Blockstream

OBJ

Building the blockchain ecosystem

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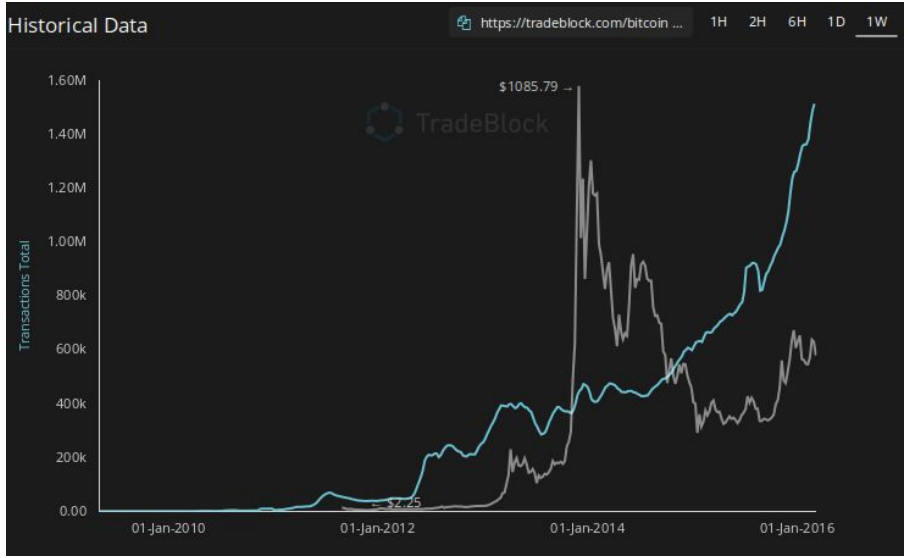
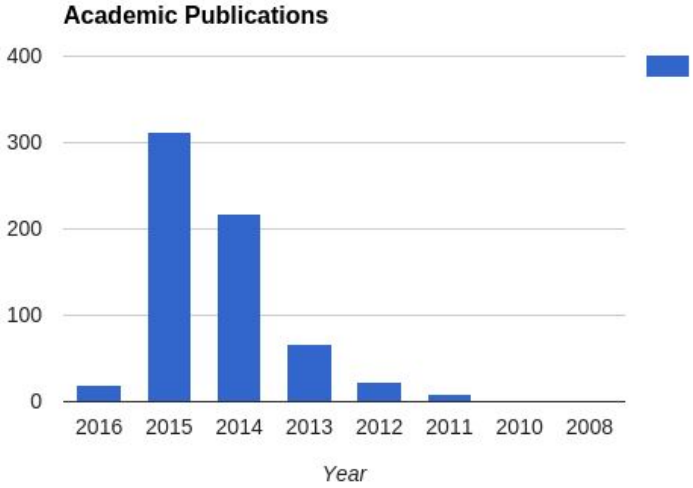
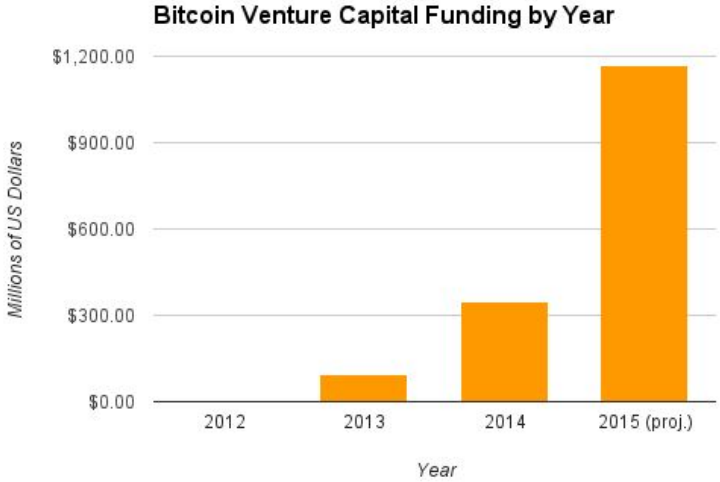
Bitcoin: A Peer-to-Peer Electronic Cash System

