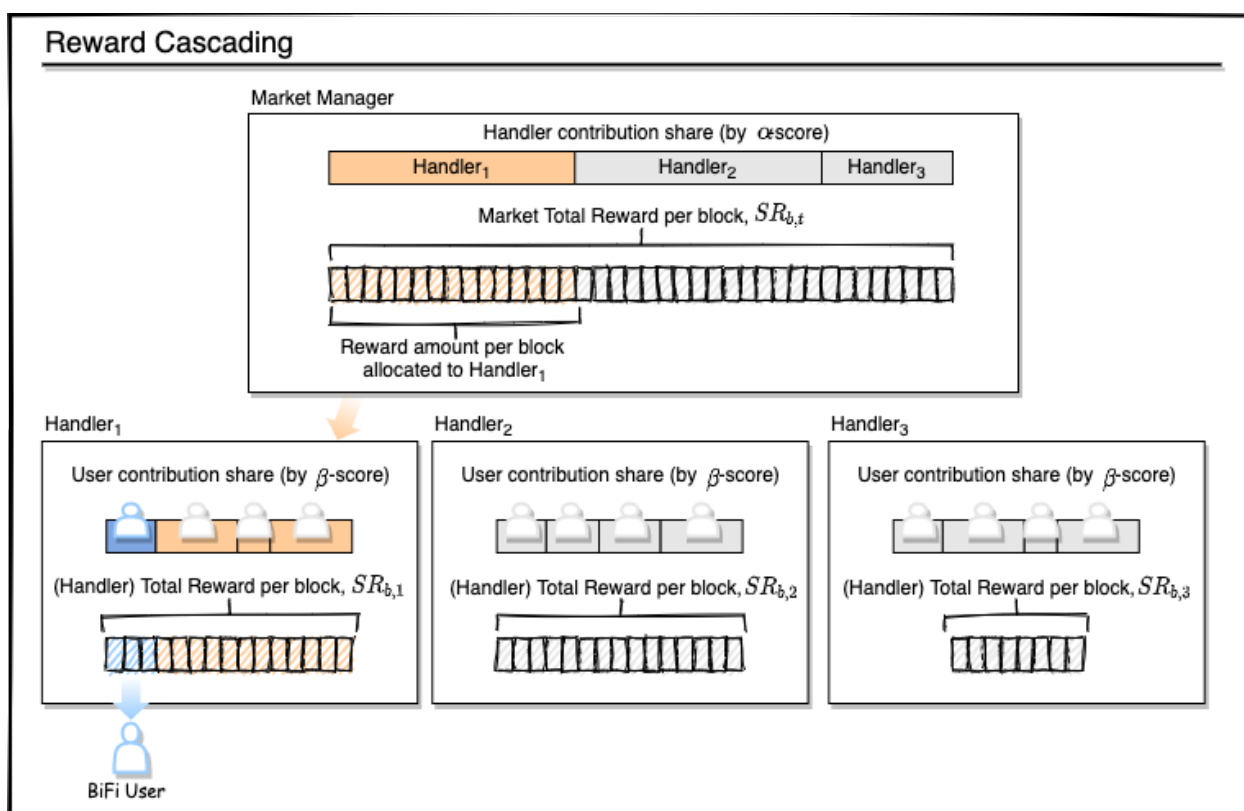


# (ENG) Appendix III: Reward Method for Reward Parameter Update

## 1. Overview



BiFi rewards SI Tokens to users who deposit and borrow supported Tokens. Each Token has different amount of rewards allocated, set as Reward Parameters and determined by the  $\alpha$ -score of each Token Handler. This allocation is then distributed to users according to the process outlined in *Appendix I: Reward Method for Deposit and Borrow*.

The  $\alpha$ -score of each Token Handler is calculated from the liquidity of that Token (the sum of deposit amounts and borrow amounts). Thus the  $\alpha$ -score should be recalculated for every user action with user paying transaction fee. In order to

reduce the excessive transaction fee of users, we extract the computation process separately and allow others (i.e., operators).to execute this process. We incentivize this recalculation process by rewarding SI Tokens to these operators.

## 1.1 Terminology

### Variables for $\alpha$ -score Calculation

- $SR_{b,t}$ : Total of reward allocated per block ( $SR_{b,i}$ ) of all Handlers
- $SR_{b,i}$ : Reward allocated per block of the  $i$ -th Handler
- $S_i$ :  $\alpha$ -score of the  $i$ -th Handler
- $D_{t,i}$ : Total deposit amount of the  $i$ -th Handler
- $B_{t,i}$ : Total borrow amount of the  $i$ -th Handler
- $P_i$ : Price of the Token of the  $i$ -th Handler
- $\alpha$ : Weight used to calculate the  $\alpha$ -score

### Variables for Operator Reward

- $RR_b$ : Reward allocated per block for updating the Reward Parameter
- $H_L$ : Block height of the last block where update function was called
- $H_C$ : Block height of the current block

### Variables for Operator Reward

- $T$ : Remaining time for reward program
- $R_t$ : Remaining rewards
- $D$ : Reward decrement amount per block (constant),  $SR_{b,t}$

## 2. Per Block Reward Allocation

## 2.1 Per Block Reward Allocation of Each Handler, $SR_{b,i}$

For every block, the reward amount of  $SR_{b,t}$  is distributed to users of BiFi Service.  $SR_{b,t}$  is divided among each Handler in the amount of  $SR_{b,i}$ , which is then distributed to users according to *Appendix I: Reward Method for Deposit and Borrow*.

