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Integritee Token Economics

This paper introduces the reader to the objectives of the Integritee platform and the design of its native token, the TEER. The paper explains why a token is needed to deliver Integritee's services and the fundamentals behind the intrinsic value of TEER.



GO STRAIGHT TO

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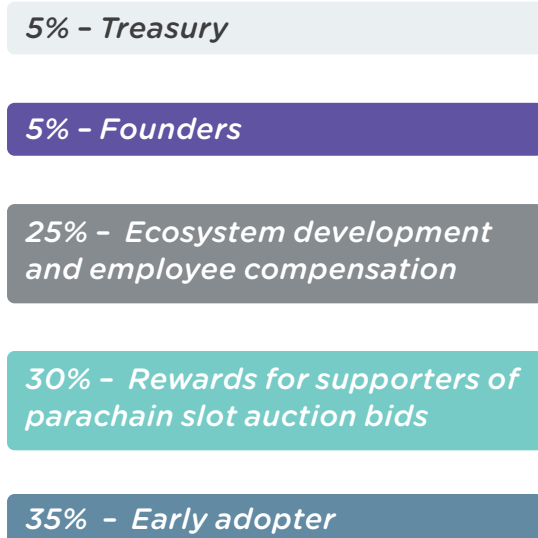
1. Executive Summary

This paper introduces the reader to the objectives of the Integritee platform and the design of its native token, the TEER. The paper explains why a token is needed to deliver Integritee's services and the fundamentals behind the intrinsic value of TEER.

1.1. TEER Token: Quick Facts

Hard-cap token supply at genesis: 10M TEER
Token nature: Utility and governance
Token Generation Event (TGE): Planned before the end of 2021

Token Supply Allocation:



1.2. Introduction

The Integritee platform enables firms and dApps to process their users' data in a privacy-preserving manner that aids compliance with GDPR and other privacy regulations. Moreover, Integritee enables firms and dApps using its service to prove that all privacy-related requirements have been respected.

For any system to be viable in the long term, all agents must be adequately incentivized to participate. Systems that work well — such as beehives producing honey, pharmaceutical research centers generating new vaccines, or entrepreneurial ecosystems originating new products and services — motivate value-generating activities and deter value-destroying behavior. Thus, the incentives which motivate agents to act in a particular way form the fundamental foundations of a system. By their very nature, decentralized systems, which lack the arbitration capacity of a central au-

thority, are even more reliant on appropriate incentive mechanisms for the agents participating in the system.

Incentive mechanisms can only be deemed to be adequate in terms of the objectives defined by the designers of the system. For this reason, this document first sets out the objectives that Integritee aims to achieve. Then, it explains how the logic and economic mechanisms underpinning the design, creation, and distribution of its token (the TEER token) will ensure the fulfillment of these objectives.

Section 2 describes Integritee's objectives and main functionalities. Section 5 describes how the design of the TEER token links the value of TEER to the value of the service offered by Integritee. Section 11 provides the reader with a complete summary of the system, building on all the concepts explained in the previous sections.

2. System Utility and Objective of the Token Economics

Integritee is a system that enables developers and firms to unlock the value of sensitive data. By combining the trust of Polkadot, the scalability of second-layer sidechains, and the confidentiality of Trusted Execution Environment (TEE) hardware, Integritee aims to power a new generation of data-driven dApps and services.

Achieving this will depend on establishing trustworthy public auditability and transparency, to allow everybody to verify that the correct code is executed on genuine TEE hardware. Since Integritee may not be a trusted intermediary, the firm will deploy a remote attestation (RA) registry on a public blockchain. More specifically, Integritee aims to deploy parachains on both Polkadot and Kusama.

The Integritee parachain will serve as a platform for off-chain computation and sidechains. Using this service will cost fees. Given that the Integritee parachain will be decentralized, this payment has to be made in tokens, hence the need for the TEER token.

Paying fees in tokens with possibly volatile

value is not attractive for enterprise clients, who require predictable costs. Therefore, the Integritee parachain usage fees will be denominated in USD. Oracle services will ensure live tracking of the USD/TEER exchange rate in order to maintain stable usage fees.

Firms do not only require predictable costs. They also still favor making payments in fiat currency over holding tokens on blockchains, as utility tokens tend to be highly volatile and there are as yet no widely adopted standards for payment interfaces or wallets. Integritee AG, the company, is determined to guide firms and enterprises to public blockchains and will therefore serve as an optional intermediary (possibly one of many), allowing clients to pay predetermined fees in fiat currency in return for services provided by the decentralized Integritee parachain. Such intermediaries will buy TEER tokens on the open market and pay TEER fees on behalf of their enterprise customers to encourage widespread adoption. As the intermediary service will take on the exchange rate risk of the TEER token, it is expected that paying in TEER directly will be cheaper than contracting an intermediary.

3. Resource Allocation and Treasury Management

The number of third-party projects that can be deployed on the Integritee platform is limited. Therefore, the question of what happens when this limit is reached must be answered.

