Taler

Taxable Anonymous Libre Electronic Reserves

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Motivation

Modern economies need a currency.

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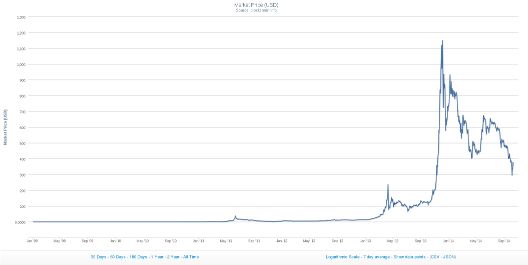
Modern economies need a currency online.

SWIFT?

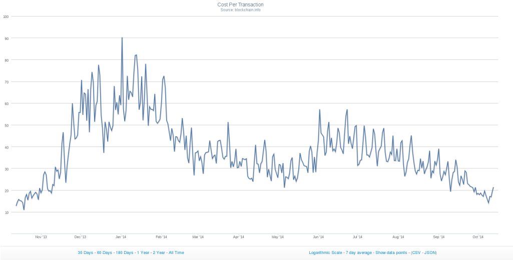
SWIFT/Mastercard/Visa are too transparent.

?



Market Price (USD)

Source: blockchain.info



Cost Per Transaction

Source: blockchain.info

?

- All BitCoin transactions are public
- BitCoin does not come with privacy guarantees

⇒ BitCoin was enhanced with “laundering” services

⇒ ZeroCoin and successors offer full anonymity

Is society ready for an anarchistic economy?

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Is society ready for an anarchistic economy?

Let’s make cash **digital** and **socially responsible**.

Taxable, Anonymous, Libre, Practical, Resource Friendly

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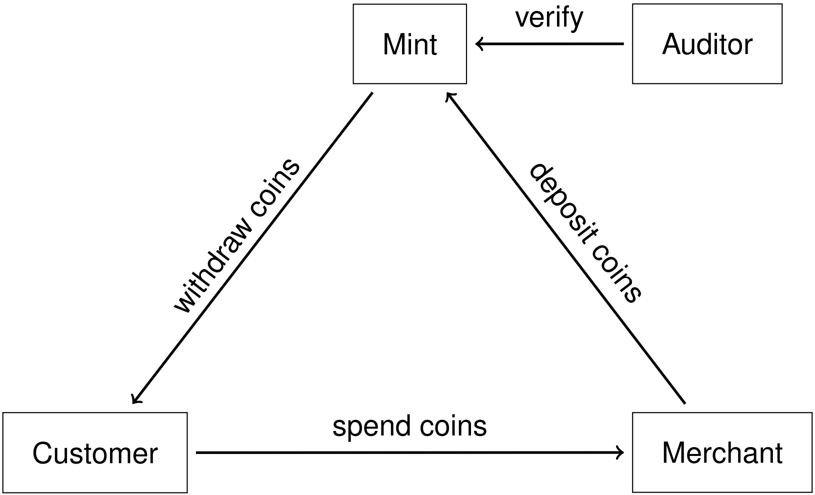
Architecture of Taler



Requirements

- Customer anonymity
- Unlinkability
- Taxability
- Verifiability
- Ease of deployment
- Green / low resource consumption
- Macropayments and microdonations

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- **Customer anonymity**
  It should not be possible to trace the spending behavior of a customer.
- Unlinkability
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Requirements

- Customer anonymity
- **Unlinkability**
  It should be infeasible to link a set of transactions (even aborted ones) to the same customer.
- Taxability
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Requirements

- Customer anonymity
- Unlinkability
- **Taxability**
  As it is the responsibility of the merchant to deduct taxes, he should be fully auditable and non-anonymous. Additionally it must not be possible to transfer cash illicitly (i.e. evading audit).
- Verifiability
- Ease of deployment
- Green / low resource consumption
- Macropayments and microdonations

