Time in Ethereum

Implications of replacing our dear friend Poisson

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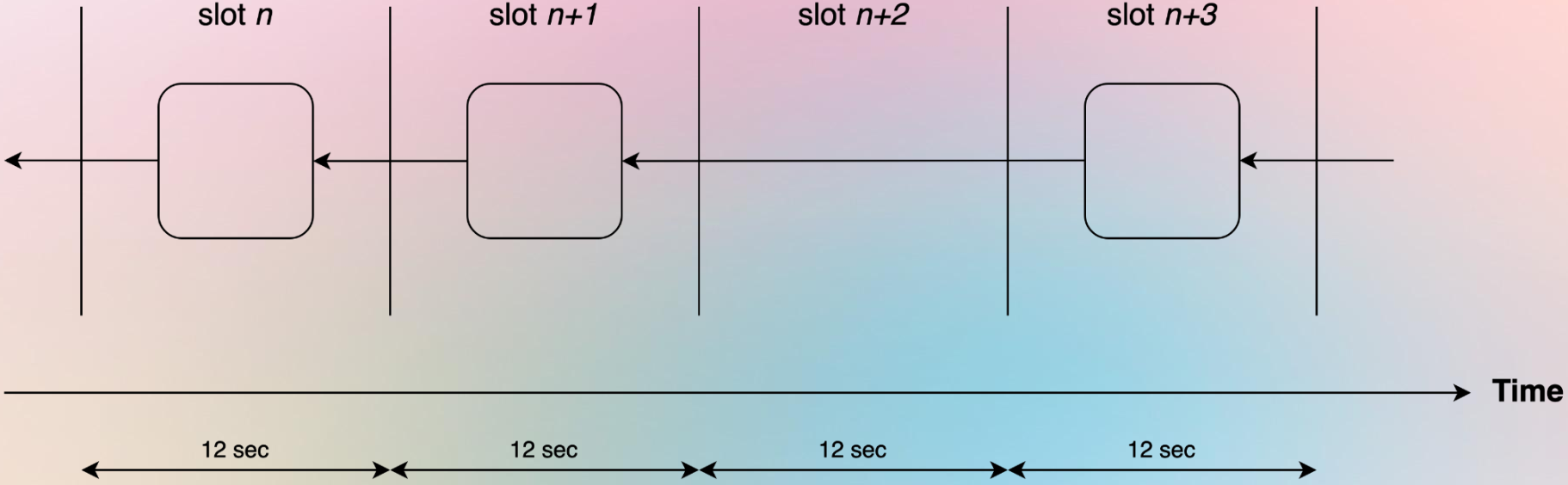
wtf *is* time ?! *

* next question please...

