Forced transaction flow

This guide explains the nuances of forced transactions during sequencer downtime.

Users are able to force-include deposit transactions, which can initiate withdrawals, at any time. However, there are important nuances to understand about the chain derivation pipeline and sequencer behavior.

Key concepts

- Sequencing Window
- : A 12-hour rolling window to include L2 transactions, including native L2 transactions and deposit transactions.
- Max Time Drift
- : 30 minutes, the maximum delay for including a deposit transaction, relative to the L2 chain.
- Sequencer Downtime
- : Period when the sequencer is offline or not producing blocks.

Normal operation

Under normal circumstances:

1. Deposit transactions are included within 30 minutes.
2. The sequencer processes transactions and produces blocks regularly.

Sequencer downtime scenarios

Short downtime (< 30 minutes)

- Deposits are still included within the 30-minute max time drift.
- Regular L2 transactions may be delayed.

Extended downtime (30 minutes to 12 hours)

1. Deposits are force-included within 30 minutes.
2. The L2 chain state remains uncertain until:* The sequencer comes back online, or
3.
    - The 12-hour sequencing window expires.

Prolonged downtime (> 12 hours)

1. After 12 hours, nodes start generating blocks deterministically.
2. These blocks only include deposit transactions.
3. When the sequencer returns:* All deposit transactions are included first.
4.
    - No regular L2 transactions are included until the L2 chain is within 12 hours of the chain.

Important considerations

- Forced transactions, through deposits (no need for deposited value), ensure timely execution of actions, mitigating risks like DEX price divergence during sequencer downtime.
- Actions remain speculative for up to 12 hours due to the sequencing window.
- The 12-hour window is a balance between operational reliability and minimizing potential L2 reorganizations.

Example scenario

If a deposit is initiated after the 30-minute mark but before the sequencing window expires:

1. The deposit will be effective when the sequencing window expires (up to ~11 hours later).
2. Nodes reading data from L1 will produce a block with the deposit after the sequencing window expires.
3. The eventual L2 chain will include the deposit in a block with an onchain timestamp close to the L1 block where the deposit originated.

The sequencing window is a rolling 12-hour delay from when an L1 block is first known. This design allows the sequencer a grace period to come back online without causing L2 chain reorganizations.

Conclusion

The forced transaction mechanism on OP Stack chains provides a robust way to handle sequencer downtime, ensuring that critical transactions are included in a timely manner. While the 12-hour sequencer window introduces a degree of uncertainty during downtime, the system is designed to guarantee eventual consistency and transaction inclusion.

[Withdrawal flow](#) [Cross domain transaction](#)