Requirements

- Customer anonymity
- Unlinkability
- Taxability
- **Verifiability**
  The trust necessary between the participants of the system should be minimized.
  Signatures over contractual information should be available in order to resolve disputes.
- Ease of deployment
- Green / low resource consumption
- Macropayments and microdonations

Requirements

- Customer anonymity
- Unlinkability
- Taxability
- Verifiability
- **Ease of deployment**
  Low entry-barrier by providing a gateway to the existing financial system (i.e. Internet-banking protocols such as HBCI/FinTS), a free software reference implementation and a open protocol standard.
- Green / low resource consumption
- Macropayments and microdonations

Requirements

- Customer anonymity
- Unlinkability
- Taxability
- Verifiability
- Ease of deployment
- **Green / low resource consumption**
  Avoid reliance on expensive and especially ”wasteful” computations such as proof-of-work.
- Macropayments and microdonations

Requirements

- Customer anonymity
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- Verifiability
- Ease of deployment
- Green / low resource consumption
- **Macropayments and microdonations**
  The system should be able to provide a solution for macropayments ($\geq 10ct$) as well as microdonations ($< 10ct$).

Taler Strong Assumptions

- Existence of anonymous channel (i.e. Tor) “works”
- Curve25519 elliptic curve cryptography “works”
- Chaum-style Blind signatures using RSA “work”
- Hash Functions “work”

Except for Tor, none of these are even remotely broken.
Tor seems still safe within Tor’s adversary model.

The Coins

- Identified by public key
- Only owner knows private key
- Signature by mint determines denomination
- Mint signs blindly to provide anonymity
- Operations are authorized by signature of coin private key

The Mint

- Mints new coins in return for customer payments
- Pays merchants when provided with valid coin's signatures
- Holds list of all (partially) spent coins
- Earns money by collecting transaction fees
- Restricted trust necessary, correctness legally enforceable

Security model: financial security

- Customer is compromised (coins lost) — like loosing wallet
- Customer is malicious — no damage
- Merchant is compromised — limited damage
- Merchant is malicious — customer sues for merchandise
- Mint is compromised (key lost) — limited damage
- Packet loss/network loss — unproblematic
- Mint goes offline — no transactions possible (!)
- Storage failure — need good backups
- Mint is malicious — need escrow, audit!

State of the project

- Cryptography worked out
- Protocol specification
- Prototype mint
- Prototype wallet
- Prototype merchant portal

Licensing

- Protocol must be open standard
- Wallets must be free (GPL or LGPL)
- Merchant integration is with merchant, but reference implementations free (LGPL)
- Mint reference implementation will be free (AGPL)

Possible outcomes (optimistic)

- Replace Mastercard/Visa/Paypal online

  $\Rightarrow$ Cheaper transactions $\equiv$ 3% reduction in VAT
- Replace cash and credit cards (and, in France, cheques)

  $\Rightarrow$ Faster business transactions in stores
- Any Taler anyone receives is easily tracked

  $\Rightarrow$ Less corruption
- Banks & spies can no longer track your spending
- Privacy for citizens!
- Industrial espionage defense for business!

Thank you for your attention.

Questions?

Answers at
`https://taler.net/`
in November 2014!

Why should *governments* be interested?

Why not do *online* what they do *offline*?[1]

[1] Just better: you can anonymously receive cash, but not Taler.

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Modes of spending

- Complete Spending
  - Online Payment
  - Sign deposit permission for full coin
- Partial Spending
  - Online Payment
  - Sign deposit permission for a fraction
  - Repeat with remaining fraction of the coin (*)
- Incremental spending
  - Online payment
  - Lock coin at mint (*)
  - Sign incremental deposit permissions
  - Merchant redeems *last* deposit
- Probabilistic spending (bona fide)
  - Offline payment possible
  - Gambling for payment “upgrade”
  - Interaction with mint only when payment gets upgraded

Refreshing (*)

- Spending parts of same coin twice uses the same key
- Merchants could link transactions

  ⇒ Danger to privacy

Mint allows (anonymous) coin owner to *refresh* coin.

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  $\Rightarrow$ Danger to privacy

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