DAGGER
BY THE COMMUNITY

XDAG: PoW + DAG

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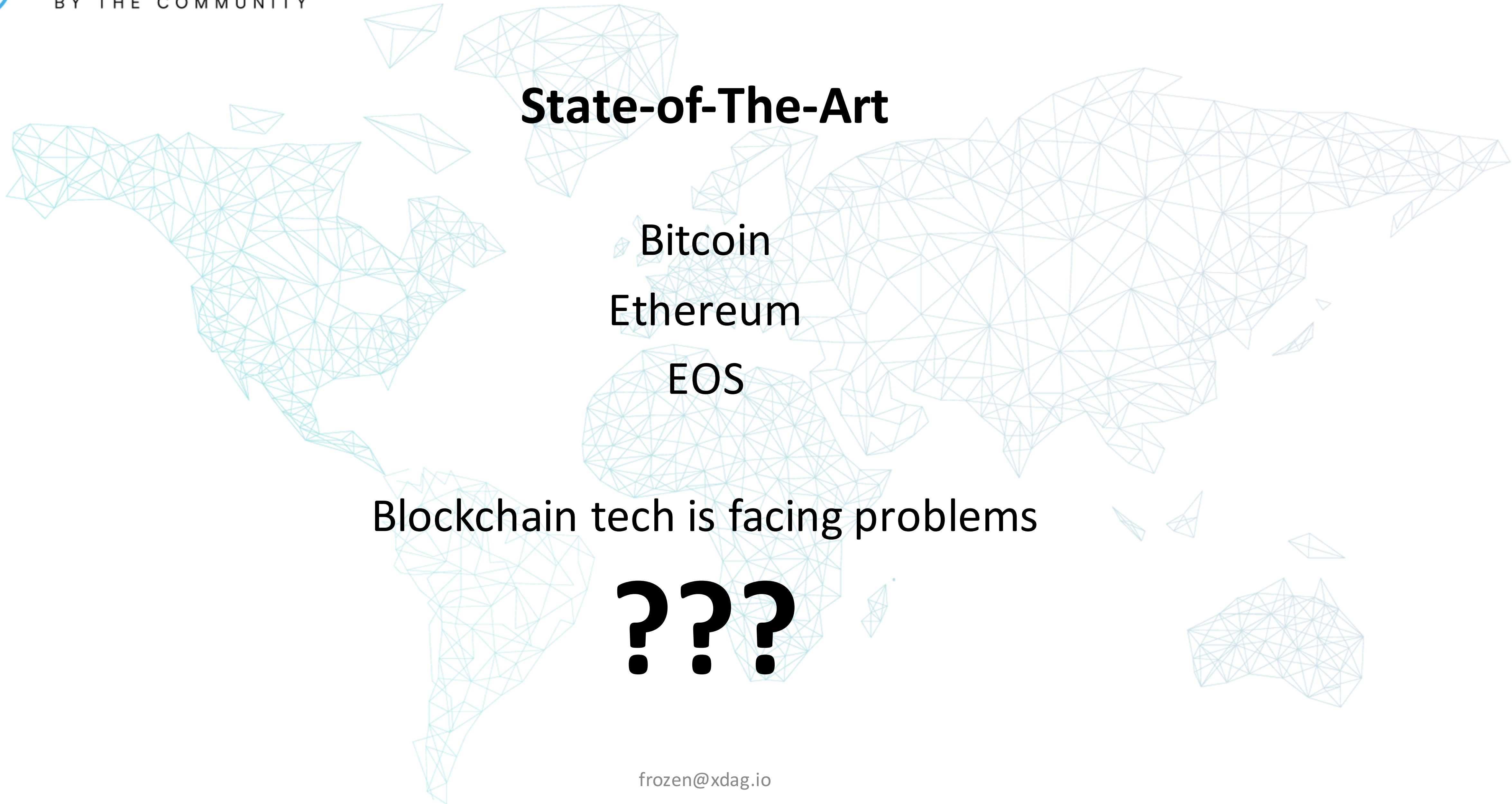
https://github.com/xrdavies



State-of-The-Art

Bitcoin

Ethereum

EOS

Blockchain tech is facing problems

???

State-of-The-Art

Layer1

- Consensus PoS/DPoS
- Shading

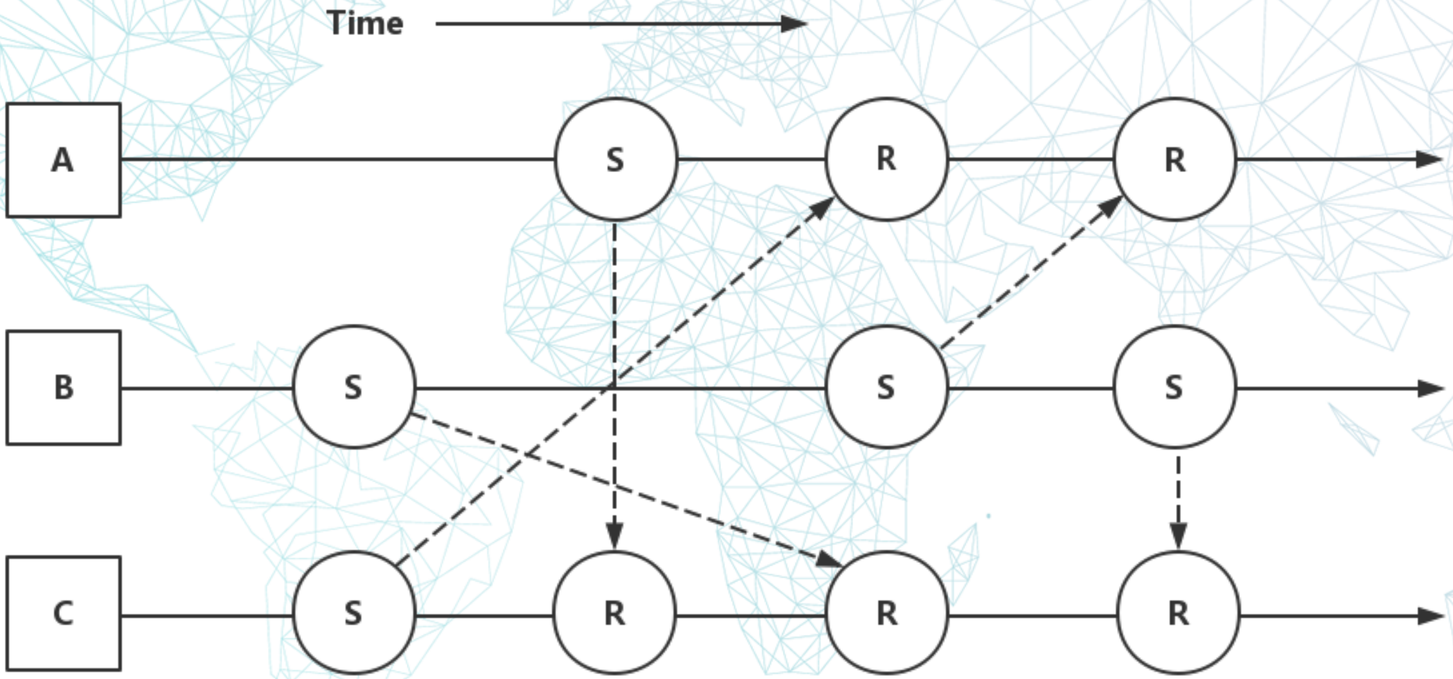
Layer2

- Side Chain
- State Channels
- Multi Chains

DAG

- Nano
- IOTA
- Byteball
- XDAG

NANO



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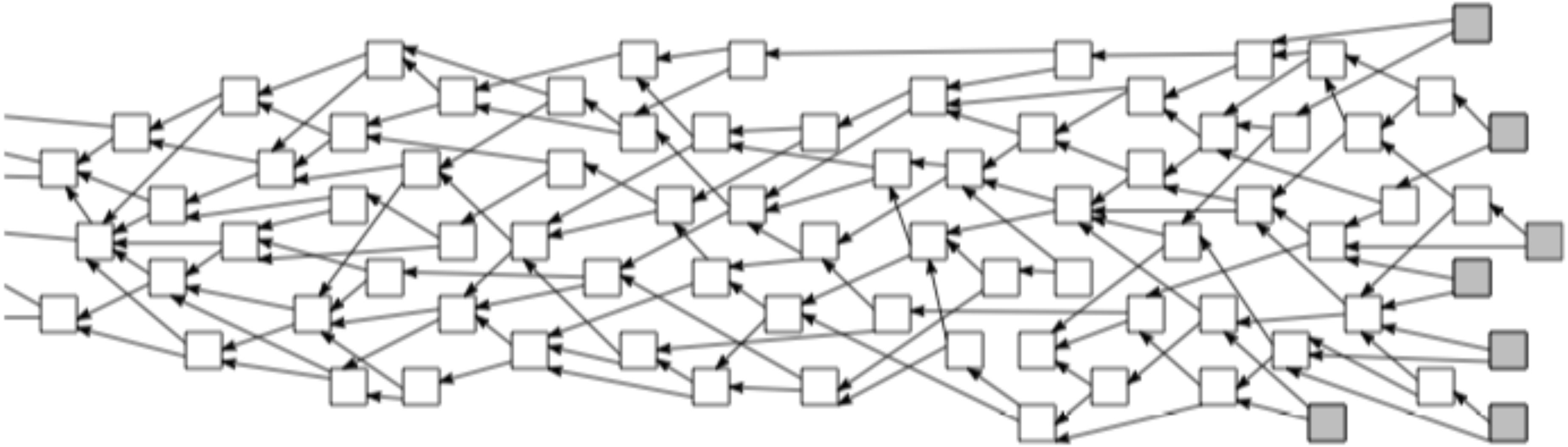
IoTA



