

# Consensus

In the Filecoin blockchain, network consensus is achieved using the Expected Consensus (EC) algorithm, a secret, fair, and verifiable consensus protocol used by the network to agree on the chain state

## Overview

In the Filecoin blockchain, network consensus is achieved using the Expected Consensus (EC) algorithm, a probabilistic, Byzantine fault-tolerant consensus protocol. At a high level, EC achieves consensus by running a secret, fair, and verifiable leader election at every [epoch](#) where a set number of participants may become eligible to submit a block to the chain based on fair and verifiable criteria.

## Properties

Expected Consensus (EC) has the following properties:

- Each epoch has potentially multiple elected leaders who may propose a block.
- A winner is selected randomly from a set of network participants weighted according to the respective storage power they contribute to the Filecoin network.
- All blocks proposed are grouped together in a tipset
- , from which the final chain is selected.
- A block producer can be verified by any participant in the network.
- The identity of a block producer is anonymous until they release their block to the network.
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## Steps

In summary, EC involves the following steps at each epoch :

1. A storage provider checks to see if they are elected to propose a block by generating an election proof
2. .
3. Zero, one, or multiple storage providers may be elected to propose a block. This does not mean that an elected participant is guaranteed to be able to submit a block. In the case where:
4.
  - No storage providers are elected to propose a block in a given epoch
5.
  - ; a new election is run in the next epoch to ensure that the network remains live.
6.
  - One or more storage providers are elected to propose a block in a given epoch
7.
  - ; each must generate a WinningPoSt proof-of-storage
8.
  - to be eligible to actually submit a block.
9. \*
10. Each potential block producer elected generates a storage proof using [WinningPoSt](#)
11. for a randomly selected [sector](#)
12. within in short window of time. Potential block producers that fail this step are not eligible to produce a block. In this step, the following could occur:
13.
  - All potential block producers fail WinningPoSt
14.
  - , in which case EC returns to step 1 (described above).
15.
  - One or more potential block producers pass WinningPoSt
16.
  - , which means they are eligible to submit that block to the epochs tipset.
17. \*
18. Blocks generated by block producers are grouped into a [tipset](#)
19. .
20. The tipset that reflects the biggest amount of committed storage on the network is selected.
21. Using the selected tipset, the chain state is propagated.
22. EC returns to step 1 in the next epoch.
- 23.

[Previous Blocks and tipsets](#) [Next Drand](#)

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