Hedera™ Hashgraph

Hbar Economics

A deep dive into the dual role of hbars & detailed release schedule

Hedera Hashgraph

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Hedera Hashgraph is a public distributed ledger technology (DLT) network that enables people to interact and transact online efficiently and securely without the need for third-party companies, which often collect and sell their users' personal information.

The purpose of Hedera is to provide a stable, trustworthy network for a wide variety of decentralized, enterprise-grade applications, not to provide a cryptocurrency. Like all public DLT networks, however, Hedera needs a cryptocurrency to function. **Hbar** is the native cryptocurrency of the Hedera network. Hbars are used to power decentralized applications, build peer-to-peer transactional models, and protect the network from malicious actors.

Hbars serve two main functions:

1. Network Fuel - Hbars serve as a "fuel" to pay for network services and incentivize nodes to contribute computing resources to the network.

2. Network Security - As Hedera moves along the path to permissionless nodes, hbars will protect the network against cyberattacks through the network's forthcoming coin-weighted, proof-of-stake consensus mechanism.

This paper describes how hbars are used on the Hedera network, their role in achieving consensus on and securing transactions, and the expected distribution of Hedera's fixed supply of 50 billion hbars. The information presented herein is provided for informational and illustrative purposes only and remains subject to change.

01.

Overview

HEDERA TECHNOLOGY

The Hedera network works through a groundbreaking form of distributed consensus technology—the hashgraph consensus algorithm. Like blockchains and other DLTs, Hedera allows online communities to create a shared, trustworthy database without the need for a third-party middleman. Other DLT networks face trade-offs between performance and security (if they are faster, they are less secure; if they are more secure, they are forced to slow down). In contrast, hashgraph technology provides superior levels of performance and security. With hashgraph, transactions are processed at speeds that are orders of magnitude faster than proof-of-work blockchains, and the hashgraph algorithm has been proven mathematically to offer the highest level of security for distributed networks.

Because the Hedera technology is dramatically faster and more secure than blockchain-based networks, it enables a whole range of new applications, use cases, and business models not currently possible on other DLT networks.

Developers and enterprises can use Hedera's network services (cryptocurrency, smart contracts, file, and Hedera Consensus Service) to create applications that run on top of the network. The network supports the potential for an exceptionally wide range of applications — from music-streaming services to pharmaceutical supply chain management to energy microgrids to multi-player online games.

HEDERA GOVERNING COUNCIL

The Hedera network is governed by the Hedera Governing Council, a rotating group of high-profile, leading global organizations that span across multiple industries and geographies. The primary responsibilities of Council members are to (i) participate in the governance of the Hedera network and (ii) host and maintain a node on the Hedera network. Council members contribute their expertise and experience in Council deliberations and decision-making relating to software updates, Hedera Treasury management, network pricing, regulatory compliance, and other key governance matters.

Each Council member holds an equal ownership interest in Hedera and has equal voting rights on governance matters. Council membership does not confer any economic interest in Hedera, such as rights to dividends or a share of profits.[1] Other than Swirlds, Inc. (which has a permanent Council seat), each Council member is term-limited to two consecutive three-year terms, and members will accordingly rotate on and off the Council.

In these ways, the Governing Council is structured to ensure decentralized, transparent, stable, and effective governance on behalf of the long-term interests of the network. In contrast to other blockchain networks, Hedera is not governed by small and/or relatively unknown groups of miners and developers. This enterprise-led structure greatly reduces the risk of ideological or personal disputes that have affected governance of other public DLT networks.

In short, Hedera's technology and governance make it scalable and well-suited to become the first public DLT network to achieve widespread acceptance and adoption, particularly by enterprises.

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[1] Council members are entitled to node fees and node reward payments that they earn as node hosts in order to offset the costs of running a node.

HEDERA'S "HBAR" CRYPTOCURRENCY

The Hedera network was launched in August 2018. At that time, the network's total fixed supply of hbars—50 billion hbars—was minted and placed into a Hedera Treasury account. The Hedera Treasury will consist of multiple cryptographically secure, multi-signature accounts. Hbars can be transferred out of a Treasury account only after a transaction is cryptographically signed by a majority of the Governing Council members. This ensures that control over the network's cryptocurrency remains decentralized and vested in large, trustworthy entities.

For more than a year after the network launched, almost all hbars remained in the Hedera Treasury account, aside from a small amount of hbars (6.7 million hbars) to early users to test the network as part of its community testing program. Then, after more than a year of testing, the Hedera network opened to the public on September 16, 2019, so that anyone could create an account on the Hedera network, and any developer could build and deploy applications on the network. A few hours after that transition to "open access," the Hedera Treasury began distributing hbars to SAFT holders, with some additional hbars distributed to employees, advisors, vendors, and others in the subsequent days. Additionally, hbars appeared on exchanges, so developers and users could begin purchasing them to use on the network.

Hedera's hbar release plan calls for a slow, measured release of hbars out of the Hedera Treasury. Only ~4% of the total hbar supply were circulating at the start of 2020 and less than 31% are expected to be circulating by the end of 2025. This release schedule is one of the mechanisms that will ensure that no would-be attackers will be able to disrupt the network. It also will ensure that the price of hbars is determined primarily through market forces, rather than by the Hedera Council.

02.

Hbars as "fuel" to pay for network services and incentivize node participation

All public DLTs need computers to serve as nodes in the decentralized network. These nodes serve two purposes:

1. **Shared Ledger:** Each node maintains a copy of the ledger of the balances in each network user's account.

2. **Execute Transactions:** Nodes verify and execute new transactions and place those transactions into consensus order, so that user account balances are updated on an ongoing basis.

Each node must provide computing power to run the network's consensus algorithm and process transactions. To incentivize nodes to participate—as computing power is not free—public DLTs typically compensate nodes with payment, often in the network's native cryptocurrency.
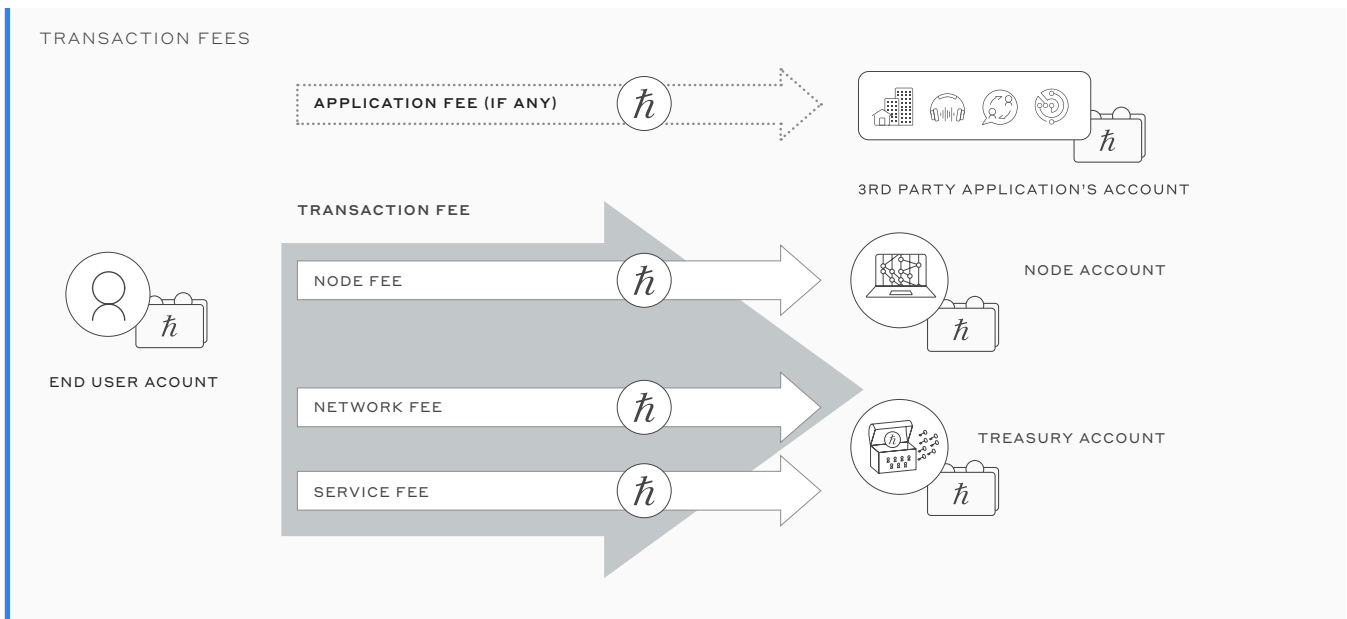
On the Hedera network, hbars are used as a "fuel" to pay for network services (i.e., to submit transactions, run smart contracts, store files, use the Hedera Consensus Service) and to reward nodes for providing their computing resources (bandwidth, processing power, memory) to the network. The fees per transaction are very low, requiring the ability to make micropayments in a form—an hbar—that is divisible to less than a penny. For example, transactions using the cryptocurrency service or Hedera Consensus Service are expected to cost ~US$0.0001 (one one-hundredth of a cent).