- Solves double spending problem without a trusted third party
- Blockchain: public database of transactions
- Secured by miners
- Controlled inflation via mining reward

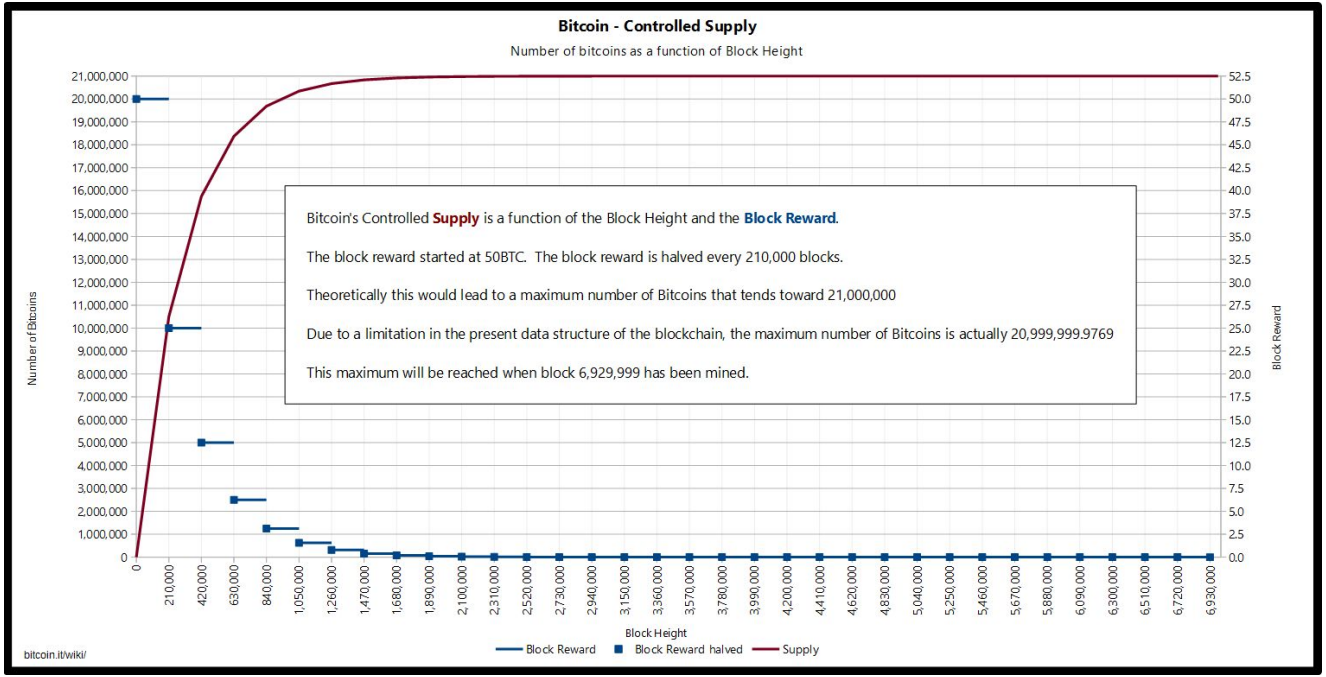

Historical Data
https://tradeblock.com/bitcoin ...
1H
2H
6H
1D
1W
TradeBlock
$1085.79
$7.45
Transactions Total
1.60M
1.40M
1.20M
1.00M
800k
600k
400k
200k
0.00
01-Jan-2010
01-Jan-2012
01-Jan-2014
01-Jan-2016


Academic Publications
400
300
200
100
0
2016
2015
2014
2013
2012
2011
2010
2008
Year


Bitcoin Venture Capital Funding by Year
Millions of US Dollars
$1,200.00
$900.00
$600.00
$300.00
$0.00
2012
2013
2014
2015 (proj.)
Year

Store of value

- properties of a currency: scarce, durable, transferable



A Payment System

INTERNET ARCHIVE WayBackMachine

http://satoshidice.com/ Go

138 captures
1 May 12 - 3 Feb 16

MAY JUL AUG
2011 12 2013
2012

SatoshiDice is the world's most popular Bitcoin betting game. Win up to 64,000x your bet, instantly. All rolls are verifiable using the blockchain.

