible.

To modernize and better secure coupons The Coupon Bureau introduced the Universal Digital Coupon standard that utilizes distributed ledger technology and expects integrations in a majority of US-based grocers in 2021. This case study reviews their motivation, implementation, and real-world results as they roll out the new Universal Digital Coupon nationwide.

01.

THE COUPON BUREAU

The retail ecosystem consists of manufacturers, providers, point of sale systems, retailers, clearinghouses, and consumers. A coupon must seamlessly work across each of these entities in order to be successful. To facilitate this cooperation a standard and its implementation need to be established, leading to the formation of a non-profit organization, The Coupon Bureau.



The Coupon Bureau, established in 2019 by the Association of Coupon Professionals and the Joint Industry Coupon Council, is a non-profit centralized data exchange connecting all stakeholders to the new Universal Digital Coupon positive offer file. In conjunction with requirements led by a consortium of ecosystem participants, The Coupon Bureau established the new standard, supported by Hedera Hashgraph.

02.

CHALLENGES

Each year coupon fraud is estimated to be at least $100M in the United States alone. Typically, fraudulent coupons are coupons that are either counterfeit or misredemption. The prior coupon standard, GS1 application identifier AI (8110), wasn't able to successfully keep up with these modern requirements leaving information siloed and parties unable to keep up with the truth. With this lack of connectivity, and trust, came an uptick in fraudulent redemptions and a limitation on the use of coupons as a whole.

The industry put forth a request for a new solution to move on from the existing AI 8110 standard. The new charter required for an implementation that could meet the following requirements:

- No additional hardware for retailers
- No increase in checkout lane times
- End-to-end security
- Agnostic approach to all participants

03.

A SHARED LEDGER FOR RETAIL

With the goal to establish a trusted, single source of truth, The Coupon Bureau began looking at blockchain and distributed ledger technology. The goal: establish a shared ledger, instantly accessible, always up-to-date, and equally available to all parties.

Distributed ledgers are a powerful tool for creating that single source of truth. By having all information go through a standard and immutable source, each party is able to independently verify the information in real-time. Unlike traditional databases, Hedera, and other public ledgers, are able to achieve a higher degree of data integrity with their decentralized nature. Each transaction that successfully reaches consensus and is thus added to the ledger is agreed upon by multiple independent parties.

Without a single owner controlling these servers, the information recorded on-ledger is immutable and unable to be modified by a single or a few bad actors. This design ensures that the information is never changed, and each party can recreate the entire history of records if they were so inclined. This makes a distributed ledger a good solution for establishing a shared state of truth in a multi-party system.

The Coupon Bureau recognized that decentralized infrastructure could augment their master offer file to allow for The Coupon Bureau to be a vendor-neutral and agnostic system. The ledger provides a source of truth able that is equally available to each participant in their network.

04.

SELECTING HEDERA HASHGRAPH

Hedera is the only decentralized network and public ledger that uses hashgraph, a faster, more secure alternative to blockchain. The Coupon Bureau selected Hedera to best meet their technical and business requirements.

Hashgraph

To process 100x more transactions per second than blockchain-based alternatives, Hedera Hashgraph uses its own consensus mechanism and data structure called hashgraph. Hashgraph is extremely efficient through two innovations: virtual voting and gossip about gossip.

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Performance

With retail transactions often occurring in person, it is critical that the speed of a transaction was reliable enough to keep up with peak retail traffic. For blockchain-based systems, this is unachievable with transactions having a high variance of latency from 10 seconds to upwards of an hour. Events sent to Hedera achieve successfully reach finality within 3 to 5 seconds, on par with the VISA network.

Cost

For a nationwide group of retailers to potentially manage billions of coupons and their redemptions requires a high-write workload. It was important to The Coupon Bureau and its constituents that the cost would scale linearly with their usage. Hedera transaction fees are predictable, set in USD, and due to the efficiency of the network are a fraction of the cost of alternatives. The typical cost of recording an event to Hedera is $.0001 with other public ledgers having variable fees that have a median price of approximately $2 per transaction.

Governance

The Hedera network is owned and operated by some of the world's leading organizations, which was desirable for establishing a form of trust that extends beyond the technology but to its long-term decisions and legal guidance. For companies, the stability from a strong governance model is paramount for not only the technology practicality but its reduction in forks and their potential repercussions.

05.

HOW IT WORKS

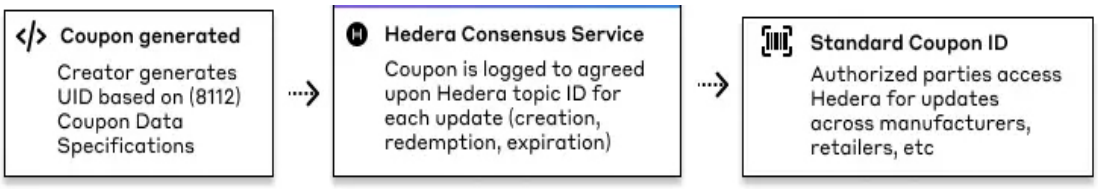
For The Coupon Bureau, each time a universal offer file – a coupon type – is created and redeemed an event is sent to Hedera using the Hedera Consensus Service.

An example of this is a manufacturer requesting to create a new offer file, for instance wanting to issue a million coupons for a certain type of toothbrush at $.75 off.

