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<https://etherscan.io/address/0xfddd9b2093664411ec07fad807a660e3ad9c6ff5#code>

A blockchain token for community engagement

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Abstract

Blockchain tokens could be a valid means to manage commitment and loyalty of members as well as reward contributors inside a voluntary-based community (like meetups are) in a gamified style.

The rules of thumb are: (1) the more contribution a member provides to the community the more tokens are credited. (2) Tokens will be used in vetting, ballots, and staking whenever required during the lifetime of a community. (3) Twinned communities acknowledge the same token, to incentivise and increase mobility and interchange of loyal members.

As historical note, the meetup "Cagliari Ethereum Lab" minted tokens² for its members. This started more an experiment than something serious, but it can become a serious game and maybe a

¹ <https://etherscan.io/token/0x662bA51F62591830CD380a7A9bEB232DbD7a92a4>

² The CEL token was initially named after the Cagliari Ethereum Lab, but it will be likely renamed as Community Engagement Token. The total cap is 9,999 with 18 decimal digits

business opportunity. Starting from this experience, the authors conceived a general token-based loyalty and reward framework to federate communities and share a superset of rules actionable via a common token. At the same time, some of the low level details are left to the event or community organizers.

Why a Community Engagement Token

Many emerging social communities are based on the voluntary work of participants, however not all participants give the same contribution. There is and always will be some unbalance between organizers, speakers, hosts and attendees. The motivation for participating and contributing are manifold: organizers earn respect and reputation, speakers shine on the stage and advertise themselves, hosts reuse some space in off-peak hours in exchange of visibility and attendees get some good talks (and sometimes food) for free, not to mention the opportunity for networking. This sounds pretty like an economy, and as such, there are issues which should be managed introducing a means to track all the contributions of participants and to give the reward everyone deserve.

For instance, one issue with free events is that they are free. Hence, people don't mind too much to register and don't care too much missing the event afterwards. This poses a major problem for the organizers which are committed to prepare a successful event, misbehavior may prevent other potential attendees from RSVP, and in general money and time is wasted by this bad practice. Introducing registration fees is the ultimate response to disincentivize this unfair behavior, but this is not always a viable solution for a number of reasons. This is often related down to the legal consequences related to taxes, liability and payment collection.

Even for the case in which payment is requested only as a deposit to secure participation and refunded to actual participants, traditional electronic payment fees doesn't make such approach worthwhile. As an example, payments to meetup organizers performed through Paypal (the integrated payment system on meetup.com) apply a cut of 30% in fees which after all results in a loss for organizers refunding actual participants. Moreover, there could always be distrust of registered participants to pay a deposit if there are no sufficient warranties that refund will be provided.

Finally, even in the case of requesting a payment for events participation, there is no way to track **reliability of registered participants who are open to lose their deposit instead of participating to the event**. As result organizers, hosts and speakers might still experience

economic loss, other than frustration for wasting time despite of their commitment to provide a voluntary community effort.

However, if traditional money and payment systems are not a viable solution to manage and incentivise participating to free events, we claim a virtual currency can instead suffice to the following needs:

- Be used as deposit to express intention to participate to an event (higher the deposit, higher the intention or the proportionate loss for not showing up). We call this “commitment stake”.
- Be partially refunded in case of notified no participation, without high fees. Only a small portion of the commitment stake could eventually be retained to still cover organization costs incurred and based on the initially expected member participation.
- Be used to openly and transparently track actual commitment of participants in joining events for which they express interest, by locking the amount of their “commitment stake” for each event actual participation didn’t follow up an initial registration, while at the same time fostering higher commitment.
- Be used across a number of different events, from a number of different organizers without any requirement for conversion or adaptation to a different registration system.
- Support a whole economy of service related to the event delivery, e.g., speakers and venue recruitment.
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As tokens can be accumulated by participants, other than be used to provide a measure of their commitment as events participants, they can also be used as additional mean to build more community engagement to make all the stakeholders involved in free events (e.g., participants, organizers, and host) more committed and the overall ecosystem of voluntary communities more sustainable.