Time in Ethereum

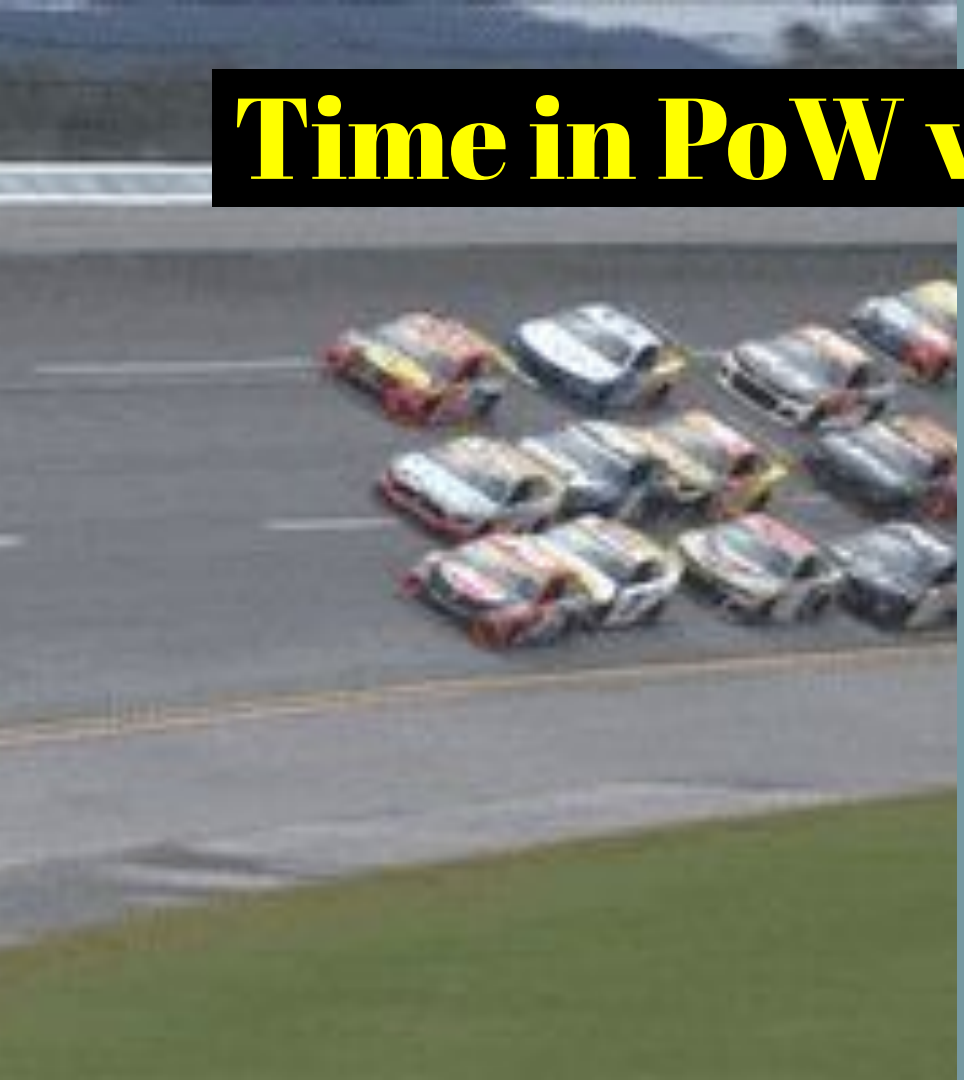


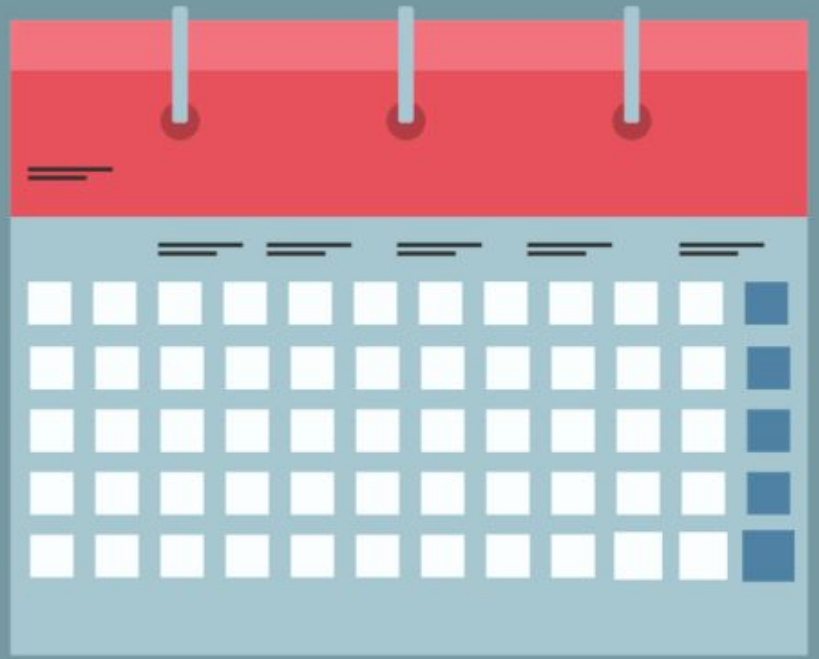
Where does the deterministic nature of time in PoS Ethereum come from?

exogenous randomness : random block time ::

