

About this document

This document is a high-level introduction to the concepts used in Hash Name Service, a solution designed to become the cornerstone of a new generation of Hashgraph domain name registration, and an in-depth analysis into the Hashgraph elements of the platform, how its used to enhance the stability and security of smart contract development, as well as how tokenized records will exist within the registry. We will provide a complete Hash domain name registration, transfer, and management service to enable simple and safe domain name service related functions natively to the Hedera Hashgraph platform.

Any terminology used in this document is used as reference only and will be subject to change as the concept continues through the implementation process.

About Hashing Systems

Headquartered in Dallas Texas, Hashing Systems is a development studio focused on rounding the cutting edge of Hashgraph development.

Background

Hashgraph Introduction

Hashgraph is a type of Distributed Ledger Technology which offers an unalterable database that can only be amended with a proper cryptographic signature. Thanks to the advances done on asynchronous Byzantine Fault Tolerance by Dr. Leemon Baird we are able to benefit from a platform with extremely high-throughput at over 100 thousand transactions per second. It makes use of a hashgraph of transactions rather than a chain of blocks which enables a new segment of online micropayments.

Hashgraph Code Security

In addition to being faster than other networks, Hashgraph is also safer, and this has an unlikely reason: Hashgraph is not open source, it's open review. This means that third cannot copy the Hashgraph network, modify it, and monetize it. Some might see this and think that it goes against the open nature of the crypto space. It is quite the contrary. Hashgraph does open itself for others to see the network code. That's the open review portion. Where Hashgraph differs from older technologies like Ethereum is in that it has protections. Ethereum and other blockchains are unprotected from third parties copying, or forking, their networks. This can create ambiguities as one cannot really tell which network is the real one after it has been forked. This has massive liability implications. Companies and individuals alike on the network that function on smart contracts cannot rely on these contracts as the network could be forked at any point. Hashgraph is patented, so it can be relied upon. There will never be ambiguity around the legitimacy of the network. That reliability is what will allow it to be adopted by the mainstream market.

Hashgraph Rent

Hashgraph rent continues the trend of paying for use (instead of owning) that has expanded from parking and toll to ride sharing and bike apps. Rent in this context is paying for the resources one uses on the network. This is measured as a function of the size of the information being stored, the duration of the storage, and the scarcity of resources to store (paid at the beginning of each cycle). In this way, each party is only proportionally charged for interacting with the network. Part of that fee is then used to reward the node runners for spending the resources to relay the information necessary for consensus. Once the period is over, given that no new funds are presented for the information's storage, the item is automatically deleted. The deletion is possible

because unlike in blockchain, in Hashgraph smart contracts can be modified or deleted. Although smart contracts can be changed, this does not compromise them as only valid changes can be made.

Why does Hashgraph Charge Rent?

There are two main reasons for charging rent on the network: protection, and encouraging innovation. Allowing for free interactions could empower ill-intentioned parties to bombard the network with fake requests in order to slow it down, known as a denial of service attack. The fees would not all-together prevent this threat, but they would mitigate it given the financial burden of sending such a large number of requests. Additionally, charging for the upkeep of information on the network will encourage developers to create quality smart contracts. Since these developers would be paying to keep those smart contracts on the network, they would be incentivized to only spend on smart contracts that could create value for them.

What are HBARs?

Hbars are the native cryptocurrency that is used to pay for transactions on the Hedera platform and to secure the network from certain types of cyberattacks. They are the native platform coin needed to interact with and exchange value on Hedera.

The symbol for hbars is "℥" so 5 ℥ means 5 hbars

What are Tinybars?

Tinybars are (not surprisingly) smaller than hbars. They are used to divide hbars into smaller amounts. One hbar is equivalent to one hundred million tinybars.

The symbol for tinybars is "t℥" so it is correct to say $1 \text{ ℥} = 100,000,000 \text{ t℥}$

Important Note: The values of all fees and transfers throughout the Hedera SDKs are represented in tinybars, though the term hbars may be used for the purposes of brevity.

Hashgraph Open Access

Currently the platform is in closed access mainnet. This means users cannot openly create accounts without going through the KYC process in the Hedera portal. The KYC (Know Your Customer) process requires users to submit their identification details in order to gain access to the network. Hedera will be opening the platform during the North American summer of 2019 and the event is dubbed "Open Access".

Domain Name Services

Domain Name Services (DNS) are the background for the rapid development that has supported the internet throughout the years. Instead of using long IP addresses which are difficult to remember and transfer, it allowed simple names registered under a global address book.

DNS refers to the name system used to provide a mapping between domain names and IP addresses. DNS is a distributed database with multiple countries and corporations managing each group of databases, all connecting to a central "root DNS". This was built with decentralization and ease of use in mind to allow companies the malleability required when modifying server locations and connections.

Similar to the DNS in the internet, it is essential for Hashgraph applications to be connected with their own version of a name rather than complex and difficult to update identifiers.

Hash Name Service

Hash Name Service is a hashgraph-based registry that will utilise the HBAR for payments and records for managing non-fungible tokens. It was first announced in October 2017 at the Hedera18 conference to provide an extensive system for the Hedera Hashgraph. It has since gone through approval and verification and is currently under development through Hashing Systems.