Aim of this paper is to describe the basic technical principle for implementation of such token and the related token economy that can be built upon it.

Implementation of a Community Engagement Token

In order to address the challenges above we will build a Community Engagement Token as ERC20 token. ERC20 tokens are special purpose Ethereum Smart Contracts that embed a data structure called “mapping” which is actually an hashtable, where the key is an Ethereum address of a token holder and the value is an unsigned integer representing its balance. This simple structure is accessed by means of an interface comprising methods for holders to

transfer from an address to another and to approve non-holders to transfer amounts on behalf of holders.

The use of a blockchain token is independent from any vendor, it is a decentralized and uncensorable ledger. This will easily allow more communities to federate without the need to maintain an authority at the centre of a federation.

CET creation and distribution

We assume that a number of CET is initially minted and will be released according to some inter-meetup rules which are described in the CEL Token Economy section. Events organizers wishing to adopt them, can promote their use through their communities (e.g., their meetups members), by distributing a link to the CET exchanges or other federated sites adopting the token.

Members wishing to join in a community can apply for receiving an initial fraction of CETs. As CET will also become a measure of contribution, getting CETs for newbies happen through airdrops or other marketing mechanisms. Moreover, some communities may ask new members to join against the endorsement of preexisting members willing to make a sum at stake for a probation period. There is no a single mechanism for newbies to get CET, the last resort is to simply buy tokens like any other currency. For this purpose, some exchange are supposed to be created as soon as the CET economy becomes larger and gains enough traction.

CET management and use inside events

Events organizers will ask members to registers using a fraction of their CET.

Members wishing to join a participation list for a given event will have to pledge an amount z (*commitment stake*) towards a smart contract. In case of priority lists, members wishing to jump ahead of the list can pledge a higher number of CET ($z > y$), where y is the average, public available value, pledged by participants already on top of the list.

This amount z is the commitment stake, and it is to be seen as the willingness of a participant to effectively join an event when it takes place. It also represents her expected risk when not being able to join or communicate any change in her intention.

Pledged CET are not meant to be collected and directly transferred to the organizer wallet. They remain instead locked into an escrow service implemented as smart contract.

Before the event, registered participants can be offered with the option to withdraw from their participations and receive back their stake in full.

After the event takes place the smart contract managing the escrow service for the given event needs to collect and redistribute the stakes according to the following:

1. Registered participants are requested to answer a clue defined by organizers and described upfront before registration for an event is provided. Answer to the clue is given during the event, this allowing only actual participants to know it. Two options are possible:
 - a. Participants that answer correctly to the clue receive back their stake minus any eventual fee requested by organizers (the fee can also be zero; we assume so for now). The commitment stake is returned in full to the participants wallets and its available for future use to buy new services (e.g., participation to next events).
 - b. Participants that do not provide the right answer lose their commitment stake (meaning they didn't actually attend the event). The smart contract distributes the stake by moving any agreed fee to the organizer wallet and the remaining difference (e.g., the commitment stake) to a previously established participant wallet. We call this wallet, the participant *loyalty* wallet. Tokens returned to this wallet are *tainted* and cannot be spent anymore to register to events or buy extra services. This should incentivise participants to keep the balance of this wallet as lower as possible.

By using the above basic rules, it is clear how the value of the loyalty wallet, containing all the locked commitment stakes, becomes a measure and evidence of the given community member reliability when committing to an action she promised (in this case actual participation to an event she registered for). This is a "trustworthiness" measure that engenders trust toward a given participant in the community. Such reliability can also be measured as T (max loyalty value) minus the current value of a given community member loyalty wallet. This in future will allow for instance to filter out some members by posing a threshold on their loyalty, willingness to commit, when participating in a community activity.

It is indeed clear how community members are incentivised to keep value of this loyalty wallet as lower as possible, to show a higher trust and reliability toward the community and the other community members and event organizers, as well as dispose of their CET for joining community events and services, instead of having them locked out. This becomes particularly true in case of scarcity of CET token for each given members. Discussion on how new CET can be minted by event organizers and earned by community members is described in the Token Economy Section.

