STBL Multi Factor Staking Framework Version 1

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1. Overview

This paper specifies a simple, tunable airdrop model for STBL that will operate before full staking emissions are enabled. In Version 1 (v1), only airdrops are active; the protocol uses this framework to distribute STBL to participants. In a future release, the base staking emissions will be switched on, and the airdrops/boosts defined here will sit on top of those staking emissions.

Each wallet's share of the airdrop is determined by a single weight, which is based on the following:

- **Balances:** the amount of STBL and USST held in the Multi Factor Staking (MFS) infrastructure,
- **Time-lock Boost:** the boost applied to staked STBL according to chosen lock term, and
- **Co-lock Boost:** a bounded logarithmic co-lock time boost that rewards holding USST alongside STBL, which prevents outsized advantages for USST relative to STBL.

The design goals for MFS were:

- **Fairness:** no runaway advantages; boosts are bounded and clearly capped.
- **Capital efficiency:** balanced incentives across STBL staking and USST co-locks.
- **Predictability:** smooth outcomes with stable parameters and simple update rules.
- **Operational simplicity:** closed-form calculations suitable for audits and user comms.

This interim airdrop framework enables STBL to launch MFS v1 quickly and safely. The official staking emission engine – including bootstrap, staking-driven, and terminal phases, as well as buybacks/burns and governance tuning – will follow in a subsequent version.

At a high level the MFS infrastructure operates in the following manner:

- A fixed airdrop emission E_{day} is split pro-rata by $\frac{w}{W_{base}+w}$, where W_{base} is the ecosystem's aggregate weight.
- Time commitments increase effective stake via a concave boost $\psi(\tau)$, delivering meaningful incentives for longer locks while preserving diminishing returns.

- USST co-locks increase weight through a bounded log boost $B_{log}(x)$. The coverage cap θ limits how much USST per unit STBL is credited, ensuring whales cannot overwhelm the system by attaching excessive USST to small STBL positions. The curvature κ_{boost} controls how quickly the boost approaches its ceiling, and β sets that ceiling.
- The final weight is $w = S_{eff} \cdot B_{log}(x)$. This single scalar drives allocation and is easy to model, simulate, and communicate.

As well as providing an overview of the framework and parameters, two worked examples follow: (A) STBL-only staking with a time-lock, and (B) a balanced STBL+USST position. They illustrate how θ, κ_{boost}, and W_{base} shape outcomes under realistic reference parameters.

2. Parameter & Equation Overview

Core stake Variables

S: amount of STBL staked (tokens).

τ_S: time-lock (months) for S; allowed values $\{0,1,3,6,12\}$.

U: amount of USST co-locked (tokens).

τ_U: time-lock (months) for U; allowed values $\{0,1,3,6,12\}$.

Airdrop Emissions

E_{day}: fixed daily airdrop (tokens/day). Tokens/day (constant).

W_{base}: baseline global weight from the rest of the ecosystem (dimensionless). This anchors pro-rata so a single new staker cannot swing distribution excessively. On-chain definition at time t:

$$W_{base}(t) = \Sigma_{j \neq i} S_{eff,j}(t) \cdot B_{log}(x_j(t))$$

In the below worked examples we use $W_{base} = 100{,}000{,}000$.

Policy Parameters

κ_{time}: controls strength of time-lock boost; logarithmic so benefits diminish with longer locks.

θ: USST coverage cap (max helpful USST per 1 STBL). Prevents whales from attaching arbitrarily large U to small S.

κ_{boost}: curvature of log-boost; tunes sensitivity of the co-lock boost to coverage x.

β : maximum incremental log-boost; ensures $B_{log}(x) \in [1, 1+\beta]$ and prevents runaway advantages.

