INITIAL PROPOSAL

Project topic: Insurance project.

Title: Hashsurance demo.

ANALYSIS OF INSURANCE WHEN VIEWED AS THE REVERSE OF LOANING.

Consider the following cases of Alice and Bob, where Bob experiences that of loaning and Alice that of insurance.

Bob and Alice, both fresh out from school, apply to several companies for a suitable job role. Bob gets an offer from a company located at the far side of the country and is required to resume as soon as possible. Alice, on the other hand gets employed by a company in their home town.

Bob migrates to the part of the country with the harshest climate conditions, to begin his job role of $5000 per month. Unfortunately, Bob falls sick after a month of full time work and gets hospitalized. Due to the lack of health benefit associated with his job role, Bob decides to solely pay for his hospital bill after recovering. He realized the $5000 salary, of the first month he worked, was by far less than enough to cover his hospital bill that had summed up to $10000. Thus, he sort for a quick loan of $10000 from the bank and was offered a 30% simple interest rate to be repaid within 12months. This means Bob will be given $10000 by the bank and has to pay (13000/12 = 1083.333333333333) $1085 every month, till it's nothing less than $13000 total, 12months later. Desperately, Bob accepts with hopes on paying in installments from his monthly salary. Therefore the capital (principal, P) is $10000, the profit interest rate R_{profit} is 30%, time T is 1yr (12months) and the monthly installment (premium P_m) is $1085.

Alice, hearing about the unfortunate experience of Bob realizes she also has no health benefit from her employer and decides to financially protect herself and income from such unforeseen circumstance. Instead of heading to a bank, she turns to us, an insurance startup, to insure her health. We begin by informing Alice of the bills for hospitals within town, which is also $10000 for severe illness. This implies Alice will need at most $10000 to cover her bills in time of hospitalization which is also the principal P in this case. To generate such funds, Alice has to begin her installment payment (premium P_m) into a private pool (account), whose value depends on the

principal P and our profit interest rate R_{profit}. Unlike the case of Bob, the period (Time T) of Alice's premium payment cannot be explicitly stated. This is because we don't know exactly when Alice will experience that kind of sickness that requires us to pay her principal amount, hence the uncertainty. This uncertainty can then be narrowed down greatly, using statistical, probabilistic and other approaches, to estimate the period Tp. With a fixed profit rate of R_{profit}, a definite principal P and an estimated premium payment period T, we can calculate the value of the premium payment, which will generate the required principal amount when Alice needs it at an estimated time.

Relating the installment payment period T_i for Bob and the premium payment period T_p for Alice we will notice T_i depends on the total amount Bob should repay. However, T_p can go on as long as Alice's policy remains valid. Thus, with R_{profit} as our target source of revenue, we have the chance to make Alice's monthly payment by far cheaper than that of Bob's ($1085) offered to him by the bank. This should give us an edge over the loaning system, thus encouraging Alice to willingly accept our offer.

MATHEMATICAL APPROACH

The above paragraphs tries to explain a simple way of understanding the mechanism of insurance, by viewing it as the reserve of taking a loan.

Loan:

Take Principal ($10000) now ==➔ Pay Total later (within 12months. i.e. $1085 monthly).

Total = Principal + R_{profit} = Pm x T (12months). ….Equation 1.

Total = $10000 + 30% of $10000 = $13000 = $1083333.333 x 12.

Insurance:

Pay P_m monthly ==➔ Take Principal later (after period T).

Pm = (Principal + R_{profit}) / T ….Equation 2.

Pm = ($10000 + 10% of 10000) / T.

Whatever we arrive at to be the periodic premium value, using an estimated time T, one of the following cases will occur within the private pool when the customer applies for a claim.

1. $SP_m > P$.
2. $SP_m = P$.
3. $SP_m < P$.

Where SP_m = Sum of premium payments,

P = Principal.

It will be highly beneficial for us if case 1 occurs for every customer. In that case, there will be more than enough funds in a private pool to serve a claim, take our profits and even prepare for a future claims.

For case 2, the total amount within the customer's private pool is equal to the principal amount. This case raises no alarm if the customer is a diligent premium payer and will continue payment after the claim has been granted. However, a worst case scenario here is one were the customer refuses to pay premium afterwards. To avoid this, every claim that falls into this case will require the customer pays a fee equal to our R_{profit}, which will be taken by our company unless the customer resumes premium payment.

Case 3 can be quite problematic for us. This means the total amount within the private pool isn't enough to fund the agreement to provide the principal amount when the customer makes a claim. From Equation 2 above, this case can occur when the actual time T is less than estimated. Lesser time T means we should have been collecting a higher amount from the customer as monthly premium. Although we can increase our monthly premium amount, we can't make it too high, otherwise we lose our selling point of cheaper monthly premiums. The solution to this problem might lie within the realm of cryptocurrency tokenomics.

POSSIBLE SOLUTION

An initial solution towards preventing case 3 is to charge a higher premium for the first month alone. A new customer might need to pay from 8% to 10% of the principal and R_{profit} amount. This should bring the amount in the private pool closer to the target principal and R_{profit} amount, than charging the same low premium amount all through. Likewise, it can serve as a means to determine if the customer is motivated enough to take up an insurance policy. Subsequent premium payments will be lower, although chances of case 3 occurring still exists.

Secondly, in addition to the benefits of insuring against unforeseen circumstances with low monthly premiums that our company offers, we can introduce an incentive for creating new policies and keeping it valid till it matures. The incentive offered will be our crypto token equal to a fraction of a customer's premium payments before total value of the private pool is equal to the principal amount and R_{profit}. However, this incentive will be locked together with the total premium in the customer's private pool. The total value of a customer's private pool, at any point in time, will be the sum of premiums SP_m and all tokens minted ST. This should further take the amount in the private pool closer to the target principal and R_{profit}.