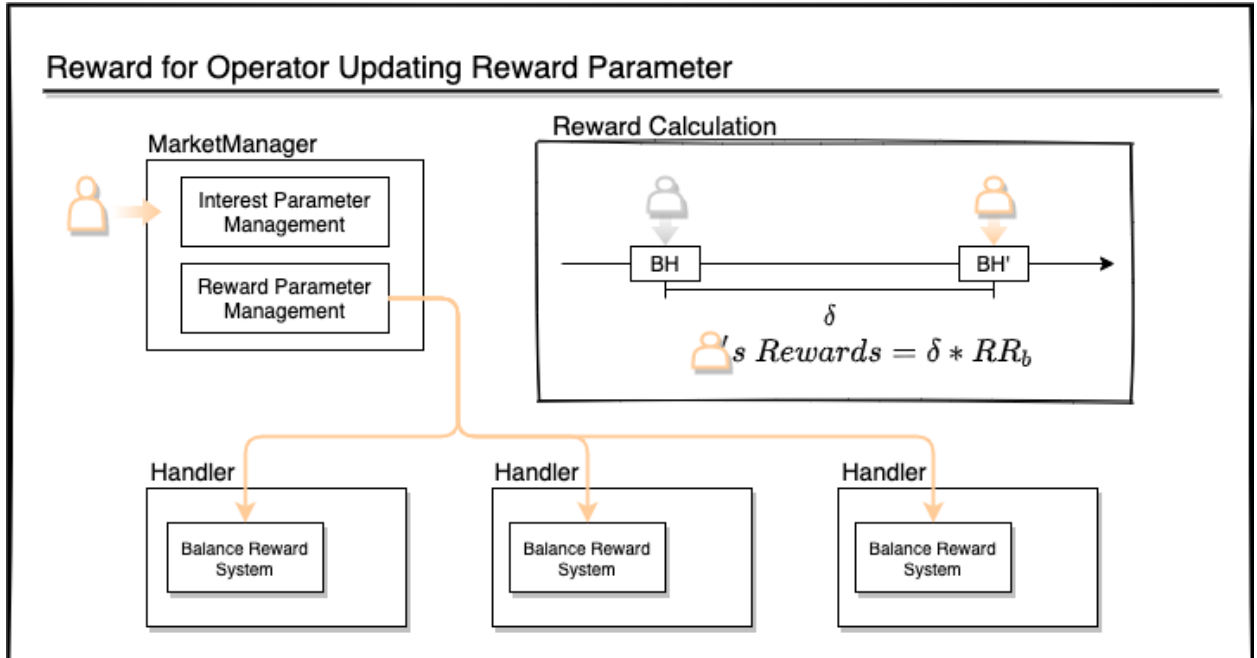
$SR_{b,t}$  is divided into  $SR_{b,i}$  as shown in the following equation:

$$S_i = P_i * \{\alpha * D_{t,i} + (1 - \alpha) * B_{t,i}\}$$

$$SR_{b,i} = SR_{b,t} * \frac{S_i}{\sum S_i}$$

$i$ -th Handler has  $\alpha$ -score, which is the weighted sum of its total deposits and total borrows.  $SR_{b,t}$  is allocated to each Handler relative to its  $\alpha$ -score.

## 2.2 Per Block Reward Allocation Model



The value of  $SR_{b,t}$  is designed to decrement constantly as the block height increases. However, the function to update the Reward Parameter ( $SR_{b,t}$ ) is not called regularly, thus  $SR_{b,t}$  cannot be decremented constantly. Therefore, the update function maintains the decrement of reward as follows:

### Update Process

- $\delta = H_C - H_L$
- Remaining period (for rewards):  $P = \frac{SR_{b,t}}{D} - \delta$
- Remaining rewards (total):  $R_t = R_t - SR_{b,t} * \delta$
- Updated  $SR_{b,i}$  :  $SR_{b,t} = \frac{2 * R_t}{P+1}$

## 2.3 Reward for Updating Reward Parameter

Operator who calls the function to update Reward Parameter is rewarded SI Tokens relative to the time elapsed since the last time the function was called.

### Reward Parameter Update Process

1. Update  $SR_{b,t}$ .
2. Update Reward Parameter for each Handler  
(See, section 3.2 in *Appendix I: Reward Method for Deposit and Borrow*.)
3. Reallocate  $SR_{b,i}$  to each Handler

### Reward Distribution Process

1. Calculate reward amount:  $RR_{op} = (H_C - H_L) * RR_b$
  2. Update block height variable:  $H_L = H_C$
  3. Reward  $RR_{op}$  number of SI Tokens to `msg.sender`
-