Other blockchains (like Ethereum) use fees that are determined by supply and demand in an open market. By allocating resources to the best-paying dApps, this mechanism effectively means that different dApps cannot scale independently of each other, as one popular dApp (for example, Cryptokitties or Uniswap) can effectively exclude other dApps from accessing the common resource.

With its USD-denominated fees, Integritee handles this differently. The popularity of one dApp

would not affect others. Integritee has the following options to ensure optimal resource allocation:

- The Integritee Council (see Section 7) can raise fees globally. This may be critical for intermediaries who have long-lasting contracts with predefined operating expenses (OPEX).
- Integritee can expand its resources and register an additional parachain or even additional parachains on Polkadot and/or Kusama to scale horizontally. Should the limit of a single parachain be reached, there will be enough economic momentum to obtain additional slots.

3.1. Treasury Management

Fees are collected in an on-chain treasury. Treasury funds are used for ongoing maintenance and operation of the parachain's infrastructure and software, as well as ecosystem development and community activity rewards.

The allocation of treasury funds is delegated to an on-chain council (see Section 7). Service providers can request funds to deliver their services and the council will evaluate proposals and allocate funds at its discretion.

4. Parachain Slot Leasing

In order to benefit from Polkadot's shared security features, Integritee intends to occupy parachain slots on both Polkadot and Kusama. A parachain slot is a limited resource. As demand for these slots is likely to exceed the supply, Polkadot has designed a unique auction framework to allocate the parachains to the projects generating the highest value for users.

Each slot is allocated to the highest bidder in a modified candle auction. Slots are technically not sold at the auction, but leased against collateral locked in DOT/KSM (Polkadot/Kusama tokens). The bids are returned to their respective owners at the end of the lease period.

Furthermore, the auction mechanism enables bidders to gather additional funds to bid for access to a parachain if they manage to mobilize holders of DOT/KSM to bond some of their holdings in support of a project.

Such supporters incur only an opportunity cost when bonding their DOT/KSM. During the entire auction process and the lease period that fol-

lows, the bidder never gains custody over the tokens of such supporters.

Integritee plans to leverage this form of crowd support in two ways. Firstly, supporters can be mobilized if they directly benefit from the availability of the service offered on the parachain. Secondly, they can be mobilized by receiving a direct reward in the form of TEER tokens.

Given the increasing public concern about privacy, citizens whose data is processed using Integritee's service will benefit simply because less of their privacy is sacrificed than would be through other data processing services. However, since this utility might not yet be perceived by all DOT/KSM holders (and privacy can be viewed as a public good), this alone may not be enough to mobilize supporters. Integritee must therefore generate a token that serves as a direct reward to supporters. The token must have intrinsic value, and it must be awarded in a way that makes bonding DOT/KSM in support of Integritee attractive.

5. Intrinsic Value of the TEER Token

In order to mobilize holders of DOT/KSM to support Integritee's parachain bids by bonding a portion of their holdings, the token they receive in returns needs to have an intrinsic value. Rational DOT/KSM holders will perform an analysis to estimate the value of the tokens. They will only bond their holdings in support of Integritee bids if the expected return is higher than the opportunity cost. Integritee has designed the TEER token in such a way that it has an intrinsic value that increases with adoption. Thus, supporters can see the real value they will receive for bonding.

A token can only have intrinsic value if it serves to achieve a purpose, such as giving access to a valuable service. Firms intending to use Integritee's service need to acquire the token, either on the open market or through an intermediary

that accepts fiat payments and pays the on-chain fees on their behalf. This creates a direct relationship between the value of Integritee's services and the demand for the token.

As a result, when the demand for Integritee's services increases, demand for TEER – and its value – will also increase.

The core competitive advantage of the Integritee platform is its technology, which enables a service that is superior to the competition. Thus, Integritee AG expects its services to be widely adopted.

The TEER token has been designed so that its value will reflect this core competitive advantage, thereby linking the value of an off-chain technology with an on-chain token.