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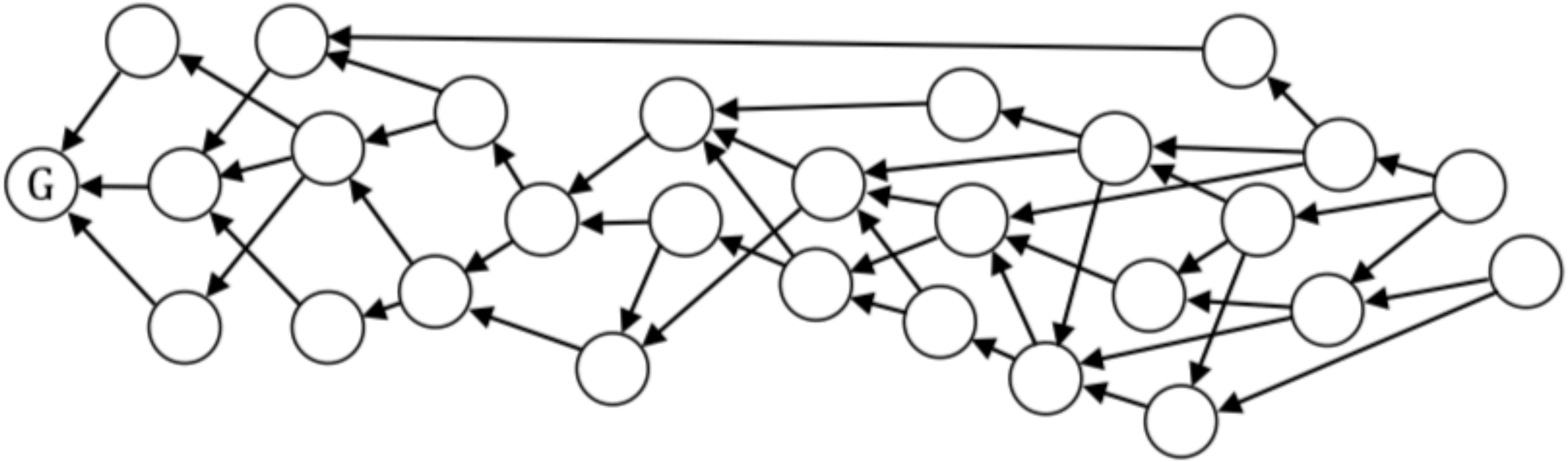
Byteball



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DAG – Directed Acyclic Graph

- XDAG is another innovation technology to solve problems

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XDAG: A new DAG-based cryptocurrency

The first mineable DAG

No Pre-mine

No ICO

Community driven

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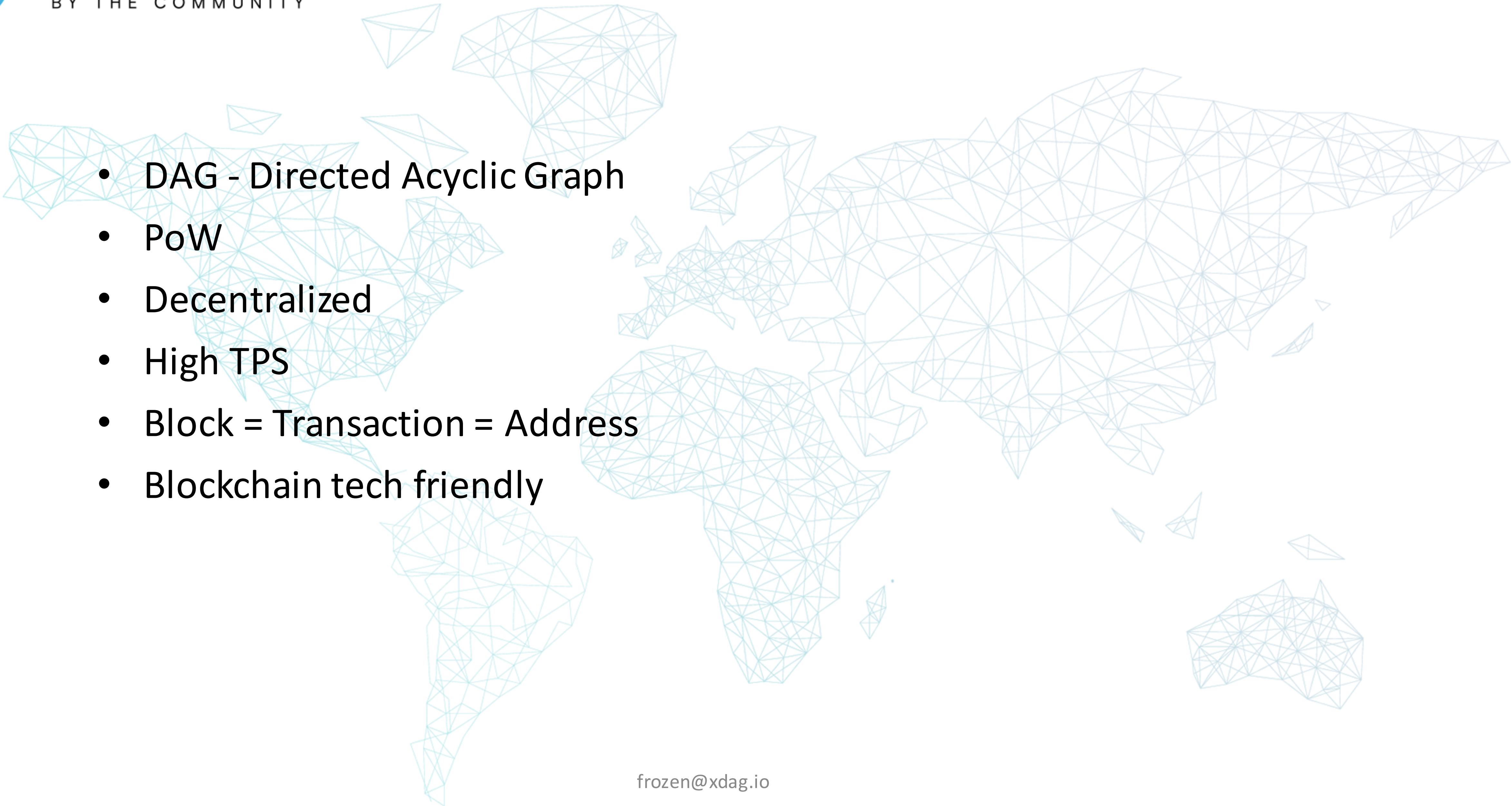

- DAG - Directed Acyclic Graph
- PoW
- Decentralized
- High TPS
- Block = Transaction = Address
- Blockchain tech friendly

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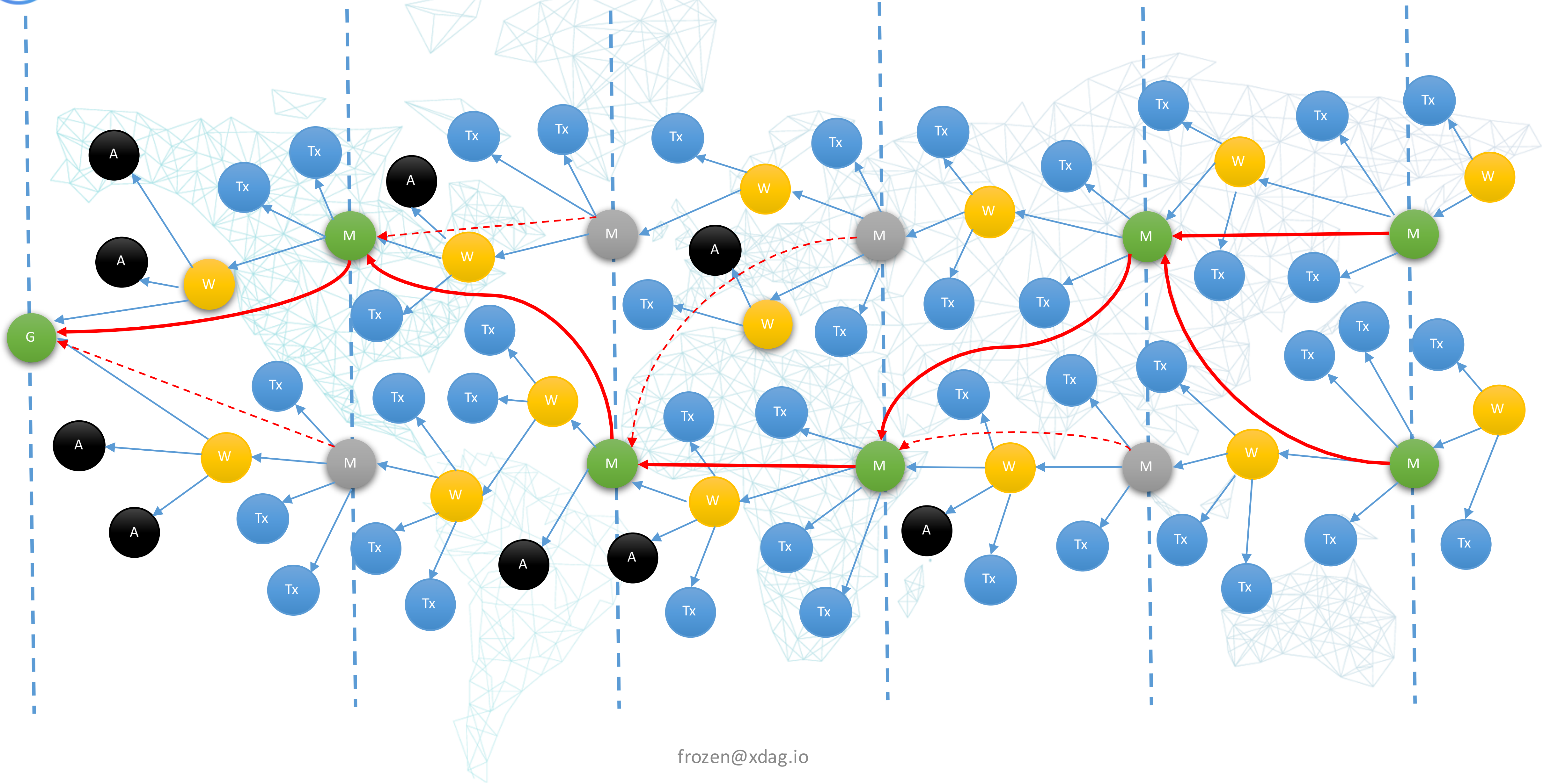