How To Play

Step 1 Send BTC to an address below to place a bet (must be between the max and min).

Step 2 The Ghost of Satoshi will roll the dice and pick a Lucky Number!

Step 3 You win if Lucky Number is less than the number you chose.

You should see a new transaction back within seconds with your prize or .005x your bet if you lose. Note: payout addresses can be customized. Best Bitcoin game ever!

Need to buy Bitcoins? Use BitInstant.com

This site is a scam. Go to satoshidice.com

Like twitter FOLLOW US

Learn More

- How it Works
- Secret Keys and Numbers
- Advanced Tips & Tricks
- Progressive Games

WARNING: Only use wallets that allow you to receive Bitcoin from the same address you sent from. If you're not sure, test with .001 Bitcoins. If you get nothing back, then your wallet is not compatible.

Bets | Recent | Unconfirmed | Big Wins | Big Losses | Rare Wins

Also visit our partner

BitLotto

To enter the next BitLotto drawing, send any multiple of 0.25 BTC to (warning above applies):

- August 3 2012: 1JreG7hy49u7iqUkwsYvxNCEu8NFe7LsVY
- Current Jackpot:26.09 BTC

Lookup Tx

House edge temporarily raised to 3%

Simple Games

Name	Bet Address	Win Odds	Price Multiplier	House Percent	Expected Return	Min Bet	Max Bet
lessthan 1	1dice1e6pdhLzzWQq7yMidf6j8eAg7pkY	0.0015%	64000.000x	1.844%	98.156%	0.0010	0.0125
lessthan 2	1dice1Qf4Br5EYjj9rnHWqgMVYnQWehYG	0.0031%	31621.125x	3.000%	97.000%	0.0010	0.0253
lessthan 4	1dice2pxmRZrtqBVzixvWnxsMa7wN2GCK	0.0061%	15810.565x	3.000%	97.000%	0.0010	0.0506
lessthan 8	1dice2vQoUkQwDMbfDACM1xz6svEXdhYb	0.0122%	7905.285x	3.000%	97.000%	0.0010	0.1012
lessthan 16	1dice2WmRTLf1dEk4HH3Xs8LDuXzaHEQU	0.0244%	3952.645x	3.000%	97.000%	0.0010	0.2024

Permissionless Innovation

Welcome! | Silk Road

Silk Road
anonymous marketplace

Welcome [redacted]
messages(0) | orders(0) | account(฿0) | settings | log out

search | (0)

Shop by category:
Cannabis(178)
Ecstasy(26)
Psychedelics(63)
Opioids(29)
Stimulants(35)
Dissociatives(7)
Other(66)
Benzos(38)


1 hit of LSD (blotter)
฿1.39


1/8 oz high quality cannabis
฿4.04


1 g pure MDMA (white)
฿5.83

Step-by-step:
1. Get **anonymous money**
2. Buy something here
3. Enjoy it when it arrives!

- New feature: **escrow hedging**.
- Change your Mt. Gox **password**.

recent feedback:

seller	rating	feedback	
hybridmike(99)	5 of 5	Good vendor. Would use again.	item
acidfriedmybrain(100)	5 of 5	Three hits and one of my friends pissed his pants. I'm pretty sure it's good.	item
jjj17(99)	5 of 5	Fast delivery, a+	item
0000ff42(99)	5 of 5	Leave feedback here	item
undrdwg(98)	5 of 5	Got it, creative packaging :)	item
PuffBuddy(99)	5 of 5	Extremely quick shipping- ordered Thursday morn and received Saturday. Double sealed.	item
MrDdroMcGillacutty(100)	5 of 5	Excellent packaging. Fast shipping. Legit product. Great accommodating seller.	item
1stdegree(93)	5 of 5	Package never arrived but I don't think it was the seller's fault. 50% refund was offered. Would like to try this vendor again. I have a good reason to believe that the package was simply stolen by someone I'm living with (that have admitted to stealing other packages).	item
scooterfan	5 of 5		item
legionx	5 of 5	Leave feedback here	item

฿1 = $14.88

list an item | how does it work? | community forums | contact us

(don’t do that!)