5.1. Token Flow

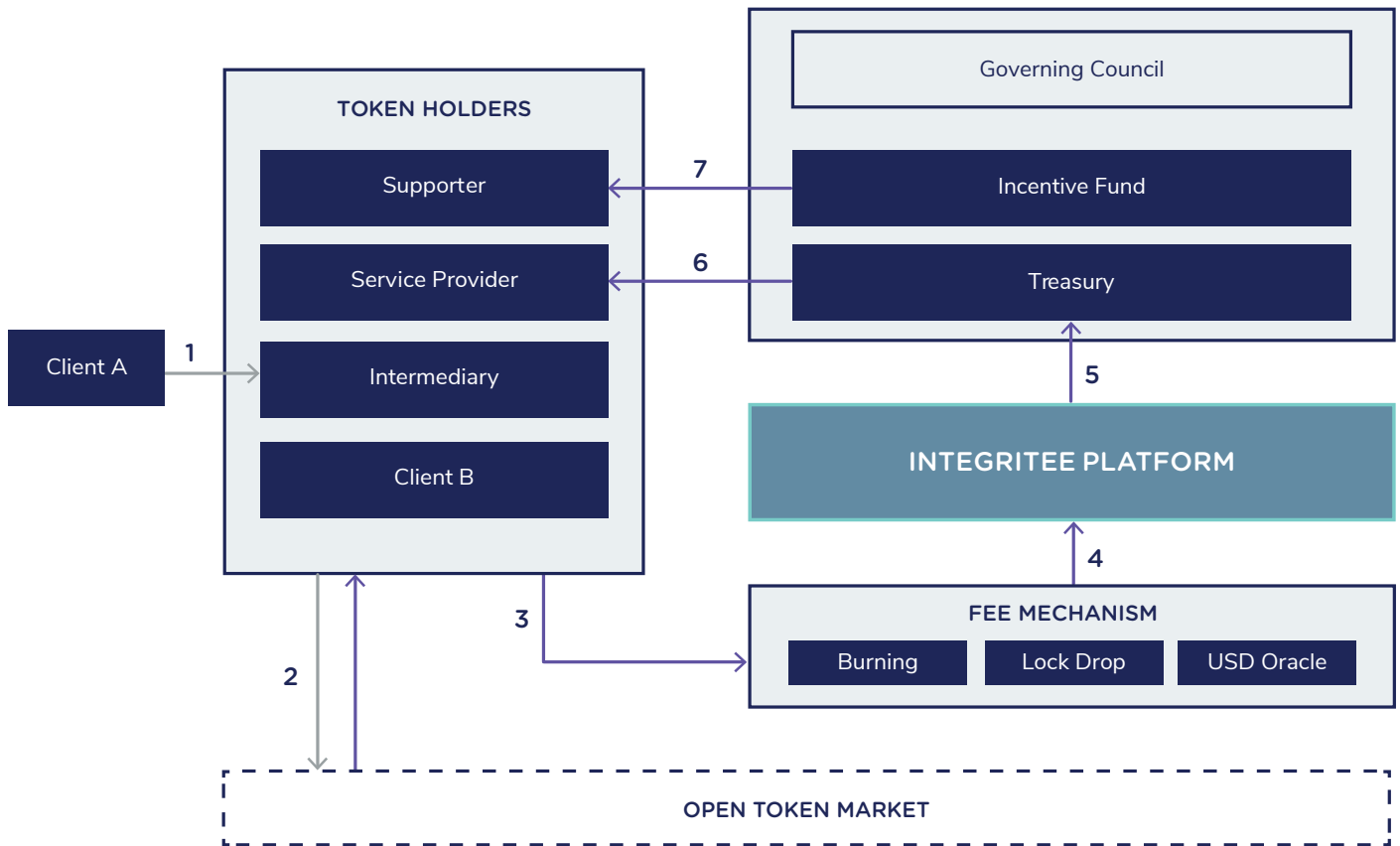


Figure 1: Token Flow

Token Flow Processes:

1. Client A pays an intermediary in fiat.
2. Any token holder buys or sells TEER in exchange for FIAT or other cryptocurrencies on the open market.
3. Token holder pays the fee in TEER to access platform services.
4. The fee mechanism calculates the service fee, taking the lockdrop mechanism into account.
5. One fraction of fees is burned, the remainder is credited to the treasury.
6. Service providers are granted tokens for their proposed work.
7. Supporters are rewarded with TEER for bonding DOT/KSM in support of an Integritee bid.

5.1. Token Flow

Client A

Wants to deploy OCWs or a sidechain without handling TEER. Client A pays the fees to an intermediary in fiat. The intermediary handles TEER (and can charge a fee for this service).

Client B

Wants to use the platform (to deploy OCWs or a sidechain). Client B holds TEER by purchasing it on the open market. She pays the fees on the platform to access the service.

Supporter

Receives TEER from the Incentive Fund for bonding DOT/KSM in support of an Integritee parachain bid.

Intermediary

Receives fiat from Client A. Buys TEER on the open market to pay platform fees on behalf of Client A.

Service Provider

Receives TEER from the treasury for proposed development services, infrastructure operation or ecosystem development.

Fee Mechanism

The Fee Mechanism comprises 3 components :

1. **Burning:** A portion of the token is burned after it was spent as a fee to run the workers and validators (see Section 6).
2. **Lockdrop:** A discounted usage fee is granted, if a certain amount of TEER tokens are deposited in the enclave wallet (see Section 9).
3. **USD Price Oracle:** The USD price oracle keeps the usage of the platform stable in USD and is oriented by the open token market.

6. Burning Function

By definition, the TEER token has an intrinsic value: users need it to pay for Integritee services. To ensure that costs are stable and predictable for Integritee users, the service is priced in USD. Payment, however, occurs in an equivalent amount of TEER tokens, based on the live exchange rate with USD. Under this assumption, the price of the TEER token might become irrelevant given that its intrinsic value is a multiple of the quantity of service it can purchase. The TEER token functions as an intermediary means of payment to the parachain treasury to use a parachain with finite growth potential.