The economics of a Hedera transaction have been designed to balance these costs and incentives to create an efficient flow of funds. This flow consists of:

1. **Transaction fees** paid by end users (or third-party applications as end users) into a Hedera account, and

2. **Reward payments** paid out of a Hedera-controlled account as **(a)** node reward payments to node hosts and **(b)** eventually, proxy-staking reward payments to hbar owners who proxy-stake their hbars to nodes.[2]

For example, if Alice sends 5 hbars to Bob, those 5 hbars are sent directly from Alice's account to Bob's account—the 5 hbars do not pass through a Hedera-controlled account—but Alice pays a node fee, a network fee, and a service fee, the latter two collected by a Hedera-controlled account.

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[2] For more on proxy-staking, see Part 3. Node reward payments and proxy-staking payments are not yet being made. Proxy-staking payments are expected to be de minimis.

TRANSACTION FEES

APPLICATION FEE (IF ANY)

3RD PARTY APPLICATION'S ACCOUNT

TRANSACTION FEE

NODE FEE

NODE ACCOUNT

END USER ACOUNT

NETWORK FEE

TREASURY ACCOUNT

SERVICE FEE

TRANSACTION FEES

End users pay fees to use the network. Fees are incurred, for example, when hbars are transferred or data is added to the Hedera hashgraph ledger. The fees for a particular action will depend on the type of network services used (cryptocurrency, smart contracts, file service, Hedera Consensus Service) and the degree and duration of network resources consumed in processing the transaction. The overall fee for an action on the network is called a Transaction Fee, which is composed of three distinct fees—a Node Fee, a Network Fee, and a Service Fee. Each of these fees relate to how the transaction is submitted to and validated by the network, and the amounts of these fees are set by the Hedera Council. In addition, developers offering applications on the Hedera network may also charge their users an Application Fee.

Although a network user pays an aggregate Transaction Fee, below is additional detail on the three Transaction Fee components and the optional Application Fee:

1. **NODE FEE:** A user or application seeking to complete a transaction on the network will send that transaction to a single node, which will then submit that transaction to the network. In doing so, that node will expend resources and energy (albeit a small amount). Node Fees compensate nodes for those resources and incentivize nodes to take on this critical role. Node Ffees are paid from the end user's account directly to the account associated with the node that submits the user's transaction to the network.

2. **NETWORK FEE:** After a transaction is submitted to the network, it is communicated to nodes that validate digital signatures, further communicate the transaction to other nodes, and temporarily store it in their memory while the network reaches consensus. Users pay a Network Fee that compensates all participating nodes for calculating consensus on the user's transaction. The computing resources consumed by this process can vary based on the file size of the transaction and the number of digital signatures. Network Fees are paid by users into a Hedera-controlled account that collects all Network Fees and Service Fees (defined below).

3.   **SERVICE FEE:** Service Fees are paid by an end user to compensate the network for the services associated with the transaction (e.g., a cryptocurrency transfer, smart contract processing, file storage, or message ordering). For example, for a file service transaction, the network will charge a Service Fee corresponding to the amount of energy and memory needed to store a file based on its size and the requested duration of time it will be stored on the network. For a smart contract transaction, the Service Fee will be based on the processing power required by network nodes to perform the computation required by the smart contract. Service Fees are paid by users to a Hedera-controlled account that collects all Network Fees and Service Fees.

4.   **APPLICATION FEES (OPTIONAL):** Developers who build applications on top of the Hedera network may want to monetize those applications to compensate themselves for the value they provide to the end users. A wallet application, for example, may choose to charge a small percentage of each deposit or withdrawal. A ridesharing dapp that connects drivers to passengers with no intermediary may choose to take a fee calculated as a small percentage of each ride completed and paid. Like many existing applications, some Hedera-based applications may offer both free services and paid services. A third-party developer will determine the amount of Application Fee she wishes to charge, and these fees will be paid by end users directly to the developer's account.

For more information on fees, visit **https://www.hedera.com/fees**.

NODE REWARD PAYMENTS

A distributed network needs to incentivize nodes to contribute computing resources to validate transactions and maintain the shared ledger. Like most DLT networks, Hedera will reward nodes by paying them in the network's native cryptocurrency.[3]

When node reward payments are implemented, it is expected that, every 24 hours, a Hedera-controlled account will automatically distribute hbars as node reward payments to all the nodes that were online and participated in validating transactions during that period. After the node software provides the ability to proxy-stake coins to node accounts, node reward payments will be distributed to nodes in proportion to the amount of hbars staked and proxy-staked to such node's account. *(Proxy-staking is explained in Part 3)*
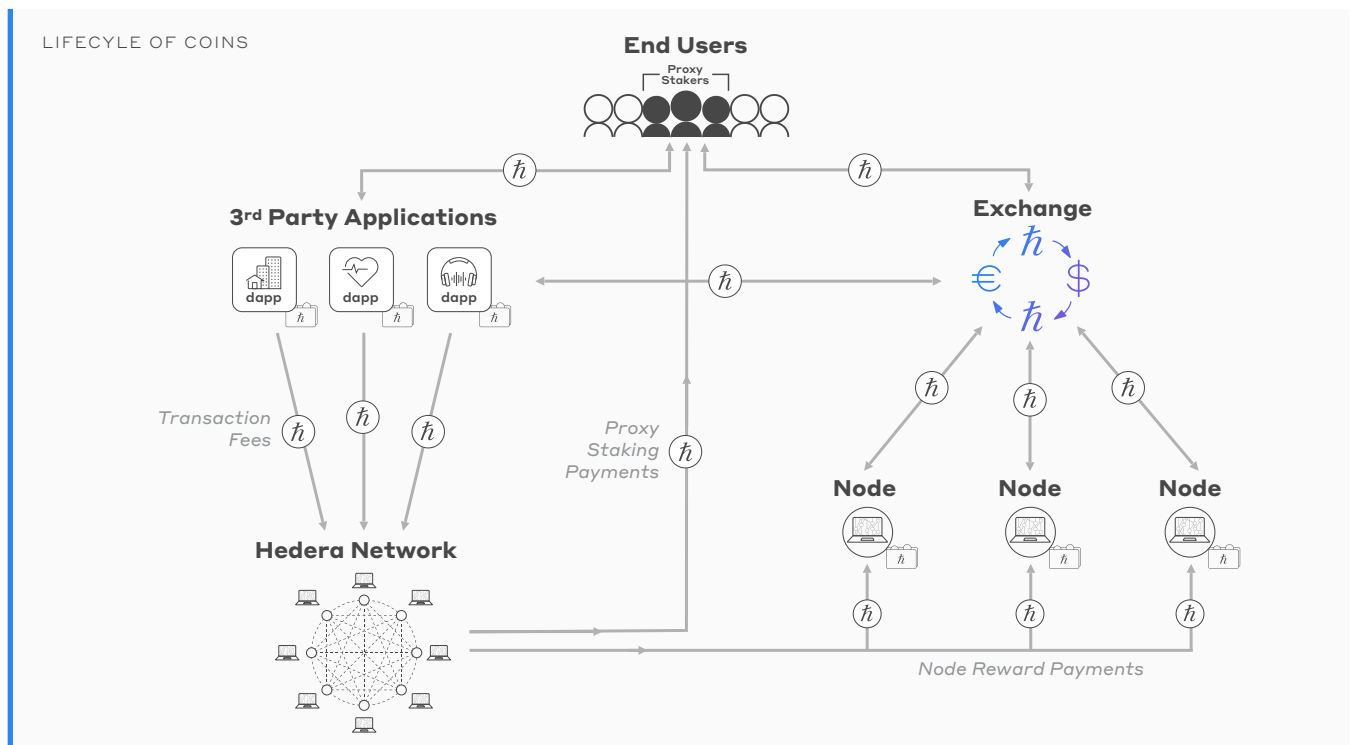
This node incentive system is far more efficient than proof-of-work, "winner-take-all" networks. In those networks, mining nodes expend energy to try to solve the cryptographic puzzle, but only the winner receives a payment. All the energy consumed by the other nodes is wasted. On the Hedera network, no energy is wasted, as nodes do not expend energy on useless math problems, but directly on communicating, validating, and supporting transactions.