Allocating a crypto incentive equivalent to the monthly premium, should also improve the demand for our token as policies are valid, thus increasing the token's price. Regular premium payments till policies mature further strengthens our token and protects against devaluation. Therefore, our tokens are minted and supported by monthly premium payments of customers.

If case 3 eventually occurs, then the customer pays a fee equal to our R_{profit}, and claims the entire amount in the private pool. However, token incentive will be unavailable for claim if case 1 or 2 occurs, but will only be used to settle validators that honestly approve a claim application.

INTRODUCING THE HASHSURANCE PROTOCOL

It is a decentralized insurance policy creator and administrator, owned and managed by its community (holders of hashsurance tokens) and powered by interconnected smart contracts running on the Binance smart chain (BSC). This is the project we are trying to build.

The major parts of this protocol are the insurance engine, hub of validators and the finance segment. Participants within its community includes the validators and stakeholders/policy holders.

- **The insurance engine**: This is involves the smart contracts that handles the creation and management of policies. It begins and closes a policy term based on the judgement of validators.
- **Hub of validators**: Managed by a separate smart contract, the hub of validators is were crucial details of the protocol is delegated on and approved or rejected by the validators, in other to promote honesty and continuity of the protocol. The goal is similar to the proof of stake (PoS) consensus mechanism, where validators have stake in the protocol and earn rewards (hashsurance tokens) for their services. Dubious or inappropriate actions will be addressed by a deduction from their stake. Validators are ranked according to their integrity points, which is a measure of their consistent honesty.
- **The finance segment**: This represent the entire tokens used for services within the protocol. First and foremost is the hashsurance token, which facilitates the honesty and continuity of the protocol. Hashsurance tokens are minted on every premium payment of a policy holder, before SPm = P within the user's private pool. The second category are stable coins used for collection of premiums and payments of claims. Other cryptocurrency tokens that can be used along with stable coins will be added after a vote by the community.

Participants.

Validators: These are select members of the hashsurance protocol community, that analyse crucial details of the protocol in other to maintain the honestly of the network. They must have a stake within the system to begin validations. Thus, there can also be policy holders as their private pool will serve as their stake. All validators earn rewards in hashsurance tokens and are ranked according to stake and integrity points.

Stakeholders: These are members of the community that own hushrance tokens of any denomination. As a decentralized protocol, hashsurance is owned by the stakeholders and managed by validators. Stakeholders participate in the protocol to preserve and uplift the value of their stake.

Although policy holders and validators can also be considered as stakeholders, there is a difference between the three roles and should not be used interchangeably.

PROTOCOL DYNAMICS

The point of entry (homepage) for this protocol will be the frontend interface to the insurance engine. A user can view his existing policies on this page and interact with them. There will be a CREATE button on this page, which when clicked will display a form to fill in the details of a new policy. Details, such as what do you want to insure", “what is its estimated cost", etc., has to be filled in, after which 10% of the estimated cost stated has to be deposited in stable coin (BEP20). The created policy is submitted to the hub of validators for analysis after the initial premium deposit is made. A small portion of the 10% initial premium will go to the validators in form of hushrance token rewards after their analysis.

All validators in the community analyse the details of the insurance policy application, and indicates if the facts are inconsistent. The report of the entire validators helps this section determine whether to approve or decline the application. The entire reward is allocated to validators, according to their stake, with higher portions given to those that spot incontinence within the application facts. A declined policy application means something is wrong somewhere. The creator can either make corrections and retry, paying another validators fees, or convert funds to hashsurance tokens and become a stakeholder or validator. This shows why creators should be honest and accurate while creating policies or risk paying validation fees more than once.

An approved policy signals the hub of validators to return control to the insurance engine. This engine, which is a smart contract, creates a sub smart contract to represent that policy (policy contract). The policy contract then determines the necessary variables and constants. It estimates the value of the policy period T and computes the premium amount P_m for the next month, using the principal amount P (estimated cost filled in by the creator). It also takes note of the time stamp in order to track policy validity and next premium payment deadline. Every policy contract within the network mints Hashsurance tokens on every premium payment until case 1 or 2 above occurs within the private pool.

A policy holder can click the claim button on the interface and fill an application form to make a claim. The application is submitted by paying a fee called deductible, which is equal to the value of our R_{profit}. Deductible need not be paid if case 1 occurs. Control goes back to the hub of validators after a claim submission for approval or rejection. All validators can review the premium payment history of the policy and look out for malicious actions such as too early claims for false reasons. Validator's incentive is deducted from policy holders hashsurance tokens and is distributed to validators according to their stake and participation. Validators that spot inconsistencies are awarded higher portions, inactive ones are given tiny incentives and dubious ones are punished by deduction or reputation slashing. If the application was rejected, the policy holder can make changes and reclaim at a later time.

After approval, control returns to the insurance engine, where the outcome of either case 1, 2 or 3 is executed. For case 1 and 2, the insurance engine directs the finance segment to unlock an amount of stable coins equal to the principal amount, so the policy holder can withdraw. Since the total amount of premium payment in stable coins for case 3, will be less than the principal amount, the remainder will be gotten from Hashsurance tokens. The equivalent amount of Hashsurance tokens will be converted to stable coins and added to sum up to the principal amount. The policy holder can then withdraw and convert to his or her preferred fiat currency.