A protocol layer

coinprism Wallet Explorer 0.00 BTC 3wwmfz

Issue Coins

Home Send coins Addresses & Colors Transactions Settings

Send coins
- Quick send
- Advanced send
- Refund

Colored coin management
- Issue colored coins
- Uncolor coins

Advanced
- Crowd sale
- Send dividends

Issue colored coins

You are about to create a transaction taking uncolored Bitcoins as input and creating colored coins as output.

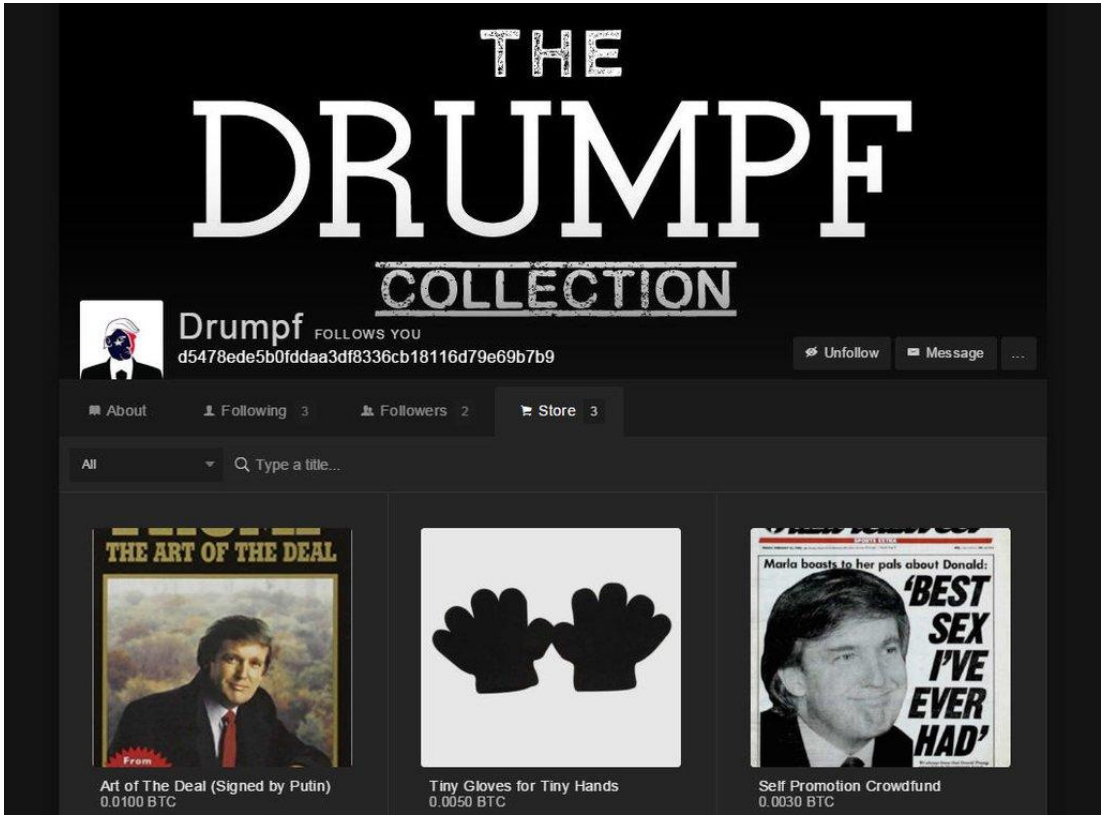
Colored coins can be uncolored at any time to recover their weight in Bitcoin.

This address has no Bitcoin available for coloring. Fund this address by transfering uncolored Bitcoins into it before you can issue colored coins.

