Investigations & cryptoactifs

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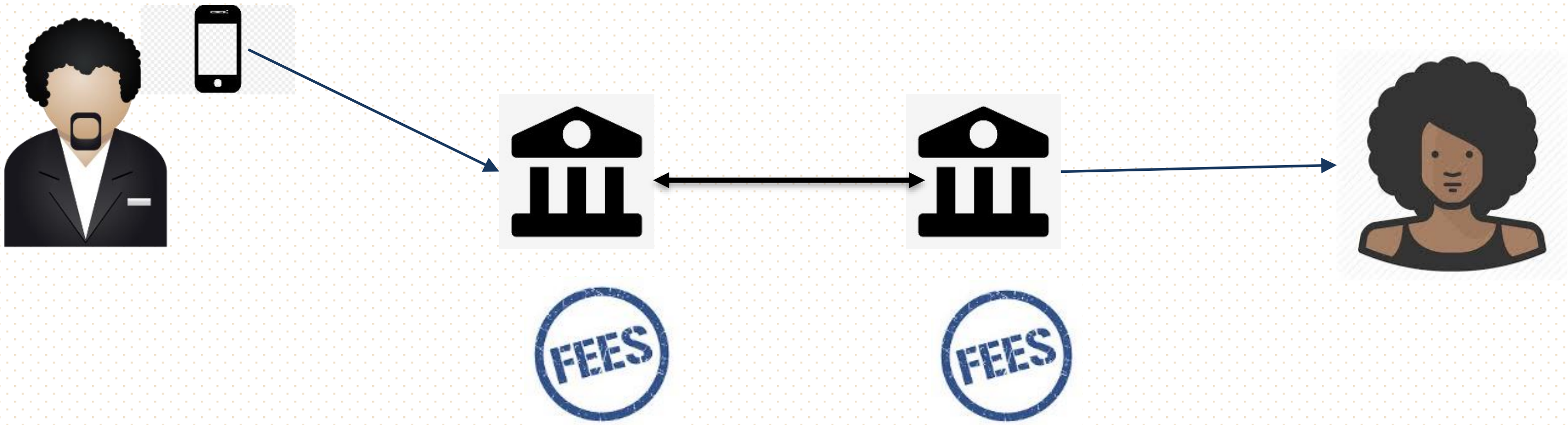
1. Rappels / Questions
2. L’enquête crypto, kezako ?
3. Les outils d’exploration
4. Cas pratique
5. Techniques d’obfuscation

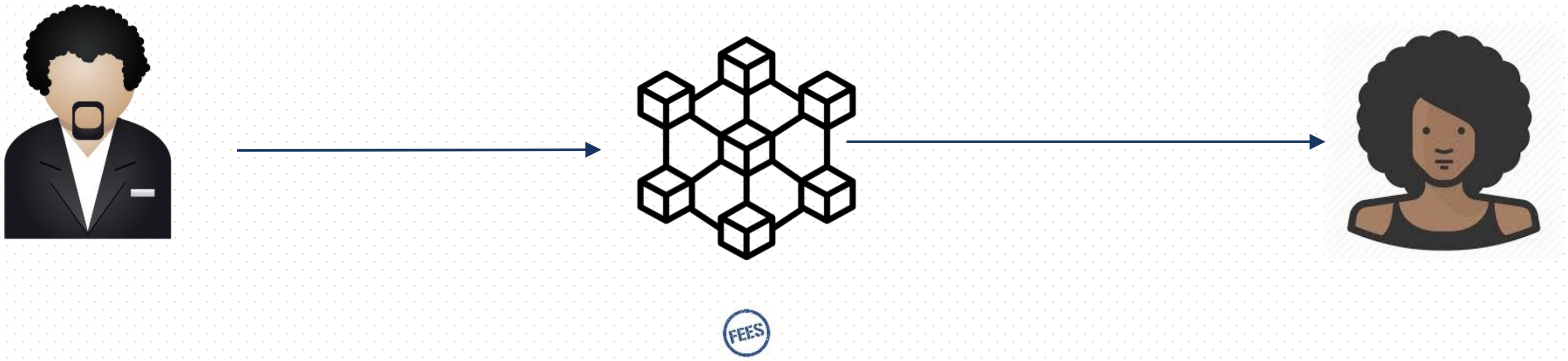
1. Quelques rappels

- Transactions, addresses, hash & co
- Blockchain
- Pseudonymat Vs Anonymat

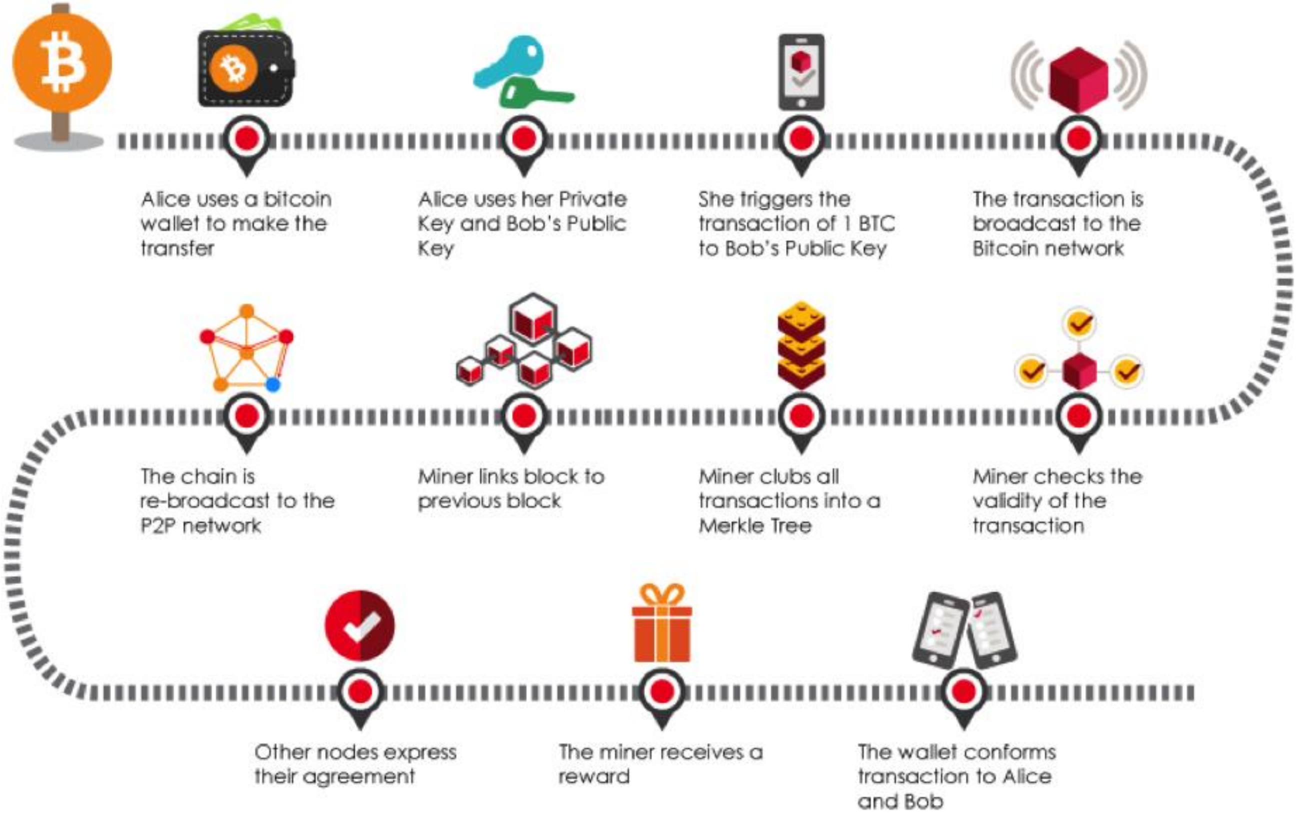
Les transactions



Les transactions

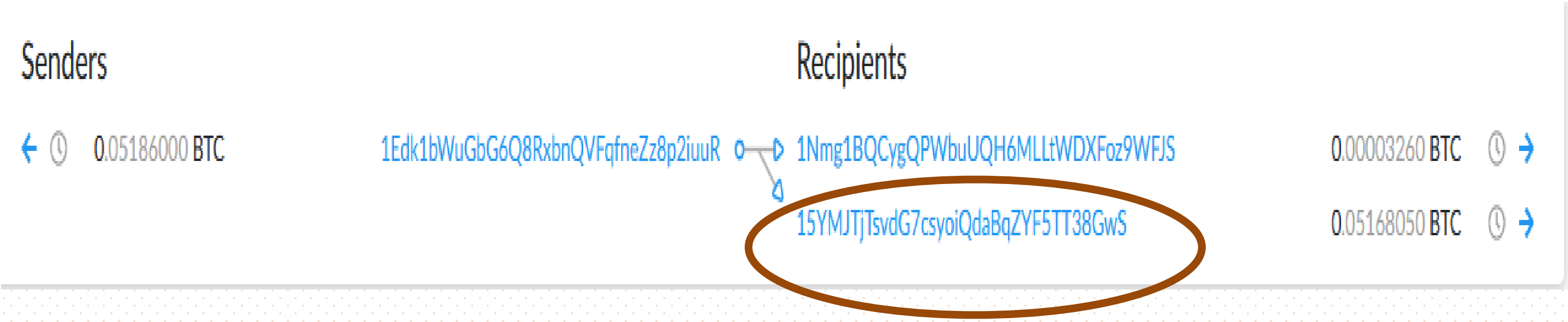


Les transactions



Alice uses a bitcoin wallet to make the transfer
Alice uses her Private Key and Bob's Public Key
She triggers the transaction of 1 BTC to Bob's Public Key
The transaction is broadcast to the Bitcoin network
The chain is re-broadcast to the P2P network
Miner links block to previous block
Miner clubs all transactions into a Merkle Tree
Miner checks the validity of the transaction
Other nodes express their agreement
The miner receives a reward
The wallet conforms transaction to Alice and Bob

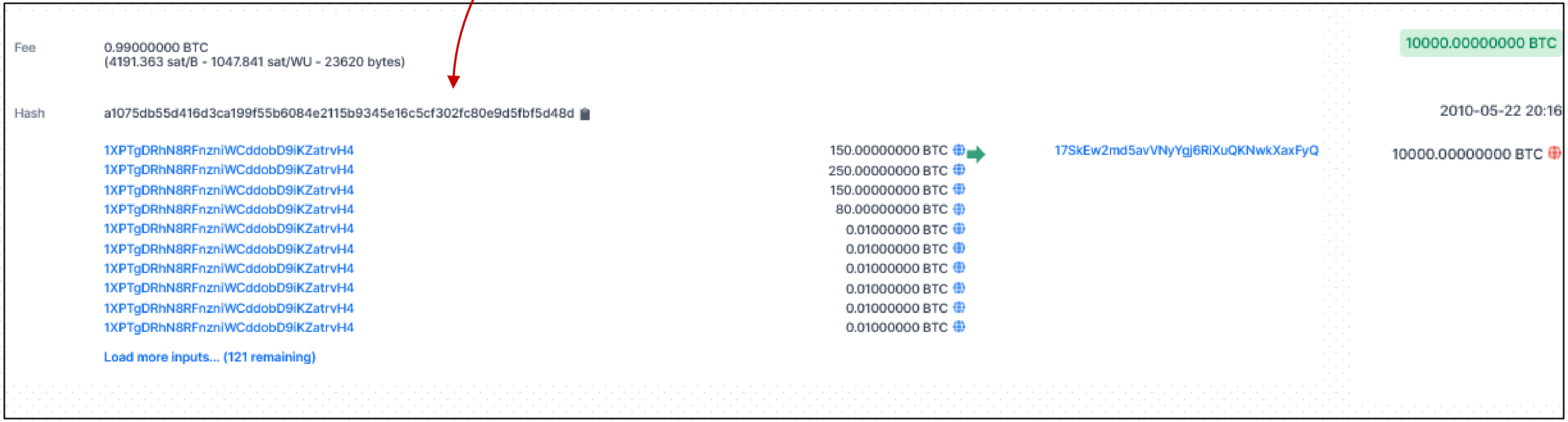
Les transactions



Senders		Recipients	
0.05186000 BTC	1Edk1bWuGbG6Q8RxbnQVFqfneZz8p2iuuR	1Nmg1BQCygQPWbuUQH6MLLtWDXFoz9WFJS	0.00003260 BTC
		15YMJTjTsvdG7csyoiQdaBqZYF5TT38GwS	0.05168050 BTC

Les transactions

Hash = a1075db55d416d3ca199f55b6084e2115b9345e16c5cf302fc80e9d5fbf5d48d



Fee 0.99000000 BTC
(4191.363 sat/B - 1047.841 sat/WU - 23620 bytes)