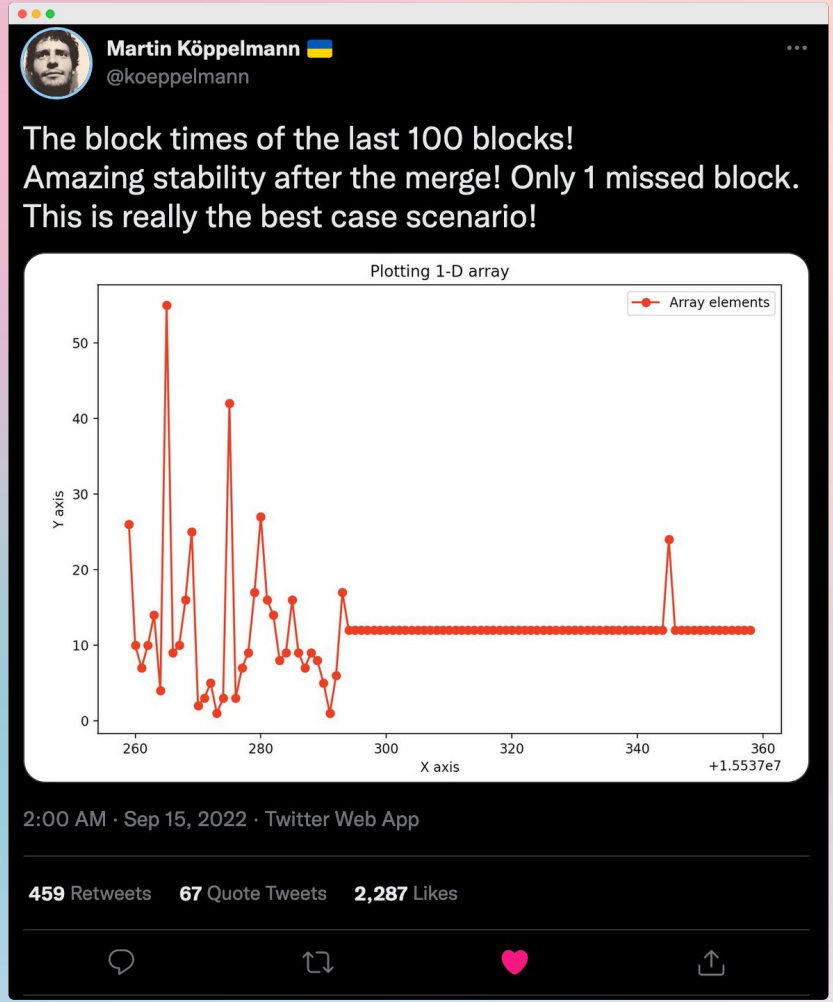
on-chain pseudo-randomness : deterministic time

Time in PoW vs. Time in PoS





Guess when Ethereum merged ...



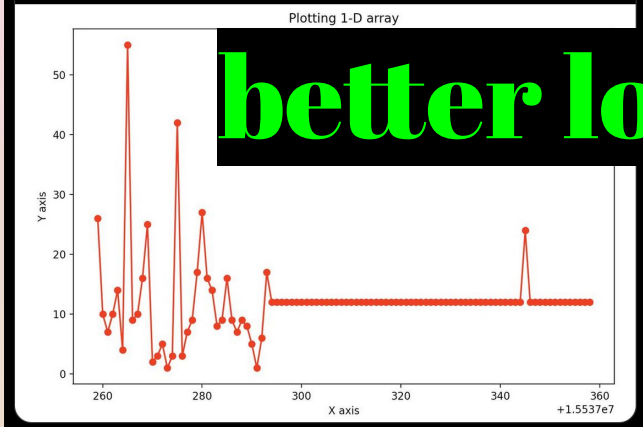
Implications of deterministic time

vitalik.eth
@VitalikButerin

One important corollary of this is better EIP 1559 performance (because fewer blocks bump up against the 2x limit). So far, the percentage of full blocks has dropped from ~20% to ~10%.

etherscan.io/blocks?ps=100&...

