BUNNYTN 7 2016

Monero vs Bitcoin

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16 November 2016, Trento

Summary of Presentation

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- Reasons and Reviews

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- Monero

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- Reasons and Reviews
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- Monero vs Bitcoin

Reasons and Reviews

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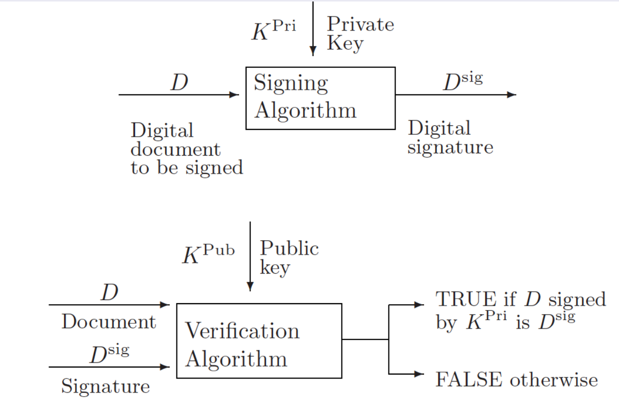

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$$\forall j = 1...m \quad \mathrm{I}_j = x_j H_P(P_\pi^j) \ \ with \ \ H_P(P) = Keccak(P)$$

Let $\mathfrak{m}$ be the message.

- **SIGN**: $\forall i = 1..n \quad i \neq \pi$ and $\forall j = 1..m$ select random scalars (in Z_q) s_i^j and a_j.

MLSAG

Let $\{P_i^j\}_{i=1...n}^{j=1...m}$ the group public keys.

- **KEYGEN**: Let π the secret index such that

$$\forall j = 1...m \quad x_j G = P_\pi^j \ (mod \ q)$$

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MLSAG

Compute:

MLSAG

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$$L_{\pi}^{j} = a_j G$$

MLSAG

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Monero

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Monero

MLSAG

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- **LNK**: If any of the I_j was already used, the signature is rejected.

Monero

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The probability that a PPT Algorithm $\mathcal{A}$ can create two verifying signatures σ and σ' signed with the vectors $\bar{y}$ and $\bar{y}'$ such that there exists the same public key y in both $\bar{y}$ and $\bar{y}'$ is **Negligible**

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The MLSAG protocol is Signer Ambiguous under the Decisional Diffie Hellman Assumption.

Monero

Monero

Commitments

Monero

Commitments

Let G be the Curve25519 Base Point

Monero

Commitments

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Monero

Commitments

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If i.e. there are 1 input and 2 outputs:

$$C_{in} = x_C G + aH$$

$$C_{out-1} = y_1 G + b_1 H$$

$$C_{out-2} = y_2 G + b_2 H$$

Monero

Commitments

with:

Monero

Commitments

with:

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Ring Confidential Transactions

Monero

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Ring Confidential Transactions

In practice C_i $i = 1...n$ are the input commitments.

Monero

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In practice C_i $i = 1...n$ are the input commitments. With the pairs (P_i, C_i) we create a Ring Signature of the form:

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$$\left\{ P_1 + C_1 - \sum_j C_{j,out}, ..., P_s + C_s - \sum_j C_{j,out}, ..., P_n + C_n - \sum_j C_{j,out} \right\}$$

Monero

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with private key $z + x'$ with $x'G = P_s$

Monero

Monero

Tag-Linkable Ring-CT with Multiple Inputs and OneTime Keys

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- Let $\left\{(P_\pi^1, C_\pi^1), \ldots, (P_\pi^m, C_\pi^m)\right\}$ be pairs of PubKeys/Commitments

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Monero

Tag-Linkable Ring-CT with Multiple Inputs and OneTime Keys

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be the Generalized Ring which we wish to sign.

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Monero

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Conclusions on RCT

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RCTs ensure hiding of amount,origins and destination.

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Conclusions on RCT

RCTs ensure hiding of amount,origins and destination. In additon coin generation is trustless and verifyable secure.

Monero vs Bitcoin

Monero vs Bitcoin

Monero and Bitcoin

Monero vs Bitcoin

Monero and Bitcoin

Bitcoin and Monero are just similar as they are different.

Monero vs Bitcoin

Monero and Bitcoin

Bitcoin and Monero are just similar as they are different.
Main differences:

Monero and Bitcoin

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Main differences:

-**Blocksize Limit**

Monero vs Bitcoin

Monero and Bitcoin

Bitcoin and Monero are just similar as they are different.

Main differences:

-**Blocksize Limit**

-**Transaction Time**

Monero vs Bitcoin

Monero and Bitcoin

Bitcoin and Monero are just similar as they are different.

Main differences:

-**Blocksize Limit**

-**Transaction Time**

-**Untraceability**

Monero vs Bitcoin

Monero and Bitcoin

Bitcoin and Monero are just similar as they are different.

Main differences:

-**Blocksize Limit**

-**Transaction Time**

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-**Safe Elliptic Curves**

Monero vs Bitcoin

Blocksize Limit

Monero vs Bitcoin

Blocksize Limit

Crypto	Monero	Bitcoin
Blocksize limit	None	1 MB

Monero vs Bitcoin

Blocksize Limit

Crypto	Monero	Bitcoin
Blocksize limit	None	1 MB

Bitcoin:

Monero vs Bitcoin

Blocksize Limit

Crypto	Monero	Bitcoin
Blocksize limit	None	1 MB

Bitcoin: has limit at 1MB.