10000.00000000 BTC

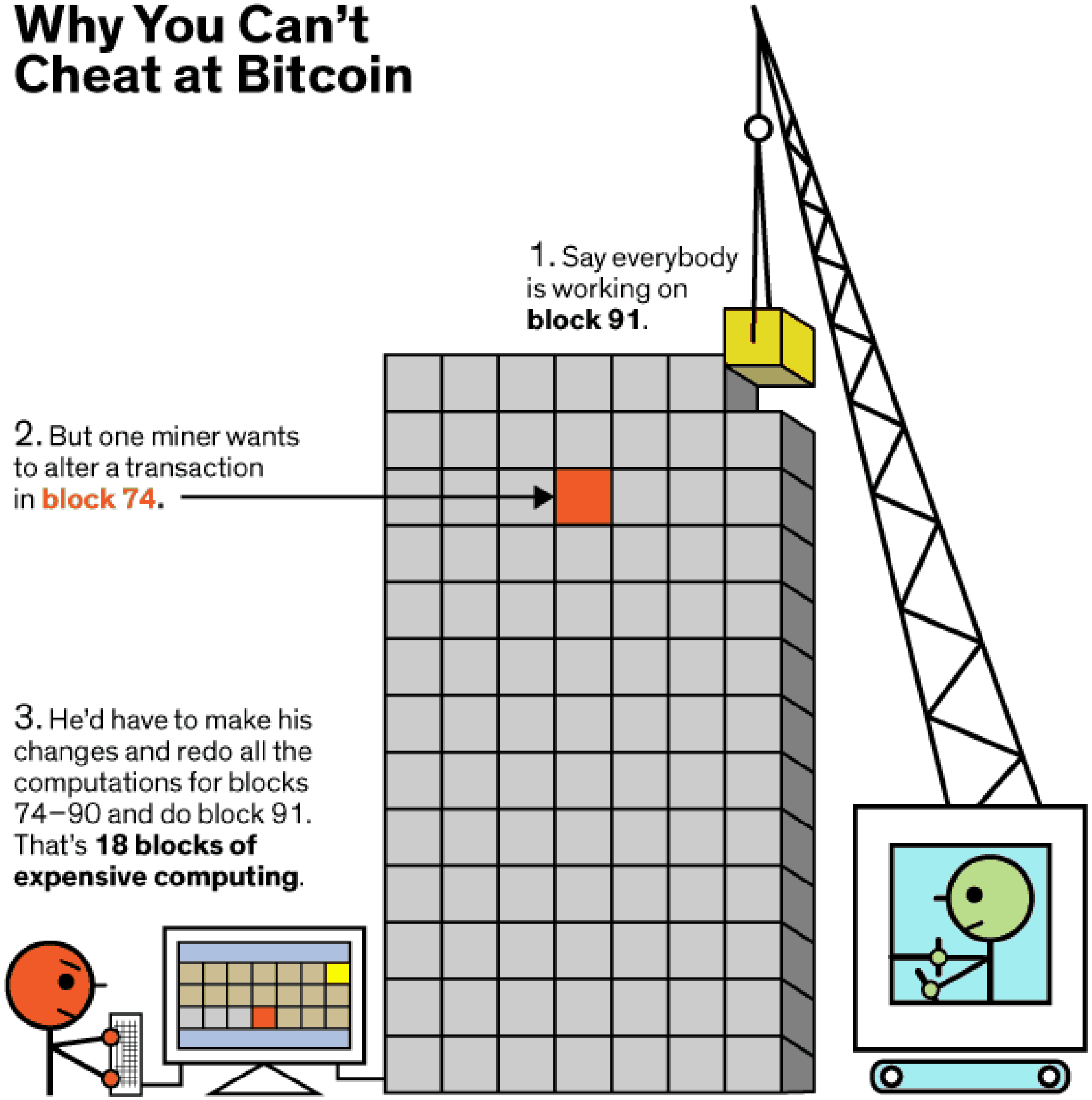
Hash a1075db55d416d3ca199f55b6084e2115b9345e16c5cf302fc80e9d5fbf5d48d

2010-05-22 20:16

1XPTgDRhN8RFnzniWCddobD9iKZatrvH4	150.00000000 BTC	17SkEw2md5avVNyYgj6RiXuQKNwkXaxFyQ	10000.00000000 BTC
1XPTgDRhN8RFnzniWCddobD9iKZatrvH4	250.00000000 BTC		
1XPTgDRhN8RFnzniWCddobD9iKZatrvH4	150.00000000 BTC		
1XPTgDRhN8RFnzniWCddobD9iKZatrvH4	80.00000000 BTC		
1XPTgDRhN8RFnzniWCddobD9iKZatrvH4	0.01000000 BTC		
1XPTgDRhN8RFnzniWCddobD9iKZatrvH4	0.01000000 BTC		
1XPTgDRhN8RFnzniWCddobD9iKZatrvH4	0.01000000 BTC		
1XPTgDRhN8RFnzniWCddobD9iKZatrvH4	0.01000000 BTC		
1XPTgDRhN8RFnzniWCddobD9iKZatrvH4	0.01000000 BTC		
1XPTgDRhN8RFnzniWCddobD9iKZatrvH4	0.01000000 BTC		

Load more inputs... (121 remaining)

Why You Can't Cheat at Bitcoin



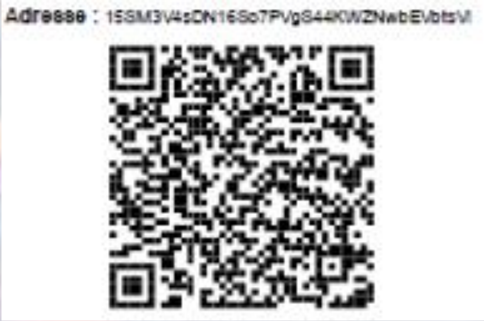
1. Say everybody is working on **block 91**.

2. But one miner wants to alter a transaction in **block 74.**

3. He'd have to make his changes and redo all the computations for blocks 74–90 and do block 91. That's **18 blocks of expensive computing**.

4. What's worse, he'd have to do it all **before** everybody else in the Bitcoin network finished **just the one block (number 91)** that they're working on.

2. Qu'est ce qu'une enquête crypto ?

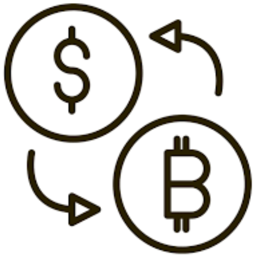

Adresse : 15SM3V4sDN16So7PVgS44KWZNwbEVbtsV

OBJECTIF FINAL =

chercher à identifier qui se trouve derrière une adresse, un portefeuille

COMMENT ?

En suivant les flux, version crypto



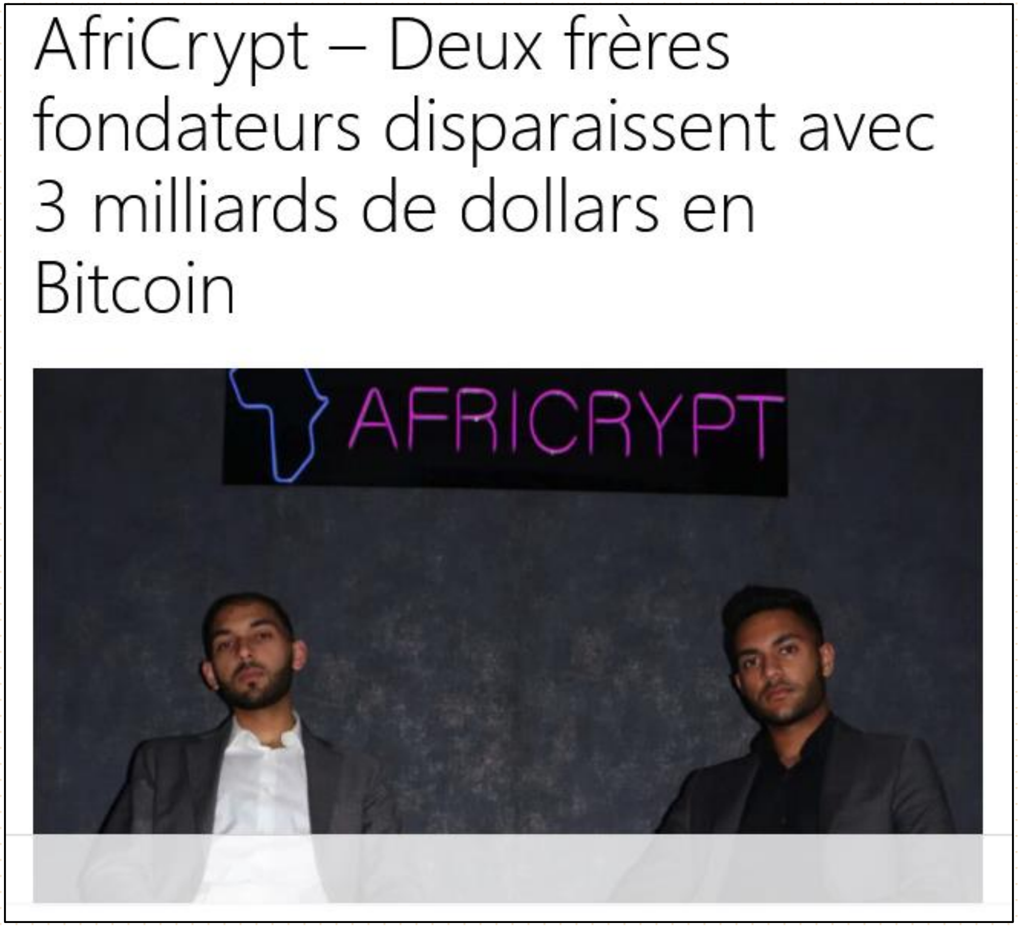
Exchange

les plateformes d’échanges (exchanges)

- Equivalent à un comptoir de change
- Le moyen le plus simple d’acquérir, échanger et vendre des cryptoactifs
- Une structure centralisée dans un environnement décentralisé
- Détient les clés privées (‘*custodial*’)
- Des milliers d’acteurs, avec des règles de KYC très variables
- Des entreprises ‘nomades’

les plateformes d'échanges (exchanges)

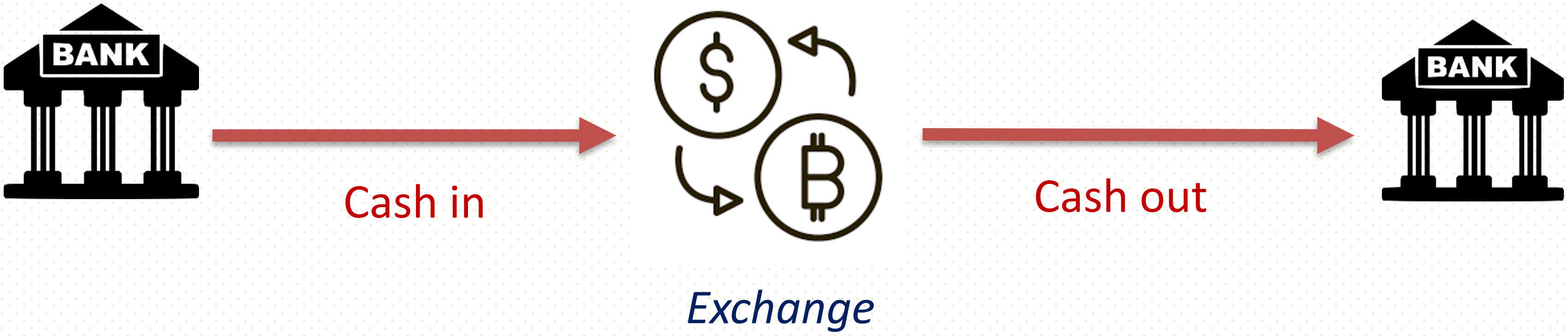
les plateformes d’échanges (exchanges)



AfriCrypt – Deux frères fondateurs disparaissent avec 3 milliards de dollars en Bitcoin

COMMENT ?

En suivant les flux, version crypto



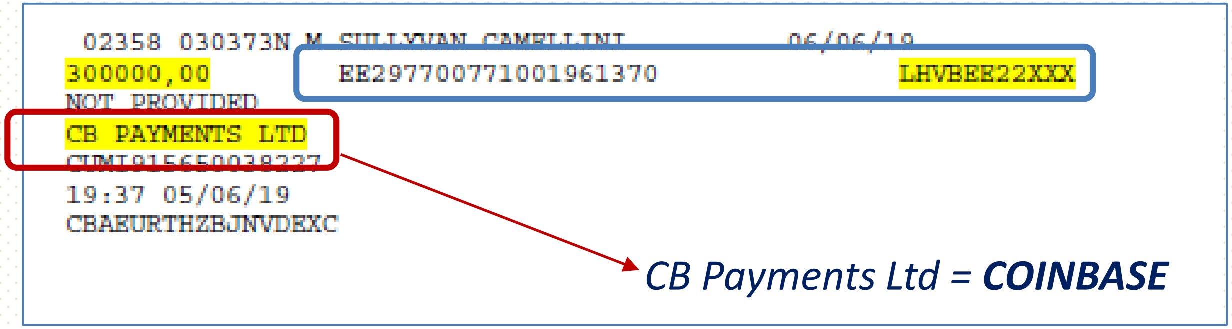
Cash in

Exchange

Cash out

Informations disponibles via le secteur financier 'classique'

- Identification de flux fiat -> crypto / crypto -> fiat



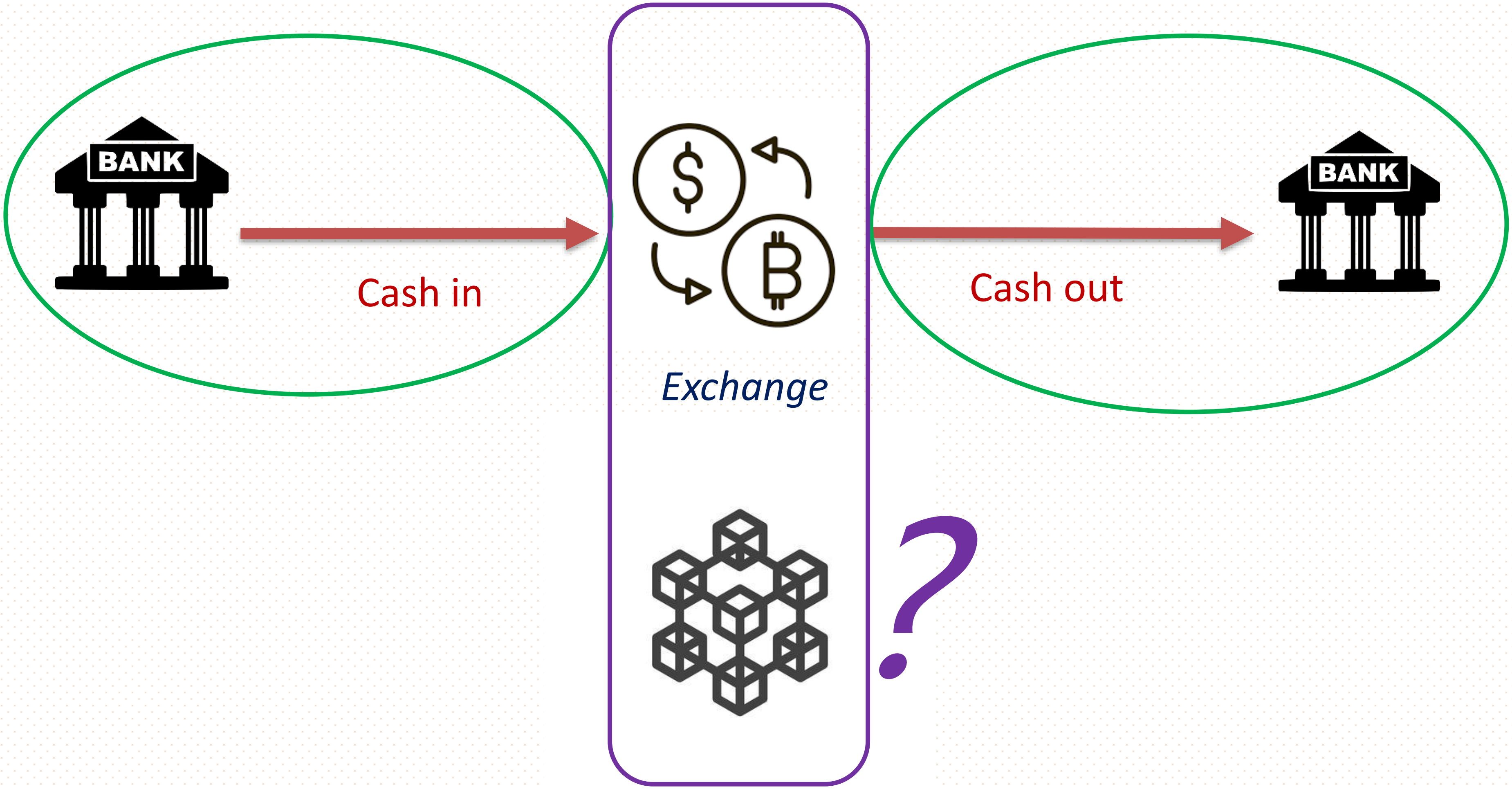
```
 02358 030373N M SULLYVAN CAMELLINI            06/06/19
300000,00        EE297700771001961370             LHVBEE22XXX
NOT PROVIDED
CB PAYMENTS LTD
CUMI91565003822 7
19:37 05/06/19
CBAEURTHZBJNVDEXC
```

*CB Payments Ltd = **COINBASE***

- Identification de comptes bancaires liés des exchanges

COMMENT ?