> Martin Köppelmann @koeppelmann · Sep 15
> The block times of the last 100 blocks!
> Amazing stability after the merge! Only 1 missed block.
> This is really the best case scenario!



2:08 AM · Sep 15, 2022 · Twitter Web App

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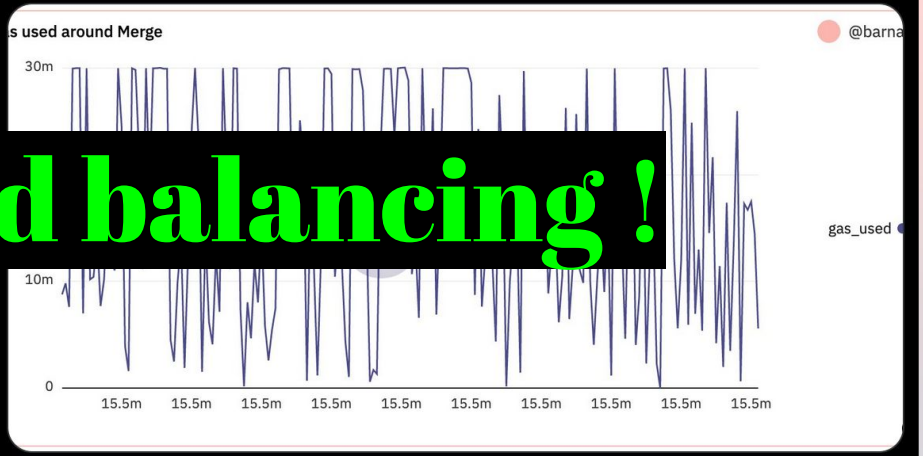
better load balancing !

barnabe.eth
@barnabemonnot

Replying to @VitalikButerin

Can you tell when the Merge happened? :) dune.com/barnabe/EIP1559



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But proposers can abuse their guaranteed monopoly power
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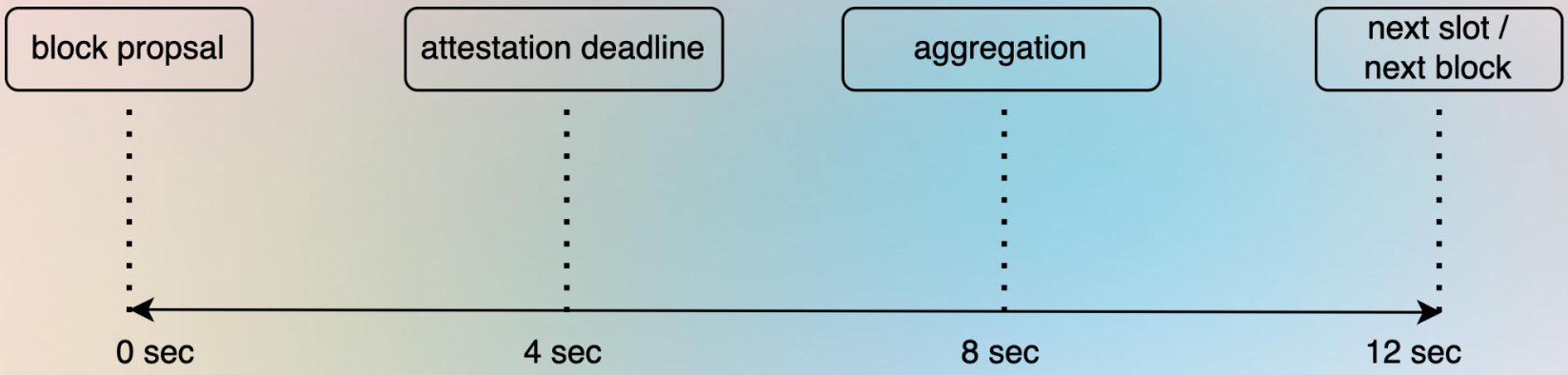
Progression of a slot

