Consensus mechanisms

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Consensus is the procedure by which the participants settle on the next block. Two families dominate. Proof of work requires a participant (a miner) to expend computation to earn the right to propose a block. Proof of stake requires a participant (a validator) to lock up tokens as a bond and selects proposers in proportion to the stake. Misbehaviour under proof of stake is punished by destroying part of the bond, which the protocols call slashing.

A lawyer meets consensus in four contexts. The first is the tax treatment of rewards. A miner receives new coins and fees for computational work, which both the Swiss Federal Tax Administration (FTA; ESTV) and Singapore's IRAS treat as income when the activity is a trade or business.[1] The second is the regulatory treatment of staking services, examined below under custody and in Part E, Chapter VIII. The third is liability for the network's conduct, which Part D, Chapter VII and Part J, Chapter VI consider for validators. The fourth is sanctions and criminal law, because a validator who includes a transaction from a sanctioned address may be said to have processed it. None of these questions can be answered without knowing which mechanism the network uses.

Feature	Proof of work (Bitcoin)	Proof of stake (Ethereum since 2022)	Permissioned (Hyperledger Fabric, Corda)
Who proposes blocks	Miners who solve a computational puzzle	Validators chosen by stake	Pre-approved nodes
Reward	Block subsidy plus fees	Issuance plus fees plus priority tips	Usually none
Penalty for misconduct	Wasted energy cost	Slashing of staked tokens	Contractual and governance sanctions
Reversal possible	Only by majority of hash power	Only by supermajority of stake	By the operator or consortium
Legal person identifiable	Rarely	Rarely for solo validators, often for staking providers	Always
Typical use in this book	Bitcoin custody, tracing	Staking, DeFi, tokenised assets	Bank consortia, SDX, Project Guardian pilots

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Notes

1. FTA, Working paper on cryptocurrencies and initial coin/token offerings as subject of wealth, income and profit tax, withholding tax and stamp duties, version of 14 December 2021, section 3.3 (mining and staking as taxable income); IRAS, e-Tax Guide "Income Tax Treatment of Digital Tokens", first published 17 April 2020, section 7 on mining. See Parts G and M.

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