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3 During the initial period of the Hedera network, Hedera is not making node reward payments as described herein.

PROXY-STAKING PAYMENTS

After proxy-staking is implemented on the Hedera network, it is expected that, initially, only Hedera will proxy-stake coins to nodes. Eventually, Hedera plans to allow any user who holds hbars to proxy-stake their coins to nodes. At this time, Hedera will begin making proxy-staking payments to user accounts that have proxy-staked coins to active nodes. These payments, like node reward payments, will be made once every 24 hours. Payments relating to a user's proxy-staked coins will be split 50-50 between the node's account and the user's account. The amounts of such proxy-staking payments are expected to be minimal.

Hbars that are staked or proxy-staked always remain under the control of their owner. Their owners can spend them at any time, and those who proxy-stake their hbars can turn off or redirect the proxy-staking to another node at any time.

LIFECYLE OF COINS

End Users
Proxy Stakers

3rd Party Applications

dapp   dapp   dapp

Transaction Fees

Hedera Network

Proxy Staking Payments

Exchange

€ $

Node   **Node**   **Node**

Node Reward Payments

DUAL ROLE OF HEDERA COINS

NETWORK "FUEL"

Coins are used to pay for network services (i.e. submit transactions, run smart contracts, store files)

Coins are used to reward nodes for providing services to the network

Coins enable micropayments (< $0.01)

NETWORK PROTECTION

Any distributed ledger can be attacked if a malicious actor controls 1/3 of voting power

Hedera's proof-of-stake system uses coins to weight the votes, making it dificult and expensive for a bad actor to gain control of 1/3 of the voting power, i.e., 1/3 of the coin supply

03.

Hbars protect the network through coin-weighted, proof-of-stake consensus

In the initial phases of the network, Hedera is a permissioned network, meaning one in which an entity or person must have permission from Hedera to host a node. Currently, all nodes in the Hedera network are operated by Hedera and Council members. Hedera is currently in the process of transitioning full operation of the nodes to the Council members.

In the future, Hedera expects to allow other entities and persons to be able to host nodes on the Hedera network. Through Hedera's planned proof-of-stake consensus model, hbars will play a key role in how the Hedera network achieves consensus on transactions and protects the network from cyberattacks.
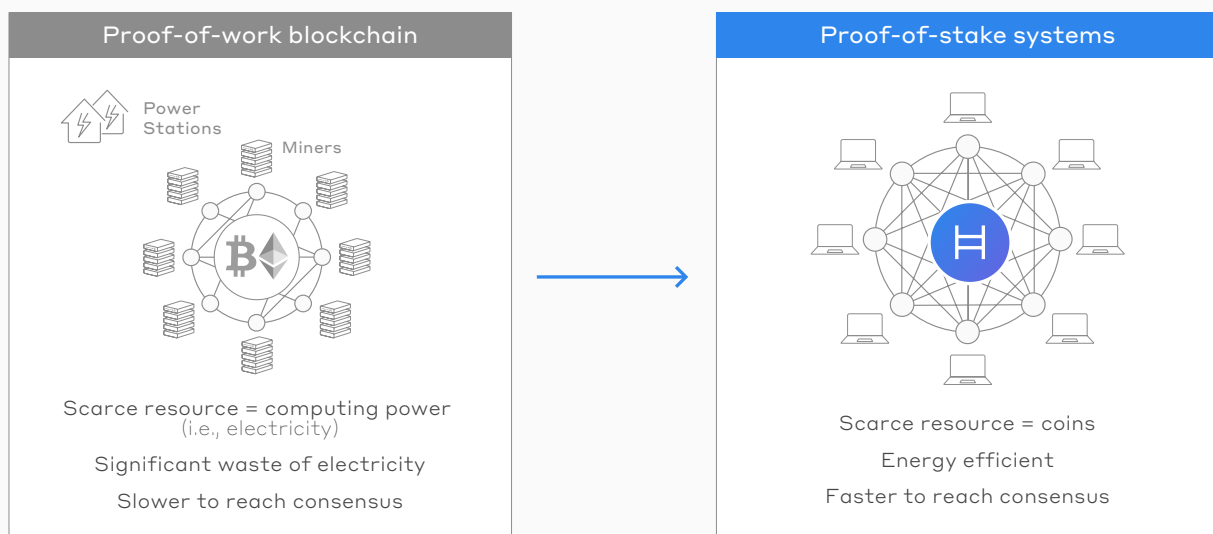
ALL PERMISSIONLESS DLTS NEED A LIMITED RESOURCE

In any permissionless DLT network, anyone can run a node that participates in consensus. In addition, it is easy to stand up numerous virtual nodes. As a result, there is a need to guard against malicious actors that seek to disrupt the network and prevent it from reaching consensus on transactions. Hackers can do this by obtaining control of a specified amount of the network's total voting power over consensus — the amount varies across networks but is typically no less than one-third of the voting power. Permissionless DLT networks need a scarce resource to secure the networks against such attacks. [4]

IN PROOF-OF-WORK, THE LIMITED RESOURCE IS COMPUTING POWER/ENERGY CONSUMPTION

In "proof-of-work" blockchains, such as Bitcoin and Ethereum, computing power and associated energy consumption are limited resources. Network nodes ("miners") group transactions into "blocks" and compete to solve a complex cryptographic puzzle to "win" the race to add the next block to the ledger, creating an ever-growing, immutable chain of blocks. The nodes are incentivized to do this work because the winner receives a payment of cryptocurrency. The proof-of-work mechanism—i.e., the cryptographic puzzle—is designed to add friction, to slow the system so that blocks are not added more quickly than the platform can reach agreement on their order. Solving the cryptographic puzzle requires significant computing power, and that computing power in turn requires significant energy consumption. A would-be attacker cannot easily set up enough nodes to disrupt the process of consensus, because doing so would require a prohibitively expensive amount of computer hardware and energy consumption.

PROOF-OF-WORK VS PROOF-OF-STAKE

Proof-of-work blockchain	Proof-of-stake systems
Power Stations / Miners	
Scarce resource = computing power (i.e., electricity)	Scarce resource = coins
Significant waste of electricity	Energy efficient
Slower to reach consensus	Faster to reach consensus

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4   Any distributed network can be hacked if malicious actors control a certain amount of the network's voting power over consensus. For Hedera, this is 1/3 of the voting power.