It is worth noticing that collecting and managing stakes through a smart contract and a clue defined upfront by organizers is a fair method for the following reasons:

- Organizers that set up fake clues will result with events not showing any participation (despite of this being the truth). This will prevent organizers to boost up their profile in the community as organizers of successful and well attended events.
- Organizers that set up fake clue and share the right answer only with few accessory participants will most likely disappoint genuine and honest ones and complaints are expected to be escalated to a designated arbiter. Due to various nature of community members, it is unluckily that real participants can organize themselves to provide wrong answers to the clue, as they will lose their commitment stake.

In order to reduce their loyalty wallet value, increase their commitment value, and unlock their CET for future use and purchase of services within the CET ecosystem, the participants are allowed to chip in future required “commitment stakes” from their loyalty wallets (e.g., y). To avoid double spending and to guarantee that loyalty wallet balance grow in case of misbehaviour of a given participant (thus commitment value decrease), any trust stake from the loyalty wallet needs to be matched from an equal amount coming from the participant main wallet. Two options are possible:

- Transaction is successful, e.g., the member participates to the event she registered for and the smart contract return the amount of the CETs pledged in commitment stake (e.g., $2*y$) to the original member wallet and any tainting is removed. As result the loyalty wallet is reduced of y and the original wallet is increased of y . The participant can now dispose of additional y CETs previously locked in and its commitment value increases of y ;
- Transaction is again unsuccessful, e.g., the member didn't participate to the event, nor notified of her absence, and the total pledged commitment stake $2*y$ is returned to the member loyalty wallet. As result the participant locked away additional y CETs that cannot be spent otherwise and its trustworthiness decrease and its commitment value decreases of y . This should incentive participant to maintain a reliable behavior.

The federation has the purpose of “trustworthiness portability”. The assumption is that trustworthiness is portable, good people are good participants not only to events of one group but of all the groups they wish to join and are operated using CET and the same basic rules. Using a single token for different communities allows this level of portability and federation. .

The CEL token economy

In this section we explain how additional CET can be minted by event organizers in order to fuel the ecosystem growth and sustainability as well as how new CET can be earned by community members towards the execution of given tasks, thus allowing them to join new events, when all their CET are spent or locked in their loyalty wallet and consequently trying to build again more trust in their community.

Token generation and release

The outcome of a new event is assumed as the “collateral” for new tokens hereby released. This is probably the strongest assumption of the overall CET design. Engagement, networking, relationships are immaterial outcomes and hardly measurable vehicles of value resulting from communities activities. It is not supposed to be a financial measurable value, however it is a value and can also impact the business prospects of participants. Thus, the CET token is aimed at quantifying this immaterial “value” produced by the communities and to instrument this value with the properties of a currency, like accountability, fungibility, transferability and the like. Of course, communities can produce more material and more financially measurable value, like for instance, open source code, creative common licensed content, or any other form of valuable outcome which in turn can be the basis of new business. However, CET is not trying to include this “business” value in its scope.

CETs are pre-minted and stored in a **genesis wallet**. The concept of **genesis wallet** resembles the one of central authority and it seems in tension with the principle of decentralization. However, the genesis wallet can be seen as an underlying mechanism which releases tokens according to some rules. In such respect it is not logically different from bitcoin mining (being completely different in how it works). Tokens here are released after some “social event” is produced and “people engagement” is “produced” from that event, the consensus is about the fairness and value of the event itself. Bitcoin mining is about unlocking new coins from a sort of “virtual cave” in function of the computing work done by miners. CET mining is about unlocking new tokens when a new event produces value in terms of networking and sociality.

In both cases, the supply is limited to an hard cap.

The rules below are designed for the federation of all communities adopting the CET token, not at level of single meetup or event. This allows a degree of flexibility by means of delegation. However, the rules for federation serve the objective to unlock tokens from the genesis wallet to organizers and then organizers are delegated to distribute tokens in their events.