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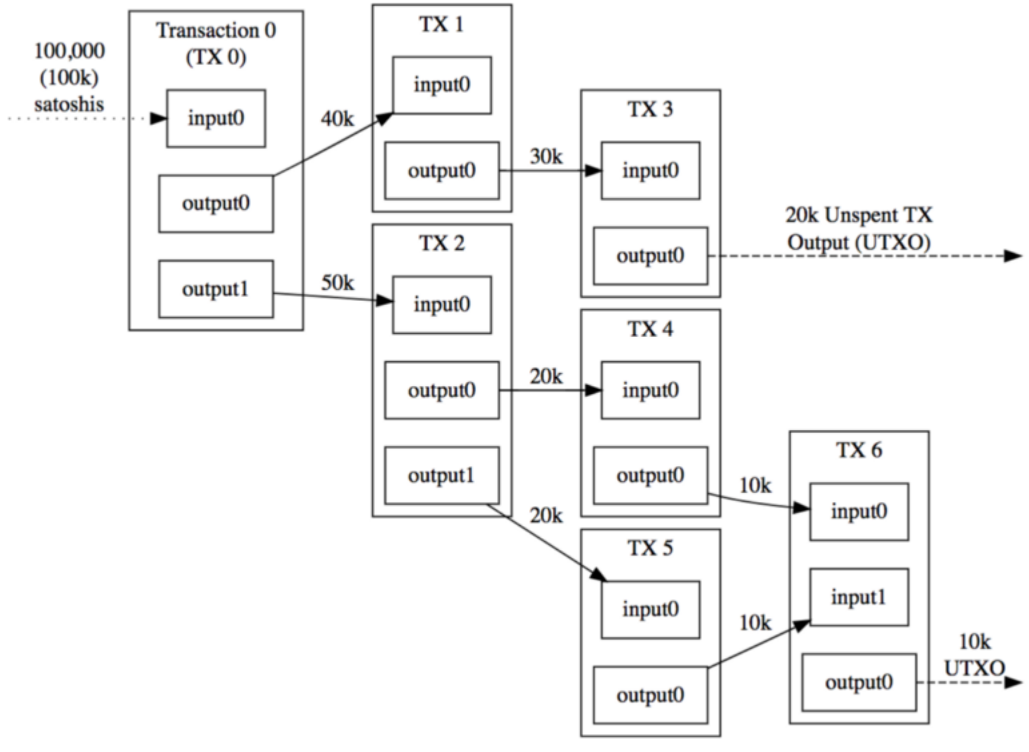
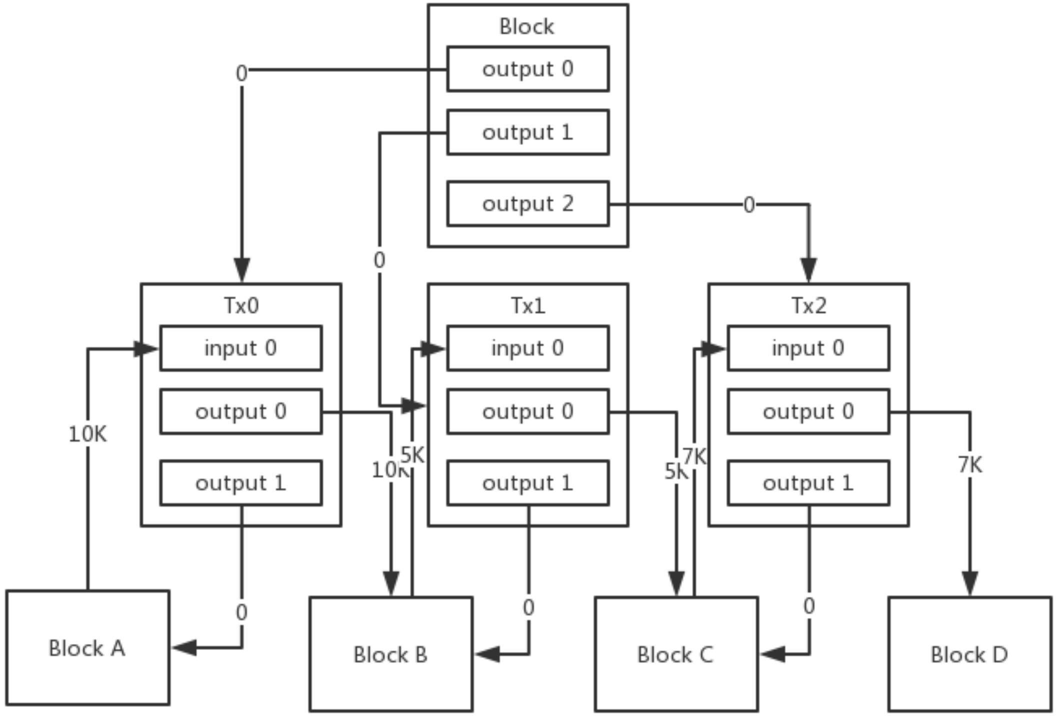
UTXO

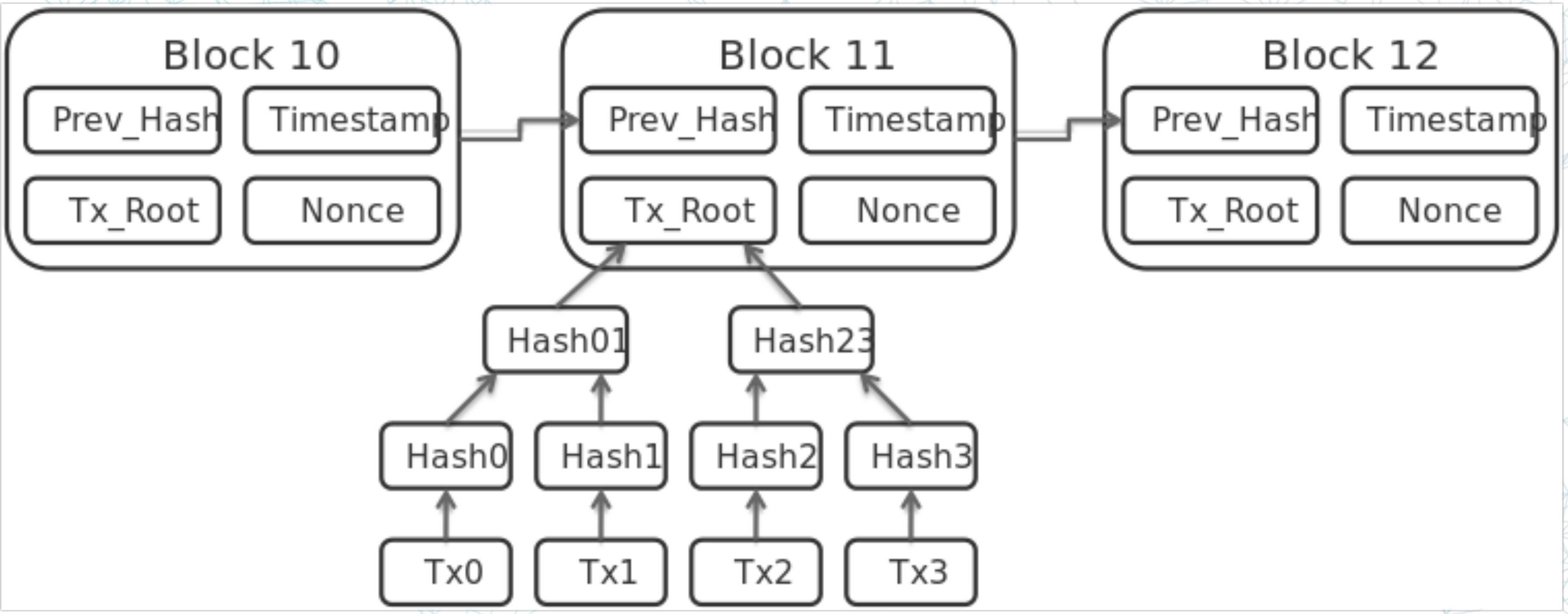


Triple-Entry Bookkeeping (Transaction-To-Transaction Payments) As Used By Bitcoin

XDAG UTXO



Blockchain


Block 10
Prev_Hash
Timestamp
Tx_Root
Nonce
Block 11
Prev_Hash
Timestamp
Tx_Root
Nonce
Block 12
Prev_Hash
Timestamp
Tx_Root
Nonce
Hash01
Hash23
Hash0
Hash1
Hash2
Hash3
Tx0
Tx1
Tx2
Tx3