IN PROOF-OF-STAKE, THE LIMITED RESOURCE IS THE NETWORK'S CRYPTOCURRENCY

In "proof-of-stake" DLT systems, the network's native cryptocurrency serves as the scarce resource that protects the network. Rather than each node having an equal vote, a node's ability to influence the consensus order of transactions is proportional to the amount of coins the node holds (i.e., its "stake"). The particular manner in which a node's stake relates to achieving consensus varies from platform to platform, but it always occurs through the platform's algorithm and is in some way proportional to a node's stake of cryptocurrency.
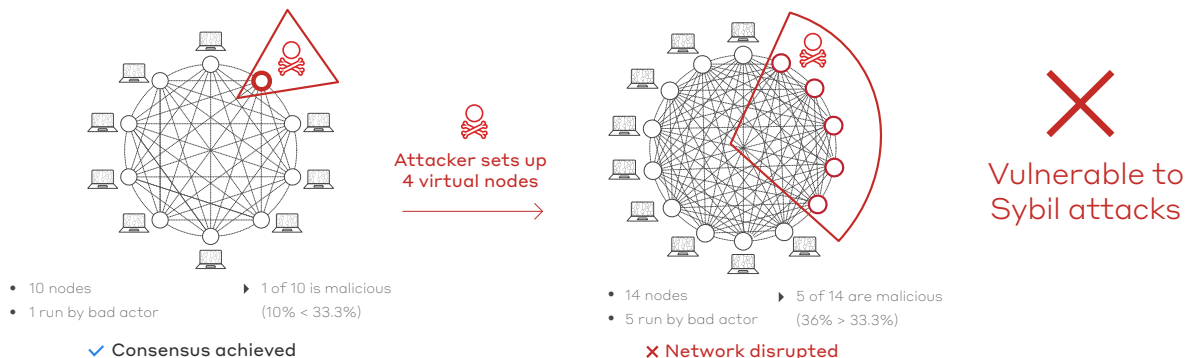
In typical proof-of-stake systems, all of the network's coins are created at the launch of the network (e.g., all 50 billion hbars were created at the time of the Hedera network's launch). There is no "mining" of new coins through expensive, energy-inefficient computations. As a result, proof-of-stake systems generally have much lower transactions costs and can process transactions much more quickly and cheaply than proof-of-work systems.

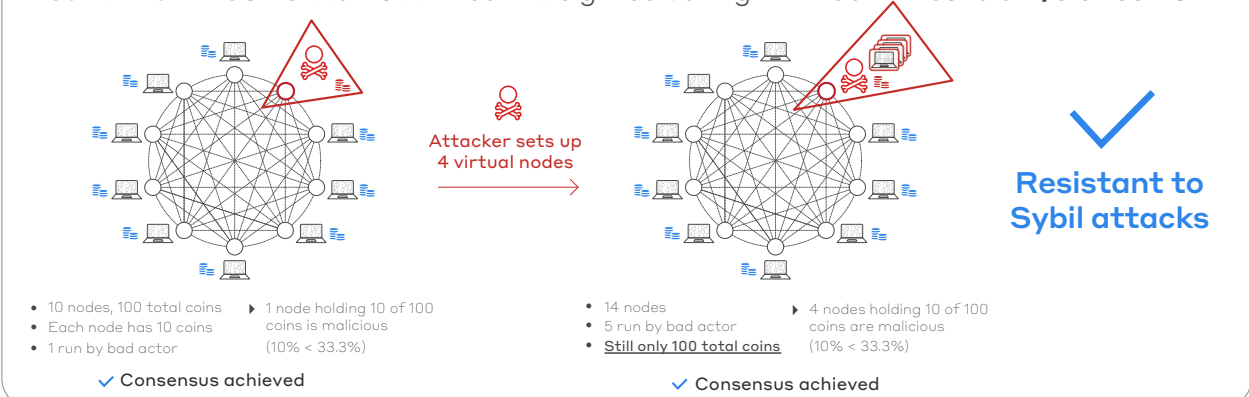## HEDERA PREVENTS CYBERATTACKS THROUGH COIN-WEIGHTED VOTING ON CONSENSUS

In Hedera's proof-of-stake system, hbars will function as the limited resource to protect the network. Any distributed ledger using the hashgraph consensus algorithm will achieve consensus on a transaction when the voting involves more than two-thirds of the network's voting power. A malicious attacker, then, would need to attain one-third of the total voting power over consensus to disrupt the network. [5]

COIN-WEIGHTED VOTING ON CONSENSUS

SCENARIO A: Networks with no coins – Attack threshold: **1/3 of nodes**

Attacker sets up
4 virtual nodes

Vulnerable to
Sybil attacks

- 10 nodes
- 1 run by bad actor
- 1 of 10 is malicious (10% < 33.3%)
✓ Consensus achieved

- 14 nodes
- 5 run by bad actor
- 5 of 14 are malicious (36% > 33.3%)
✗ Network disrupted

SCENARIO B: PoS networks with coin-weighted voting – Attack threshold: **1/3 of coins**

Attacker sets up
4 virtual nodes

Resistant to
Sybil attacks

- 10 nodes, 100 total coins
- Each node has 10 coins
- 1 run by bad actor
- 1 node holding 10 of 100 coins is malicious (10% < 33.3%)
✓ Consensus achieved

- 14 nodes
- 5 run by bad actor
- Still only 100 total coins
- 4 nodes holding 10 of 100 coins are malicious (10% < 33.3%)
✓ Consensus achieved

- In a distributed platform, consensus is reached when a transaction is validated by >2/3 of the platform's voting power
  - To mount a successful attack, a bad actor must control 1/3 of the voting power
- Coin-weighted, PoS voting protects against Sybil attacks by making it difficult to reach that 1/3 threshold

[5] Note: The Hedera Governing Council does not exercise discretion over node voting to validate transactions. On the Hedera network, governance (in which Council members vote through individual representatives) is separated from consensus (in which nodes vote automatically per the hashgraph consensus algorithm). While the Council members operate the initial nodes, those nodes "vote" automatically by running the algorithm.

Hedera Hashgraph

In permissioned DLT networks, in which all node hosts are known and trusted by each other, the voting power could be calculated based on a one-node, one-vote basis. Once a transaction is validated by more than two-thirds of the nodes, the network would have reached consensus and the transaction would be placed into the shared ledger.

In any permissionless DLT network, anyone can run a node that participates in consensus, and it can be easy and virtually cost-free to set up virtual nodes. As a result, this one-node, one-vote approach leaves the network vulnerable to attackers who create such virtual nodes (known as "sock puppets") at little to no cost. In this scenario, an attacker could create a horde of sock puppets to increase their voting power and surpass that one-third attack threshold (known as a "Sybil attack").

To protect against Sybil attacks, the Hedera network will calculate a node's voting power over consensus on a one-hbar, one-vote basis. After a node submits a transaction to the network, the transaction gets communicated to random nodes, which validate the transaction's authenticity. Each node's vote will be weighted by the number of hbars that are staked (or proxy-staked) to it, and consensus on a transaction will be reached once the transaction is validated by nodes representing more than two-thirds of the total supply of coins.

This coin-weighted system will prevent Sybil attacks, because the creation of additional nodes by an attacker would have no effect on the attacker's stake of hbars, and thus the attacker's voting power over consensus.