Domain Pre-registration

Users are able to pre-register with a desired domain on <https://hns.domains> during the pre-registration period lasting between February 2019 and Open Access. This does not constitute a guarantee of ownership but rather a request for notification from the user and early access links to the management platform. Users will be able to sign up early and buy their domains during a short window of time prior to the main release. Early access does not guarantee the domain. When the manager is made public anyone will be able to register any unregistered domain.

Domain Registration

Domain registration will be enabled a few weeks after Open Access and tests can be performed on mainnet. These tests include throughput and account integrity among others. In order to register a domain you'll need a Hedera wallet as well as HBAR cryptocurrency. The domain cost will be based on the underlying compute and storage costs incurred in retaining the domain for the registration period. Cost for domains is expected to be 100hbar, subject to adapt with the price of storage.

Technicals

Introduction

Currently only domain names ending in .hh will be available. The identifiers will contain 3 integers separated by periods representing the realm id, shard id, and the account id (example: 0.0.1761).

Realm Id

Shard Id

Account Id

Service Architecture

Hash Name Service operates on a resolving side and a registrar side.

The role of the resolver is to ask questions, such as “what is the address for name x?”. A local database of previously checked names can be kept for quick turnaround and when a new name is queried it can go through the resolver contract.

The registrar will control record changes and maintain access limitations to make sure only the account with the proper authority is able to make changes. This access is given to a smaller registry that is able to provide a globally-recognized control to the end user. It is decoupled in order to maintain the throughput required for a Domain Service with hundreds of thousands of transactions per second.

Ecosystem Value

HNS domains will have a high operational value. Traditional DNS markets have created amazing transaction records in the past. According to statistics, the industry’s annual output value reached over 20 billion US/year. This provides everyone using HNS with a great opportunity and potential.

The current development of HNS is expected to inherit the DNS market’s track. At the time of this white paper’s development, there have been over 5,000 names registered under the HNS pre-registration platform.

Tokenization

Hash Name Service will utilise Hashgraph non-fungible tokens to manage the unique ownership of each domain name.

Ownership and Control

The name system is designed in a time-locked nature around the storage of the records. The intent being that the user will actively maintain their name on the registry by paying for storage on the HNS contract on a yearly basis. If this isn't maintained the domain record will be marked for removal and available for purchase by anyone.

Registry Model

The Hashgraph smart contract service will provide the basis for the root-registry, which is the only authorized record creator of the platform. The record will point to a unique contract controlled by the owner account. This account is set by the purchase done in the root-registry.

Registration

In Hash Name Service, a record kept that can only be managed by its owner account. It can be updated to resolve to different values in the Hashgraph network such as other smart contracts, files, or accounts.

Name Management

This registration is referenced by the root registry to provide a clear way to resolving the object. The meta registry is only updated during the purchase but not when managing the resolving identifiers. It is built in this way to prevent smart contract global state bottlenecks.

Meta registry → Registration → object (SC, Account, File)

Costs

Each element in the Hedera Hashgraph platform incurs rent. This rent refers to the storage, computing, and networking costs incurred in running the infrastructure managing the code. HNS' fees are built in to cover these costs as well as maintaining a secure platform for developers and corporations to rely on.

Registration Metadata

Below is a sample of the type of information users can expect to see from a record resolved from HNS.

```
{
  Root: hh
  Name: hashgraph
  Type: Contract
  Identifier:0.0.22100
  ttl: 86400
}
```

Root

Refers to the top level domain. Future applications and registrations will be introduced for entities developing within the Hashgraph ecosystem, such as the global council members.

Name

It is the name given to the resource. Currently we only support alphanumeric english names.

Type

There will be three types of resources with HNS. Smart contracts (ex: dapps names), file identifiers (ex: html pages), and accounts (ex: usernames)

Identifier

The smart contract will support the {"realm id"}."{"shard id"}."{"account id"} identifier outlined in the Hedera Hashgraph whitepaper.

TTL

Each domain will contain a Time To Live value in seconds. Applications implementing domains can follow this to limit the queries done to the smart contract.

HNS.domains Roadmap

P1 - Conceptual development

During Helix, Hashing Systems is able to survey developing teams to learn more about their processes building on Hashgraph. This provides a clear way for implementing the service.

P2 - Workspace Implementations

Hashing Systems is working directly with the Hashgraph technical roadmaps, which provides HS a deep understanding of the decentralized platform's current and future functionalities. This allows them to build a clear roadmap for the workspace solution that is able to adapt as new features are released.

P3 - HNS manager launched

A few weeks after the Hedera Open Access is released, the HNS platform will go live and enable simple updating of references to contracts, global usernames, and even basic website resolving capabilities.

P4 - Integrations period

After launching we will work along community projects to integrate domains for new use cases. Including providing paths for new registrars to enable payment and registration solutions.

P5 - Further Collaboration

As the network evolves we will adapt functionality to enable a larger range of use cases. Specialized lists such as Token Names and Nodes have been discussed. These will be analyzed as community support is gathered.

Notes

Details and terminology in this document are subject to change.

The Hash Name Service records is a standalone record that can be used inside the Hedera Hashgraph platform but is not a Hedera Hashgraph product.

Pre-registering for a domain on the Hash Name Service page isn't a guarantee of ownership. Further action from the user will be required and without it, the preregistration will be void and unrecoverable.

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