To overcome this limitation, Integritee has implemented another vector that will drive growth in the value of TEER. A revenue burning function burns a fraction of each fee paid to the treasury.

This implies that the overall TEER token supply is deflationary. In a nutshell: Each time a user pays for Integritee's service with TEER tokens, a fraction of the fees are burned. The number of TEER tokens received by the treasury is reduced and the total TEER token supply becomes smaller. Approximating this through the supply and demand equilibrium, the price of the TEER token will increase as its supply decreases.

By burning a part of the TEER token from the fee, the treasury is fostering the decentralization of the project and sacrificing part of its wealth in favor of the community. The logic for doing this stems from "ecosystem thinking": If we create a healthy and sustainable collective environment for our community, each of us, as an individual, has a better chance to excel.

6. Burning Function

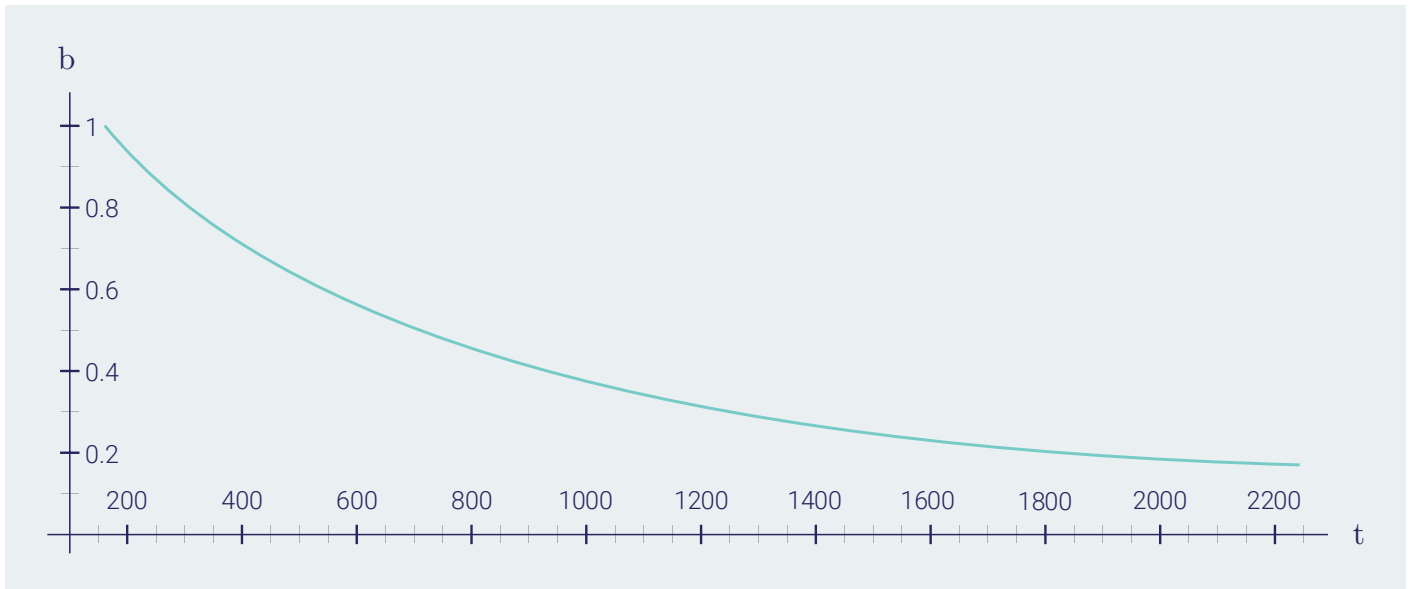


Figure 2: Illustrative burning rate for $\beta=1$ and t is the cumulative number of transactions.

The burning rate b of TEER is defined by the formula:

$$b = \beta * (\gamma)^t$$

where β stands for the initial burning rate, γ stands for a fraction between 0 and 1, and t for the transaction number 2. Assuming illustrative values of $\beta = 1$ and $\gamma = 0.999$, the evolution of the burning rate is depicted in Figure 2.

7. Governance and the Role of Integritee AG

In a first phase, Integritee AG will develop and deploy the Integritee parachain and an SDK for third parties to develop off-chain workers and sidechains.

Integritee AG is the entity issuing the TEER token during the token generation event. It will distribute the token to early adopters of the platform who aim to obtain the token at a discounted rate early on. Integritee AG will ensure listing on various centralized and decentralized token exchanges to make the TEER token easily obtainable by everyone following the launch of the platform. Exchange listing is planned for Q4 2021.

Integritee AG aims to decentralize the Integritee parachain as quickly as possible. During the launch phase, it will still have absolute power over the parachain through a “sudo” account. As soon as stable operation has been demonstrated, control over the parachain will be handed over to

an elected Governing Council. The TEER token allows its holders to vote for individuals or entities seeking election to the council.