A bad actor would be able to disrupt consensus only by amassing and staking one-third of the total coin supply. In addition, because consensus will be determined by the number of staked hbars, not the number of nodes, it does not matter if a node goes on or offline while consensus is being calculated.
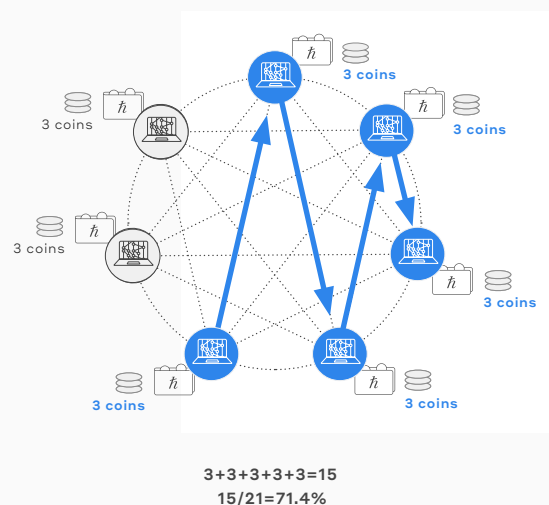
HEDERA PLATFORM WITH COIN-WEIGHTED VOTING

The platform will reach consensus on a transaction once the transaction is validated by nodes holding >2/3 of the coins
SCENARIO: Assume 7 nodes and 21 total coins
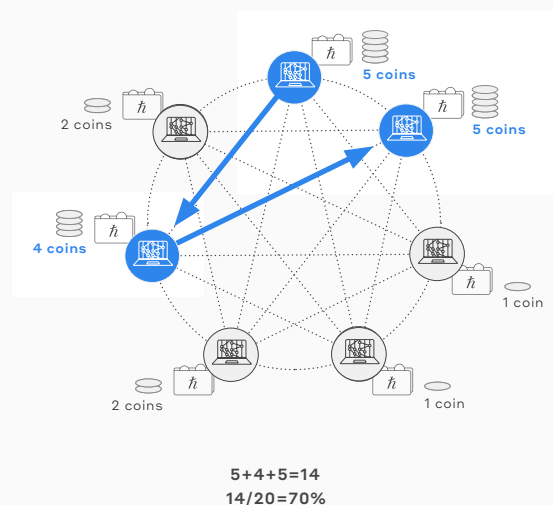
EXAMPLE A
• Coins distributed equally to each node (3 coins/node)
• Consensus after transaction validated by 5 nodes
(5x3=15, 15/21 coins = 71.4% > 66.6%)

EXAMPLE B
• Coins distributed unequally across nodes
• Consensus after transaction validated by nodes
  holding stake of 14 coins (14/20 coins = 70% > 66.6%)

3+3+3+3+3=15
15/21=71.4%

5+4+5=14
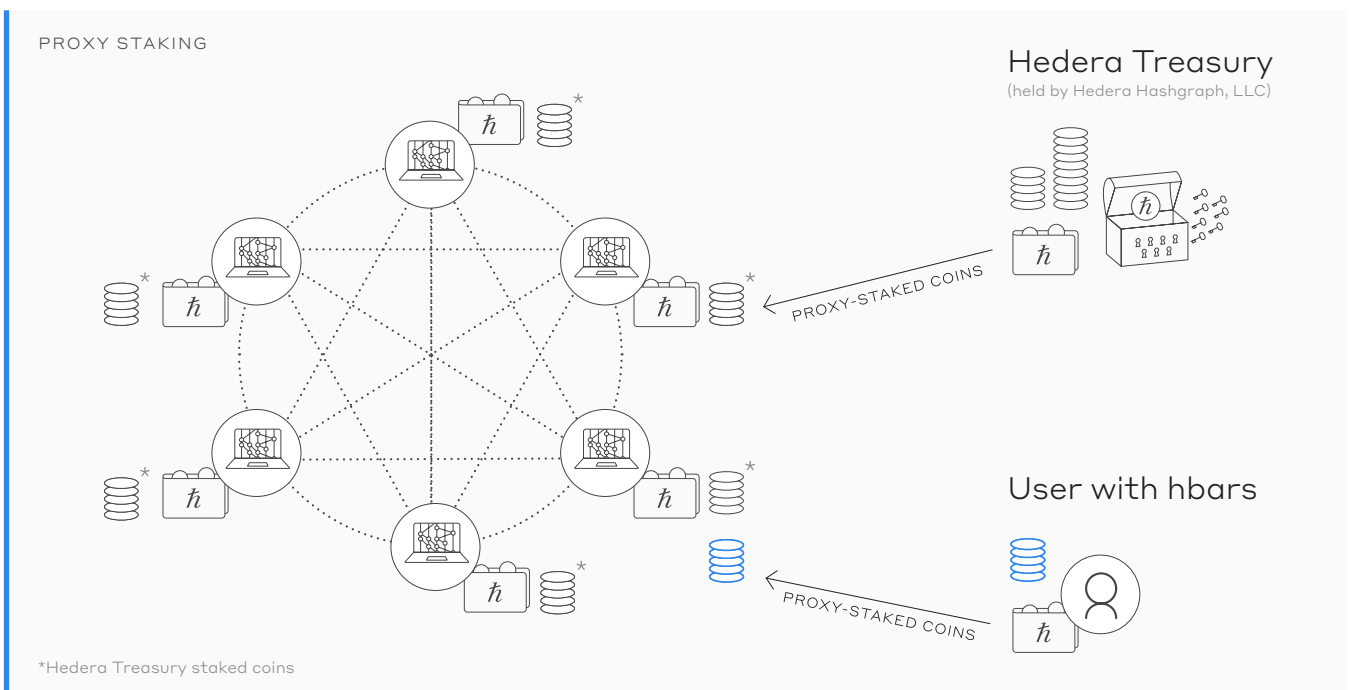14/20=70%

Hedera Hashgraph

STAKING AND PROXY-STAKING

As Hedera's coin-weighted consensus algorithm will require that a transaction be validated by nodes representing more than two-thirds of the total hbars, it will be important to ensure that well over two-thirds of the total hbars are actually staked to nodes. Yet while everyone who wishes to use the Hedera network will need hbars to pay for transactions on the network, most users are not likely to be interested in running a node.

"Proxy-staking" will allow hbar owners who do not run nodes to still stake those coins and be compensated for contributing to consensus by proxy-staking their hbars to a node.[6] Hbars proxy-staked to a node are considered part of that node's stake (i.e., voting power) when validating transactions.

Node reward payments will be paid to nodes in proportion to the total amount of hbars staked (including proxy-staked hbars) and will be split between the node and the owner of the hbars being proxy-staked. The compensation for proxy-staking is meant only to encourage users (or the builders of their wallet software) to make the very small effort to choose a reliable node to which to proxy-stake. Users who proxy-stake their hbars will receive proxy-staking payments, but the amount of those payments will be de minimis.

Proxy-staked hbars remain under the control of their owner; the node to which they are proxy-staked cannot spend them. The owner will also be able to turn off or redirect the proxy-staking to another node or spend the hbars at any time.

PROXY STAKING

Hedera Treasury
(held by Hedera Hashgraph, LLC)

PROXY-STAKED COINS

User with hbars

PROXY-STAKED COINS

*Hedera Treasury staked coins

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6 Proxy-staking by network users is not yet an available feature of the network and is expected to be added in a later phase of the network's development.

04.

Treasury Management & Distribution Schedule

NOTE: This section describes the planned hbar allocation and release schedules. The release schedule described below may vary in the future due to unforeseen business or regulatory changes, and Hedera assumes no liability whatsoever for any variations therefrom.

On August 24, 2018, Hedera launched the Hedera network and created the fixed supply of 50 billion hbars held in the Hedera Treasury account.

Well before the network launched, Hedera developed a plan for hbar distribution to ensure the network could grow in a stable and secure manner. This plan was informed by key considerations of:

- **Regulatory compliance**
- **Network security**
- **Decentralization**
- **Reliance on market forces for pricing (rather than centralized decision-making)**

Hedera's strategy behind this schedule is to release hbars from Treasury such that the growth of circulating supply is commensurate with the adoption and use of the Hedera network. Hedera's strategy regarding the number of hbars in circulation may change depending on several factors, including (but not limited to) accelerated or diminished demand for services on the network, network security considerations, efforts to provide incentives or support to developers and others who will encourage use of the network, and as may be needed based on regulatory considerations.