Framework & Equations

Time-lock boost:

$$\psi(\tau) = 1 + \kappa_{time} \cdot ln(1+\tau)$$

Effective stakes:

$$S_{eff} = S \cdot \psi(\tau_S), \qquad U_{eff} = U \cdot \psi(\tau_U)$$

Raw USST coverage ratio (pre-cap):

$$r = \frac{U}{\theta \cdot S}$$

Coverage used for boost (includes time-lock tilt, capped to 1):

$$x = min\left(r \cdot \frac{\psi(\tau_U)}{\psi(\tau_S)}, 1 \right)$$

Logarithmic boost (monotone, capped at 1+β):

$$B_{log}(x) = 1 + \beta \cdot \frac{ln(1+\kappa_{boost} \cdot x)}{ln(1+\kappa_{boost})}$$

Final weight and pro-rata airdrop:

$$w = S_{eff} \cdot B_{log}(x)$$

$$\frac{Airdrop}{day} = A_w = E_{day} \cdot \frac{w}{W_{base} + w}$$

Ranges & Example Parameters

$$\tau \in \{0,1,3,6,12\}, \qquad \psi(\tau) \geq 1, \; x \in [0,1], \qquad B_{log}(x) \in [1, 1+\beta]$$

$$\kappa_{time} = 0.25, \qquad \kappa_{boost} = 100, \qquad \beta = 1, \qquad \theta = 10$$

$$E_{day} = 5{,}000, \qquad W_{base} = 100{,}000{,}000$$

3. Worked Examples

Example 1 - STBL Only

Inputs: $S = 10{,}000$, $\tau_S = 3$, $U = 0$.

1. Time-lock boost on S

$$\psi(\tau_S) = 1 + 0.25 \cdot ln(4) \approx 1.3465735903$$

2. Effective stake

$$S_{eff} \approx 10{,}000 \cdot 1.3465735903 \approx 13{,}465.73590$$

3. Coverage and boost

$$x = 0, \qquad B_{log}(0) = 1$$

4. Weight and daily airdrop

$$w \approx 13{,}465.73590 \cdot 1. \approx 13{,}465.73590$$

$$A_w \approx 5{,}000 \cdot \frac{13{,}465.73590}{(100{,}000{,}000 + 13{,}465.73590)} \approx 0.6731961443$$

Example 2 - With USST Coverage

Inputs: $S = 10{,}000$, $\tau_S = 6$, $U = 50{,}000$, $\tau_U = 6$.

1. Time-lock boosts and effective stakes

$$\psi(6) = 1 + 0.25 \cdot ln(7) \approx 1.4864775373$$

S_{eff} and U_{eff}:

$$S_{eff} \approx 10{,}000 \cdot 1.4864775373 = 14{,}864.77537,$$

$$U\_eff \approx 50{,}000 \cdot 1.4864775373 = 74{,}323.87686$$

2. Coverage fraction

$$r = \frac{50{,}000}{10 \cdot 10{,}000} = 0.5$$

$$x = min\left(0.5 \cdot \frac{\psi(6)}{\psi(6)}, 1\right) = 0.5$$

3. Log boost

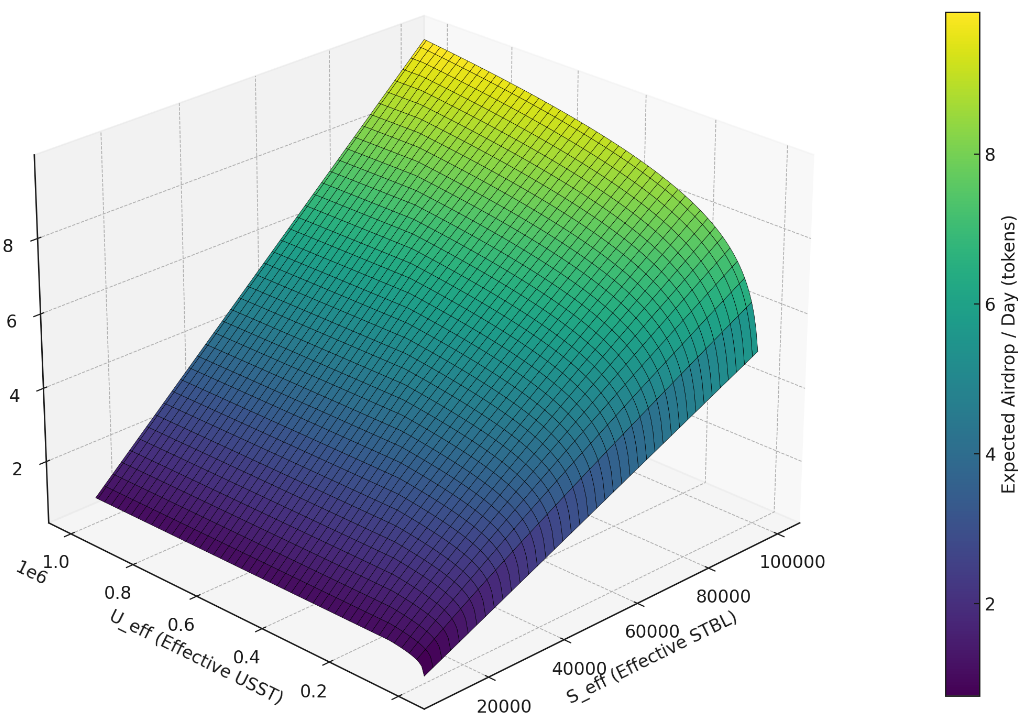
$$B_{log}(0.5) = 1 + \frac{ln(51)}{ln(101)} \approx 1.8519443032$$

4. Weight and daily airdrop

$$w \approx 14{,}864.77537 \cdot 1.8519443032 \approx 27{,}528.73607$$

$$A_w \approx 5{,}000 \cdot \frac{27{,}528.73607}{(100{,}000{,}000 + 27{,}528.73607)} \approx 1.3760579921$$

4. Simulation of A_w as a Function of S_{eff} and U_{eff}



5. Further Work

The focus of this work is to accelerate development and ship a reliable and robust MFS v1 so users can stake/lock/boost and receive rewards with clear rules. However, MFS v1 is temporary; the official emissions and long-term token mechanics will be driven by the full protocol design, which will be covered in the STBL whitepaper, and will be published soon. This will include the bootstrap + staking-driven + terminal emissions, buybacks/burns, governance tuning.

The key decisions and tasks to finalize v1 and move forward are as follows:

- **MFS v1 Final Design:** Current framework is being implemented and will be audited before launching beta version - final implemented spec will be published.
- **Emission Policy:** Define total amount of rewards to be distributed per month, and how this will be changed e.g. constant, inflationary or hybrid depending on staked assets.
- **Emission Caps & Bounds:** Set E_{min} , E_{max} and day-over-day change limits for emissions, as well as transparent emergency pause policy.
- **W_{base} Calculation:** Publish how STBL measures and uses this in onchain staking calculations.
- **Core Parameters:** Define defaults for $\kappa_{time}, \kappa_{boost}, \ \theta, \ \beta$ and allowed lock terms $\{0, 1, 3, 6, 12 \ months\}$.
- **Anti-gaming and Fairness:** Stress-test scenarios (wallet splitting, timing/churn, sybil behavior), gather community feedback, and codify mitigations (minimum lock, cooldowns, snapshotting).
- **USST Coverage Sanity:** keep θ conservative at launch and monitor distribution of USST and STBL to detect leverage clusters and adjust if needed.
- **Parameter Governance:** List which knobs are upgradable in v1, which require governance, and which are frozen until v2.
- **Operations Runbooks**: incident playbook (oracle failure, abnormal staking surge), and rollback steps.
- **Versioned Upgrade Path:** Publish the full whitepaper and schedule transition milestones (v1.5 hardening, v2 with the official emission engine).