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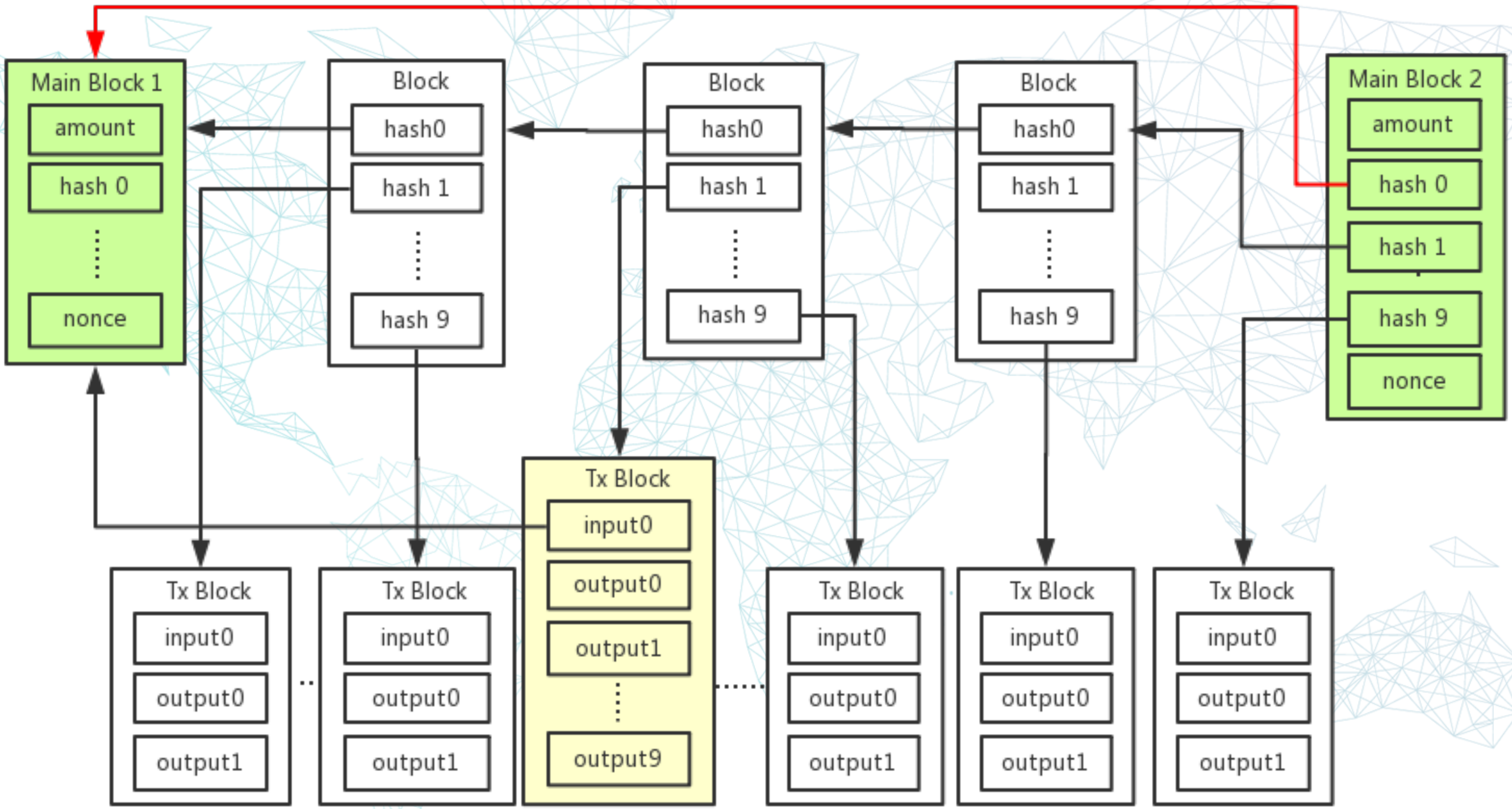
XDAG



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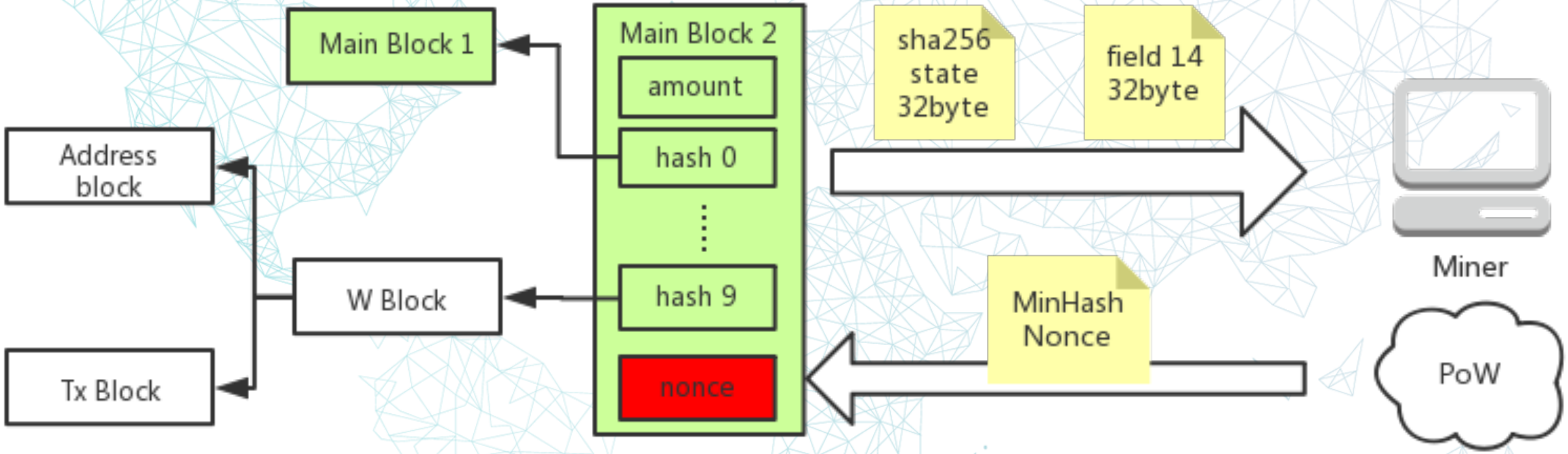
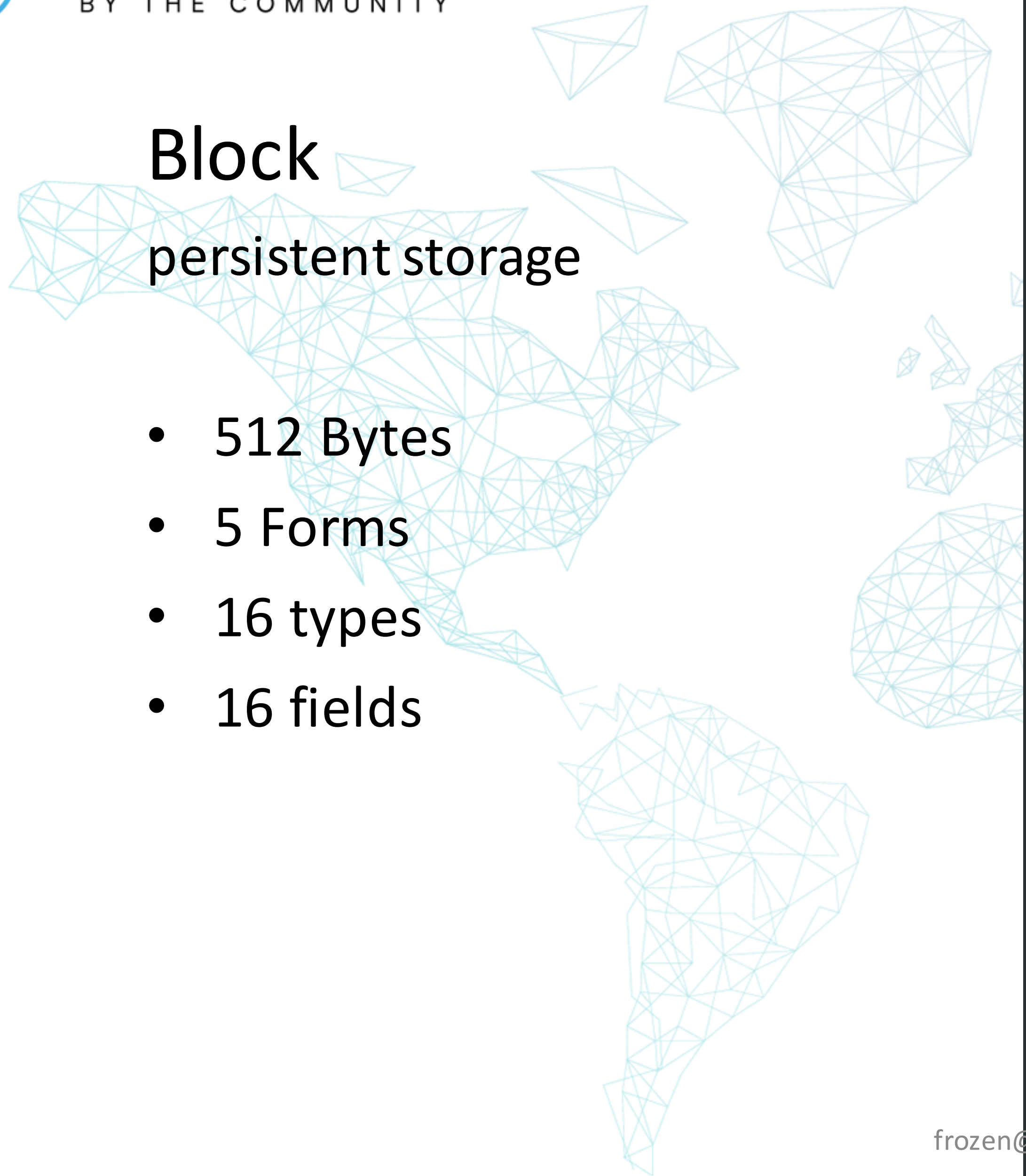
PoW: The Spirit of Blockchain