HEDERA TREASURY MANAGEMENT

The Hedera Council is ultimately responsible for hbar distribution and circulation. Hedera has certain contractual obligations to distribute hbars, some of which predate the formation of the multi-member Hedera Council (e.g., SAFTs; agreements to pay advisors and certain vendors in hbar; compensation agreements with employees). However, hbars may not be transferred out of the Hedera Treasury account and new types of allocations may not be made without the approval of a majority of Council members or, if delegated by the Council, Hedera's Board of Managers.
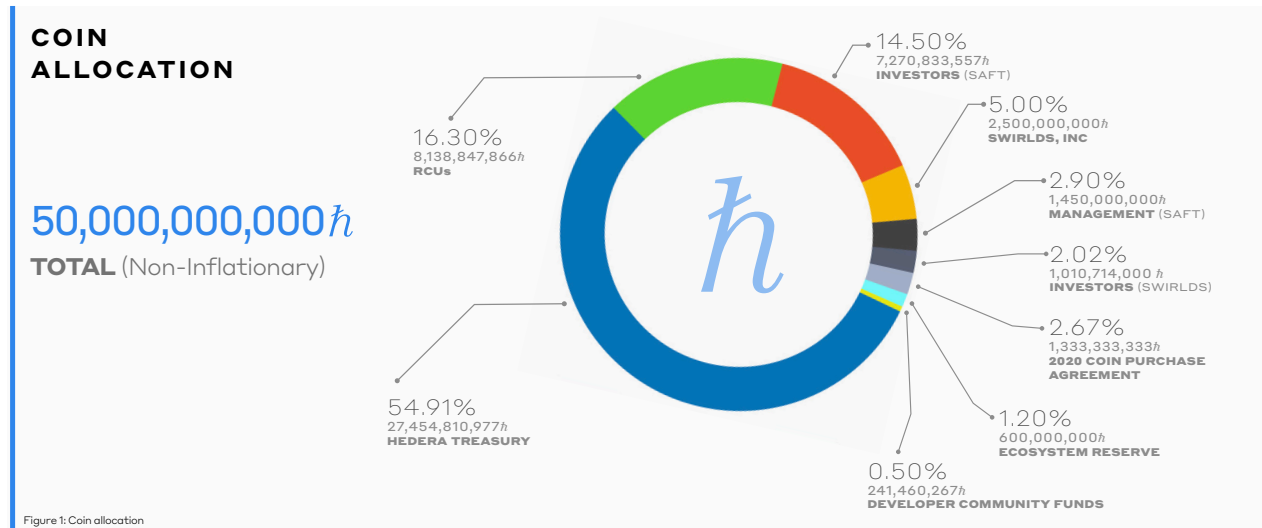
HBAR ALLOCATIONS & DISTRIBUTIONS

When the Hedera network opened access to the public, approximately 46% of the network's 50 billion hbars had been allocated, with the remaining 54% in the Hedera Treasury.   The allocated hbars included those to be distributed over time to SAFT investors, early management, employees, advisors, vendors pursuant to contractual commitments as well as hbars earmarked for future employees, community earn programs, and programs to incentivize network use through hbar grants to enterprises and developers.

Hedera provides monthly reports on hbar distributions, which are available at:
https://help.hedera.com/hc/en-us/articles/360002789198

The current allocation of hbars is set forth in **Figure 1** below. Please note that this allocation encompasses hbars that have been distributed and those yet to be distributed. Coins that have already been distributed may subsequently have been transferred to other parties, so the figures do not necessarily reflect current ownership. In addition, Figure 1 is based on current obligations and expectations, which may be subject to change.

COIN ALLOCATION

50,000,000,000ℏ
TOTAL (Non-Inflationary)

14.50%
7,270,833,557ℏ
INVESTORS (SAFT)

5.00%
2,500,000,000ℏ
SWIRLDS, INC

2.90%
1,450,000,000ℏ
MANAGEMENT (SAFT)

2.02%
1,010,714,000 ℏ
INVESTORS (SWIRLDS)

2.67%
1,333,333,333ℏ
2020 COIN PURCHASE AGREEMENT

1.20%
600,000,000ℏ
ECOSYSTEM RESERVE

0.50%
241,460,267ℏ
DEVELOPER COMMUNITY FUNDS

54.91%
27,454,810,977ℏ
HEDERA TREASURY

16.30%
8,138,847,866ℏ
RCUs

Figure 1: Coin allocation

Hedera's estimated hbar release schedule through 2025 is set forth in **Table 1** below. The annual distributions by category in Table 1 reflect estimated distributions under current contractual obligations and expectations. It does not include the quarterly "bonus" allocations of hbars to be distributed to SAFT holders who accepted the SAFT exchange offer described below.   The distribution schedule will change based on, among other things, the number of "bonus" hbars distributed in connection with the SAFT exchange offer, attrition, and market conditions. In addition, Hedera expects to distribute additional coins from Treasury over time to support the development of the network ecosystem; to make coin grants to employees, contractors, and vendors; and to sell coins to cover operating costs.

HEDERA COIN DISTRIBUTION SCHEDULE (ESTIMATED THROUGH 2025)

	As of Open Access	2019	2020	2021	2022	2023	2024	2025	Total through 2025
Total % of Coins Released	1%	4%	13%	18%	23%	27%	32%	34%	
Total Aggregate Distributions	372,540,769	1,934,179,700	6,375,871,070	8,868,557,505	11,393,645,675	13,686,935,540	15,805,818,090	17,033,014,757	
Total Incremental Distributions	372,540,769	1,561,638,931	4,441,691,370	2,492,686,435	2,525,088,170	2,293,289,865	2,118,882,550	1,227,196,667	
Incremental distribution by category, current obligations *									
Founders (SAFT + RCUs)	9,643,334	68,521,250	910,528,333	251,583,750	-	678,481,667	1,885,445,000	1,156,963,333	4,961,166,667
2017 Executives (SAFT + RCUs)	8,866,667	62,800,000	886,850,000	230,512,500	110,250,000	172,804,167	187,850,000	70,233,333	1,730,166,667
SAFT 1 + 1N: (excl. Founders, 2017 executives)	30,412,857	216,691,605	746,538,334	744,352,778	744,352,778	561,932,778	11,004,583	-	3,055,285,714
SAFT 2 + 2N	139,250,000	368,968,920	839,056,383	828,586,562	656,339,326	69,798,809	-	-	2,902,000,000
SAFT 3A + 3AN	135,861,270	203,791,893	340,028,155	-	-	-	-	-	679,681,318
SAFT 3B + 3BN	48,506,641	-	39,860,896	39,860,896	39,860,896	39,860,896	34,582,966	-	242,533,191
RCUs: Employees & Contractors (excl. Founders, 2017 executives)	-	535,897,979	229,486,708	158,934,417	90,740,761	12,394,835	-	-	1,027,454,700
RCUs: Advisors & Vendors	-	104,967,284	240,842,561	72,055,532	29,555,565	13,972,224	-	-	461,393,166
Swirlds ** (est. revenue share over 46 months per the MLA)	-	-	208,500,000	166,800,000	166,800,000	97,900,000	-	-	640,000,000
2020 Coin Purchase Agreements (estimated)		-	-	-	687,188,844	646,144,489	-	-	1,333,333,333
Held by Swirlds ***									
Swirlds (one-time allocation per the MLA)	2,500,000,000								2,500,000,000
Retained by Swirlds: (future dividends to Swirlds investors; excl. Founders)	1,010,714,000								1,010,714,000
Other Budgeted Allocations ****									
Developer, Community & Ecosystem Incentives	6,700,000	7,300,000	1.2 billion coins expected to be distributed starting in 2020						1,241,460,267
RCUs: Reserve for future grants	-	-	1.8 billion coins expected to be distributed starting in 2020						1,800,000,000

*   The allocation amounts do not include the quarterly bonus allocations of hbars to SAFT 1N, 2N, 3AN, and 3BN.