In order for this council to be decentralized, Integritee may not remain a major token holder. Therefore, Integritee AG intends to distribute tokens to stakeholders who are determined to further the goals of the Integritee parachain.

By the time the “sudo” account is removed, Integritee AG will no longer be necessary for the sustainable operation of the Integritee parachain. Integritee AG will continue to offer its services to the council, but competition is expected and desired to ensure a healthy ecosystem.

Integritee AG may continue to offer intermediary services or even a platform-as-a-service solution (PaaS) to enterprise customers (as described in Section 2).

7.1. Governance Processes

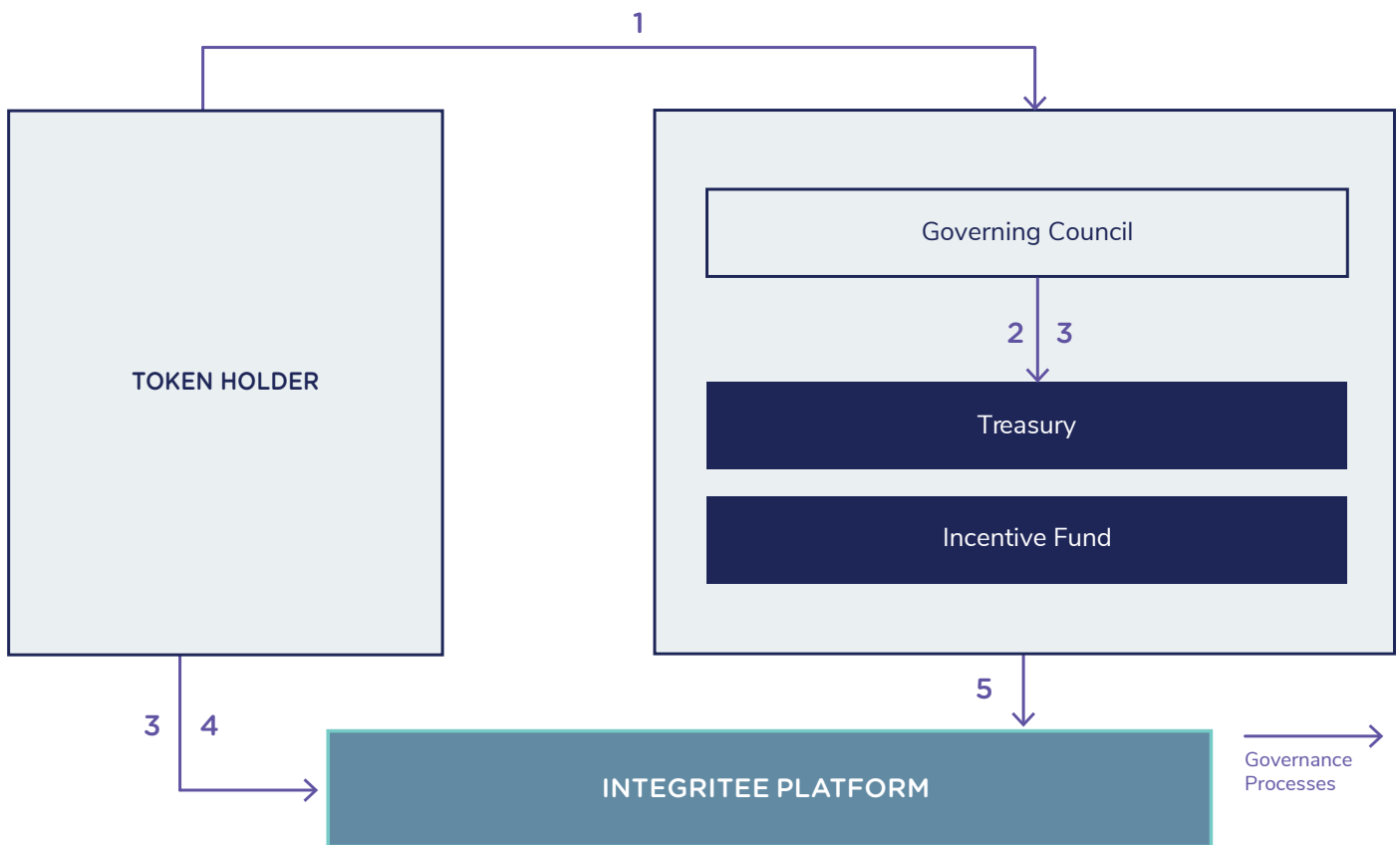


Figure 3: Integritee Governance

Governance Processes:

1. Token holders elect the Governing Council.
2. The Governing Council manages the funds.
3. Token holders or the Governing Council can propose changes.
4. Token holders vote on proposed changes and enhancements.
5. The parachain enforces the accepted changes and enhancements.