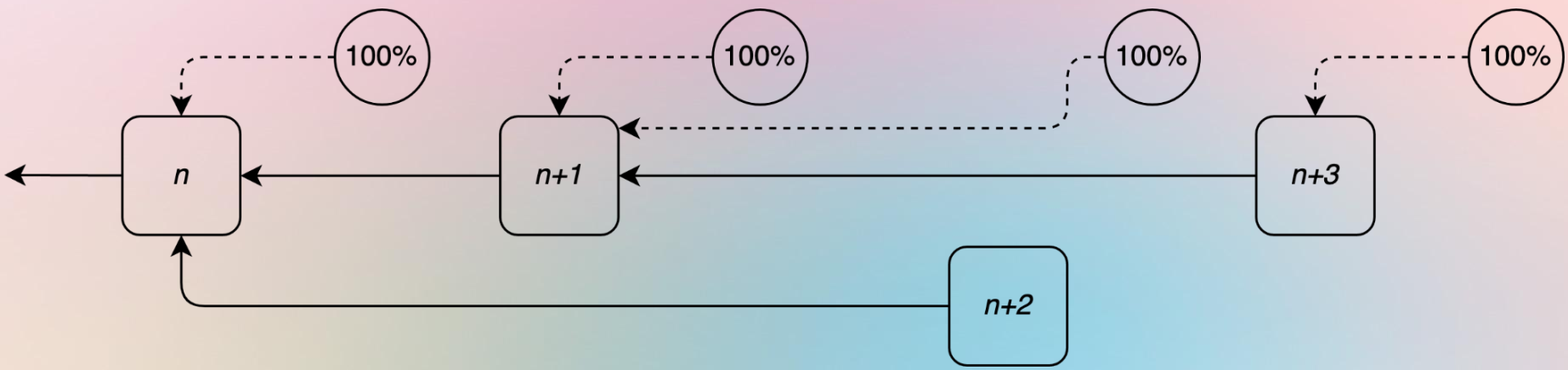
Attesting

A validator is expected to create, sign, and broadcast an attestation during each epoch. The `committee`, assigned `index`, and assigned `slot` for which the validator performs this role during an epoch are defined by `get_committee_assignment(state, epoch, validator_index)`.

A validator should create and broadcast the `attestation` to the associated attestation subnet when either (a) the validator has received a valid block from the expected block proposer for the assigned `slot` or (b) `1 / INTERVALS_PER_SLOT` of the `slot` has transpired (`SECONDS_PER_SLOT / INTERVALS_PER_SLOT` seconds after the start of `slot`) -- whichever comes *first*.