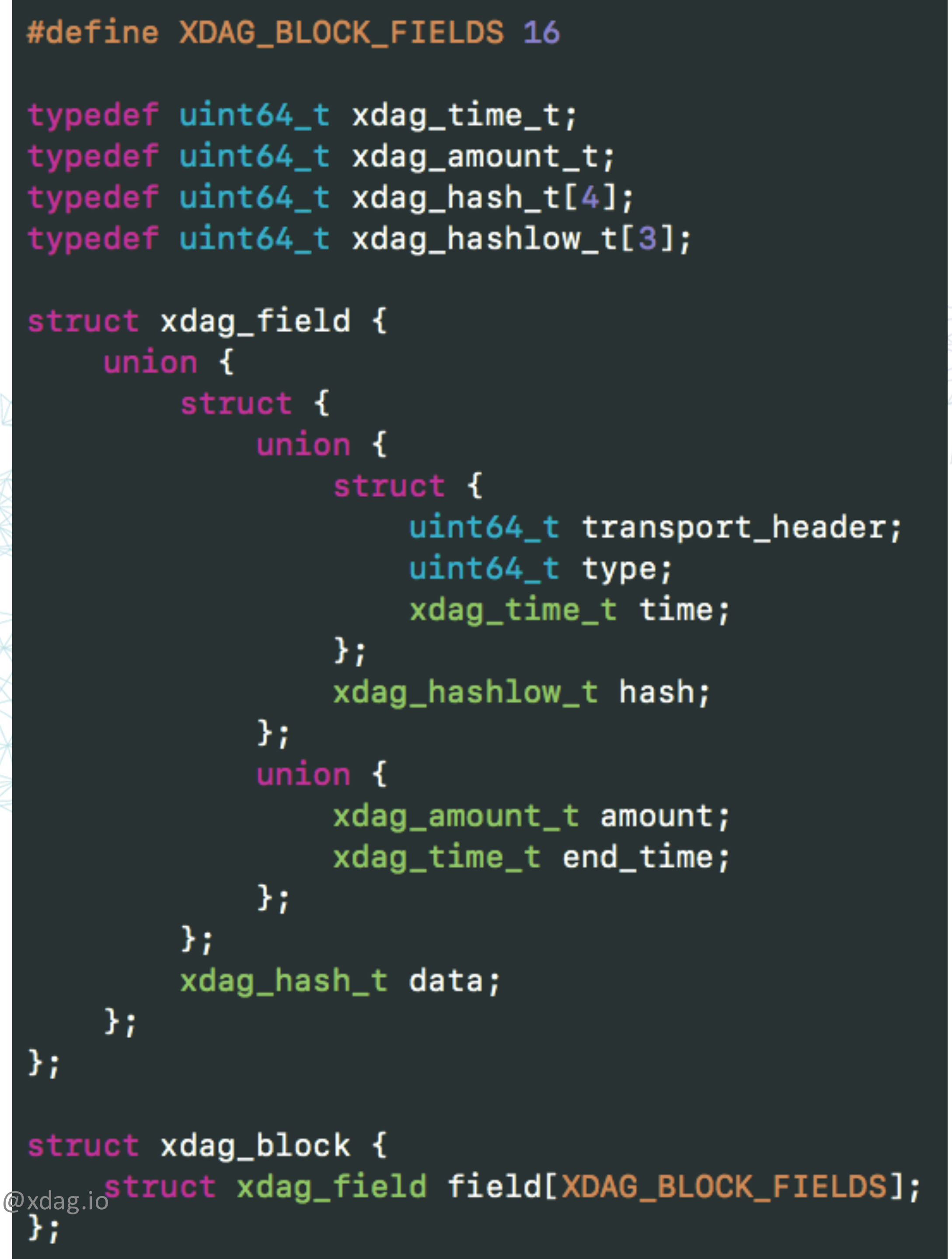
- Miner uses double sha256 to find minimal hash
- Node generates main block based on minimal hash every 64s
- Determine main chain based on difficulties of generated main blocks



Block

persistent storage

- 512 Bytes
- 5 Forms
- 16 types
- 16 fields



```c
#define XDAG_BLOCK_FIELDS 16

typedef uint64_t xdag_time_t;
typedef uint64_t xdag_amount_t;
typedef uint64_t xdag_hash_t[4];
typedef uint64_t xdag_hashlow_t[3];

struct xdag_field {
    union {
        struct {
            union {
                struct {
                    uint64_t transport_header;
                    uint64_t type;
                    xdag_time_t time;
                };
                xdag_hashlow_t hash;
            };
            union {
                xdag_amount_t amount;
                xdag_time_t end_time;
            };
        };
        xdag_hash_t data;
    };
};

struct xdag_block {
    struct xdag_field field[XDAG_BLOCK_FIELDS];
};
```

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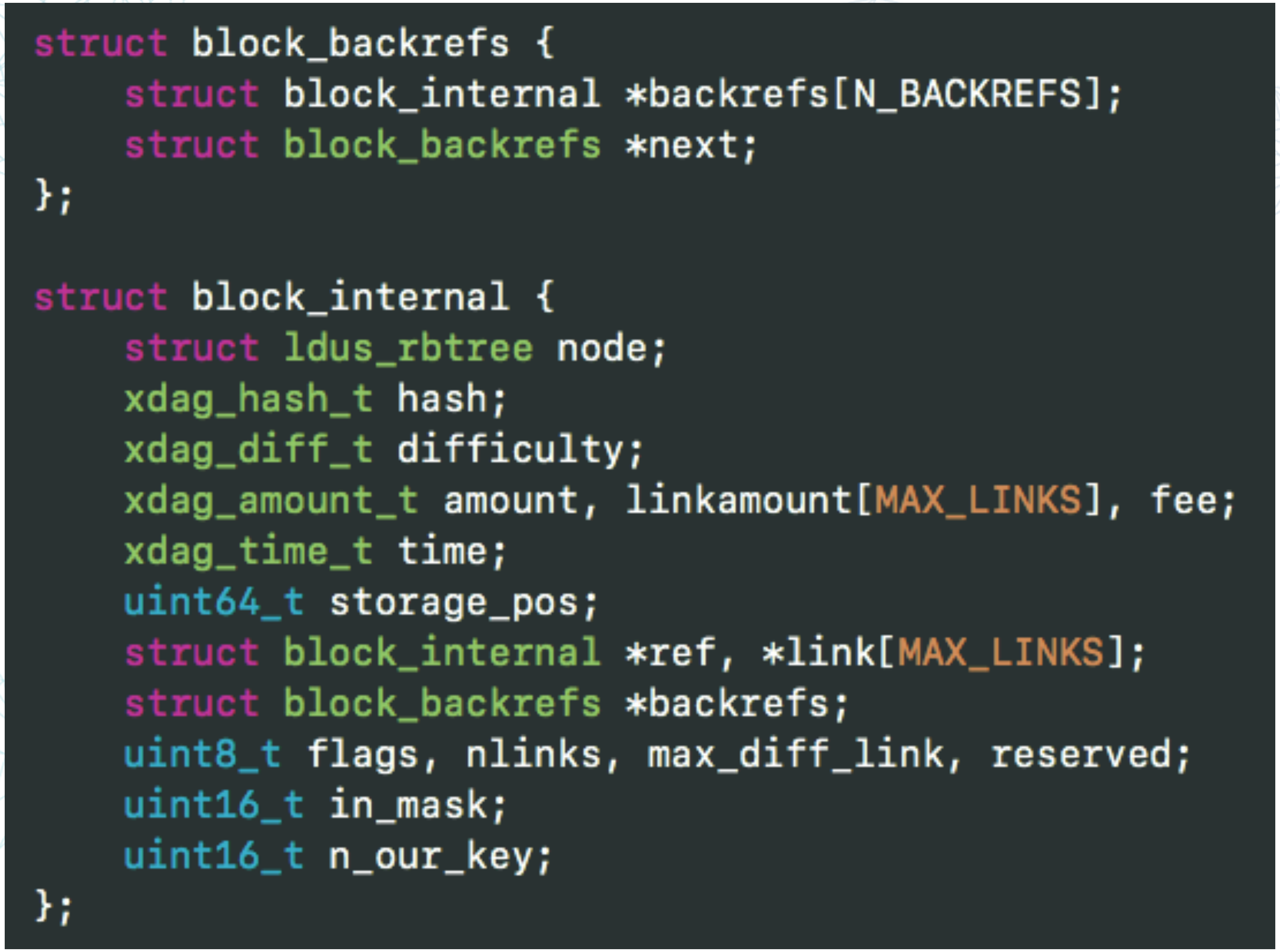
Block example

- 512 Bytes
- 1 header
- 15 fields
- Storage on disk
- max limit 10 transactions

8 Bytes	8 Bytes	8 Bytes	8 Bytes
transport header	type	time	amount
Output hash			amount
Output hash			amount
Input2 hash			amount
Input3 hash			amount
			amount
Output hash			amount
Output hash			amount
Output hash			amount
Public Key 1			
Output sign R 1			
Input sign S 1			
Public Key 2			
Input sign R 2			
Input sign S 2			