8. Non-Incentivization of Infrastructure Providers

The Integritee parachain ecosystem will need collators, off-chain workers and sidechain validators. Collators produce parachain blocks and send them together with a proof-of-validity (PoV) to relay-chain validators for validation and finalization. Collators do not need to be trusted because the security of parachains comes from the relay-chain validators. Collators are, however, necessary for availability. The Integritee parachain will not incentivize collators through its token. Instead, it relies on the assumption that whoever runs TEEs on Integritee already has ample incentive to ensure that an adequate number of collators are running. Initially, Integritee AG will run enough collator nodes to ensure the availability of its parachain.

Off-chain workers (OCWs) run a TEE to perform tasks with confidentiality and/or integrity, such as oracle services, operations on encrypted storage, and bridges to other blockchains.

Sidechain validators (SCVs) operate second-layer sidechains. Block production and validation happens in TEEs. Therefore, the

validators can trust each other and the consensus protocol is greatly simplified, leading to superior scalability in terms of both latency and throughput. It is expected that sidechains will need to operate no more than a handful of SCVs to guarantee availability.

OCWs and SCVs pay fees in TEER in order to register their TEE's remote attestation (RA) on the parachain. RA is needed to know the exact software that is executed on the OCW or SCV and it also guarantees that this software is executed by genuine TEE hardware operated with the latest security patches. OCWs and SCVs have to regularly renew their RA and pay fees in TEER, so they should only be relied upon by their users if they can show they have enough TEER to pay fees during a reasonable upcoming time span.

Integritee does not incentivize OCWs or SCVs because they are dApp-specific. It is up to the stakeholders of each dApp project that deploys on Integritee to incentivize infrastructure providers. This gives projects deploying on Integritee a great deal of independence.

9. Lockdrops for Fee-Discounts

Integritee offers OCWs and SCVs discounted fees if they lock TEER tokens. The more TEER

they lock and the longer they lock them, the higher the discount.

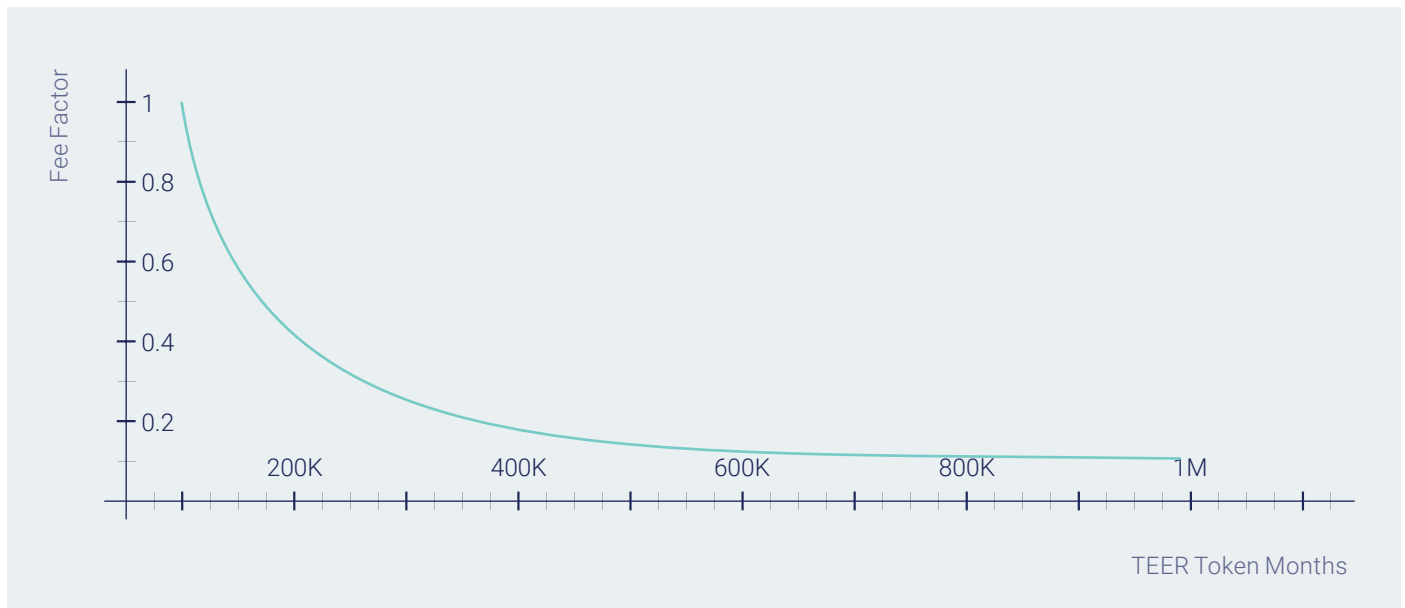


Figure 4: Fee factor vs locked token months for the illustrative case of $\epsilon=0.999995$

- F: fee factor to be applied to standard fee
- S_i : amount of TEER tokens locked by account i
- D_i : duration for which the tokens are locked by account i
- ϵ : tuning parameter (TBD by governance)

Projects which use their own native token on their sidechains can use this mechanism for lockdrops. They can offer their native token as a reward to users who lock in their TEER on the Integritee parachain and then benefit from a reduction in fees. Just as DOT/KSM holders can support their favorite Polkadot/Kusama parachain projects, Integritee lockdrop participants can support their favorite sidechains.

