Fantom Fluid Staking Model

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1 Fluid staking

1.1 Common constants

Symbol	Description	Value	Formulae
s_d	Seconds per day	86400	24 * 60 * 60
e	Epoch length in seconds		
s_y	Number of seconds in a year	31536000	

Symbol	Description	Value	Formulae
p_{min}	Mininum lockup period (14 days)	14 days	14 * s_d
p_{max}	Mininum lockup period (365 days)	365 days	s_y

1.2 Staking and Rewards

Symbol	Description	Value	Formulae
r_d	Daily rewards FTM	534,247	
r_s	Rewards FTM Per Second	6.183414352	r_d/s_d
p_{base}	% of rewards earned for staking, regardless of a lockup or not	30.00%	
$r_{s_{base}}$	rewards earned for staking per second, regardless of a lockup or not	1.855024306	r_s * p_{base}
$r_{s_{lock}}$	rewards earned for staking per second, locking up tokens	4.328390046	r_s - $r_{s_{base}}$
S	Estimated Current Staking	1,391,859,486.38	
pa	Annualized % Network Estimated Staking Rewards	14.01%	$r_d * 365/S$
pa_{base}	Annualised Base % rewards (no lockup)	4%	$pa * p_{base}$
pa_{lock}	Annualised Max reward % (12 months)	9.81%	pa - pa_{base}
pa_{total}	Total annualised % rewards 14%	$pa_{base} + pa_{lock}$	equal to pa
pa_{diff}	Difference between Max reward % (12 months) and Base rewards	9.81%	$pa_{diff} = pa_{lock}$

Symbol	Description	Value	Formulae
ps	Per second rate of change of annualised rewards	0.000000444255645944 1%	pa_{total}/s_y
ps_{lock}	% additional rewards per second lockup (12 months)	0.000000310978952160 9%	pa_{lock}/s_y
ps_{base}	Base % rewards per second (no lockup)	0.0000001332766938%	pa_{base}/s_y

Variable lockup period

Symbol	Description	Value	Formulae
$pa_{lock}(t)$	Estimated staking rewards per annum for t seconds lockup		$pa/s_y * t$
$pa(t)$	Total estimated staking rewards per annum for t seconds lockup		$pa/s_y * t + pa_{base}$
$ps_{lock}(t)$	Per second rate of change of annualised rewards		$pa_{lock}(t)/s_y$
$ps(t)$	Per second rate of change of annualised rewards		$pa(t)/s_y$

Symbol	Description	Formulae
$ps(t)$	Total % rewards per second for t second lockup	
st	number of tokens staked	
t	Staked seconds (total staking time in seconds)	
e	Epoch length in seconds	
r_{lock}	Total reward (lockup) earned so far:	$ps_{lock}(t) \times st \times t$
r_{lock_e}	Reward (lockup) per epoch:	$ps_{lock}(t)t \times st \times e$
r_{base}	Total reward (base) earned so far:	$ps_{base}(t) \times st \times t$
r_{base_e}	Reward (base) per epoch:	$ps_{base}(t) \times st \times e$
r_{all}	Total reward (base+ lockup) earned so far:	$[ps_{base}(t) + ps_{lock}(t)] \times st \times t = ps(t) \times st \times t$
r_{all_e}	Total reward (base+lockup) per epoch:	$[ps_{base}(t) + ps_{lock}(t)] \times st \times e = ps(t) \times st \times e$

1.3 Penalty

Penalty: Slashed rewards are calculated based on number of FTM withdrawn, such that base reward earned by that staking is half of the base % rewards rate.

Symbol	Description	Formulae
ws	number of FTM to withdraw	
r_{lock}	Total FTM rewards earned so far through lockup yield	
r_{base}	Total FTM rewards earned so far through base yield	
r_w	ratio of withdrawal amount over the total staked (ws/st)	
$pe(t)$	Penalty for withdrawing while still locked	$ws/st \times (r_{lock} + r_{base}/2) = ws/st \times pe_s(t)$
$pe_s(t)$	Penalty per FTM per second	$ps_{lock}(t) + ps_{base}/2$
e	Earnings after withdrawal penalty:	$r_{all} - pe$