Monero vs Bitcoin

Blocksize Limit

Crypto	Monero	Bitcoin
Blocksize limit	None	1 MB

Bitcoin: has limit at 1MB. Some people agree to remove the Limit, but it could overload the nodes.

Monero vs Bitcoin

Blocksize Limit

Crypto	Monero	Bitcoin
Blocksize limit	None	1 MB

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Monero:

Monero vs Bitcoin

Blocksize Limit

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Blocksize limit	None	1 MB

Bitcoin: has limit at 1MB. Some people agree to remove the Limit, but it could overload the nodes.
Monero: has **Scalability**,

Monero vs Bitcoin

Blocksize Limit

Crypto	Monero	Bitcoin
Blocksize limit	None	1 MB

Bitcoin: has limit at 1MB. Some people agree to remove the Limit, but it could overload the nodes.
Monero: has **Scalability**, it modify its size in scale with respect to memory requested.

Monero vs Bitcoin

Transaction Time

Monero vs Bitcoin

Transaction Time

Crypto	Monero	Bitcoin
Transaction time	1 minute	10 minutes

Monero vs Bitcoin

Transaction Time

Crypto	Monero	Bitcoin
Transaction time	1 minute	10 minutes

Bitcoin:

Monero vs Bitcoin

Transaction Time

Crypto	Monero	Bitcoin
Transaction time	1 minute	10 minutes

Bitcoin: about 10 min.;

Monero vs Bitcoin

Transaction Time

Crypto	Monero	Bitcoin
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Bitcoin: about 10 min.; Hash Algorithm is CPU-bound.

Monero vs Bitcoin

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Monero:

Monero vs Bitcoin

Transaction Time

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Monero: about 1 min;

Monero vs Bitcoin

Transaction Time

Crypto	Monero	Bitcoin
Transaction time	1 minute	10 minutes

Bitcoin: about 10 min.; Hash Algorithm is CPU-bound.
Monero: about 1 min; Hash Algorithm is Memory-bound.

Monero vs Bitcoin

Monero vs Bitcoin

Untraceability

Monero vs Bitcoin

Untraceability

Crypto	Monero	Bitcoin
Untraceable	Yes	No

Monero vs Bitcoin

Untraceability

Crypto	Monero	Bitcoin
Untraceable	Yes	No

Bitcoin:

Monero vs Bitcoin

Untraceability

Crypto	Monero	Bitcoin
Untraceable	Yes	No

Bitcoin: most trasparent currency,

Monero vs Bitcoin

Untraceability

Crypto	Monero	Bitcoin
Untraceable	Yes	No

Bitcoin: most trasparent currency, all transactions are public

Monero vs Bitcoin

Untraceability

Crypto	Monero	Bitcoin
Untraceable	Yes	No

Bitcoin: most trasparent currency, all transactions are public
Monero:

Monero vs Bitcoin

Untraceability

Crypto	Monero	Bitcoin
Untraceable	Yes	No

Bitcoin: most trasparent currency, all transactions are public
Monero: Untraceable thanks to Ring Confidential Transactions.

Monero vs Bitcoin

Untraceability

Crypto	Monero	Bitcoin
Untraceable	Yes	No

Bitcoin: most trasparent currency, all transactions are public
Monero: Untraceable thanks to Ring Confidential Transactions. It is optionally transparent.

Monero vs Bitcoin

Monero vs Bitcoin

Safe Elliptic Curves

Monero vs Bitcoin

Safe Elliptic Curves

Crypto	Monero	Bitcoin
Safe elliptic curve	Yes (Curve25519)	No (Secp256k1)

Monero vs Bitcoin

Safe Elliptic Curves

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Safe elliptic curve	Yes (Curve25519)	No (Secp256k1)

Bitcoin Curve:

Monero vs Bitcoin

Safe Elliptic Curves

Crypto	Monero	Bitcoin
Safe elliptic curve	Yes (Curve25519)	No (Secp256k1)

Bitcoin Curve: **Secp256k1**

Safe Elliptic Curves

Crypto	Monero	Bitcoin
Safe elliptic curve	Yes (Curve25519)	No (Secp256k1)

Bitcoin Curve: **Secp256k1** Unsafe

Monero vs Bitcoin

Safe Elliptic Curves

Crypto	Monero	Bitcoin
Safe elliptic curve	Yes (Curve25519)	No (Secp256k1)

Bitcoin Curve: **Secp256k1** Unsafe
Monero Curve:

Monero vs Bitcoin

Safe Elliptic Curves

Crypto	Monero	Bitcoin
Safe elliptic curve	Yes (Curve25519)	No (Secp256k1)

Bitcoin Curve: **Secp256k1** Unsafe
Monero Curve: **Curve25519**

Monero vs Bitcoin

Safe Elliptic Curves

Crypto	Monero	Bitcoin
Safe elliptic curve	Yes (Curve25519)	No (Secp256k1)

Bitcoin Curve: **Secp256k1** Unsafe
Monero Curve: **Curve25519** Safe

Monero vs Bitcoin

Safe Elliptic Curves

Crypto	Monero	Bitcoin
Safe elliptic curve	Yes (Curve25519)	No (Secp256k1)

Bitcoin Curve: **Secp256k1** Unsafe
Monero Curve: **Curve25519** Safe

Curve	Field	Equation	Base	ρ	Transfer	CM Discr.	Rigid.	Ladder	Twist	Complete	Indistin.	Safe?
Curve25519	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Secp256k1	✓	✓	✓	✓	✓	x	✓	x	✓	x	x	x

GRAZIE PER L'ATTENZIONE!!