Lockdrops have become increasingly popular for spreading tokens to a wide range of individuals and entities who demonstrate support for an ecosystem by holding and locking a primary token to get a secondary token in return. This does not affect the ownership status of the primary token. This lock-in scheme slows down the token velocity of TEER and therefore further increases its value as adoption rises.

10. Parachains and Parathreads on Polkadot and Kusama

To obtain parachain slots on both Kusama and Polkadot for continuous operation, Integritee AG will launch incentive campaigns for supporters. It is expected that parachain slots will lock a substantial amount of relay chain tokens (DOT/KSM). Therefore, a great number of DOT/KSM holders must be incentivized to bond their tokens in support of Integritee's parachain for several months or years. There is an opportunity cost of not staking

DOT/KSM, not trading DOT/KSM and not bonding DOT/KSM to other parachain projects during that time. Thus, Integritee has devised an attractive and competitive incentive scheme for supporters. For a wide range of use cases, a parathread would be sufficient to operate Integritee's services, but to ensure predictable finality of sidechains and lower latency for off-chain workers, a parachain is clearly superior.

10.1. Multi-Parachain Deployment

The Integritee platform can span multiple parachains and parathreads on both Polkadot and Kusama. There will only be one token, the TEER, acting as the native token on all those parachains and parathreads, bridged at a 1:1 valuation.

10.2. Why both Polkadot and Kusama?

Kusama is the canary network of Polkadot where innovation happens quicker and new features can be evaluated "in the wild" before deploying them on Polkadot. Integritee will follow this approach and deploy new features first on Kusama. This will enable Integritee to ensure that only well-proven updates happen

on Integritee's Polkadot parachain(s). The usage fees on Kusama will be lower than on Polkadot. Fee burning rates may be set differently too. In the spirit of a canary network, Parachain slot auctions will start on Kusama first. It is expected that Integritee will obtain a parachain slot on Kusama first, and Polkadot second.

10.3. Cross-Parachain Governance

Integritee will have a single native token, the TEER, that can freely float among multiple parachains. Thus, governance — which relies on coin voting — should also be unified. Therefore, a single council will be elected and all acts involving coin voting will be aggregated across all parachains/parathreads.

11. Summary

The mechanisms introduced in this paper, such as the burn rate, the lockdrop and the incentive campaigns aim to ensure Integritee's sustained access to Polkadot parachains while guaranteeing stable fees for service users and an appreciation of the TEER token.

As illustrated in Figure 1, clients are the engine of the system. When clients use Integritee's services, they need the TEER token. Therefore, whenever demand for Integritee's services increases, the demand for the TEER token grows too, increasing the value of TEER. In order to increase the demand for Integritee's services and hence, the value of TEER, the system allows clients (such as Client A in Figure 1) who do not wish to hold crypto to hire an intermediary to pay the transaction fee in TEER on their behalf. This is intended to help drive broad enterprise adoption of Integritee's services. It is also a key difference between Integritee and similar projects, since it means that services can be adopted not only by the relatively small percentage of firms in the crypto space, but also by the much greater number of enterprises outside it.

It is important to be aware that the design of the TEER token has established a direct relationship between Integritee's core competitive advantage (its technology), and the value of the TEER token. For consumers, privacy is becoming an increasingly important priority. For firms, in order to compete and comply with regulations, they need to implement privacy-preserving technologies for data processing. As a result, technologies like the solution developed by Integritee AG are going to become (or have in many industries already become) a must. Hence, adoption and demand for privacy-preserving technologies is assured. With the token design explained in this paper, Integritee is allowing DOT (or KSM) holders to participate in the success of its technology. Those who understand the factors driving the market and who acknowledge the fundamental and growing importance of privacy in our society, will take the opportunity to hold (and hodl) TEER, a token that enables anyone to co-own Integritee's privacy-preserving technology; a technology that firms simply cannot afford not to implement.