Internal Block

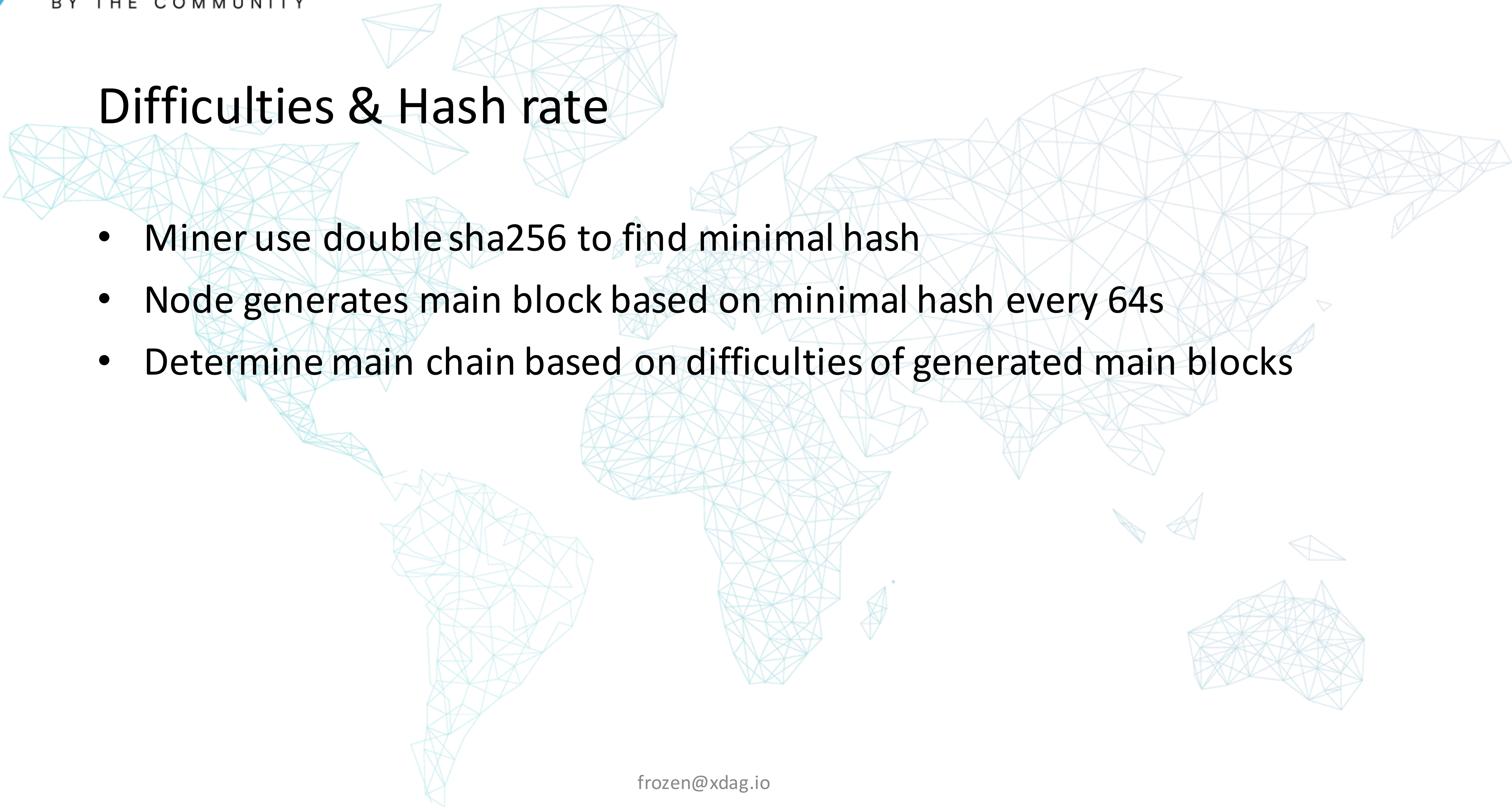
- Store DAG
- To construct account system



```
struct block_backrefs {
    struct block_internal *backrefs[N_BACKREFS];
    struct block_backrefs *next;
};

struct block_internal {
    struct ldus_rbtree node;
    xdag_hash_t hash;
    xdag_diff_t difficulty;
    xdag_amount_t amount, linkamount[MAX_LINKS], fee;
    xdag_time_t time;
    uint64_t storage_pos;
    struct block_internal *ref, *link[MAX_LINKS];
    struct block_backrefs *backrefs;
    uint8_t flags, nlinks, max_diff_link, reserved;
    uint16_t in_mask;
    uint16_t n_our_key;
};
```

Difficulties & Hash rate



- Miner use double sha256 to find minimal hash
- Node generates main block based on minimal hash every 64s
- Determine main chain based on difficulties of generated main blocks

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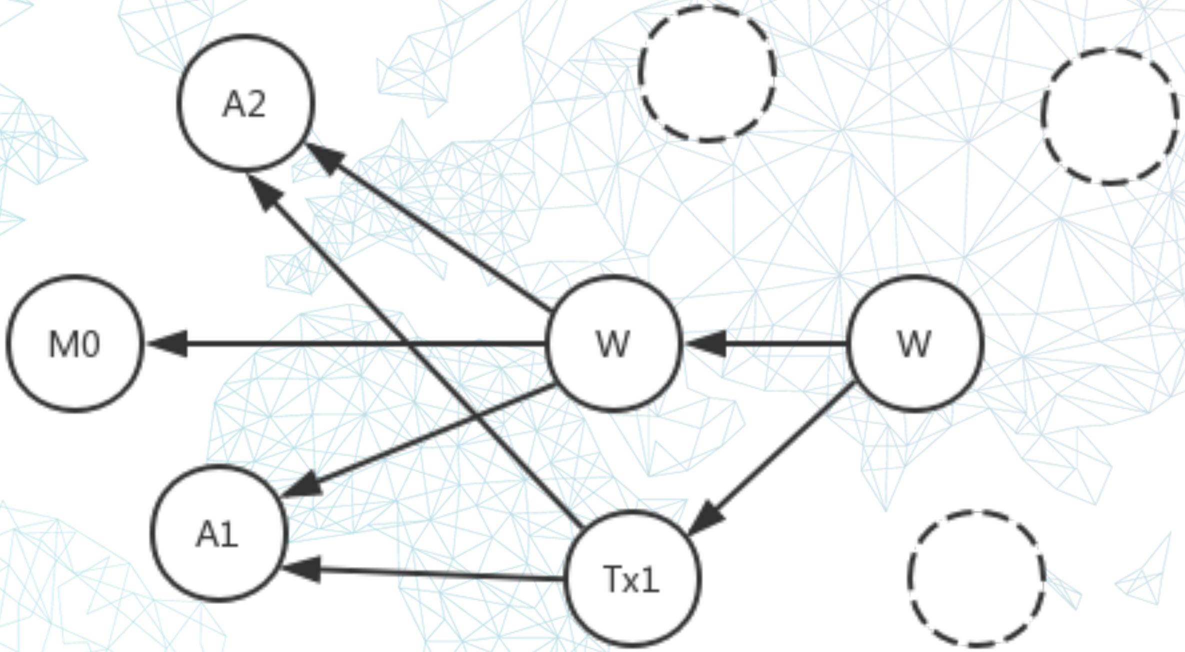
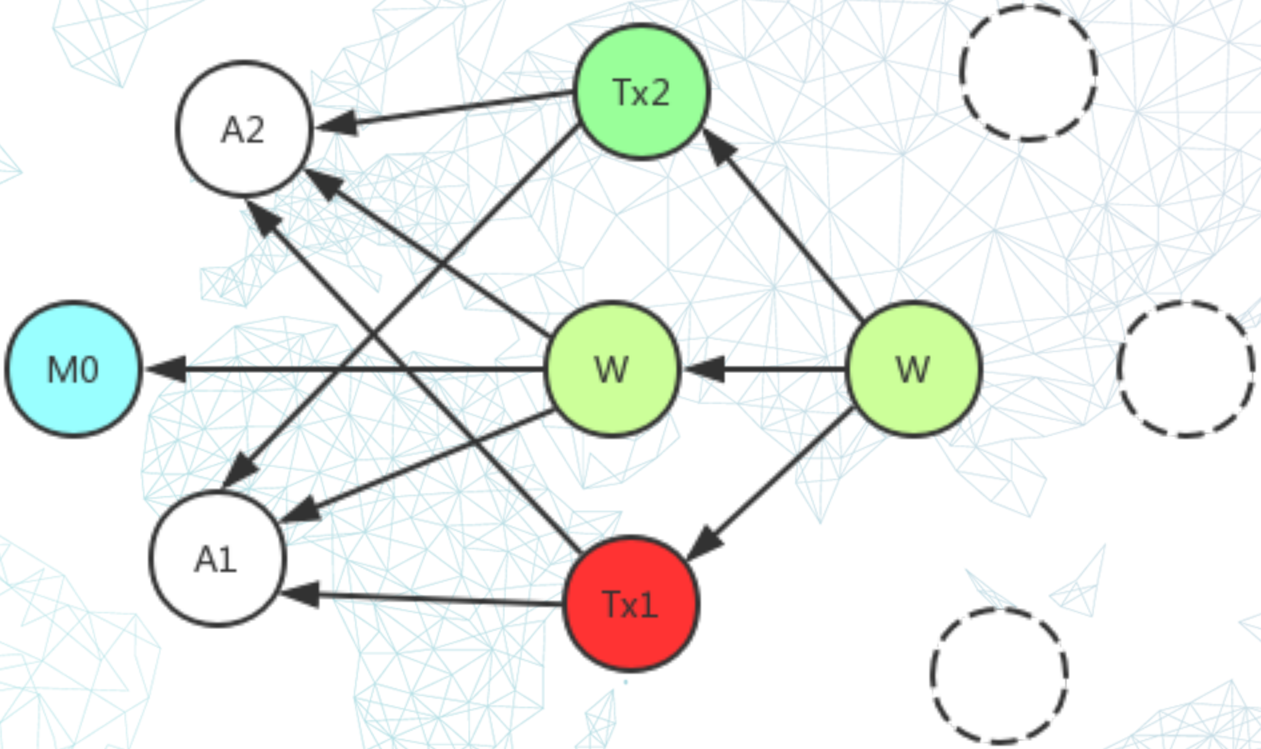
Simple Transaction case

- A1 A2 address
- M0 main block
- Tx1 transaction
- W witness block



Double spend 1

- double spend case on same node
- A1, A2 are wallet block
- Tx1, Tx2 are Txs from A1 to A2.
- Detected by ref orders directly.



