# Canyon: Permanent Storage Layer for Limitless Scalability

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#### Abstract

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A Appendix

# 1 Introduction

## 1.1 Motivation

TODO

## 1.2 Organization

TODO

## 2 Related works

## 2.1 Filecoin

TODO

## 2.2 Crust

TODO

#### 2.3 Arweave

TODO

# 3 System design

## 3.1 Consensus

## 3.1.1 Proof of Access

$$P(\text{win}) = P(\text{has recall block}) * P(\text{finds hash first})$$
 (1)

$$P(\text{win}) = P(\text{has recall block}) * P(\text{claims slot})$$
 (2)

$$\hat{x} = \frac{1}{N} \sum_{i=1}^{N} x_i$$

$$R = \frac{1}{\hat{x}_{N \to +\infty}}$$

#### Algorithm 1: Generation of POA

#### Input:

The random seed S;

The weave size W;

#### **Output:**

The proof of accesing the recall block POA;

1 Initialize the number of repeats x with 1;

#### 2 repeat

- **3** Draw a random byte B with MULTIHASH $(S, x) \mod W$ ;
- Find the TX in which the random byte B is included;
- $x \leftarrow x + 1;$
- 6 until The data of TX is available;
- 7  $POA \leftarrow CONSTRUCTPOA(TX);$
- s return POA;

#### 3.1.2 Proof of Stake

#### 3.1.2.1 Staking Rewards

#### 3.1.2.2 Stake

## 3.2 Economy Model

#### 3.2.1 Perpetual Storage Cost

$$P_{GBH} = \frac{HDD_{price}}{HDD_{capacity} * HDD_{mtbf}}$$
(3)

- $P_{GBH} =$
- HDD<sub>price</sub>
- HDD<sub>capacity</sub>
- HDD<sub>mtbf</sub>

$$P_{store} = \sum_{i=0}^{\infty} (Data_{size} * P_{GBH}[i])$$
(4)

### 3.2.2 Transaction Fee

$$TX_{permacost} = TX_{data\_size} * Sum (5)$$

$$TX_{bandwidthcost} = TX_{data\_size} * C_{network\_per\_byte}$$

$$\tag{6}$$

$$TX_{reward} = TX_{permacost} * C_{fee} + TX_{bandwidthcost}$$
 (7)

$$TX_{total} = TX_{permacost} + TX_{reward} \tag{8}$$

•  $TX_{permacost}$ 

- TX<sub>data size</sub>
- $TX_{bandwidthcost}$
- $TX_{reward}$
- $TX_{total}$

#### 3.2.3 Data Oblivion

TODO

#### 3.2.4 Multi-currency Payment

TODO

#### 3.3 Transaction Pool

TODO

# 4 Roadmap

TODO

## 5 Conclusion

## 5.1 Future work

# References

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# A Appendix