En suivant les flux, version crypto

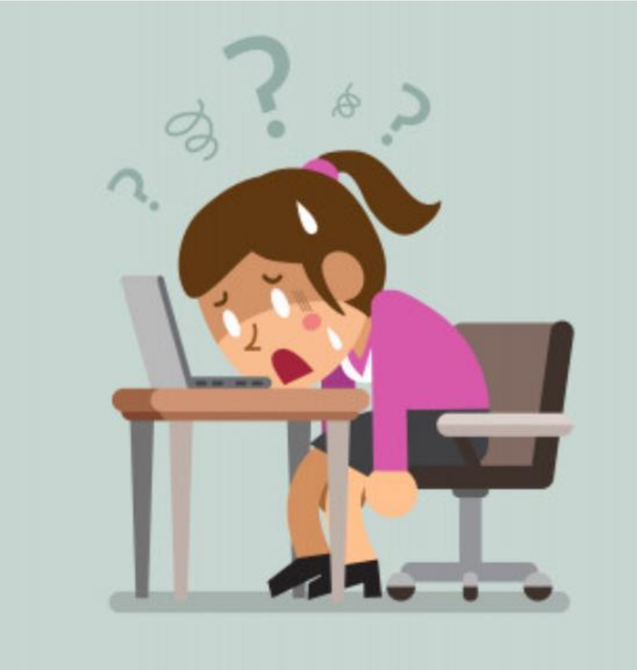


Cash in

Exchange

Cash out

?

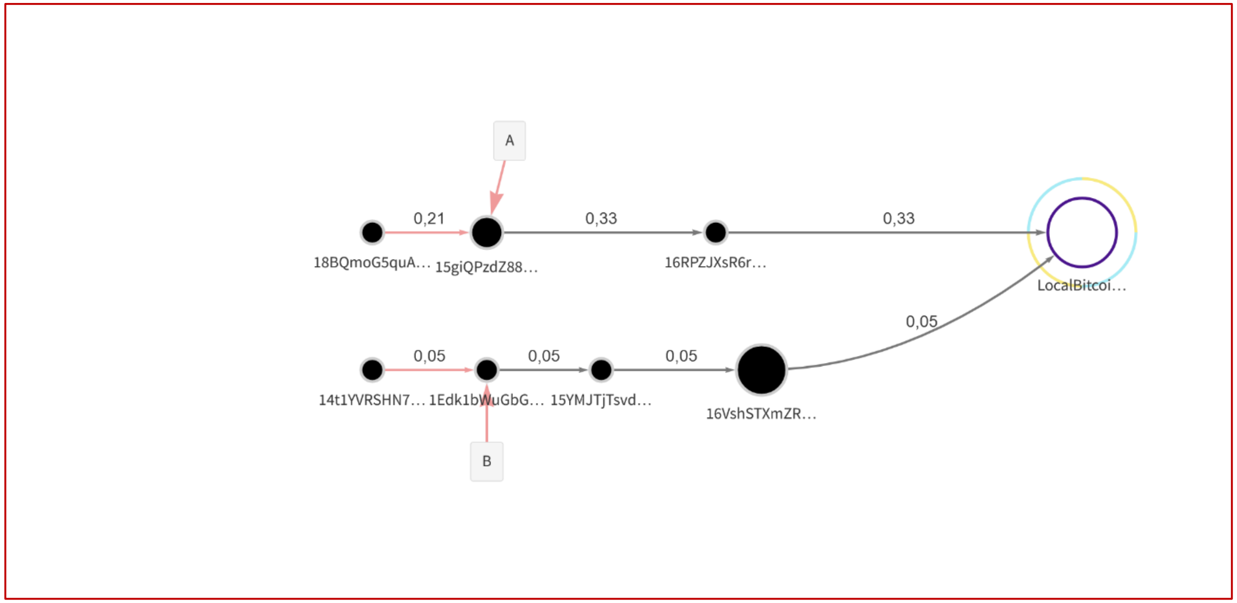


L’analyse CRYPTO:

Une analyse <u>interprétative</u> des transactions enregistrées au sein de la blockchain

Exploration de la blockchain

- Suivre les transactions
- Comprendre leur logique (s'il y en a une)



- Identifier un exchange
- Etre en mesure de l'interroger

3. les outils d’exploration

- Explorateurs online

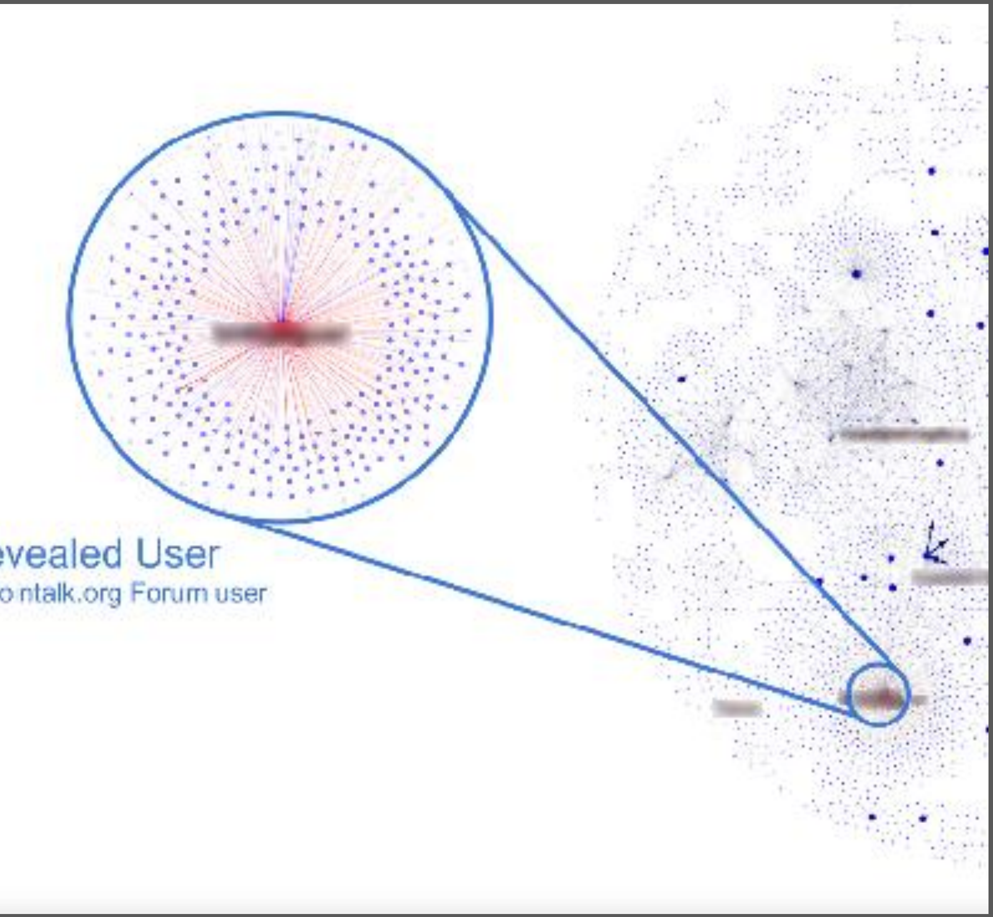
  https://blockchain.com/explorer

  https://www.walletexplorer.com/

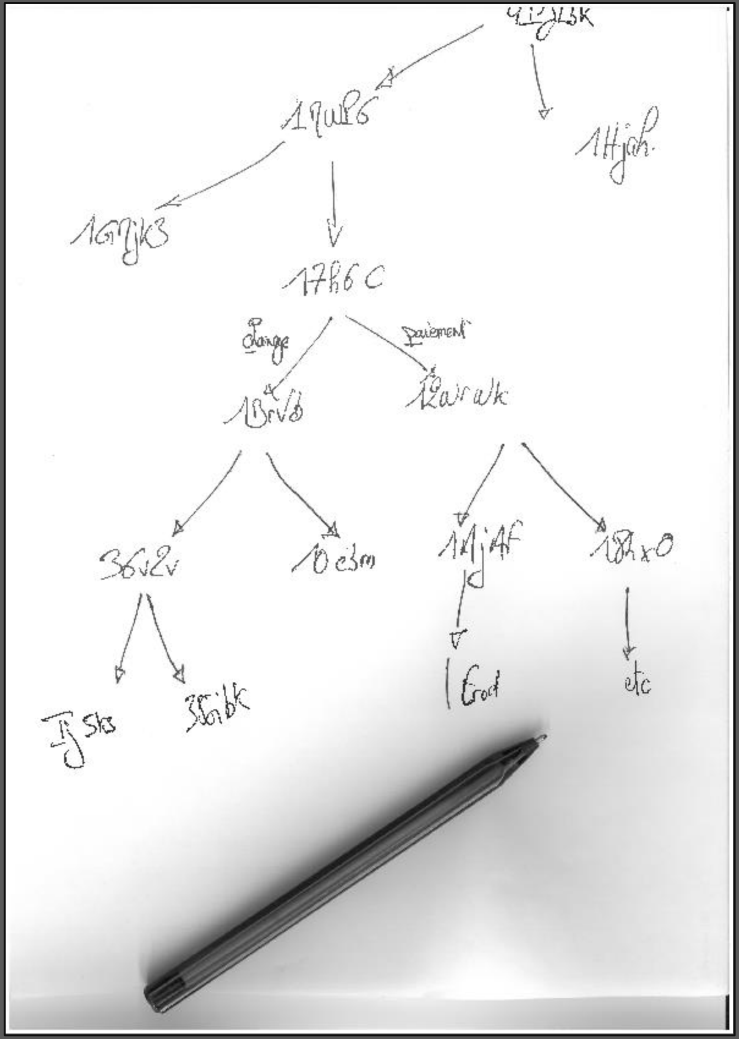
  https://www.blockchair.com/

- Outils commerciaux

  Coinbase Analytics   ELLIPTIC   CHAINALYSIS

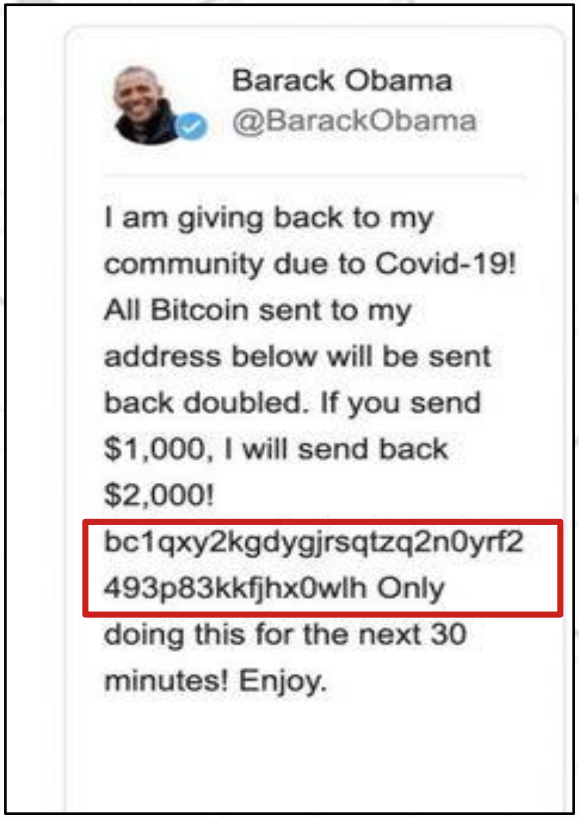

evealed User
o ntalk.org Forum user

Vs


4i7jL3k
1QwP6
1Hjch.
1GMjk3
17h6C
change
paiement
1Brvb
12wrwk
36v2v
1Oe3m
1MjAf
18hx0
Tj5ks
35oibk
1Eroef
etc

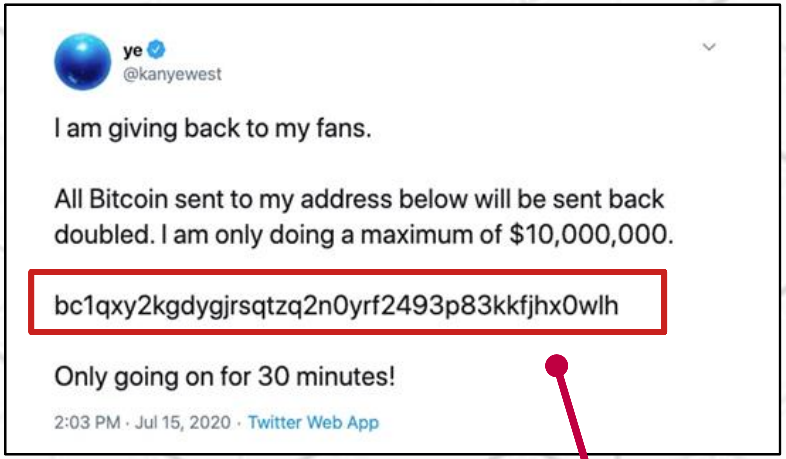
Un peu d'exercice

En juillet 2020, le piratage de comptes twitter de personnalités permet d'adresser de faux messages incitant à verser des fonds sur une adresse BTC.