GENESIS WALLET

An amount of tokens is unlocked by the genesis wallet for each event. This amount is proposed by the “organizers” to the **genesis wallet** and announced to all federated parties

(using channels like forums, chats) and then a withdrawal of such amount is created inside the genesis wallet as “proposed”

APPROVAL BOARD

For each event submitted by an organizer, a number of $N=3$ token holders are randomly selected from a special roster called the “master-holder list”. This list is populated voluntarily by holders committed to vote and to access to this list a token holder must lock a number of tokens (5 CET). Voting and reaching consensus on events is an essential part of the whole token economy, hence master-holders which take part in ballots will get a fee which is decided by organizers.

EVENTS EXECUTION

The organizers use their personal tokens during the event and aftermath, anticipating with their holdings all the “token” expenditures. Giving the adequate publicity to the outcome of the event to show evidence of “participation” and “Community engagement” which are the two primary objectives of CEL.

REIMBURSEMENT CLAIM AND CONSENSUS

After the event, the organizer can claim his tokens back from the genesis wallet. For his claim to be approved he must get the endorsement of at least 50% of the appointed master holders. A non vote is equal to a NO. Missing a vote does not entitle the master holder to get the consensus fee, while voting NO does.

If an organizer feels the consensus is not reached for misbehavior of the appointed master-holders she can appeal a second and third time for consensus. After three attempts the claim is no longer eligible.

ACCOUNTABILITY OF APPROVAL BOARD

An approval board member voting against a claim is not charged if the claim finally is approved. Voting against the 50% majority is legit. On the other hand, if this happens 6 times out of 10 ballots, the masterholder is suspended and her funds remains locked for a number ($N=6$) of ballots.

CAVEATS

The organizer can propose a withdrawal larger than the amount he actually spends on the event. It is up to the token holders watch that this is a fair amount. In other words it is legitimate to ask 1.1 CEL for an expenditure of 0.9 CEL if the event has reached its objectives. It is not legit to claim 10 CEL against an expenditure of 1 CEL

The genesis wallet sooner or later will be emptied. When it happens the federation has two options, either the token holders decide to refill the genesis wallet with their tokens or the CEL simply ceases to exist. The latter options will mark the end of the lifetime of a successful experiment though.

The unlock-by-endorsement is a proof of stake protocol for real world events.

