Plasma MVP and Plasma Cash seem to be focused on a UTXO based coin. Although the challenges we face are from a DEX point of view, solving them will benefit Plasma MVP and Plasma cash as well, so this discussion will help both projects.

Basics

Price Time priority:

Exchanges with an order book need to match orders with better price first, followed by orders placed earlier.

Example: If there exist sell orders (id, price, qty) of (id1, 51, 3) (id2, 52, 1) (id3, 52, 2),

when a buy (id4, 52, 5) is placed, orders with id1 and id2 are filled completely and id3 is filled partially.

Market Maker:

A trader who provides liquidity on the platform. On many assets, the market maker is one party to almost every single trade.

Plasma MVP Challenges

1: UTXO shredding

Price time priority execution means that larger UTXOs will be replaced with smaller UTXOs over time. The result of this is that all the system will rapidly tend to large number of UTXOs of the smallest possible size. A market maker's account is likely to end up with a few thousand UTXO per hour. Gas cost for exit on individual shredded utxos may not justify its value. This will also impact the ability to take tiny fees.

2: Exit delay too large

Traders are accustomed to withdrawing in minutes or hours. A delay of several days could be a huge UX issue. Since large traders hedge their positions and require moving large amounts of funds from a winning exchange to a losing exchange, a 2 week delay will make it hard to attract any decent liquidity into the plasma DEX

3: Exit window too small

It is highly likely that on detecting a maleficent operator, a huge number of UTXOs wish to exit simultaneously. The current manner of exiting would require a user to exit every UTXO they have when they detect this. An average trader may make 5 trades a day, but a market maker is likely to make 100K trades and have over a million UTXOs. It is unlikely that one week is sufficient to get all these into the priority queue. Perhaps parameterizing the delay by the exit priority queue size is an option?

4: Exit tx too large

The gas required for finalizeExit (in OMG implementation) is likely to exceed the block limit preventing exit. At 8M gas limit and 80K gas per output finalized, a max of 100 outputs can exit. Breaking the finalizeExits into [multiple batches](#) may be a solution if we can do this without introducing race conditions.

Update

Batching using block numbers [suggested here](#).

5: Everyone needs to validate all Plasma blocks

This is an onerous requirement on the users of Plasma MVP. This will also endanger UTXOs of people in natural disaster areas like Puerto Rico after hurricane Maria, who may be cut off from internet service for a while.

6: Long commitment chains

Every transfer of an UTXO increases the transaction size as it requires the [full history](#) from the original on-chain deposit. At high transaction rates and lots of tiny outputs to spend for a payment, with market maker trading with many parties, this could complicate logic and degrade performance.

Plasma cash

7: Penny wise

Price time priority matching is impractical unless everyone holds all their coins in the smallest denomination.

Possible Solutions

Account Model

Most plasma issues are exacerbated because of the UTXO model. An account model eliminates many of these and lightens the impacts of the rest. Fixes UTXO shredding

, Long commitment chains

and Penny wise

Limited Proof of Authority

A POA chain can provide instant finality. As long as the POA is strictly limited by what it can do using fraud proofs on the root chain, we have the best of both worlds. Every bad state change should be detectable and proven on root chain by anyone watching the plasma chain. An error, intentional or otherwise should halt the chain, enabling users to withdraw their coins at leisure. Fixes Exit window too small

Retiring outputs

Requiring an output to be marked as retired

would prevent that output from being included in any further transactions on the plasma chain. The only thing that can be done with a retired output is withdrawal on Root chain once retirement is confirmed on plasma block. This can eliminate the 1 week delay and improve UX. The priority queue exit would continue to exist in case the POA fails to include the retire on the plasma chain. Fixes Exit delay too large

Exit Delegation

It should be possible to delegate an exit a coin to the depositor address to specialists. The delegate wont be able to spend the coin but they can only initiate a withdrawal ONLY to the depositors address. This removes the onerous requirement of having every user to monitor the chain themselves which is a barrier to entry. Fixes Everyone needs to validate all blocks

We have a version of plasma that incorporates the above and I will post our spec in a different thread once we work out the final kinks.