Barack Obama
@BarackObama

I am giving back to my community due to Covid-19! All Bitcoin sent to my address below will be sent back doubled. If you send $1,000, I will send back $2,000! bc1qxy2kgdygjrsqtzq2n0yrf2493p83kkfjhx0wlh Only doing this for the next 30 minutes! Enjoy.



ye
@kanyewest

I am giving back to my fans.

All Bitcoin sent to my address below will be sent back doubled. I am only doing a maximum of $10,000,000.

bc1qxy2kgdygjrsqtzq2n0yrf2493p83kkfjhx0wlh

Only going on for 30 minutes!

2:03 PM · Jul 15, 2020 · Twitter Web App

bc1qxy2kgdygjrsqtzq2n0yrf2493p83kkfjhx0wlh

Un peu d’exercice

Vous allez maintenant débuter vos premières recherches.

Vous pouvez utiliser, au choix, un de ces trois explorateurs :

https://www.blockchair.com/

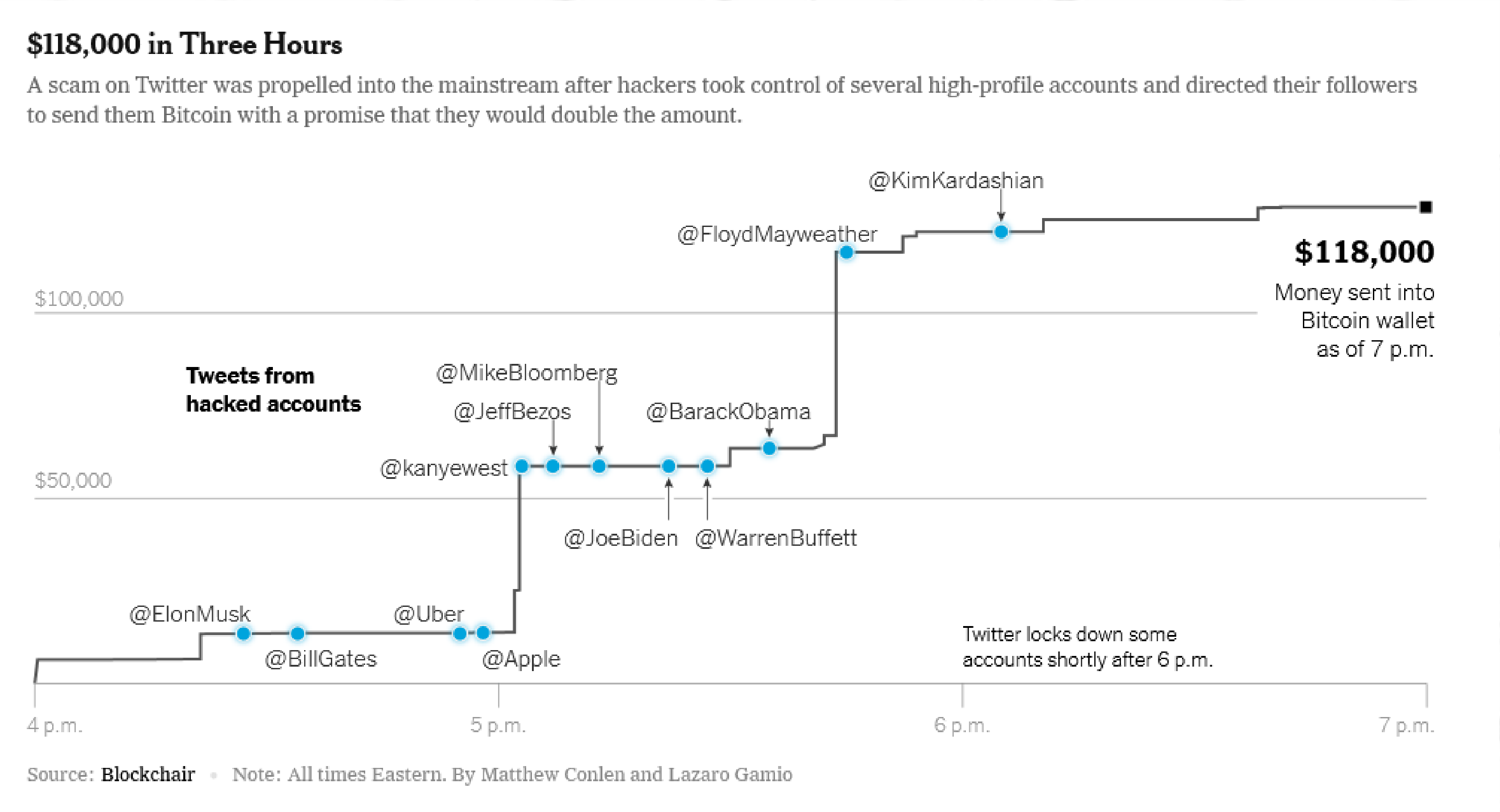
https://blockchain.com/explorer

https://www.walletexplorer.com/

Essayez maintenant de répondre aux questions suivantes à l’aide de l’adresse communiquée par les escrocs

bc1qxy2kgdygjrsqtzq2n0yrf2493p83kkfjhx0wlh

Un peu d’exercice



$118,000 in Three Hours

A scam on Twitter was propelled into the mainstream after hackers took control of several high-profile accounts and directed their followers to send them Bitcoin with a promise that they would double the amount.

Source: **Blockchair** • Note: All times Eastern. By Matthew Conlen and Lazaro Gamio

Un peu d'exercice

Questions:

- Quelles sont les dates des 1ère et dernière transactions ?
- Combien de transactions ont été reçues ?
- Montant reçu en BTC et en US$?
- Quel est le solde actuel de l'adresse ?

Un peu d'exercice

Réponses :

- Quelles sont les dates des 1ère et dernière transactions ?

  15/07/2020 et **03/03/2022**

- Combien de transactions ont été reçues ?

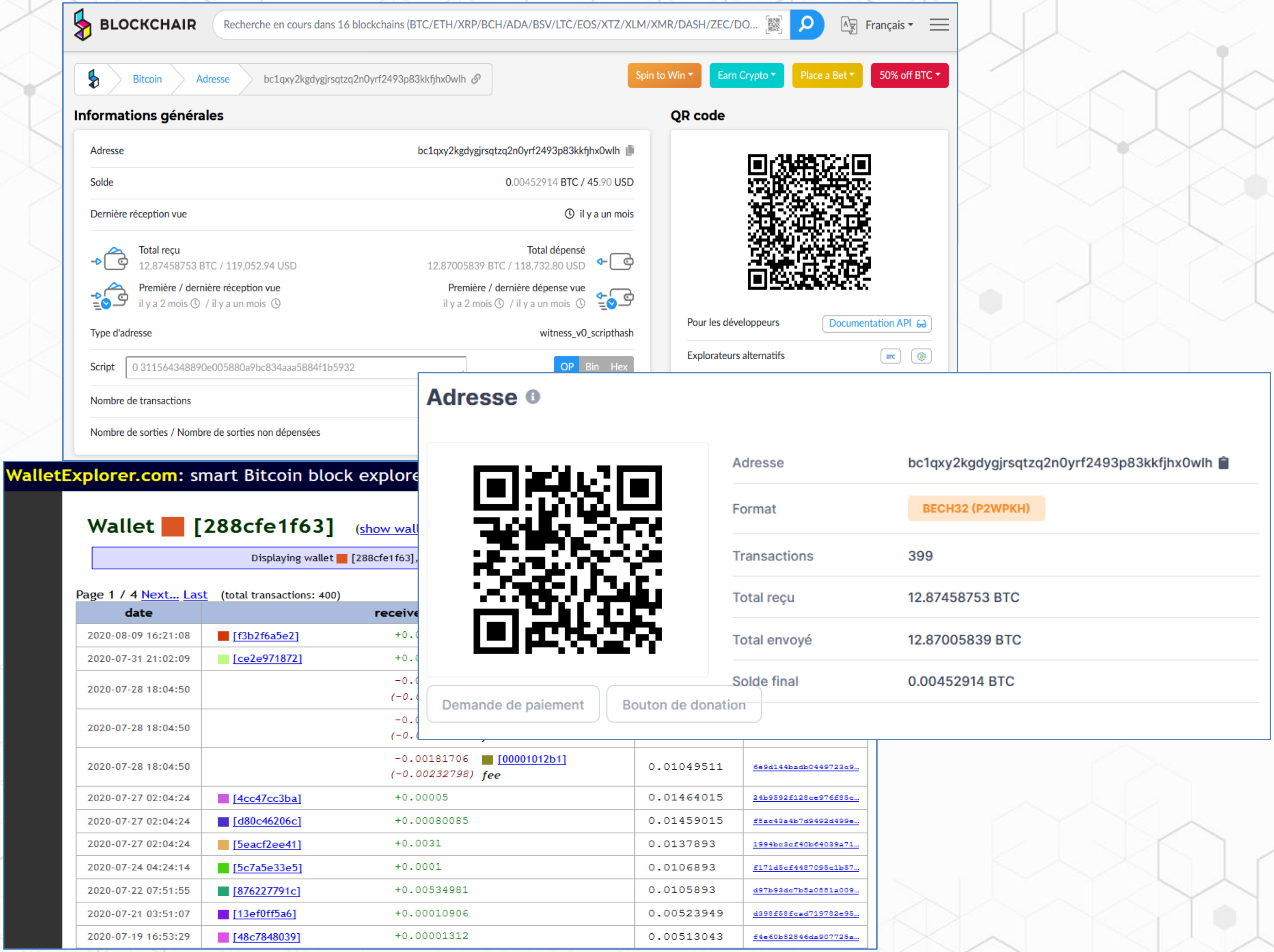
  513

- Montant reçu en BTC et en US$?

  12,96553266 BTC soit 527 771,86 US$

- Quel est le solde actuel de l'adresse ?

  0,09547427 BTC soit 3 888,35 US$



BLOCKCHAIR
Recherche en cours dans 16 blockchains (BTC/ETH/XRP/BCH/ADA/BSV/LTC/EOS/XTZ/XLM/XMR/DASH/ZEC/DO...
Français
Bitcoin
Adresse
bc1qxy2kgdygjrsqtzq2n0yrf2493p83kkfjhx0wlh
Spin to Win
Earn Crypto
Place a Bet
50% off BTC

Informations générales

Adresse	bc1qxy2kgdygjrsqtzq2n0yrf2493p83kkfjhx0wlh
Solde	0.00452914 BTC / 45.90 USD
Dernière réception vue	il y a un mois

Total reçu
12.87458753 BTC / 119,052.94 USD

Total dépensé
12.87005839 BTC / 118,732.80 USD

Première / dernière réception vue
il y a 2 mois / il y a un mois

Première / dernière dépense vue
il y a 2 mois / il y a un mois

Type d'adresse	witness_v0_scripthash
Script	0 311564348890e005880a9bc834aaa5884f1b5932
Nombre de transactions	
Nombre de sorties / Nombre de sorties non dépensées	

QR code

WalletExplorer.com: smart Bitcoin block explore

Wallet 🟧 [288cfe1f63] (show wall

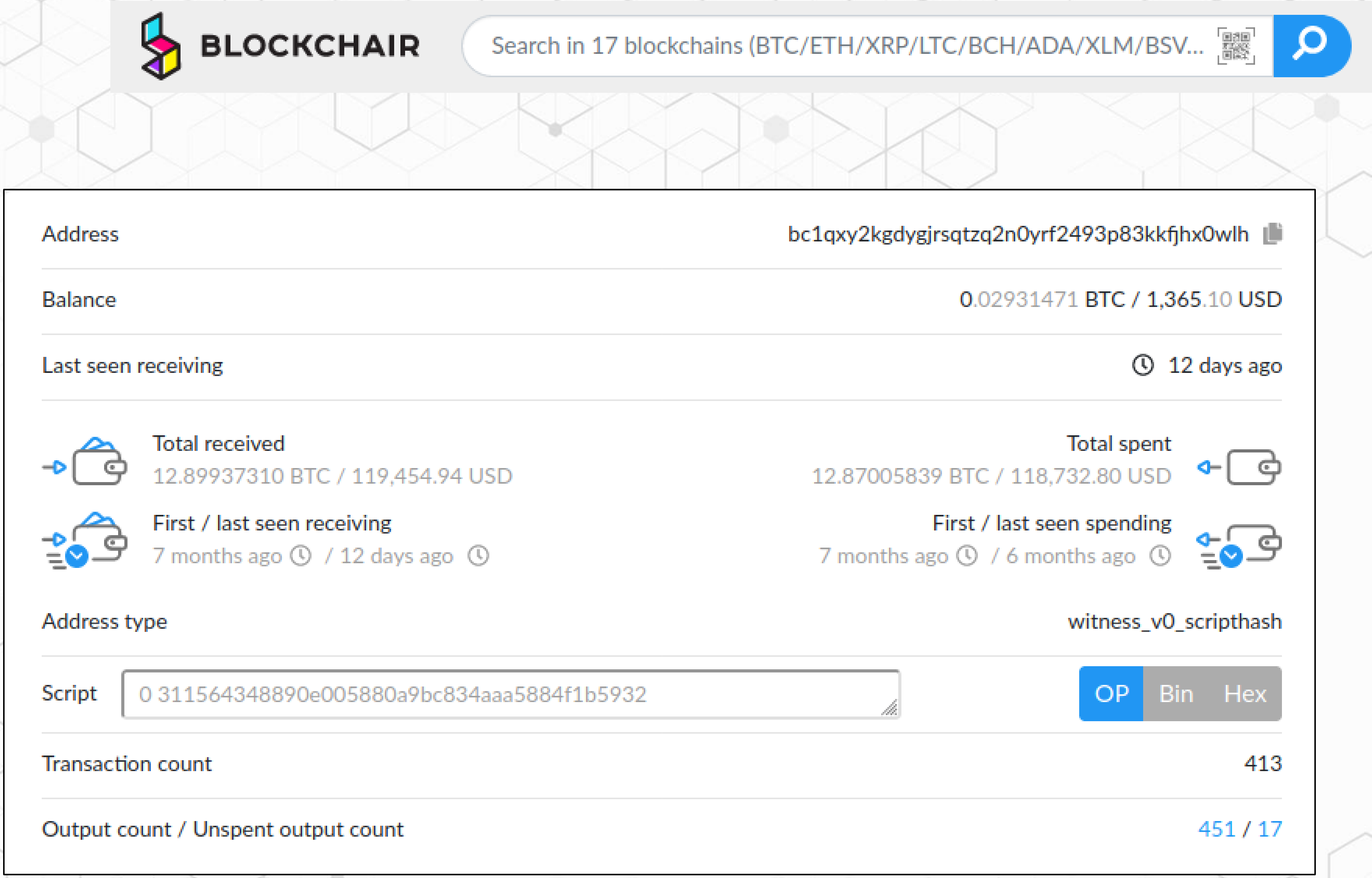
Displaying wallet 🟧 [288cfe1f63],

Page 1 / 4 Next... Last (total transactions: 400)

date	receive				
2020-08-09 16:21:08	[f3b2f6a5e2]	+0.			
2020-07-31 21:02:09	[ce2e971872]	+0.			
2020-07-28 18:04:50		-0. (-0.			
2020-07-28 18:04:50		-0. (-0.			
2020-07-28 18:04:50		-0.00181706 (-0.00232798)	[00001012b1] fee	0.01049511	6e9d144badb0449723c9...
2020-07-27 02:04:24	[4cc47cc3ba]	+0.00005		0.01464015	24b9592f128ce976f85c...
2020-07-27 02:04:24	[d80c46206c]	+0.00080085		0.01459015	f8ac43a4b7d9492d499e...
2020-07-27 02:04:24	[5eacf2ee41]	+0.0031		0.0137893	1994bc3cf40b64039a71...
2020-07-24 04:24:14	[5c7a5e33e5]	+0.0001		0.0106893	f171d5cf4487095c1b57...
2020-07-22 07:51:55	[876227791c]	+0.00534981		0.0105893	d97b93dc7b5a0881a009...
2020-07-21 03:51:07	[13ef0ff5a6]	+0.00010906		0.00523949	d398f58fcad719782e95...
2020-07-19 16:53:29	[48c7848039]	+0.00001312		0.00513043	f4e60b52846da907725a...