11.1. The Integritee System

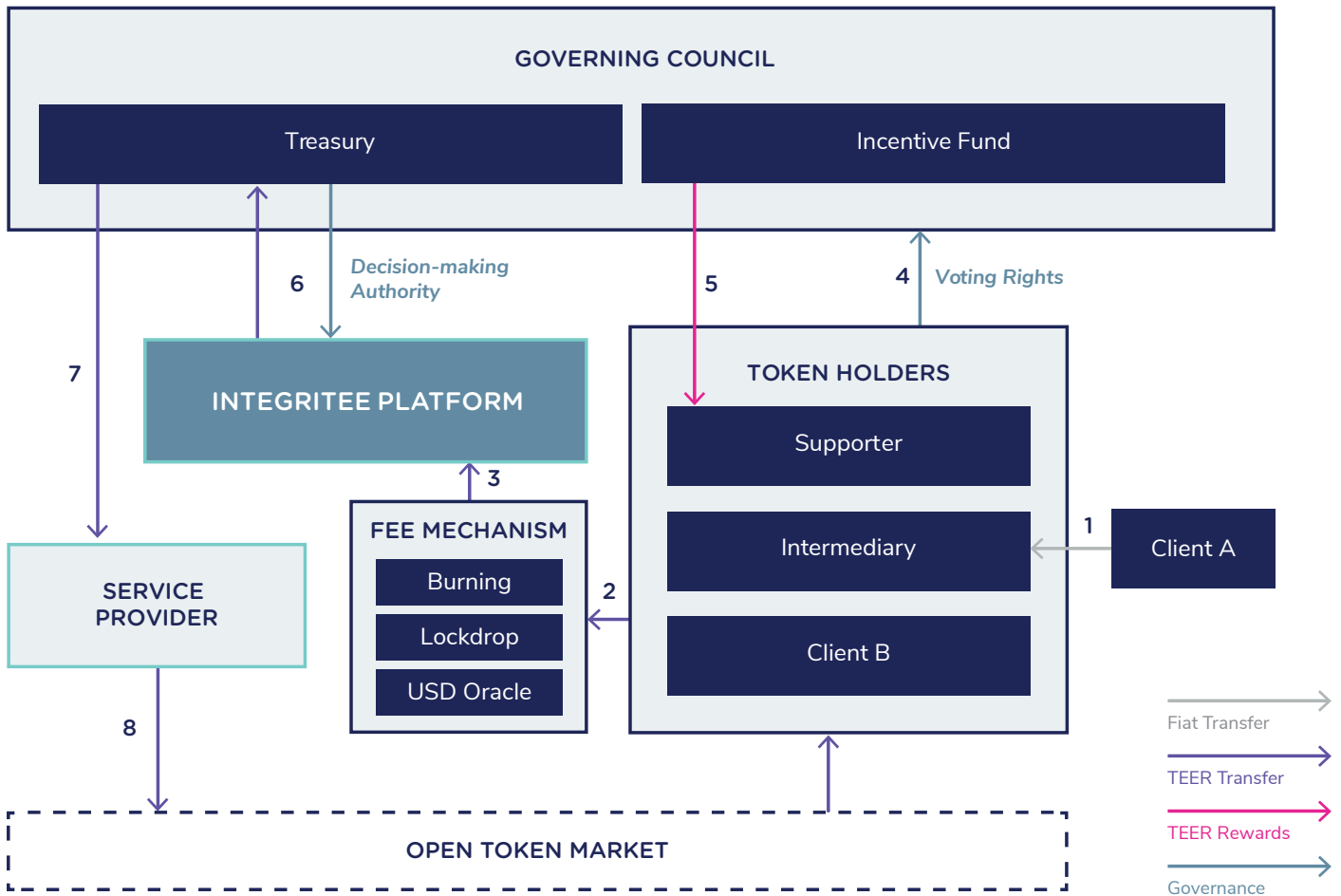


Figure 5: The Integritee system

1. Client A wants to use the Integritee platform without handling TEER. She pays fees and a service charge to an intermediary, which handles TEER on her behalf.
2. All token holders can also use TEER for Integritee services. As no intermediary is required, this is expected to be a cheaper option.
3. The fee mechanism burns a portion of the tokens spent in each transaction. Fees are lower if TEER tokens are deposited in an enclave wallet (lockdrop). The price oracle helps to ensure stable usage fees.
4. Token Holders elect the members of the Gov-

- erning Council. The Governing Council administers the Treasury and the Incentive Fund.
5. The Incentive Fund incentivizes holders of DOT/KSM to bond a share of their tokens in support of Integritee parachain bids.
6. The Governing Council votes on proposed changes to the Integritee platform. The parachain enforces accepted changes.
7. The Governing Council may award funds from the Treasury to service providers which launch projects that enrich the Integritee ecosystem.
8. Service providers purchase tokens on the open market to facilitate the operation of their services.

11.1. The Integritee System

Governing Body

The Governing Body encompasses all token holders. They are entitled to use their holdings to coin vote.

Governing Council

The Governing Council will be elected by token holders to manage the Treasury and the Incentive Fund. Additionally, the council will make proposals and enforce decisions on the platform (like code updates).

Incentive Fund

The Incentive Fund finances the incentive mechanisms to encourage DOT/KSM holders to bond tokens in support of Integritee's bids to secure parachains on Kusama and Polkadot.

Treasury

The Treasury holds the funds that secure the future development of the Integritee platform, community and ecosystem development.

Token Holder

Token holders are all actors who buy, receive, hold or use the TEER Token.

Integritee Platform

The Integritee Platform is the network. It offers a scalable and confidential layer which serves as the basis for projects to build dApps and use tokens to run applications.



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