**   The actual number of hbars that Swirlds may receive under the MLA will vary depending on the price of hbars.
       The number represented here is an estimate only, based on the trailing 30-day median price of hbars as of March 15, 2020, and the actual number could be higher or lower.

*** The one-time allocation to Swirlds and the hbars allocated to Swirlds investors (excluding the Founders) are held by Swirlds, have not been sold or distributed. Swirlds must provide a schedule, notice, and right of first refusal to Hedera with respect to any such sales. The current coin distribution schedule provided by Swirlds to Hedera, which is for calendar year 2020, states that Swirlds has no coin sales planned for the entirety of that period.

**** The reserve of 1.8 billion coins for future RCU grants and most of the 1.2 billion coins allocated for developers, community and ecosystem incentives have not yet been granted or distributed, but have been earmarked for such intended use.

Table 1: Hedera coin distribution schedule

SAFTS AND SAFT EXCHANGE OFFER

Hedera raised capital to develop the Hedera network through the issuance of Simple Agreements for Future Tokens ("SAFTs"). Hedera issued three series of SAFTs, with the first SAFTs being offered in December 2017 and the final SAFT round closing in August 2018. In the aggregate, 17.45% of all hbars were sold via SAFTs.

When Hedera started distributing hbars to SAFT holders in September 2019, the distributions schedules for the SAFTs ranged from monthly distributions over 9 months for SAFT 3A, monthly distributions over 3 years for SAFT 2, quarterly distributions over 4 years for SAFT 1, and annual distributions over 4 years for SAFT 3B. Detailed information for each of the SAFTs can be viewed at **https://help.hedera.com/hc/en-us/articles/360007219337**.

In March 2020, all SAFT holders were given the option to participate in a SAFT exchange offer. The purpose of the offer was to help incentivize SAFT holders — many of whom are also developers and/or otherwise involved in the broader DLT ecosystem — to continue supporting further growth and development of the Hedera network, while further slowing the release of coins (which is contractually set) during this period of early adoption.

In exchange for extending the release schedule for their original allocation of coins, SAFT holders who accepted the offer will receive an additional bonus allocation of coins on a quarterly basis, beginning in Q4 of 2020, and continue until the cumulative value of those additional distributions equals the value of their original principal investment. Overall, 71% of SAFT holders accepted the exchange offer. Detailed data on the results of the SAFT exchange offer is provided in **Table 2**. The SAFT exchange offer documents are publicly available and can be viewed at **https://help.hedera.com/hc/en-us/articles/360007276858**. Distribution schedule changes due to acceptance of the SAFT exchange offer have been reflected in the estimated distribution schedule with respect to the original allocations of coins, but does not include the quarterly "bonus" allocations of coins to those who accepted the SAFT exchange offer as such amounts are difficult to predict and, at least initially, likely to be relatively small.

SAFT EXCHANGE OFFER ACCEPTANCE

	Number (#)	Percentage (%)	USD invested (~$)	Percentage (%)
All SAFTs	1188	-	$123,001,943	-
Accepted Offer	842	70.9%	$75,295,076	61.2%
SAFT 1 Total	59	-	$4,657,000	-
Accepted Offer	4	6.8%	$77,000	1.7%
SAFT 2 Total	80	-	$14,510,000	-
Accepted Offer	28	35.0%	$3,025,000	20.8%
SAFT 3A Total	671	-	$81,501,757	-
Accepted Offer	501	74.7%	$51,442,296	63.1%
SAFT 3B Total	378	-	$22,333,186	-
Accepted Offer	309	81.7%	$20,750,780	92.9%

Table 2: SAFT Exchange Offer acceptance

FOUNDERS & EARLY EXECUTIVES

Hedera's co-founders and early members of management also invested in SAFTs and, as part of their compensation, received coin grants. Accounting for coins they may receive through coin grants and the coins they will receive under their SAFTs, Dr. Baird and Mr. Harmon (together, the "Founders") each have a right to just over 5% of the total coin supply. Dr. Baird and Mr. Harmon each have a coin grant of two billion hbars in total allocation (4% of the total supply of 50 billion hbars), each vesting over a six-year period.

None of the hbars that Hedera's co-founders, Leemon Baird and Mance Harmon, are receiving as compensation (employee grants) were released before January 1, 2020. While Leemon and Mance also own SAFTs and will receive some hbars under their SAFTs, they are also further delaying the release of 76% of all of their hbars (whether from SAFTs or grants) until after August 2023 (i.e., after the fifth anniversary of network launch).

For both coins received under their coin grants and coins received under their SAFTs, DMr. Baird and Mr. Harmon will define a reasonable selling plan, which will be disclosed publicly at least 30 days before selling any of their coins. The selling plan will be designed to avoid flooding the market or selling based on non-public information, and to comport with all applicable laws and regulations.

Other senior executives who joined Hedera prior to March 2018 will receive an aggregate of 3.5% of the total coin supply through their SAFTs and coin grants.   The senior executive employees who remain on staff have also agreed that none of the hbars they receive through employee grants were to be released before January 1, 2020, and that a substantial portion of their total hbars will be further delayed until October 2023.

EMPLOYEES & SERVICE PROVIDERS

Hedera has adopted a coin plan through which it can compensate employees, contractors, advisors, vendors who provide services to Hedera, and other service providers using hbars. At present, all grants that have been made under the plan have been in the form of restricted coin units ("RCUs"), whereby individuals vest into a right to receive a number of hbars over a vesting will generally receive those hbars on or after the applicable vesting date.

Hedera has created a reserve of 8.1 billion hbars for the coin plan that governs the RCUs. Out of that RCU reserve, Hedera has granted RCU awards ccovering 6.5 billion hbars.

RCU grants to employees and contractors typically follow a four-year vesting schedule with a one-year cliff and then monthly thereafter (i.e., no portion of the RCU award vests unless the individual continues to provide services to Hedera for one year, at which point 25% of the RCU award vests and then the RCU award vests in equal monthly installments thereafter). With limited exceptions, if an employee or contractor departs before the end of the vesting period, the unvested portion of the grant reverts to Hedera while the individual retains the right to receive any vested but undistributed hbars. Hedera plans to continue providing RCU grants, including retention grants to employees, as part of its overall compensation. As of June 2020, RCU awards covering 1 billion coins have been granted to employees and contractors (excluding the co-founders and early executives referenced in the prior section.

The structure of RCU grants to advisors and vendors vary depending on the terms of the particular contract. As of June 2020, RCU awards covering 461 million coins have been granted to advisors and vendors who provide services to Hedera.

SWIRLDS

Swirlds, which owns patents on the hashgraph technology, founded Hedera in order to create and launch a distributed general-purpose public ledger based on the hashgraph technology. Towards that end, Swirlds has granted to Hedera an exclusive non-transferable, perpetual right and license in and to the hashgraph technology for the limited and sole purpose of making the Hedera network a general-purpose public ledger available to entities or individuals to use as developers, users, testers, and node operators.

Under the license agreement between Hedera and Swirlds, a portion of the license fees are paid to Swirlds in hbars. Under those terms, Hedera paid Swirlds a one-time allocation of 5% of the total supply of coins (2.5 billion hbars) and will make ongoing monthly license fee payments in hbars equal to 10% of Hedera's revenue, with a monthly minimum of $625,000 worth of hbars (at fair market value) if paid in coins.[7] Because distributions of coins are subject to Council approval and regulatory considerations, the parties remain in discussions about effectuating the minimum payments. Hedera currently estimates that it will pay 640 million coins to Swirlds over 46 months in respect of the monthly license fee; the actual number will be higher or lower, depending on the market price of hbars.

Independent of the license agreement, an additional 1 billion coins were allocated to Swirlds investors (excluding the Hedera founders), who agreed to have Swirlds commit its resources and personnel almost entirely to the development of the Hedera network during the period between Hedera's founding and when the network was opened for public use in September 2019.