The Coupon Bureau generates the master offer file, recorded to Hedera, and an associated data string is made available to consumers through mobile distribution providers.

Whenever an offer is attempted to be redeemed the point of sale system checks the latest state of that unique data string via The Coupon Bureau API.

From data verified on Hedera, the API returns whether the coupon is valid and if it has already been redeemed or is still available for use.



Hedera Consensus Service

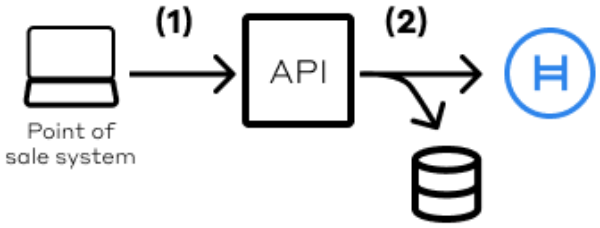
Hedera offers a set of network services for developers to integrate common use cases such as tokenization and messaging. To implement AI 8112 The Coupon Bureau relies on the Hedera Consensus Service (HCS). HCS is designed to manage arbitrary event data. Events are immutably recorded and confirm critical metadata such as who sent it, what the information was, and exactly when it was sent.

As the Hedera network is a public ledger, with all information publicly viewable, it is up to each application to determine if transactions are in plain text, encrypted, or be a hash of a transaction. Being a managed API service, The Coupon Bureau send a hash of each of thier transaction events to Hedera. This allows for The Coupon Bureau, and its ecosystem, to preserve privacy while having an immutable audit log accessible to all parties.

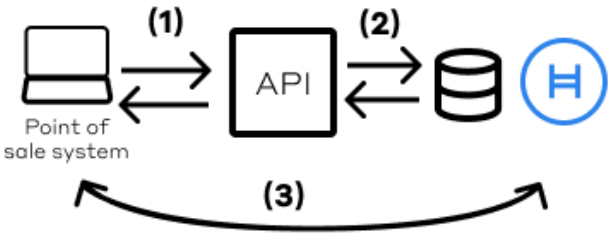
06.

ARCHITECTURE EXAMPLE

An example implementation to what The Coupon Bureau and its ecosystem employs could be as follows. In this instance, The Coupon Bureau manages a centralized API service. The API receives requests from the point of sale systems and other partner applications to check for the current state of a coupon. Upon each event received, like a successful coupon redemption, the API sends an event to The Coupon Bureau's managed database and a hash of the transaction to Hedera as a Hedera Consensus Service message. In turn, this event is immutable, receiving a consensus timestamp from the decentralized Hedera network.



To verify the information and integrity of the state of a coupon, each authorized party can pull data from the managed API and check Hedera directly. The partner application can take the information from the API for the relevant coupon and recalculate the hash. Once the hash is confirmed to match, the transaction ID can be checked on a Hedera mirror node to guarantee it was recorded correctly on the public ledger.



This verification process proves to the requesting party that any other party has not used or modified the state for that particular coupon. And that its current state, as retrieved from the database, is accurate.

FURTHER DECENTRALIZATION

In the future, it is conceivable that The Coupon Bureau's partners want to decentralize this architecture further. This proposed architecture can be improved by removing the centralized points; considering design decisions such as:

- The partners can write to the agreed-upon Hedera topic directly.
- Each partner could manage a copy of the database or deploy a private, permissioned blockchain on top of the Hedera network.
- Hedera Token Service could be used to create a unique NFT per each coupon; reducing the reliance on recreating or reverifying the state of a coupon.

07.

IN ACTION

As of February 2021, The Coupon Bureau's AI (8112) is in production, actively being used in Lowe's markets at over 150 locations, with expectations to be utilized in a significant number of grocers and other large retailers nationwide by the end of 2021.

Lowe's markets leverage the point of sale SaaS provider IT Retail, which has integrated The Coupon Bureau API to recognize the new barcode and successfully check positive offer files status. The IT Retail application then adjudicates if the offer detail matches what is in the shopper's basket.

In its introductory open connectivity phase offer files have been generated with participation by P&G, General Mills, Kimberly Clark, and others. Meaning that each time a coupon was issued, such as the one shown previously for Pampers, The Coupon Bureau created a HCS message within the agreed upon topic. When a consumer then goes to use their coupon, the PoS system calls The Coupon Bureau's API which returns the latest state for the coupon. Upon a successful redemption the coupon's state is updated.

Pampers Betty Crocker Elden's

REVTRAX Popwallet QPLES

08.

ACROSS INDUSTRIES

As seen in The Coupon Bureau's use of Hedera Hashgraph, distributed ledgers can play a vital role in sharing information between multiple parties. These parties benefit by having a single, shared, and trusted source of truth. In the case of coupons, this source of truth is in an effort to curtail the hundreds of millions of dollars worth of coupon fraud that takes place each year. Using a public ledger, the latest state of a coupon and its use can be immutably recorded in real-time using secure public key cryptography. This architecture is applicable in a number of fields outside of retail.

Media

Use a public ledger to create a single source of truth for IP rights. With verifiable records, usage can increase and payment distribution can be streamlined.

IT

Access controls between internal and external systems can use a common protocol, ensuring the right individuals have access or restrictions at a moments notice.

Education

Credentials can be recorded on-ledger, signed by central issuing authorities, like a university. These attestations can be readily used to support key decisions from employment to use of financial services.

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