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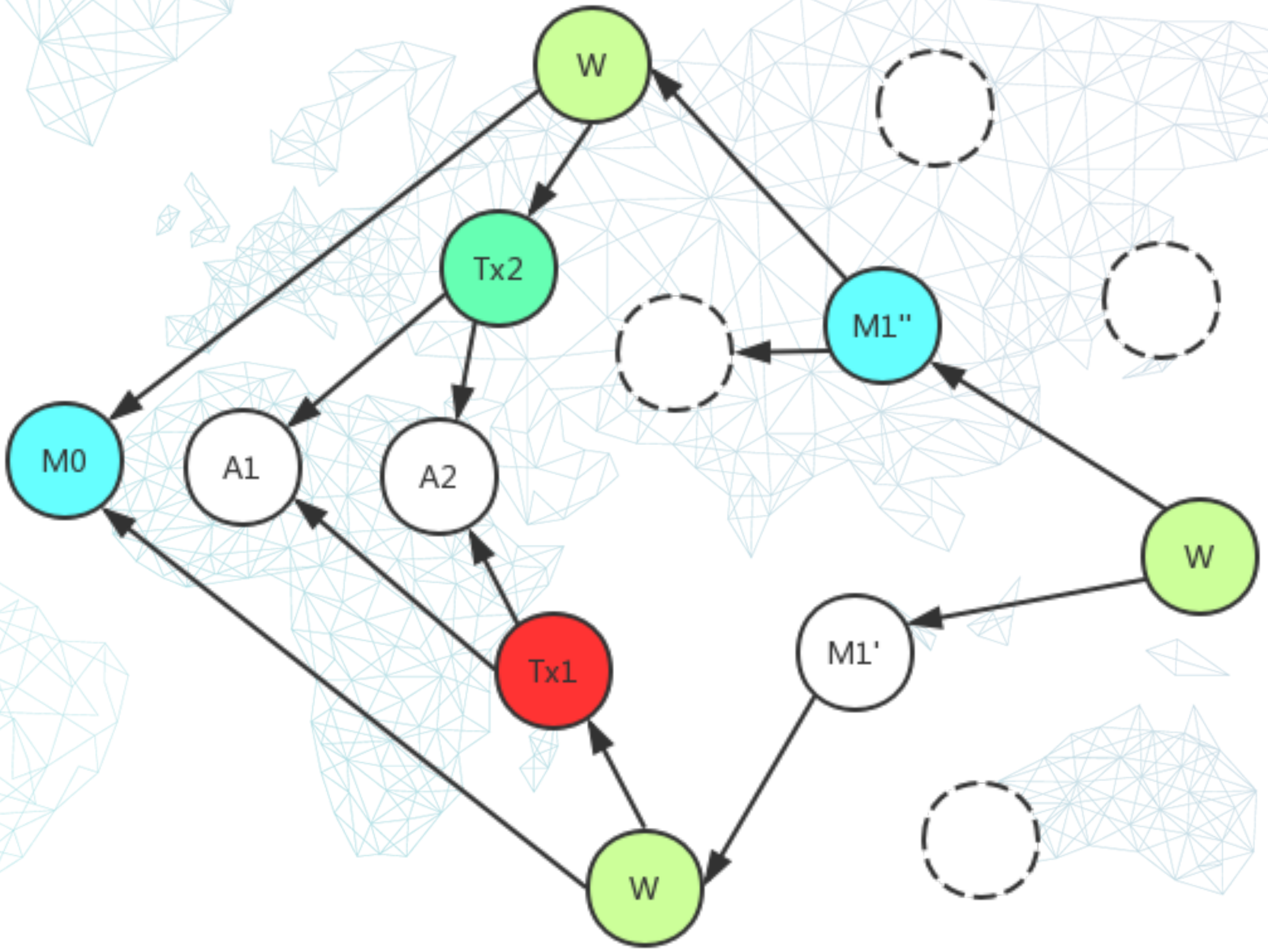
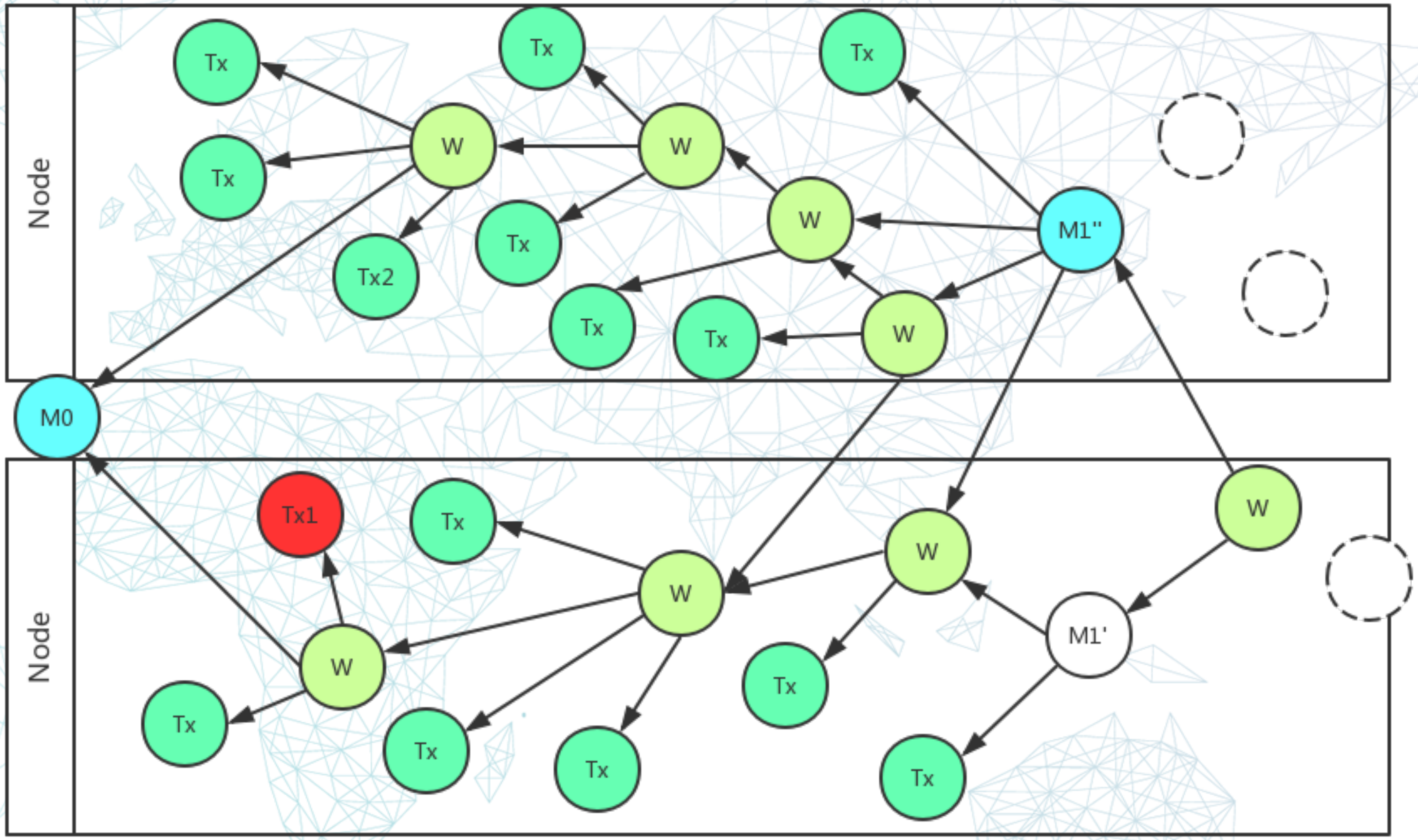
Double spend 1

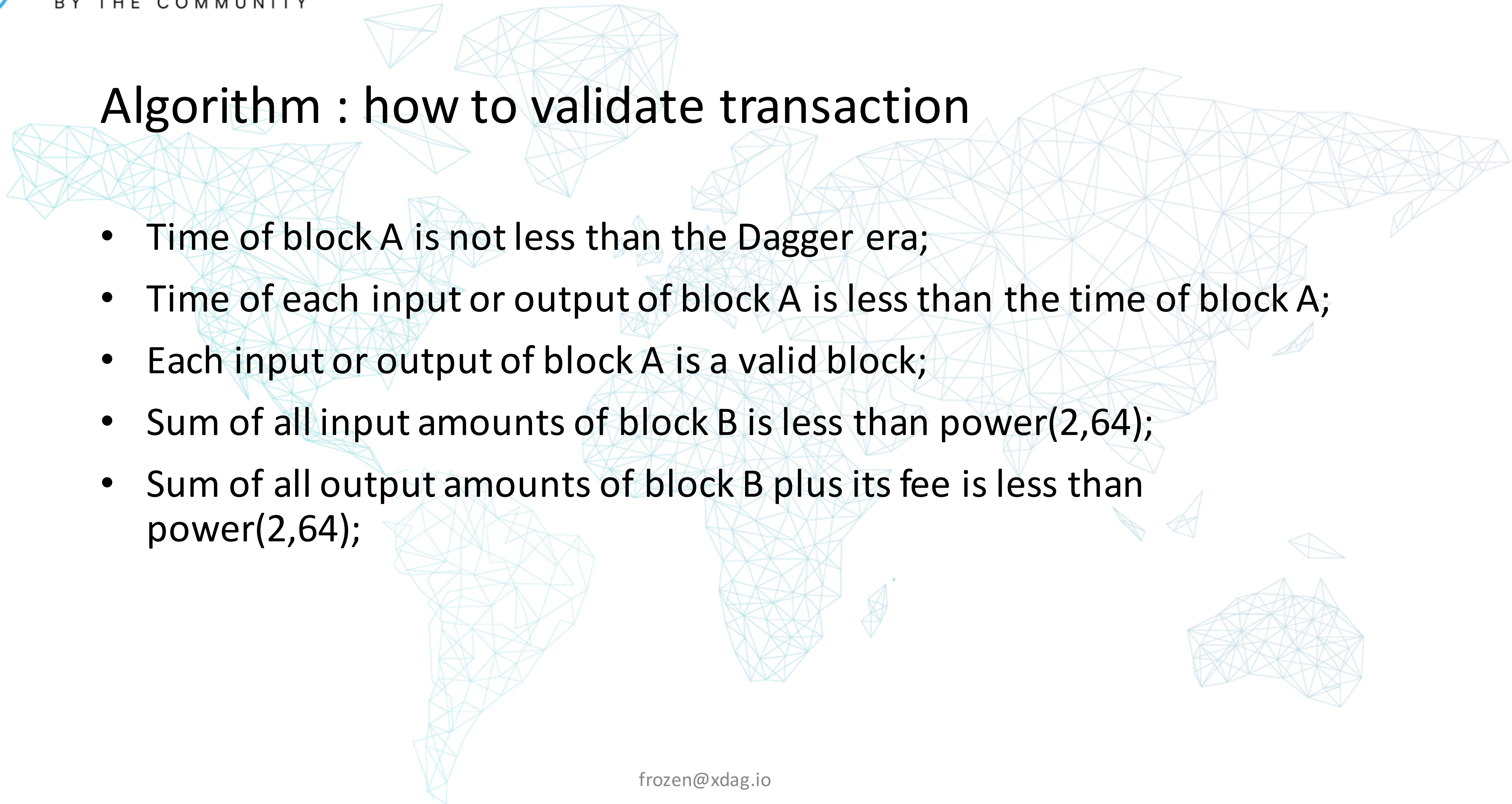
- double spend case on different nodes
- A1, A2 are wallet block
- Tx1, Tx2 are Txs from A1 to A2.
- Detected by ref orders and block difficulties.