From address	hacks	
To address	akMA9inh4hhW6JGPqBLFKFNep6Fj4GsU4pV	hacks
Amount	100	hax
Fees	0.0001	BTC

This asset is indivisible

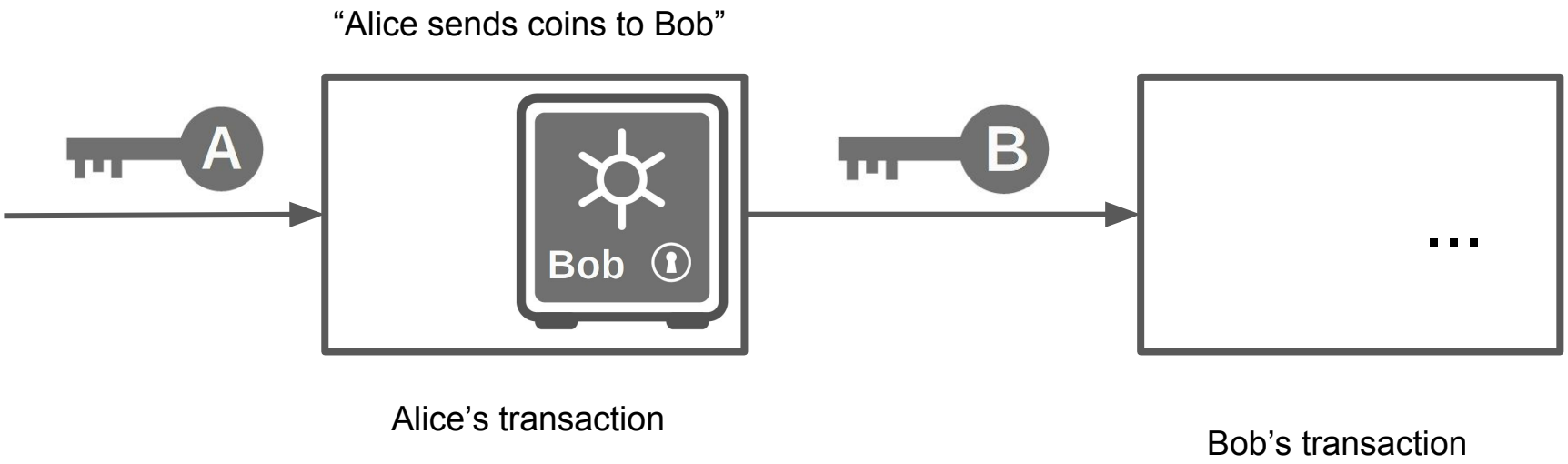
A Smart Contract Platform



Cryptography Basics

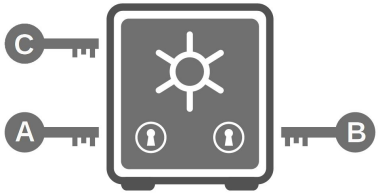
- cryptographic hash functions
  - hash: `{0,1}* -> {0,1}^n`
  - collision resistant
- public key cryptography
  - keypair: secret key `sk` and public key `pk`
  - cryptographic signature over message m
    - `sign(message, sk) -> sig`
    - `verify(message, pk, sig) -> {0, 1}`