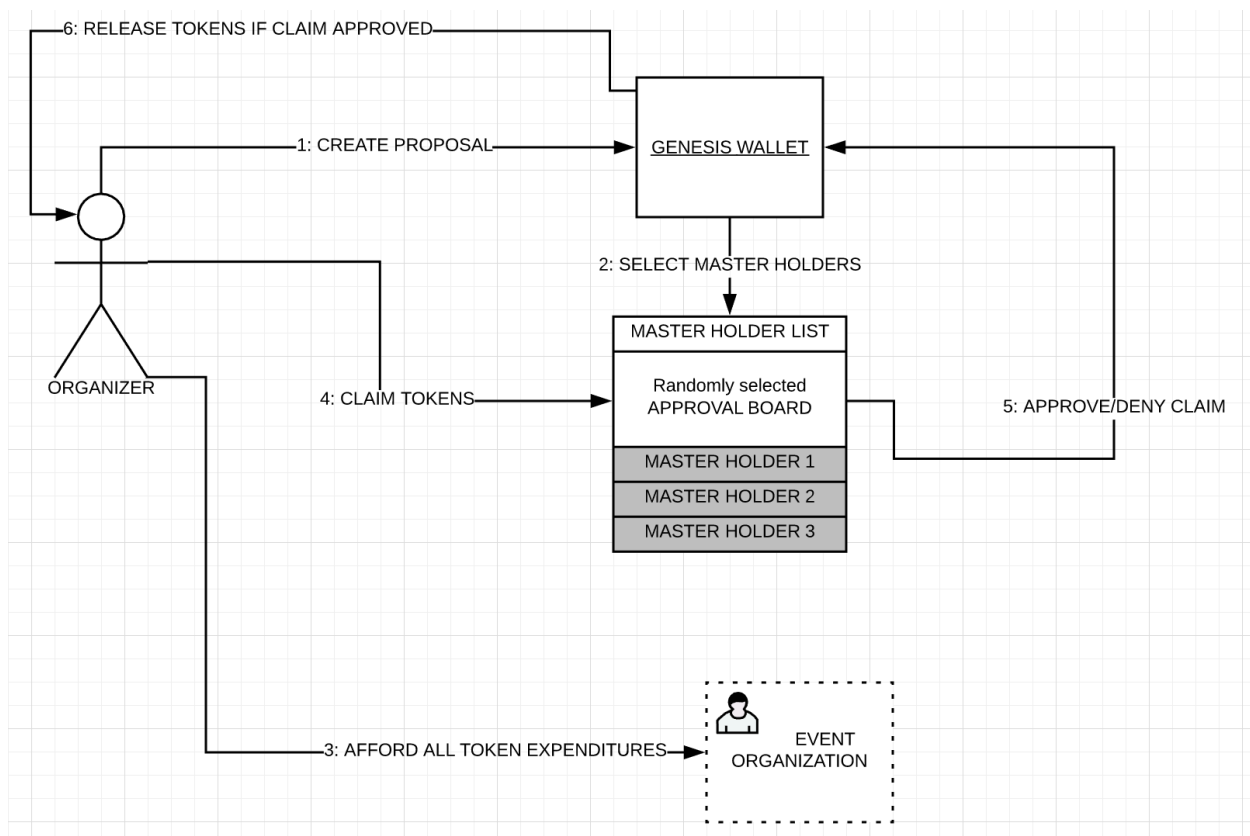


FIG: Straightforward sequence of actions to: create a proposal, organize an event and generate new tokens aftermath.

Discussion on possible orchestrated attacks

Here we discuss some of the possible threats to the system:

Organizer Sybils

An attacker forges multiple organizers and participants identities to increase the commitment value of a specific identity. Because loyalty wallet and commitment value are not the result of a peer-to-peer relation but of a community activity, to actuate this attack will require to create fake events, an opportunity mitigated by the adopted approach (see below). Moreover, because the system is first of all meant to track commitment of a given community member participating to events, it is clear how the economic effort of this attack might overcome the expected benefits, due to the need to spend tokens for many identities at once.

Fake events and fake participants

An attacker can simulate events, pretending that people are participating. This attack vector can be used to lower down loyalty wallet of colluding people (thus increasing their commitment value).

Countermeasure:

an event is not a fake one if at least a number x of trustworthy participant (loyalty wallet balance = 0) register, participate and receive their commitment stake back. If the event doesn't take place, trustworthy participants (those with maximum commitment value and loyalty wallet equal to 0) will complain. No commitment stake is unlocked in case of event not considered real (no registration, nor reward of trustworthy participants). As result new events from the same organizers will be unlikely successful.

To mitigate the risk that only colluding participants join a potentially fake event, an additional mechanism can be created for incentivising trustworthy participants (those with an history of participation to previous events) to register and go (as observer and validator) to events for which so far have registered only participants with loyalty wallet > 0 (possible fraud).

Master holders sybils

A malicious participant can create many identities to be included many times in the approval board for any event. In principle she could organize an event with one identity and manage all the masterholders identities to approve her own claims. However, this attack is mitigated if more masterholders are actually in the roster as for each masterholder a stake of 5 CET is required to be locked. This attack is effective only until a critical mass of real users is reached, afterwards it become less and less practicable.

Genesis Wallet DoS

A malicious participant can invoke repeatedly the propose() transaction on the Genesis wallet to cause congestion. To mitigate this attack can be envisioned many solutions. The most effective is to make the propose() transaction payable and requiring an amount of ether. This will discourage any attempt to game the wallet. The amount of ether collected could be then redistributed to token holders according to some policy. Other countermeasures can consist in locking an amount of tokens to be released at the end of approval process or to force a gas price through `require(tx.gasprice > threshold)` with **threshold** pretty high in order to reward miners running the smart contract and thus making DoS less appealing.