High TPS

- each node process its transactions and construct self sub-DAG. Then merge them together through mined main blocks.





Algorithm : how to validate transaction

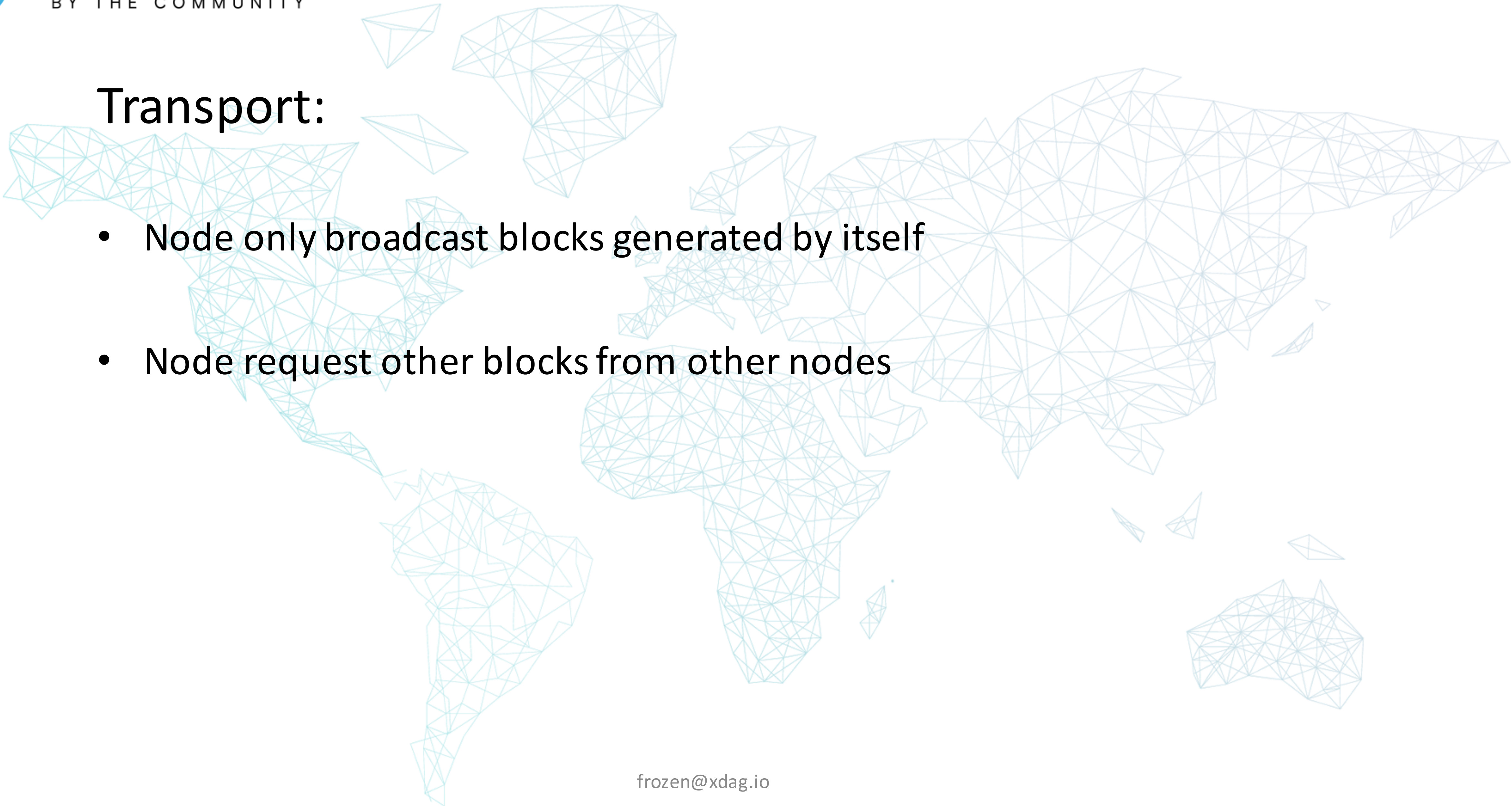
- Time of block A is not less than the Dagger era;
- Time of each input or output of block A is less than the time of block A;
- Each input or output of block A is a valid block;
- Sum of all input amounts of block B is less than power(2,64);
- Sum of all output amounts of block B plus its fee is less than power(2,64);

Algorithm : how to validate transaction

- If there is at least one input and sum of all inputs must be not less than sum of all outputs plus fee; otherwise sum of all outputs must be zero;
- For each input B of the block A there are public key K and input or output signature S in the block A and output signature T in the block B such that signature S is obtained from block A using key K and signature T is obtained from block B using the same key K (informal description: only owner of block B can withdraw money from it).
- Number of output signature fields must be even instead of number of input signature fields may be odd; in this case the last input signature field may be used as nonce which can be altered without rebuilding any signatures.

Algorithm : how to sort transactions

- Block referenced by a main block is ahead of block not referenced
- The smaller i-referenced block to the same common block is ahead
- The referenced block is ahead of linked block



Transport:

- Node only broadcast blocks generated by itself
- Node request other blocks from other nodes

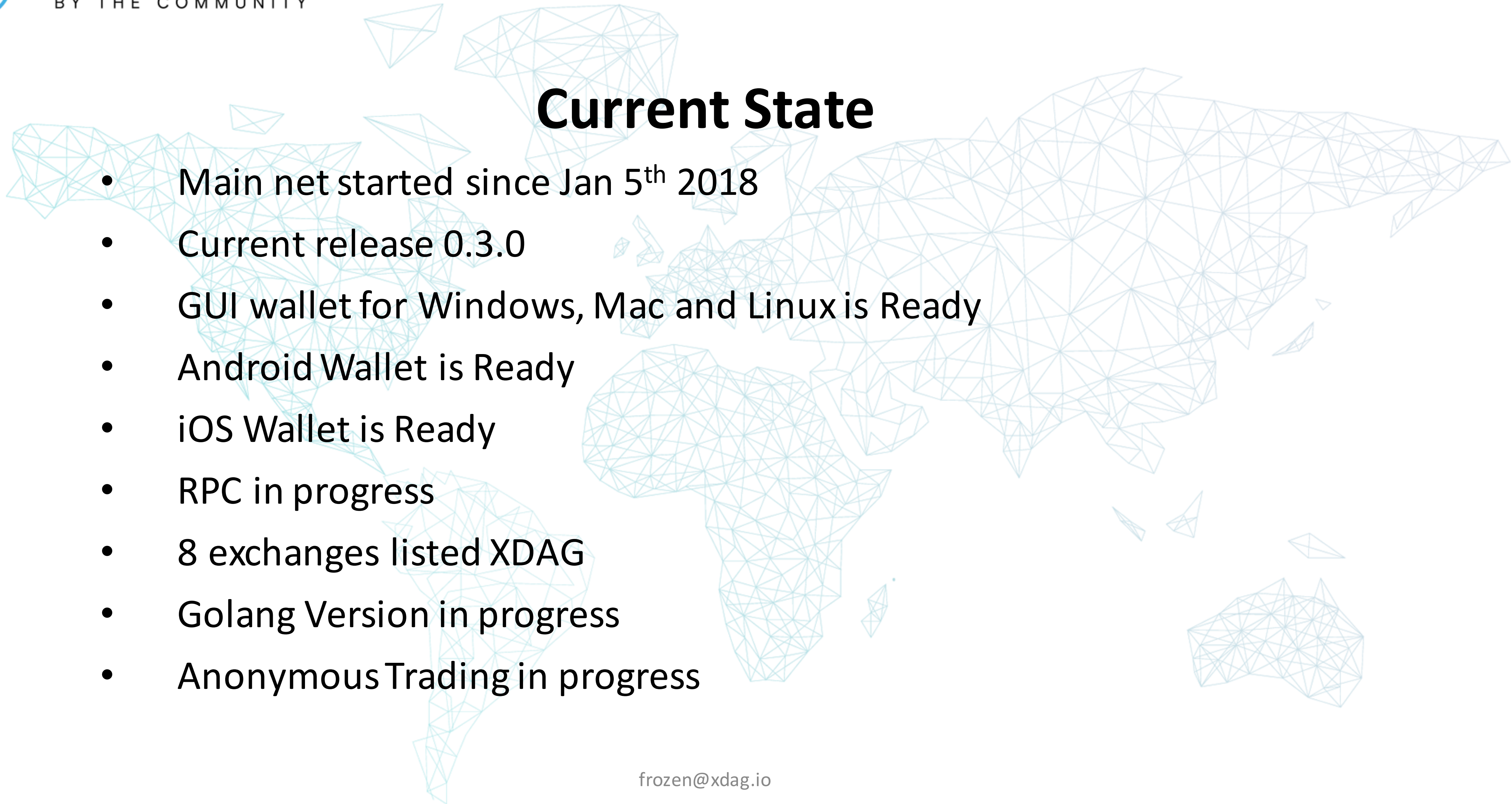
Security

- ECDSA secp256k1 for signing

- Semi-symmetric for transport

Community Driven

- No ICO, No Pre-mining, No investment, No capitals
- Community members are from different social channels
- Current developers are from different countries who never met each other



Current State

- Main net started since Jan 5th 2018
- Current release 0.3.0
- GUI wallet for Windows, Mac and Linux is Ready
- Android Wallet is Ready
- iOS Wallet is Ready
- RPC in progress
- 8 exchanges listed XDAG
- Golang Version in progress
- Anonymous Trading in progress

The Future

- **Hash algorithm adjustment** – Q1 2019
- **Anonymous Trading** – Q2 2019
- **Smart Contract** – Q3 2019

- Full Wallet – Q1 2019

How to Join & Help Community

Everyone related to XDAG is part of community

- Spread XDAG
- Discuss proposal
- Report issues
- Translation
- Contribute code

Thank you!

Thanks to all developers!

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Bill, Solar, ssyijiu, trueserve, Toneyisnow, czslience, kbs1

rubencm, Jimmy, mathsw, Wendy

Thanks to all Miners, Pool Owners, Community Members
and
other Contributors

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