Fork choice rule: LMD GHOST-*ish*




But proposers can abuse their guaranteed monopoly power
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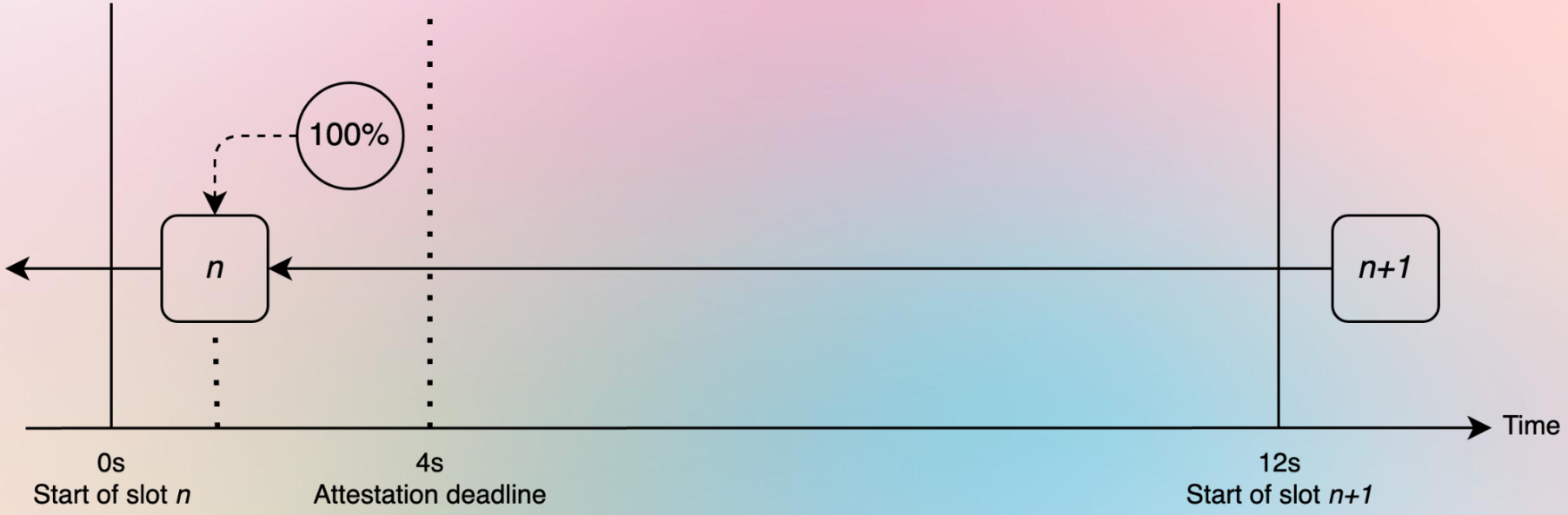
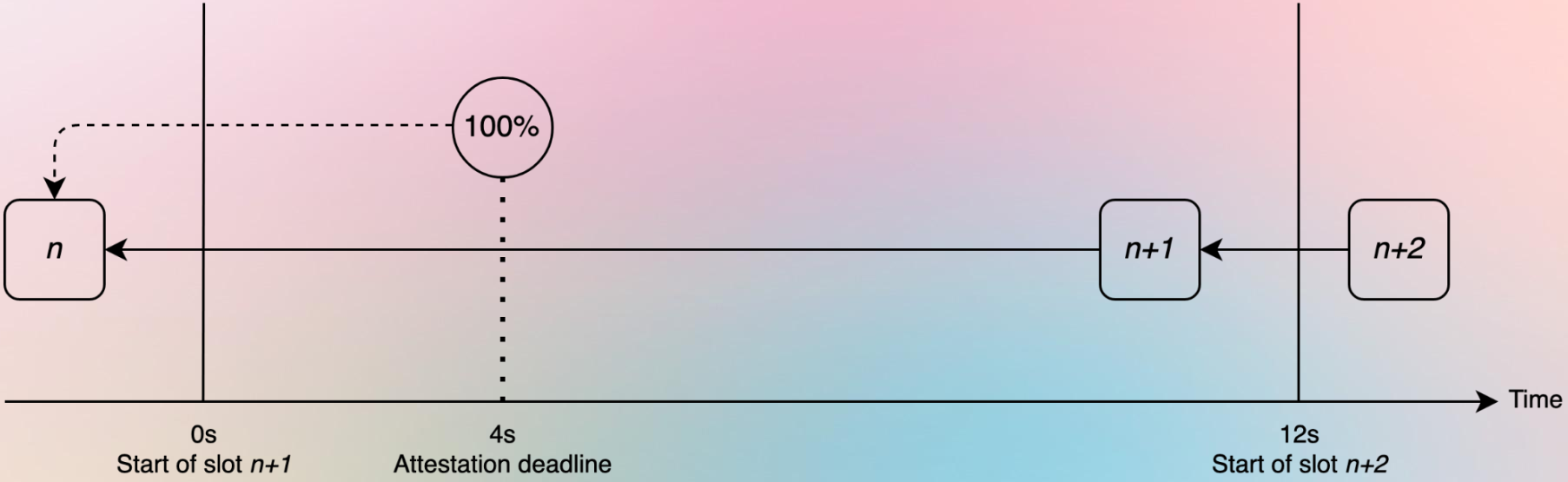
Block receival time: 0s-4s into slot ("on time" -*ish)*

