OP Supervisor

Interop is currently in active development and not yet ready for production use. The information provided here may change. Check back regularly for the most up-to-date information. OP Supervisor is a service that verifies cross-chain messages and manages interoperability between chains in the OP Stack. It serves as a hub where eachop-node can index the data needed for cross-chain verification. Chain operators and teams running full nodes like RPC providers are expected to run this service. Some features and benefits include:

- Enables secure cross-chain message passing on the Superchain
- Provides a unified point for managing interoperability data
- Supports multiple networks simultaneously
- Offers potential for public endpoints to aid in node synchronization

How cross-chain message verification works

OP Supervisor verifies messages between different chains in the OP Stack, reducing the risk of invalid or malicious cross-chain interactions. It centralizes the verification process, which reduces the complexity of operating individual nodes.

- op-geth
- : queriesop-supervisor
- during block-building to verify if a message is sufficiently safe to include. This process involves checking each executing message and potentially undoing transactions if conflicts or unknown states are encountered.
- op-node
- : queries cross-chain safety information and coordinates safety updates between OP stack nodes andop-supervisor
- . It uses the API provided byop-supervisor
- to perform actions like:* Updating and retrieving various safety levels
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  - Checking and returning thecross-unsafe
-
  - head for a given chain
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  - Attempting to promote a block tocross-safe
-
  - status
-
  - Attempting to finalize an L2 block based on L1 finality

Log data indexing and management

OP Supervisor acts as a hub for indexing data that everyop-node needs to cross-verify with other chains, centralizing the process of managing interoperability data. Maintains the integrity of cross-chain interactions by tracking safety changes across the Superchain, ensuring consistent application of invalid dependency resolutions.

op-supervisor indexes two types of cross-chain dependencies:

- Interop messages (events):op-supervisor
- maintains an events-index per L2 chain, which determines message-dependencies to check if blocks are safe
- L1 DA (data availability):op-supervisor
- tracks the L1 DA for L2 blocks and maintains a DA safety-index per L2 chain, which helps determine how to rewind L2 chains to resolve invalid dependencies

API for cross-chain safety

OP Supervisor provides an interface forop-node to query cross-chain safety information and coordinate safety updates between OP stack nodes andop-supervisor . OP-Supervisor uses a global read API to determinemessage safety andblock safety, utilizing both the events index and the safety index (See op-supervisor's[log data indexing](#)). The API is designed to handle potential L1 reorgs that can affect the validity of cross-chain messages.

Key API methods include:

Method Description UnsafeView andSafeView Returns the Local and Cross heads for their respective levels DerivedFrom OP Nodes use to check the L1 source of the Supervisor (needed for Safe Head tracking) UpdateLocalSafe andUpdateLocalUnsafe Tells the Supervisor when the Node's heads change Finalized Returns the Finalized Head UpdateFinalizedL1 Signals to the Supervisor new finality signals CheckMessage Checks logs in the DB directly in tests For a full listing of API names, see the[op-supervisor client(opens in a new tab)](#) .

RPC access to all chains

OP Supervisor requires RPC access to all chains in the dependency set. This allowsop-supervisor to verify cross-chain messages and sync data across multiple networks simultaneously, such as OP Mainnet and Base nodes using the same instance.

Benefits:

- Scalability: As the number of chains in the Superchain grows,op-supervisor
- can handle the increasing complexity of cross-chain interactions.
- Improved reliability: It enables a more redundant setup, which is good for stability in the growing ecosystem.

Next steps

- Want to learn more? Read our guide on the anatomy of a cross-chain message
- or check out this interop design video walk-thru(opens in a new tab)
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- For more info about how OP Stack interoperability works under the hood check out the specs(opens in a new tab)
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SuperchainWETH (Interoperable ETH) How to transfer a SuperchainERC20