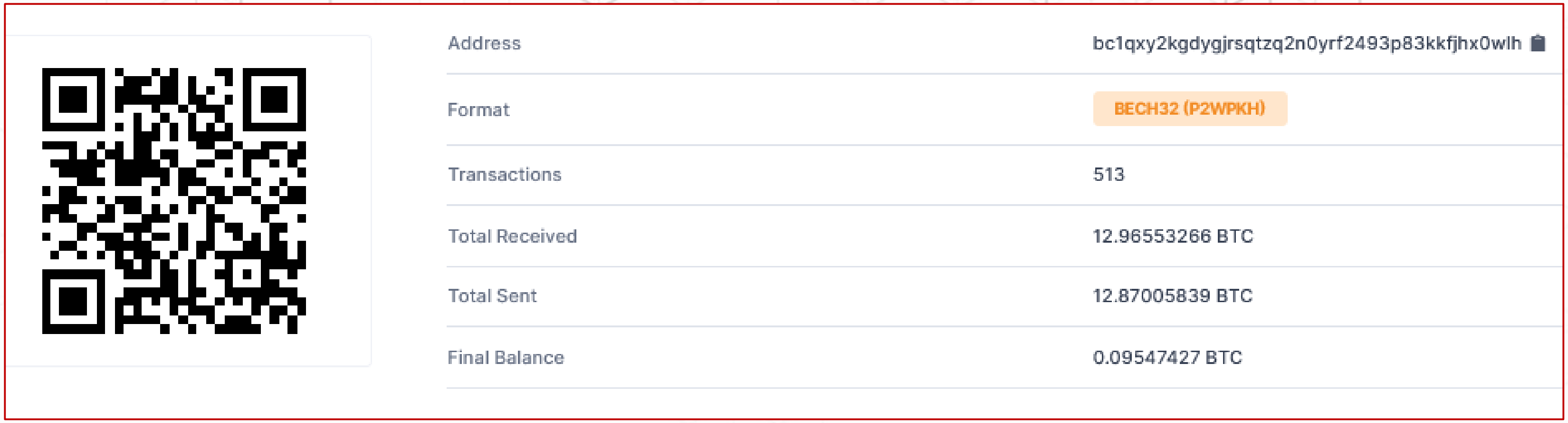
Adresse

Adresse	bc1qxy2kgdygjrsqtzq2n0yrf2493p83kkfjhx0wlh
Format	BECH32 (P2WPKH)
Transactions	399
Total reçu	12.87458753 BTC
Total envoyé	12.87005839 BTC
Solde final	0.00452914 BTC


BLOCKCHAIR
Search in 17 blockchains (BTC/ETH/XRP/LTC/BCH/ADA/XLM/BSV...
OP
Bin
Hex

Address	bc1qxy2kgdygjrsqtzq2n0yrf2493p83kkfjhx0wlh
Balance	0.02931471 BTC / 1,365.10 USD
Last seen receiving	12 days ago
Total received 12.89937310 BTC / 119,454.94 USD	Total spent 12.87005839 BTC / 118,732.80 USD
First / last seen receiving 7 months ago / 12 days ago	First / last seen spending 7 months ago / 6 months ago
Address type	witness_v0_scripthash
Script	0 311564348890e005880a9bc834aaa5884f1b5932
Transaction count	413
Output count / Unspent output count	451 / 17

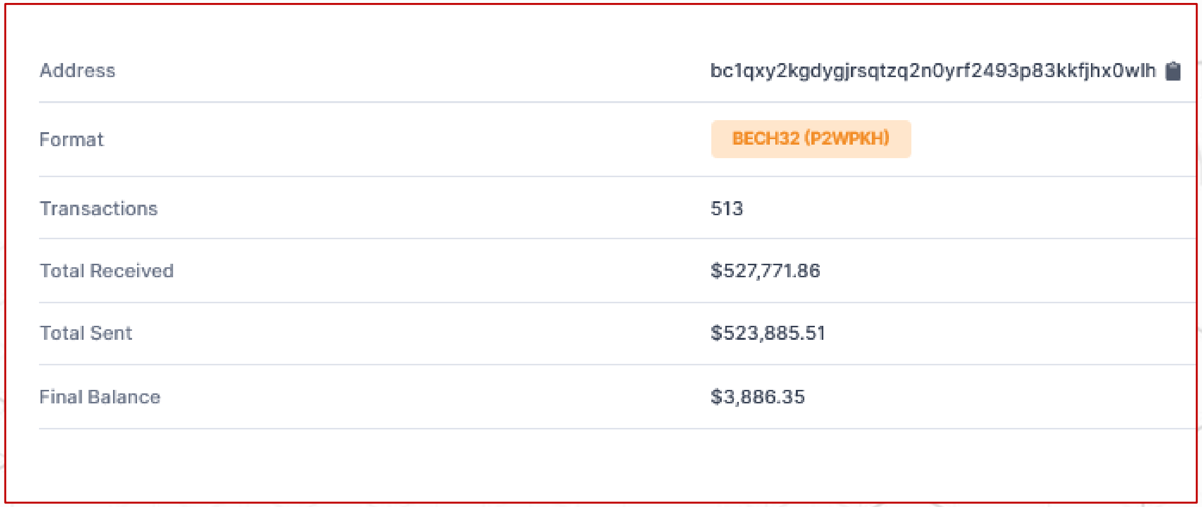
Blockchain.com



Address	bc1qxy2kgdygjrsqtzq2n0yrf2493p83kkfjhx0wlh
Format	BECH32 (P2WPKH)
Transactions	513
Total Received	12.96553266 BTC
Total Sent	12.87005839 BTC
Final Balance	0.09547427 BTC

BTC

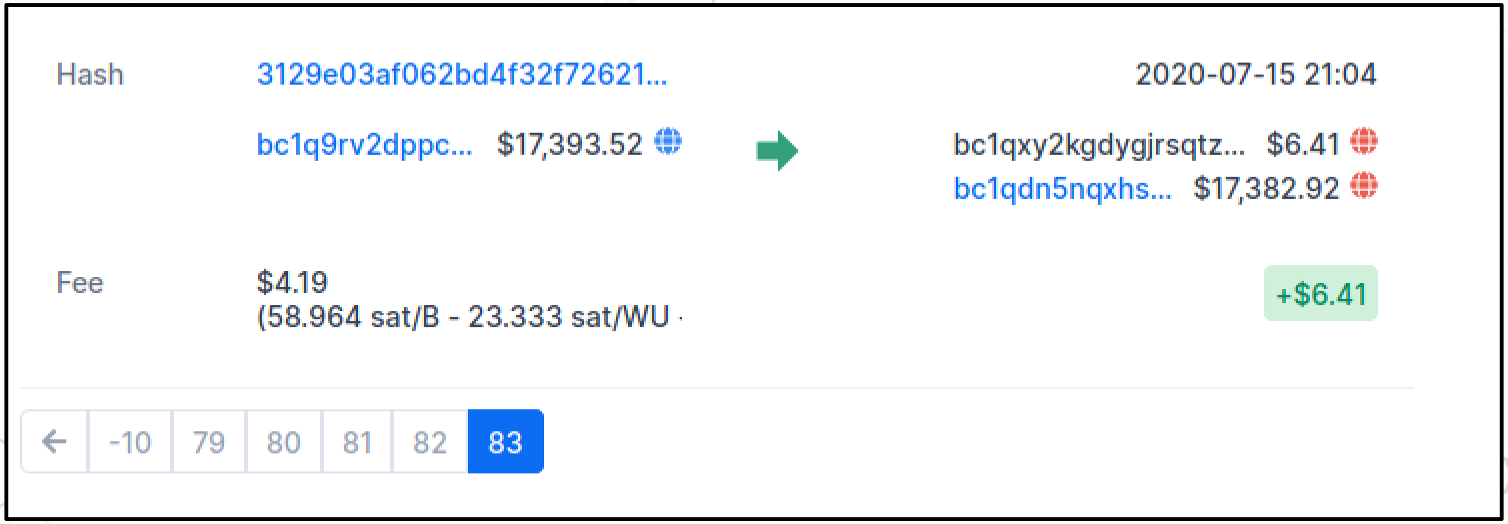
USD



Address	bc1qxy2kgdygjrsqtzq2n0yrf2493p83kkfjhx0wlh
Format	BECH32 (P2WPKH)
Transactions	513
Total Received	$527,771.86
Total Sent	$523,885.51
Final Balance	$3,886.35

Blockchain.com

Pour trouver la première transaction…
Il faut atteindre la page **103** et cliquer sur le **hash**

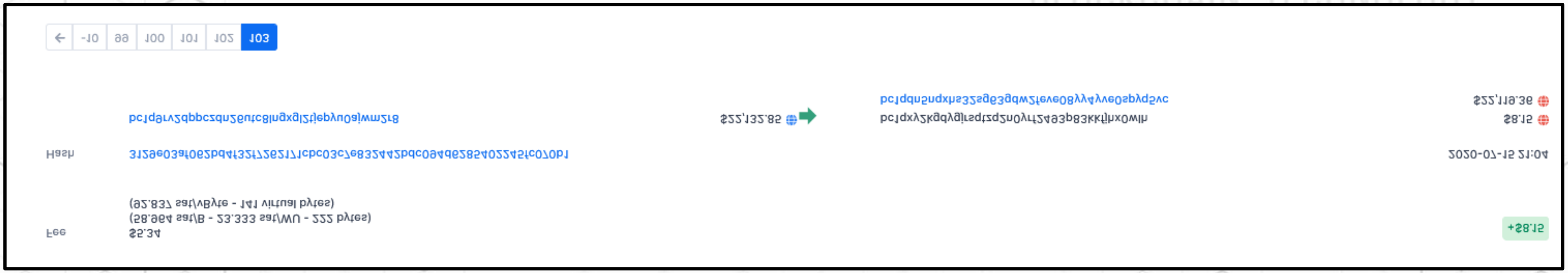


Hash 3129e03af062bd4f32f72621... 2020-07-15 21:04

bc1q9rv2dppc... $17,393.52 → bc1qxy2kgdygjrsqtz... $6.41
bc1qdn5nqxhs... $17,382.92

Fee $4.19
(58.964 sat/B - 23.333 sat/WU ·

+$6.41



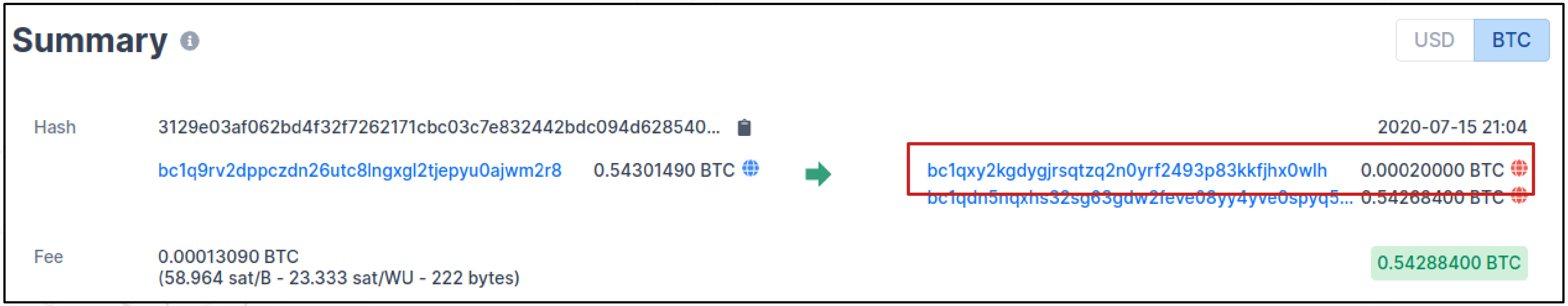
Hash 3129e03af062bd4f32f72621cbc03c76832442bdc094de285402245fc070b1 2020-07-15 21:04

bc1q9rv2dppc2qn2gutc8lngxgl2tjepyn0ajwmzr8 $22,132.85 → bc1qxy2kgdygjrsqtzq2n0yrf2493p83kkfjhx0wlh $8.15
bc1qdn5nqxhs32sg93gdw2tev08yy4yve0sbyd5vc $22,116.36

Fee $5.34
(58.964 sat/B - 23.333 sat/WU - 222 bytes)
(92.837 sat/vByte - 141 virtual bytes)