None of the coins held by Swirlds for its own account or allocated for Swirlds investors have been sold or distributed, and Swirlds is required to provide Hedera with a non-binding schedule that sets forth its expected plan for the sale of coins over the subsequent twelve months and at least 24-hour notice prior to any such sale or distribution, and Hedera has a right of first refusal at fair market price on any such sale. The current coin distribution schedule provided by Swirlds to Hedera, which is for calendar year 2020, states that Swirlds has no coin sales planned for the entirety of that period.

DEVELOPER COMMUNITY FUNDS AND AND ECOSYSTEM RESERVE

Hedera has allocated 1.24 billion coins for programs that provide hbars to incentivize adoption and use of the Hedera network, such as through the Hedera Heroes and Hedera Boost programs. So far, most of these 1.24 billion coins have not yet been granted or distributed, but there may be significant allocations of this reserved number to important commercial partners at any time.

Hedera may, through other initiatives and/or agreements, provide large amounts of hbars to enterprises, developers and other third parties that are able to drive network growth, development, and decentralization. Hedera also may pay some developers for services (e.g. tools, data analytics, advertising) and those payments may be in hbars, some or all of which those developers can then use to pay for API calls or other goods and services on the Hedera network. All such programs and distributions are subject to Council review and approval.

2020 COIN PURCHASE AGREEMENTS

Hedera is raising additional funds to support ongoing operations by selling hbars to a small number of institutional purchasers, with coins to be delivered after a multi-year lockup period consistent with Hedera's previously published coin release schedule.

Under the agreed-upon terms of these sales, purchasers will pay $0.015 per hbar, will not receive any of those hbars for the first two years, and then will receive delivery of the hbars in 12 equal monthly installments beginning two years from the close of the sale (i.e., from month 25 to month 36 following closing).

The hbars that will ultimately be distributed to the counterparties under these agreements are hbars that otherwise could have been release or sold by Hedera from the Treasury account during the next 2-3 years. Hedera expects to raise up to approximately $20 million in these sales, which would account for 1,333,333,333 hbars. Table 1: Hedera coin distribution schedule on page 15 includes the estimated release of these coins.

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7   For more on the terms of the license agreement, go to: https://help.hedera.com/hc/en-us/articles/360006895498

HBAR RELEASE SCHEDULE AS PART OF THE SECURE PATH TO DECENTRALIZATION

Hedera believes there are four key requirements that provide a secure pathway to broad and continued decentralization:

1. **Decentralized governance**
2. **Network utility**
3. **Permissionless nodes**
4. **Coin distribution**

DECENTRALIZED GOVERNANCE

Hedera achieves decentralized governance of the network through the Hedera Council, a rotating set of leading global enterprises from across industries and geographies. Governing Council members do not receive any economic interests in Hedera and, with the exception of Swirlds, they are term-limited. In these ways, the Governing Council is structured to provide wise, decentralized, transparent, and stable governance on behalf of the long-term interests of the network. For more information, visit **https://www.hedera.com/council**.

NETWORK UTILITY

A successful public DLT network will provide value to its users through the applications deployed on it. The Hedera network's core services provide developers and enterprises with powerful tools to create decentralized applications. Hedera currently has dozens of applications operating on the network aAs of March 14, 2020, the Hedera network is processing more than 750,000 transactions per day, generated by over two dozen applications running on the network and exchanges transacting hbar.

PERMISSIONLESS NODES

"Permissioned" networks are those in which a person or entity that wishes to operate a node must have permission from the network's owner (in Hedera's case, the Hedera Council). In contrast, "permissionless" networks allow anyone to run a node on the network. A public DLT network (i.e., one that anyone can use) can be permissioned and/or permissionless. Hedera's path to decentralization starts with a handful of permissioned nodes hosted by Council members, which over time will grow in number as the Council adds new members. In the future, Hedera expects to allow other entities and persons to be able to host nodes and, eventually, anyone would be able to host a node.

COIN DISTRIBUTION

To ensure the Hedera network is secure under a permissionless model, the network's coins must be widely distributed. Coins represent the "stake" of voting power in Hedera's proof-of-stake consensus model – more coins equal more voting power over consensus. Thus, to ensure the security of the network, hbars need to be widely distributed so no attacker or group of attackers can amass control over one-third of the coins.
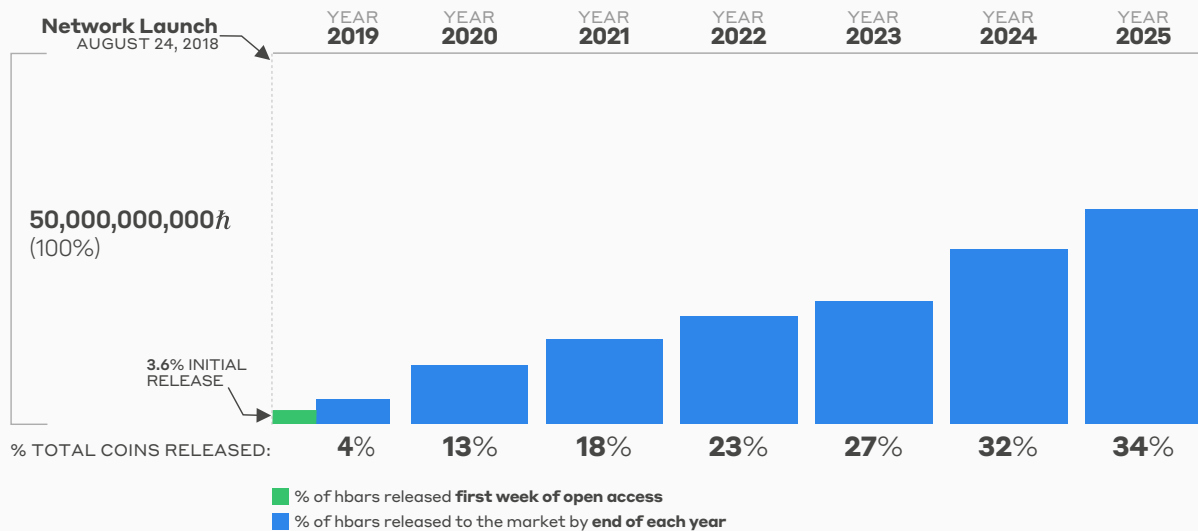
Hedera aims to combine a "path to permissionless" with a "path to widespread coin distribution" to keep the network secure while working to achieve greater decentralization.

First, until coins are sufficiently distributed, Hedera will remain a permissioned network. For the security of the network, the network will remain permissioned until the total value of all the circulating coins is high enough to be too expensive for a malicious user (or group of users) to buy a third of them to conduct an attack. When proxy-staking is introduced, there will also be a cap on how many hbars can be proxy-staked to a single node.

Second, Hedera has a slow and measured release schedule such that no more than 34% of all hbars are expected to be released until 2025. This slow release schedule is intended to provide for the stable and orderly growth of the network so that it can reach scale without sacrificing the safety necessary for a truly useful and widespread network that realizes the promise of building a trusted, empowering and secure online world. It is also tailored to match projected user needs to discourage excessive speculation in the coins. In addition, by publicly communicating the expected release schedule and requiring any material changes to be implemented through the vote and signature of a diverse set of Governing Council members, Hedera provides transparency and predictability about the total circulating supply of coins to further dampen speculation, minimize information asymmetry, and protect against market manipulation.

6-YEAR HBAR RELEASE SCHEDULE

Coin release ≠ Coin sale

Network Launch
AUGUST 24, 2018

| YEAR 2019 | YEAR 2020 | YEAR 2021 | YEAR 2022 | YEAR 2023 | YEAR 2024 | YEAR 2025 |

50,000,000,000ℏ
(100%)

3.6% INITIAL RELEASE

% TOTAL COINS RELEASED:

| 4% | 13% | 18% | 23% | 27% | 32% | 34% |

🟩 % of hbars released **first week of open access**
🟦 % of hbars released to the market by **end of each year**

Hedera™
Hashgraph

What future will you build?