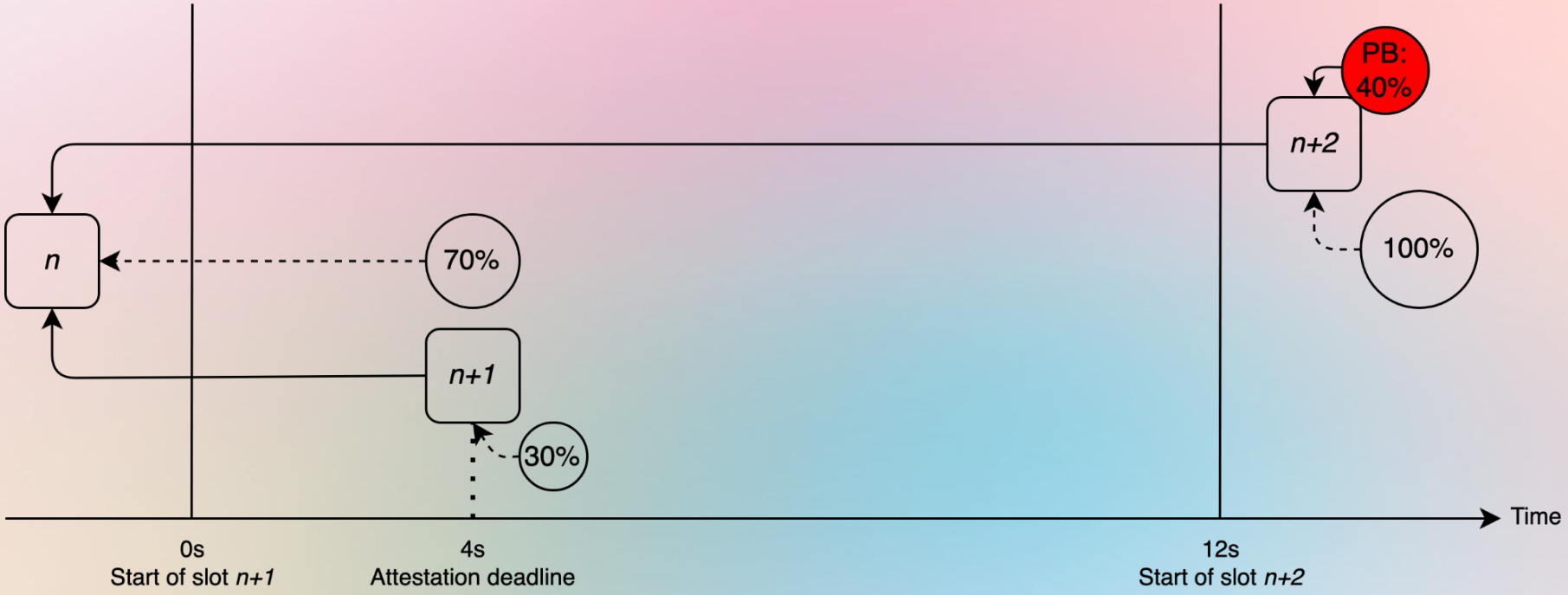


Block receival time: >4s into slot (“late”)