+$8.15

Blockchain.com



Summary

USD | BTC

Hash 3129e03af062bd4f32f7262171cbc03c7e832442bdc094d628540... 2020-07-15 21:04

bc1q9rv2dppczdn26utc8lngxgl2tjepyu0ajwm2r8 0.54301490 BTC

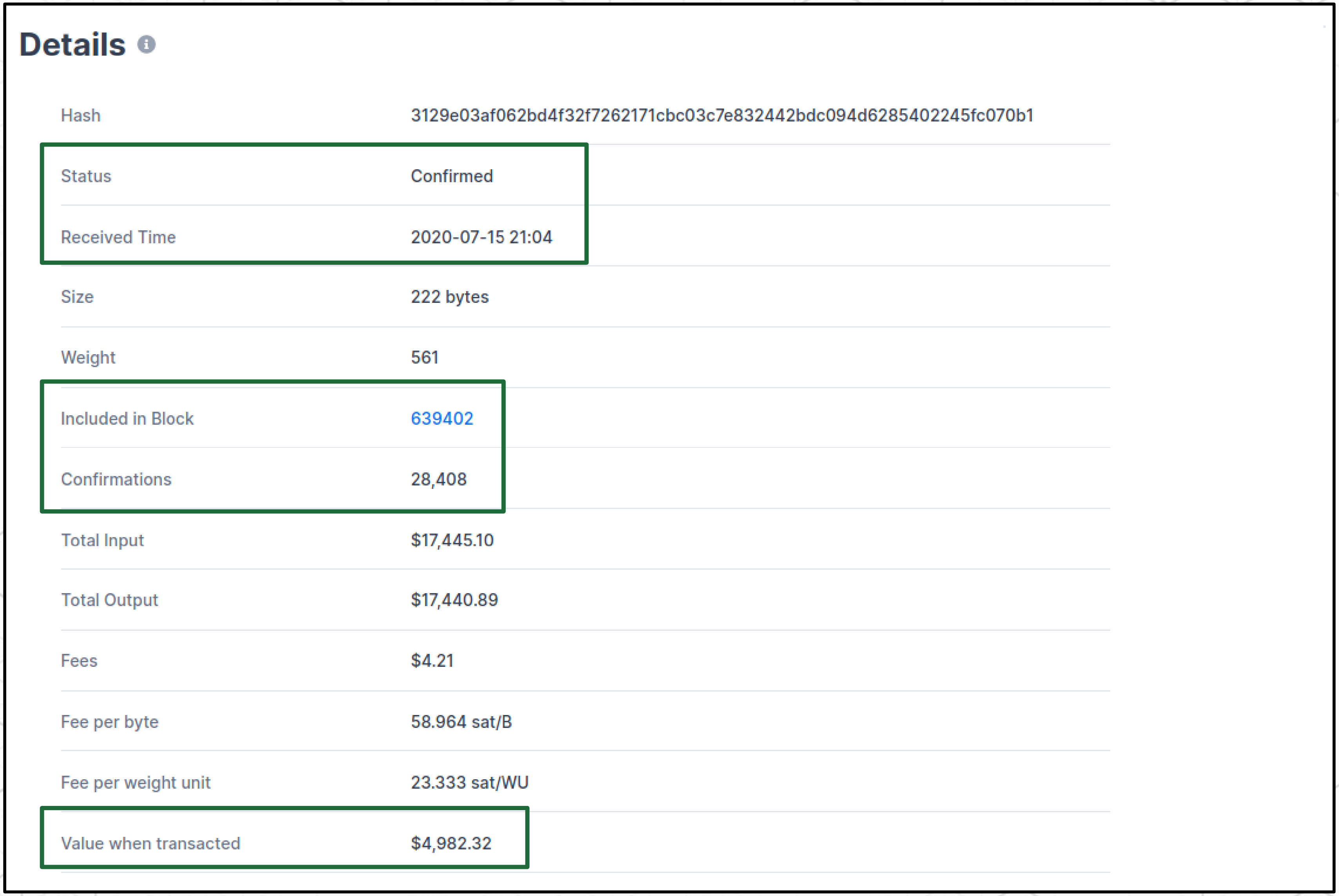
bc1qxy2kgdygjrsqtzq2n0yrf2493p83kkfjhx0wlh 0.00020000 BTC

bc1qdn5nqxhs32sg63gdw2feve08yy4yve0spyq5... 0.54268400 BTC

Fee 0.00013090 BTC
(58.964 sat/B - 23.333 sat/WU - 222 bytes)

0.54288400 BTC

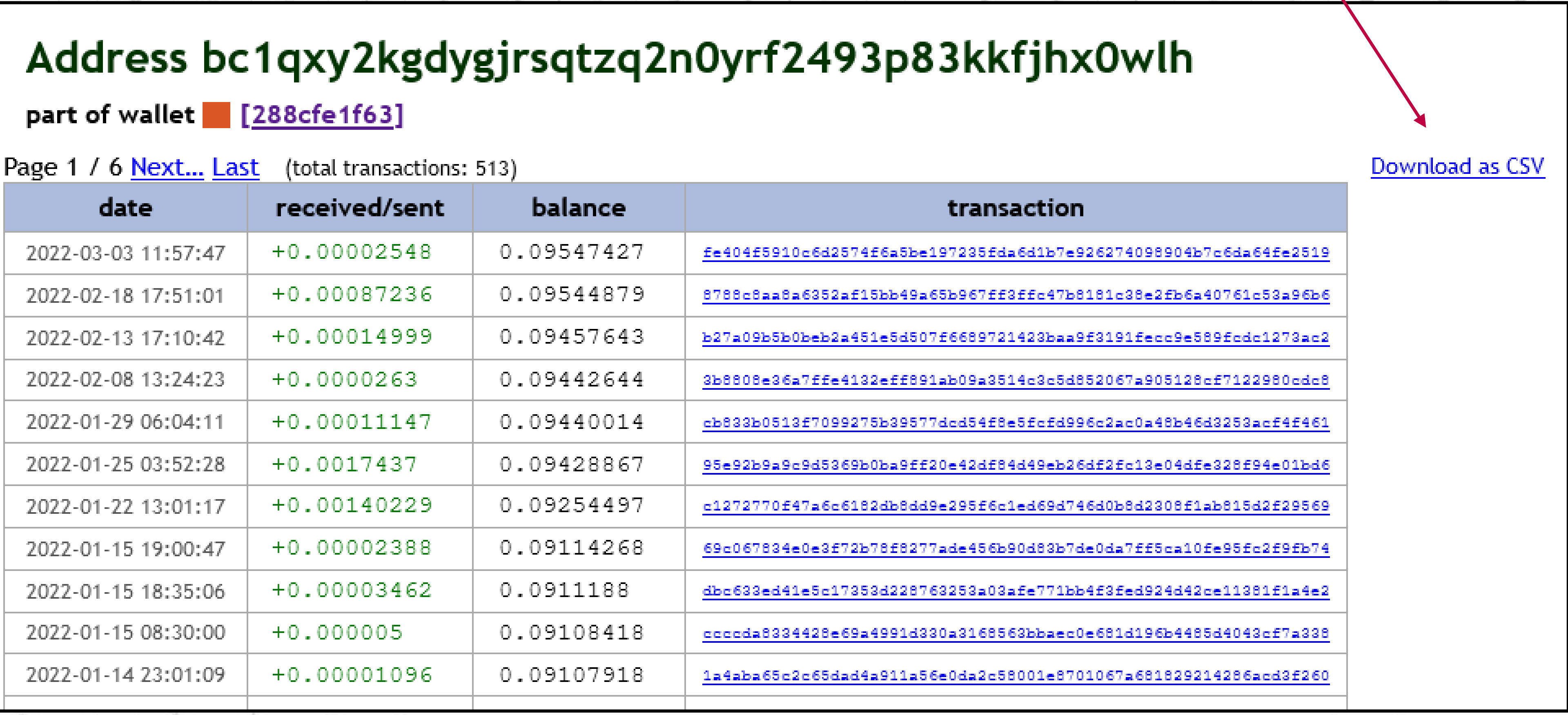
Blockchain.com



Details

Hash	3129e03af062bd4f32f7262171cbc03c7e832442bdc094d6285402245fc070b1
Status	Confirmed
Received Time	2020-07-15 21:04
Size	222 bytes
Weight	561
Included in Block	639402
Confirmations	28,408
Total Input	$17,445.10
Total Output	$17,440.89
Fees	$4.21
Fee per byte	58.964 sat/B
Fee per weight unit	23.333 sat/WU
Value when transacted	$4,982.32

WalletExplorer.com:



Address bc1qxy2kgdygjrsqtzq2n0yrf2493p83kkfjhx0wlh

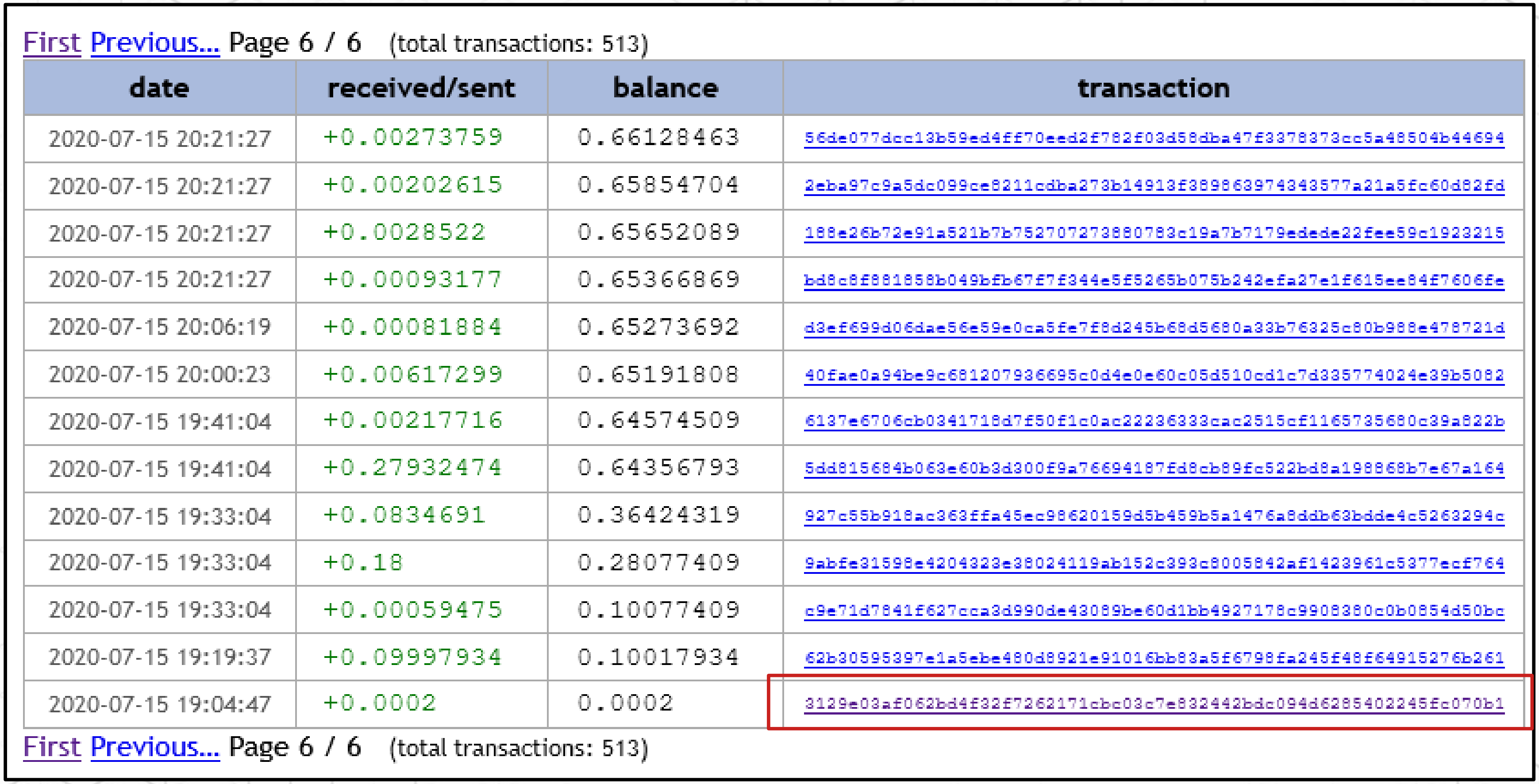
part of wallet 🟧 [288cfe1f63]

Page 1 / 6 Next... Last (total transactions: 513)

Download as CSV

date	received/sent	balance	transaction
2022-03-03 11:57:47	+0.00002548	0.09547427	fe404f5910c6d2574f6a5be197235fda6d1b7e926274098904b7c6da64fe2519
2022-02-18 17:51:01	+0.00087236	0.09544879	8788c8aa8a6352af15bb49a65b967ff3ffc47b8181c38e2fb6a40761c53a96b6
2022-02-13 17:10:42	+0.00014999	0.09457643	b27a09b5b0beb2a451e5d507f6689721423baa9f3191fecc9e589fcdc1273ac2
2022-02-08 13:24:23	+0.0000263	0.09442644	3b8808e36a7ffe4132eff891ab09a3514c3c5d852067a905128cf7122980cdc8
2022-01-29 06:04:11	+0.00011147	0.09440014	cb833b0513f7099275b39577dcd54f8e5fcfd996c2ac0a48b46d3253acf4f461
2022-01-25 03:52:28	+0.0017437	0.09428867	95e92b9a9c9d5369b0ba9ff20e42df84d49eb26df2fc13e04dfe328f94e01bd6
2022-01-22 13:01:17	+0.00140229	0.09254497	c1272770f47a6c6182db8dd9e295f6c1ed69d746d0b8d2308f1ab815d2f29569
2022-01-15 19:00:47	+0.00002388	0.09114268	69c067834e0e3f72b78f8277ade456b90d83b7de0da7ff5ca10fe95fc2f9fb74
2022-01-15 18:35:06	+0.00003462	0.0911188	dbc633ed41e5c17353d228763253a03afe771bb4f3fed924d42ce11381f1a4e2
2022-01-15 08:30:00	+0.000005	0.09108418	ccccda8334428e69a4991d330a3168563bbaec0e681d196b4485d4043cf7a338
2022-01-14 23:01:09	+0.00001096	0.09107918	1a4aba65c2c65dad4a911a56e0da2c58001e8701067a681829214286acd3f260

WalletExplorer.com:

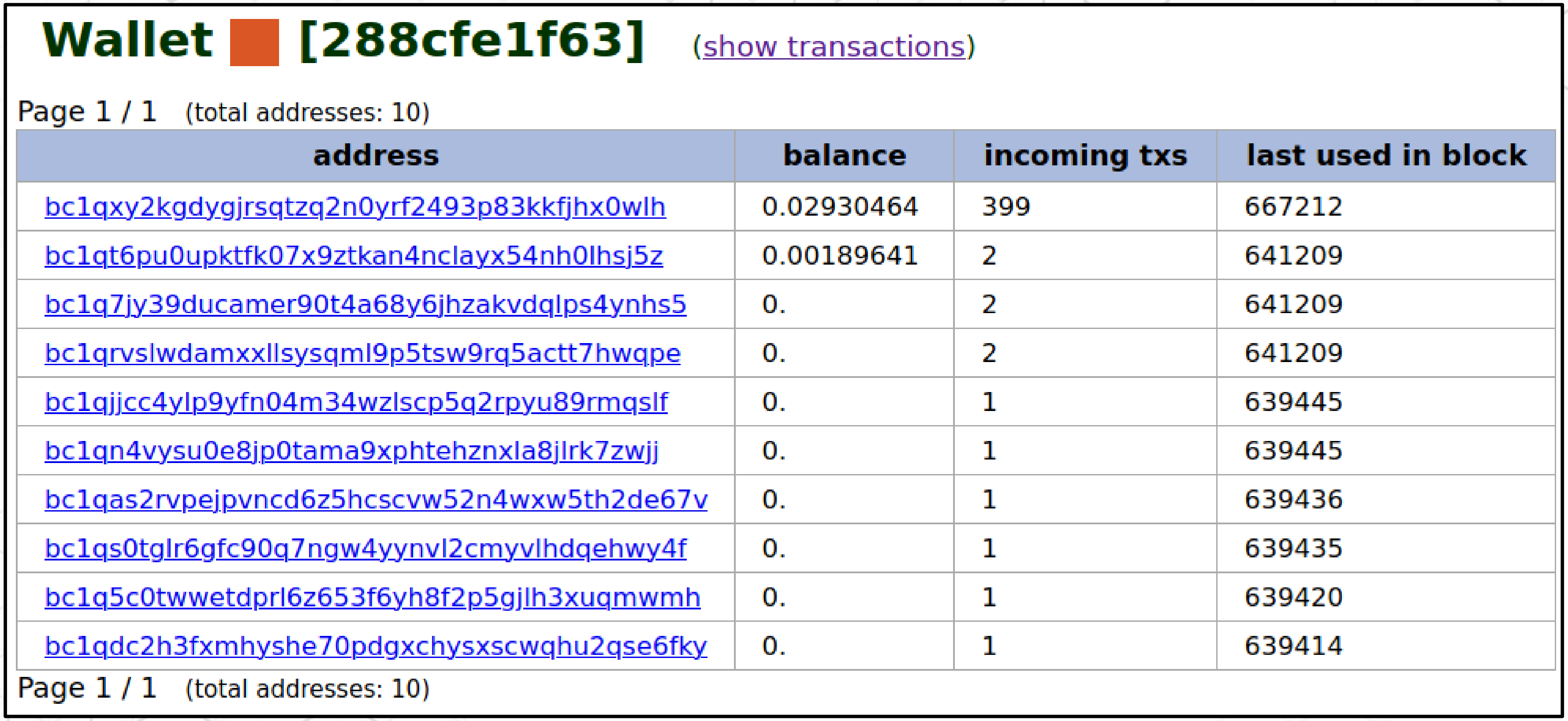


First Previous... Page 6 / 6 (total transactions: 513)

date	received/sent	balance	transaction
2020-07-15 20:21:27	+0.00273759	0.66128463	56de077dcc13b59ed4ff70eed2f782f03d58dba47f3378373cc5a48504b44694
2020-07-15 20:21:27	+0.00202615	0.65854704	2eba97c9a5dc099ce8211cdba273b14913f389863974343577a21a5fc60d82fd
2020-07-15 20:21:27	+0.0028522	0.65652089	188e26b72e91a521b7b752707273880783c19a7b7179edede22fee59c1923215
2020-07-15 20:21:27	+0.00093177	0.65366869	bd8c8f881858b049bfb67f7f344e5f5265b075b242efa27e1f615ee84f7606fe
2020-07-15 20:06:19	+0.00081884	0.65273692	d3ef699d06dae56e59e0ca5fe7f8d245b68d5680a33b76325c80b988e478721d
2020-07-15 20:00:23	+0.00617299	0.65191808	40fae0a94be9c681207936695c0d4e0e60c05d510cd1c7d335774024e39b5082
2020-07-15 19:41:04	+0.00217716	0.64574509	6137e6706cb0341718d7f50f1c0ac22236333cac2515cf1165735680c39a822b
2020-07-15 19:41:04	+0.27932474	0.64356793	5dd815684b063e60b3d300f9a76694187fd8cb89fc522bd8a198868b7e67a164
2020-07-15 19:33:04	+0.0834691	0.36424319	927c55b918ac363ffa45ec98620159d5b459b5a1476a8ddb63bdde4c5263294c
2020-07-15 19:33:04	+0.18	0.28077409	9abfe31598e4204323e38024119ab152c393c8005842af1423961c5377ecf764
2020-07-15 19:33:04	+0.00059475	0.10077409	c9e71d7841f627cca3d990de43089be60d1bb4927178c9908380c0b0854d50bc
2020-07-15 19:19:37	+0.09997934	0.10017934	62b30595397e1a5ebe480d8921e91016bb83a5f6798fa245f48f64915276b261
2020-07-15 19:04:47	+0.0002	0.0002	3129e03af062bd4f32f7262171cbc03c7e832442bdc094d6285402245fc070b1

First Previous... Page 6 / 6 (total transactions: 513)

WalletExplorer.com:



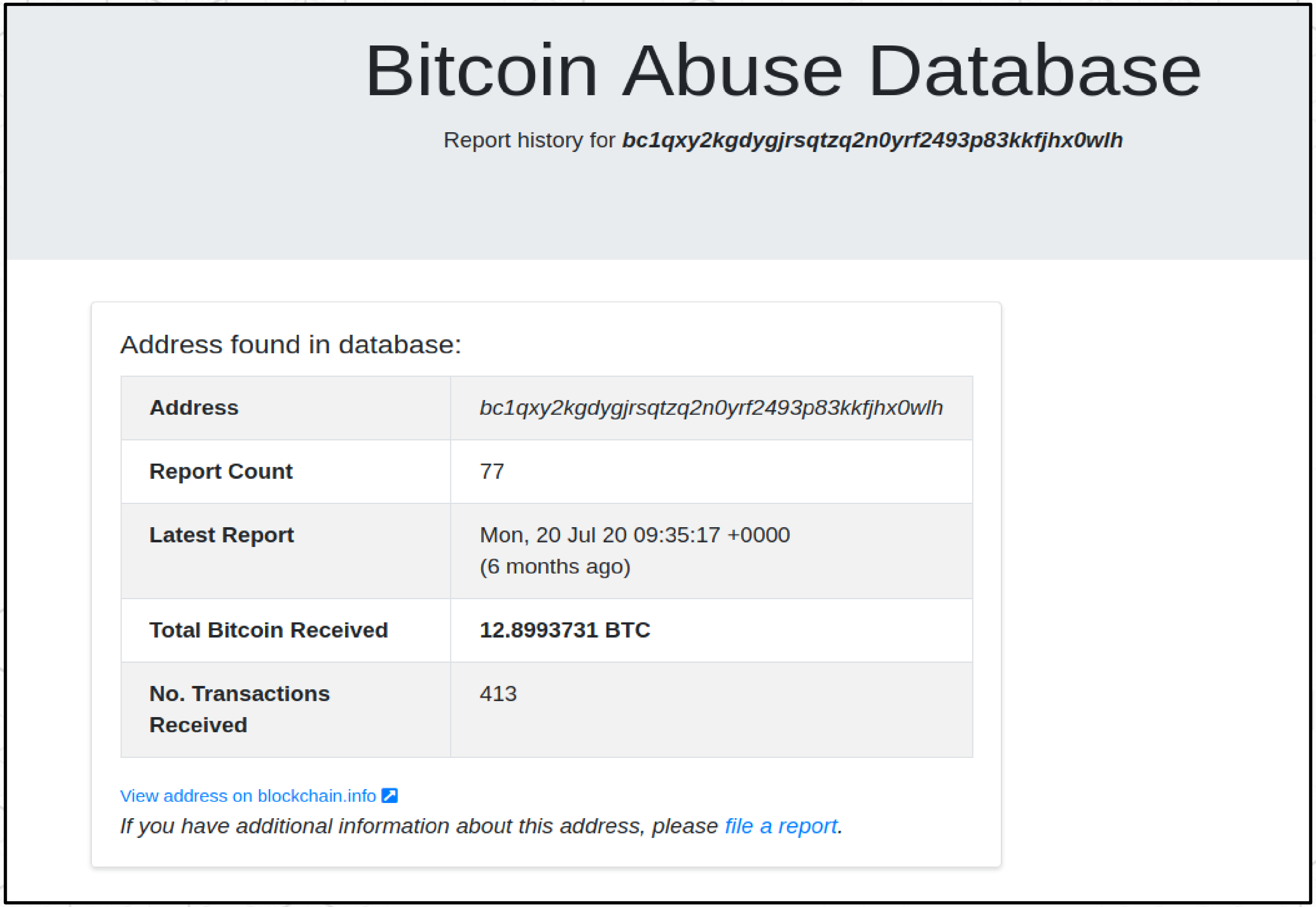
Wallet 🟧 [288cfe1f63]

(show transactions)

Page 1 / 1 (total addresses: 10)

address	balance	incoming txs	last used in block
bc1qxy2kgdygjrsqtzq2n0yrf2493p83kkfjhx0wlh	0.02930464	399	667212
bc1qt6pu0upktfk07x9ztkan4nclayx54nh0lhsj5z	0.00189641	2	641209
bc1q7jy39ducamer90t4a68y6jhzakvdqlps4ynhs5	0.	2	641209
bc1qrvslwdamxxllsysqml9p5tsw9rq5actt7hwqpe	0.	2	641209
bc1qjjcc4ylp9yfn04m34wzlscp5q2rpyu89rmqslf	0.	1	639445
bc1qn4vysu0e8jp0tama9xphtehznxla8jlrk7zwjj	0.	1	639445
bc1qas2rvpejpvncd6z5hcscvw52n4wxw5th2de67v	0.	1	639436
bc1qs0tglr6gfc90q7ngw4yynvl2cmyvlhdqehwy4f	0.	1	639435
bc1q5c0twwetdprl6z653f6yh8f2p5gjlh3xuqmwmh	0.	1	639420
bc1qdc2h3fxmhyshe70pdgxchysxscwqhu2qse6fky	0.	1	639414

Page 1 / 1 (total addresses: 10)



Bitcoin Abuse Database

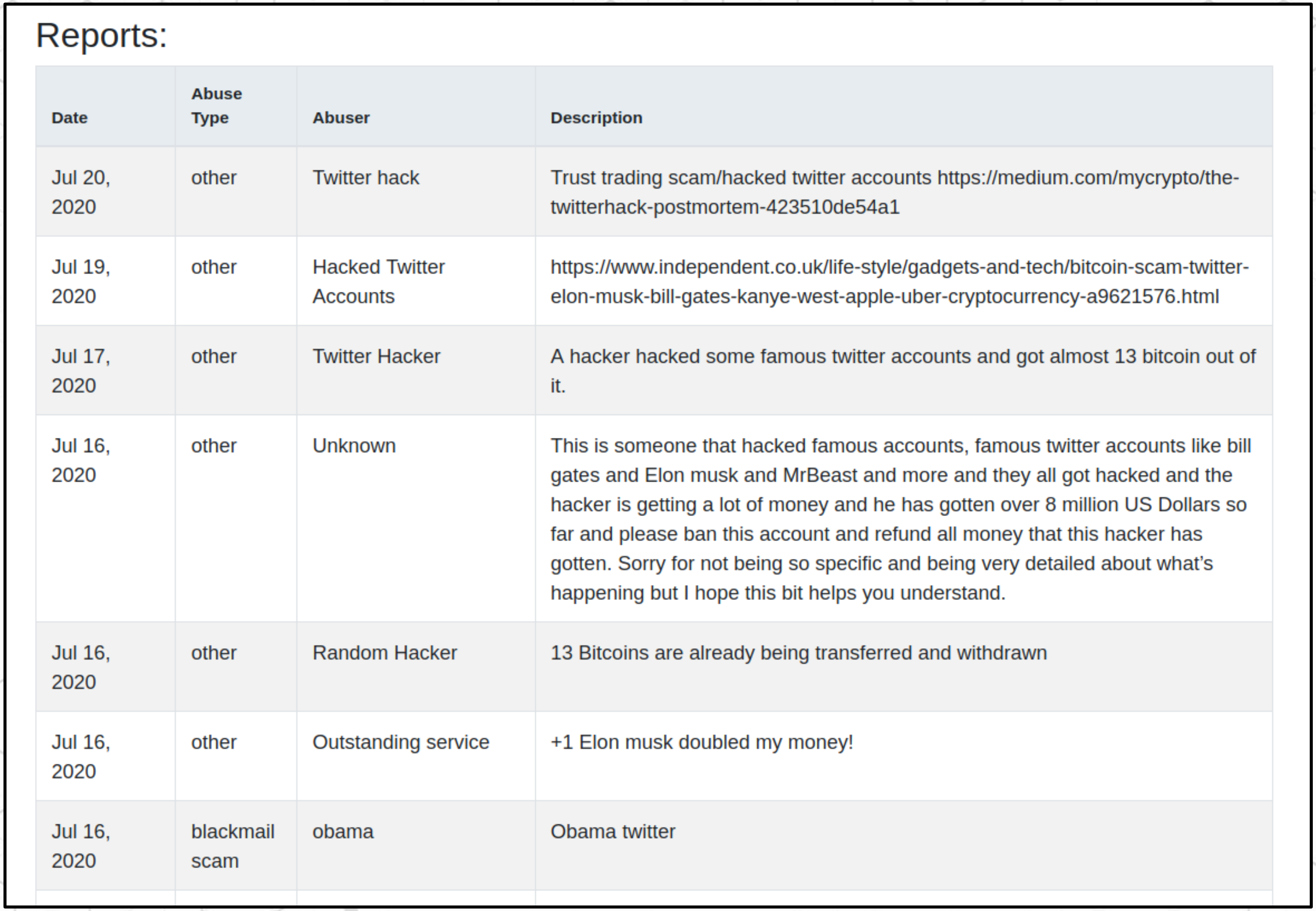
Report history for ***bc1qxy2kgdygjrsqtzq2n0yrf2493p83kkfjhx0wlh***

Address found in database:

Address	*bc1qxy2kgdygjrsqtzq2n0yrf2493p83kkfjhx0wlh*
Report Count	77
Latest Report	Mon, 20 Jul 20 09:35:17 +0000 (6 months ago)
Total Bitcoin Received	**12.8993731 BTC**
No. Transactions Received	413

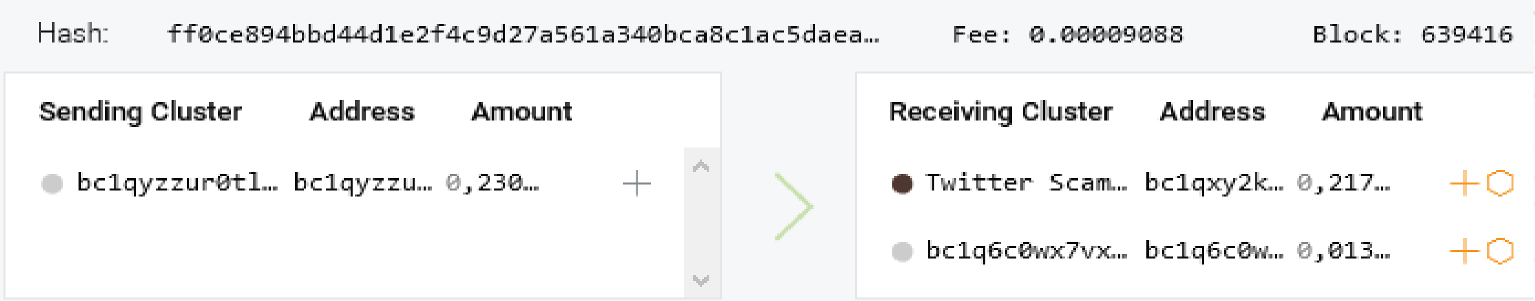
View address on blockchain.info

If you have additional information about this address, please file a report.