Transactions



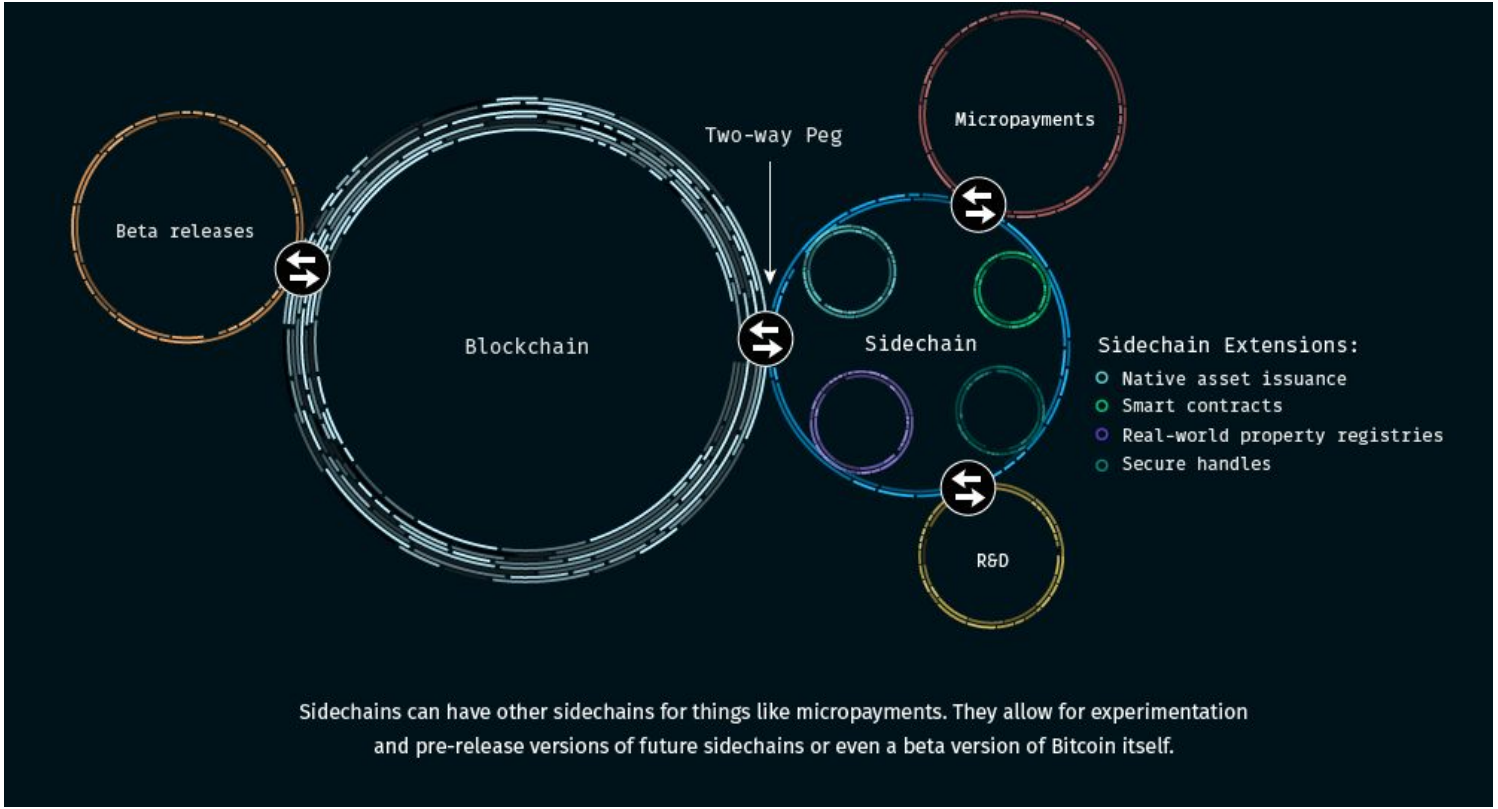
Smart Contract platform

- Transactions contain Bitcoin Script
  - Key: `<Signature>`
  - Tresor: `<Public Key> OP_CHECKSIGVERIFY`
- multisig



  - multisig wallets
  - escrow
- sidechains

Interoperable Blockchains



Sidechains

- Use case: Create blockchain with new features
- Altcoins not ideal
  - Network effect
  - Security
- Pegged Sidechains
  - transfer Bitcoins to sidechain and back without trusted third party
  - no separate token, uses Bitcoin mining power
  - federated peg
  - Elements Alpha

Project Inspiration: Build your own blockchain

- Features
  - opcodes for specific protocols, covenants
  - Turing Complete Script Language