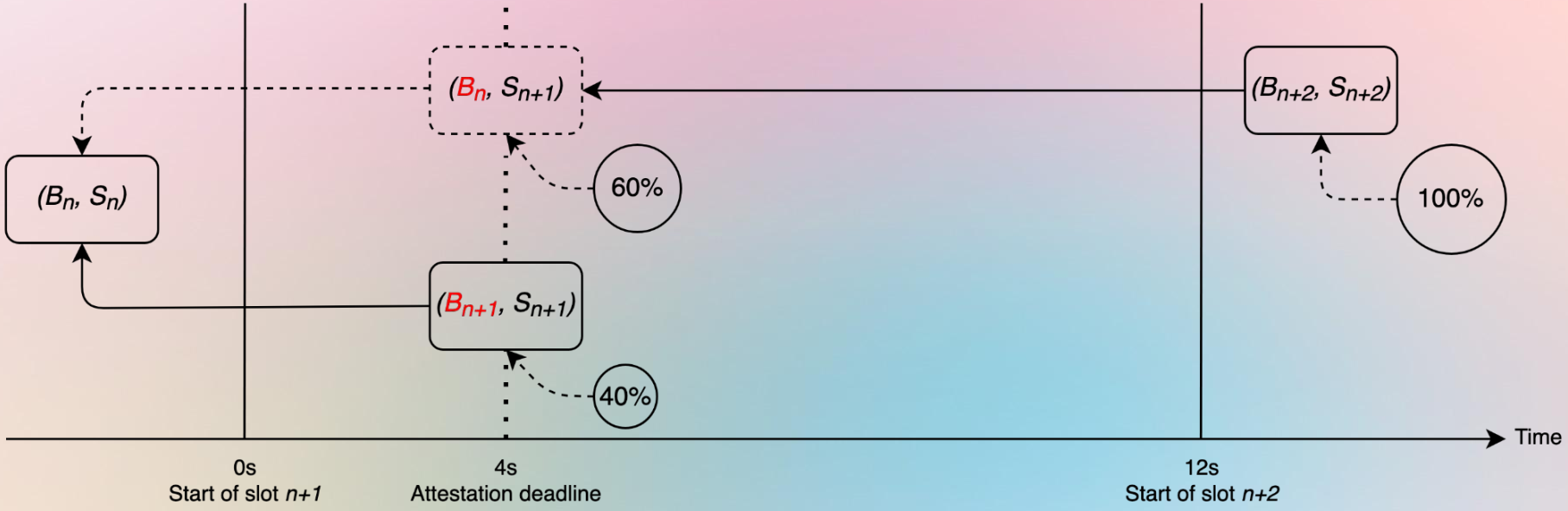


Proposer monopoly... wat do?

Fork choice fun TODAY: proposer boost



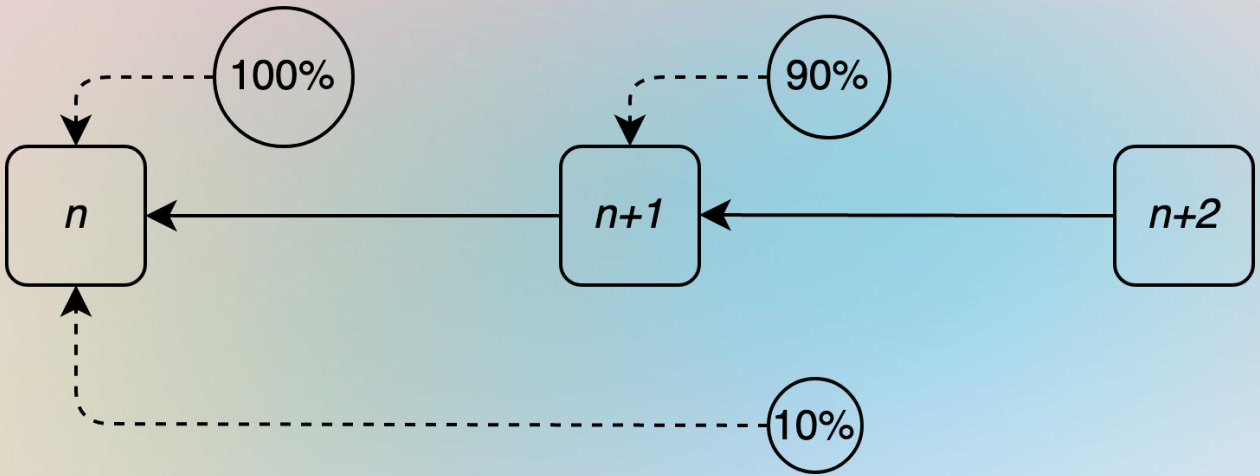
Fork choice fun TOMORROW: (block, slot)-voting



Idea: Incentivizing timeliness explicitly

Today: Block proposers are rewarded in proportion to the profitability of attestations they include in their block.

Idea: Scale the proposer's reward by the **share of same-slot committee votes that the block receives and are included in the subsequent block**.



load stability, good.
guaranteed monopoly, bad.

Thank you!

Strong research background?
Mechanism design expert?
Want to help us make sense of it?
Apply to the RIG now!

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