GLUON

ETHEREUM LAYER 2 SCALING SOLUTIONS COMPARED

SCALING SOLUTION	STATE CHANNELS	OPTIMISTIC ROLL-UPS	GLUON	ZK ROLL-UPS	SIDECHAINS
HOW IT WORKS	A portion of the blockchain state is locked into a multi-sig contract controlled by a set number of participants. Once locked, channel participants use off-chain messaging to exchange sign valid Ethereum transactions which are submitted back to the blockchain, closing the state channel and unlocking the state again.	Layer 2 smart contract-based solution where aggregators publish the bare minimum information needed with no proofs. Optimistic because it assumes aggregators won't commit frauds and only provides proofs in case of fraud. Rollups because transfers are bundled before being pushed to the mainchain.	**A plasma implementation built specifically for high frequency DEXs.** Unlike some earlier Plasma builds, Gluon uses an accounts/balance based ledger not a UTXO one. Gluon enables faster, cheaper Ethereum transactions by offloading them from the main Ethereum chain to a smart contract-based side chain which periodically reports back to the main cha	Scales by processing mass transfers within a single transaction. The multiple transfers within these transactions are deconstructed by a smart contract using zero knowledge proofs. ZKs are used to publicly record the validity of the block on the Ethereum blockchain. ZK reduces computation and storage space because zero knowledge of the entire data is needed.	Interoperable, Ethereum compatible independent blockchains that employ their own consensus model and block parameters designed to more efficiently process transactions than the mainchain. Tend to incorporate alternate validator selection models and consensus mechanisms. Sidechains manage their own security, separate from Ethereum's.
ADVANTAGES!	✓ Very private as everything happens inside a channel between participants ✓ Instant finality. When both parties sign a state update, it is considered final &enforceable on the blockchain	✓ Flexibility in generalized computation. own smart contracts. ✓ Data is available onchain. Utilizes a trusted availability oracle ✓ Easier validity proof-verification than plasma	✓ Offchain operations improves scaling ✓ Lower fees & much faster operations for computationally intensive apps ✓ Account-based model eliminates issues like shredding, long delays, and large transaction sizes that occur when using a UTXO based plasma model for trading ✓ Frequent checkpointing keeps data storage needs low ✓ Fraud proofs help check against exchange issues like front running ✓ Instant finality on the plasma chain (can be challenged) ✓ Withdrawals in under an hour (exchange specific feature)	✓ Robust security offered by validity proofs ✓ ster than Optimistic Rollups ✓ Bocks computed in a parallel computing model that may encourage decentralization ✓ less data contained in ch transaction aids scalability	✓ Sidechains are permanent. Users don't have to close sidechains to add new users and sidechains can simply be accessed for specific purposes ✓ Allow cryptocurrencies to freely interact with each other in a contained environment
DRAWBACKS	Requires 100% availability of all participants involved Adding or removing participants requires changing the state deposit contract each time. Hard to add new participants	Limited throughput when compared with other Layer 2 solutions like classic Plasma and Gluon Aggregators are trusted to deploy contracts, process user transactions, and include them in a "rollup block". There is an assumption that there is at least one aggregator is not censoring transactions. Strong reliance on trust and game theory Fraud game verifications can delay withdrawals by up to 2 weeks	Some centralization as sidechain needs to be managed by an authority High liveness requirement for validators on the sidechain. Every Gluon block transaction needs an honest verifier (mitigated by incentive models)	Difficulty computing zero-knowledge proofs requires data optimization to maximize throughput Potentially higher fees as validity proofs are more expensive to prove than fraud proofs Assumes a level of unverifiable trust from users Initial setup requires subject matter expert developers	Loses out on the security of a mainchain. Sidechain users must trust its security Sidechains require a great deal of setup for security and operations. Robust miner and validators must be established because sidechains are their own blockchains, not just smart contracts

APPLICATIONS

Celer · UNIPIG coinbase · LEVERJ · zkSync · SKALE