(WARNING: insecure and stupid)

```
case OP_ADD:
case OP_SUB:
case OP_BOOLAND:
case OP_BOOLOR:
{
    ...
}

case OP_PYTHON:
{
    if (stack.size() < 1)
        return set_error(serror, SCRIPT_ERR_INVALID_STACK_OPERATION);
    valtype& code = stacktop(-1);
    popstack(stack);
    valtype output = eval(sprintf("python -c %s", code));
    stack.push_back(output);
}
```

src/script/interpreter.cpp

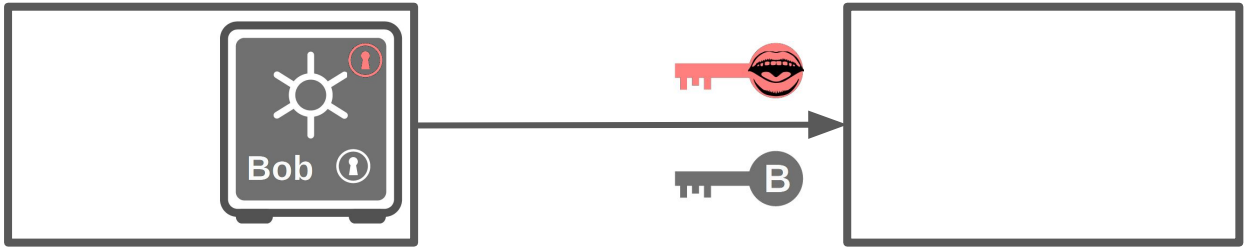
Project Inspiration: Atomic Cross Chain Swap (ACCS)

- Problem: transfer between chains is either centralized or slow
  - implement ACCS protocol to allow trustless transfer between blockchains
  - decentralized exchange
- Coordination layer: “Alice wants exchange Bitcoins on a sidechain with Bob’s zcash coins”

Atomic Cross Chain Swap

sidechain

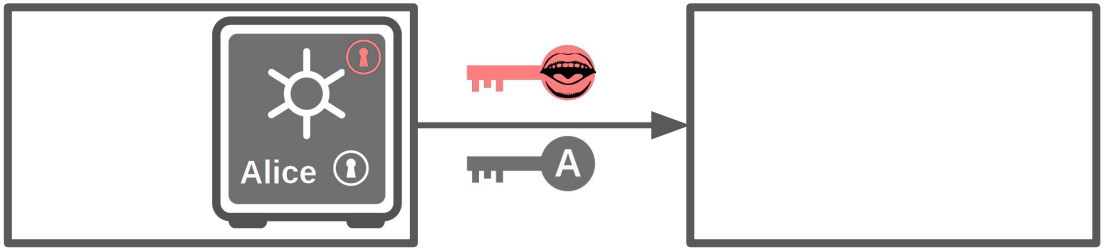
Alice hashes secret:



Alice's transaction

Bob's transaction

zcash chain



Bob's transaction

Alice's transaction

Project Inspiration: Leverage Elements Alpha features

- CT coinjoin
  - coinjoin is mechanism to merge transactions of multiple users into a single one to improve privacy
  - Elements Alpha has Confidential Transactions (CT) which means that transaction values are encrypted
  - CT makes coinjoin much more practical
- Sidechain-aware blockchain analytics
  - visualize peg-specific smart contracts
  - represent chain specific features (Confidential transactions, …)

Resources

- Bitcoin Developer Documentation (RPC API etc.)
  - https://bitcoin.org/en/developer-documentation
- Elements Alpha
  - https://github.com/ElementsProject/elements
  - https://elementsproject.org/
  - Guide http://blog.cryptoiq.ca/?p=395
  - Create new sidechain https://github.com/bitcoin-s/elements#building-a-new-sidechain-with-elements

Resources

- Covenants
  - http://hackingdistributed.com/2016/02/26/how-to-implement-secure-bitcoin-vaults/
- ACCS
  - https://en.bitcoin.it/wiki/Atomic_cross-chain_trading
  - https://bitcointalk.org/index.php?topic=946174.0
- Coinjoin
  - https://bitcointalk.org/index.php?topic=279249.0
  - https://github.com/JoinMarket-Org/joinmarket
- existing block explorers
  - blockchain.info, insight.bitpay.com, tradeblock.com/bitcoin, kaiko.com, blockbin.com, blockseer.com

Contact

- #sidechain-dev irc channel (user nickler)
- slack (user jnick)