Reports:

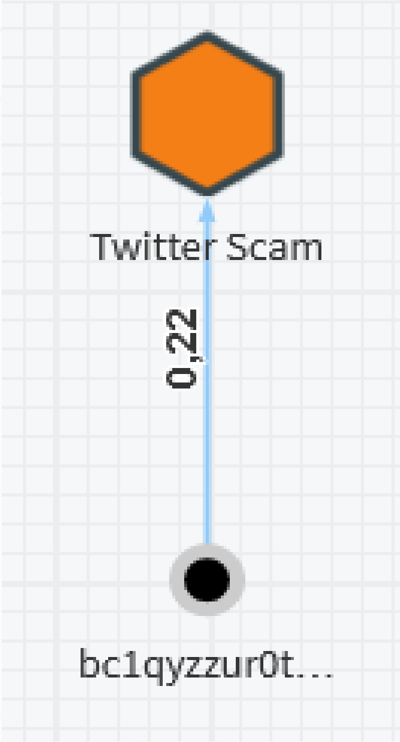
Date	Abuse Type	Abuser	Description
Jul 20, 2020	other	Twitter hack	Trust trading scam/hacked twitter accounts https://medium.com/mycrypto/the-twitterhack-postmortem-423510de54a1
Jul 19, 2020	other	Hacked Twitter Accounts	https://www.independent.co.uk/life-style/gadgets-and-tech/bitcoin-scam-twitter-elon-musk-bill-gates-kanye-west-apple-uber-cryptocurrency-a9621576.html
Jul 17, 2020	other	Twitter Hacker	A hacker hacked some famous twitter accounts and got almost 13 bitcoin out of it.
Jul 16, 2020	other	Unknown	This is someone that hacked famous accounts, famous twitter accounts like bill gates and Elon musk and MrBeast and more and they all got hacked and the hacker is getting a lot of money and he has gotten over 8 million US Dollars so far and please ban this account and refund all money that this hacker has gotten. Sorry for not being so specific and being very detailed about what's happening but I hope this bit helps you understand.
Jul 16, 2020	other	Random Hacker	13 Bitcoins are already being transferred and withdrawn
Jul 16, 2020	other	Outstanding service	+1 Elon musk doubled my money!
Jul 16, 2020	blackmail scam	obama	Obama twitter

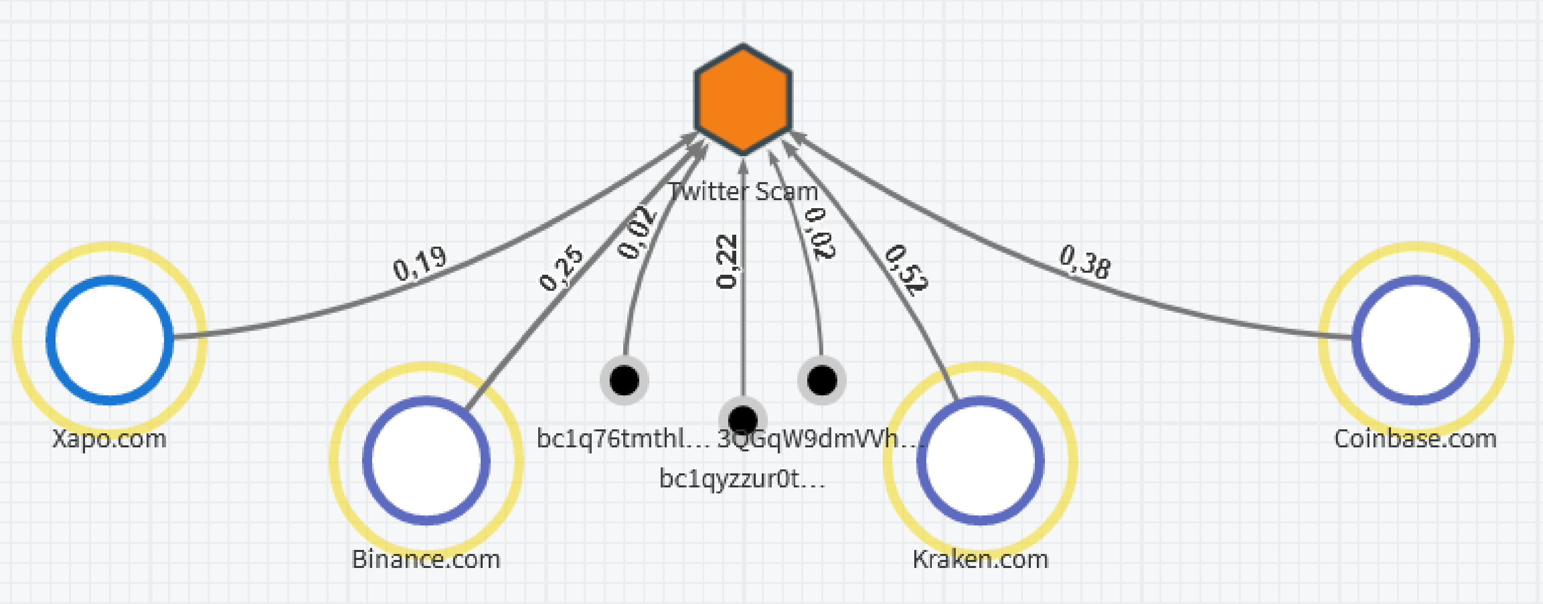


Hash: ff0ce894bbd44d1e2f4c9d27a561a340bca8c1ac5daea… Fee: 0.00009088 Block: 639416

Sending Cluster	Address	Amount
● bc1qyzzur0tl…	bc1qyzzu…	0,230…

Receiving Cluster	Address	Amount
● Twitter Scam…	bc1qxy2k…	0,217…
● bc1q6c0wx7vx…	bc1q6c0w…	0,013…




Twitter Scam
0,19
0,25
0,02
0,22
0,02
0,52
0,38
Xapo.com
Binance.com
bc1q76tmthl…
3QGqW9dmVVh…
bc1qyzzur0t…
Kraken.com
Coinbase.com

Identifier le propriétaire / l'utilisateur des cryptos en interrogeant les exchanges

- D'abord identifier la jurisdiction de rattachement

- Adresser une demande portant sur les transactions suspectes

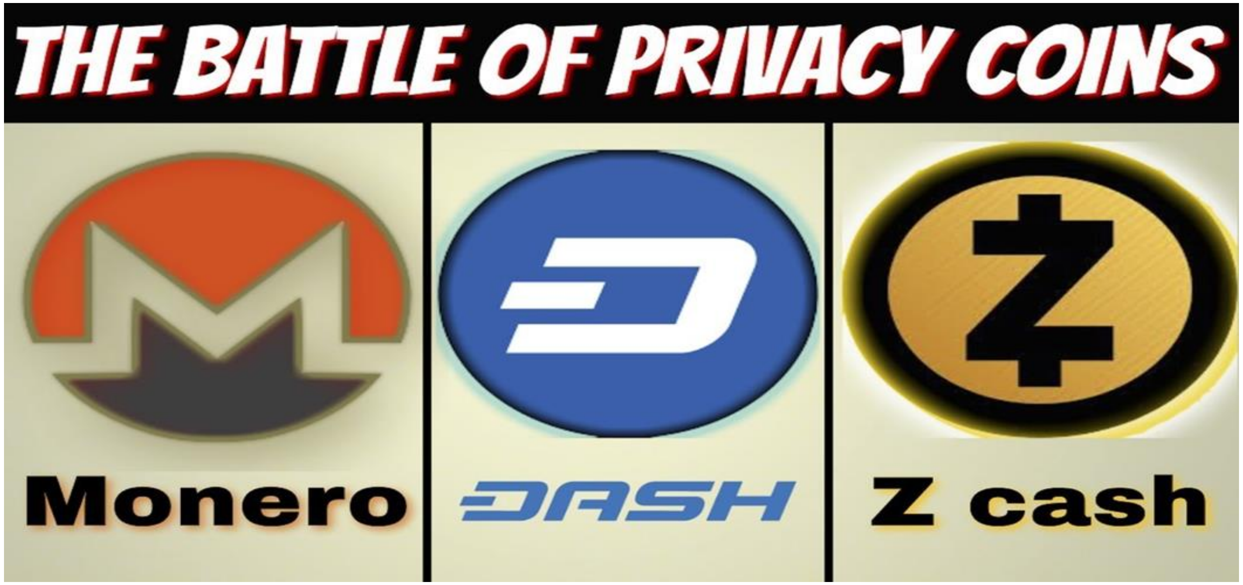
- Informations fournies par les exchanges
    - historique des transactions fiat/crypto, crypto/crypto
    - KYC, le plus souvent à distance (ID, voire échanges avec service client)
    - logs de connexion
    - comptes bancaires, adresses crypto et moyens de paiements rattachés

5. Outils et techniques rendant plus difficile la traçabilité des opérations

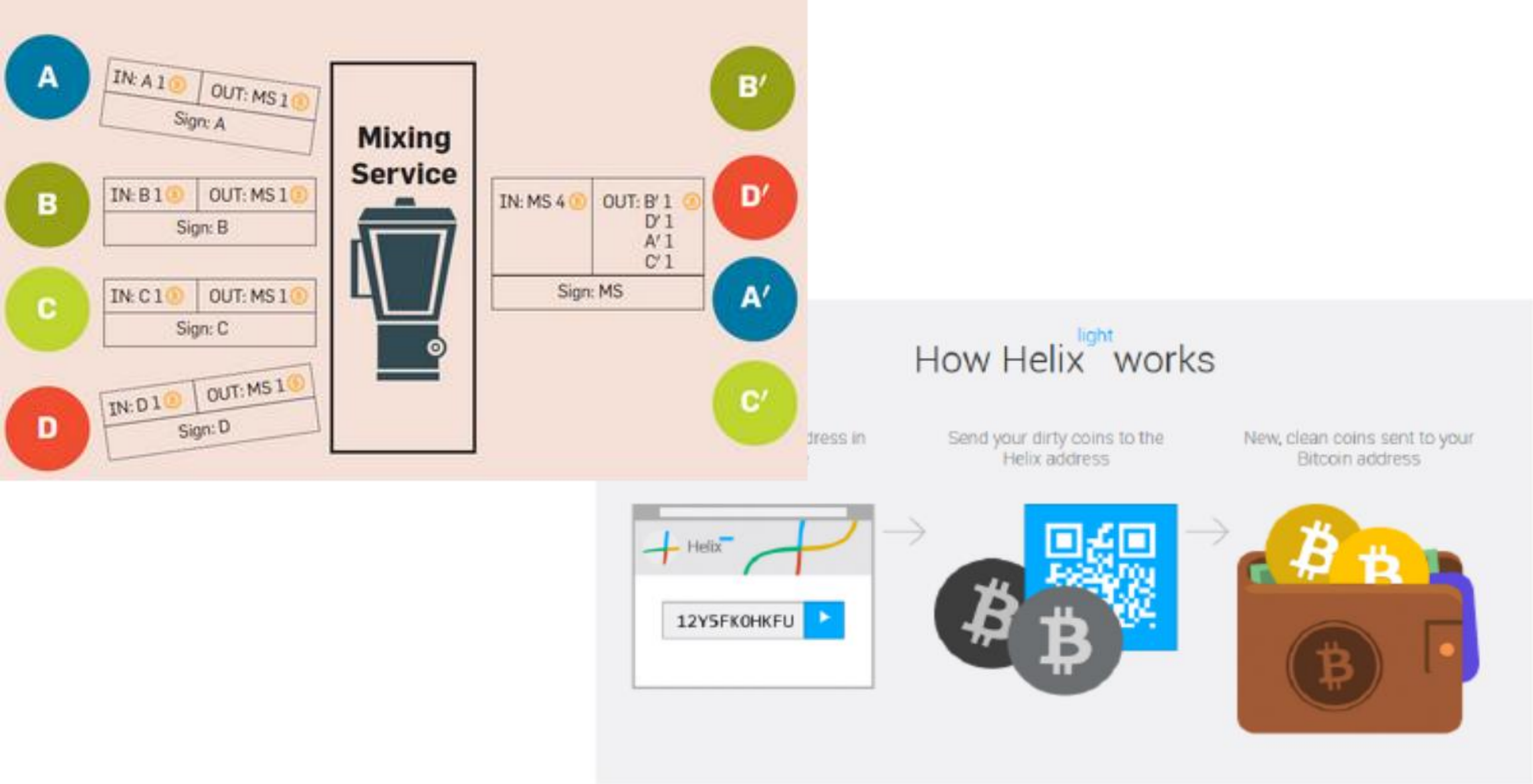
- Les bonnes vieilles recettes : recours à plusieurs exchanges, smurfing, utilisation de plusieurs blockchain
- Privacy coins : Monero, Dash, Zcash…
- Les mixers
- Les cartes prépayées
- Over-the-counter (OTC) trading

Swapping

‘privacy coins’



Les mixers



Simple

1 transaction in, Many transactions out

Speedy

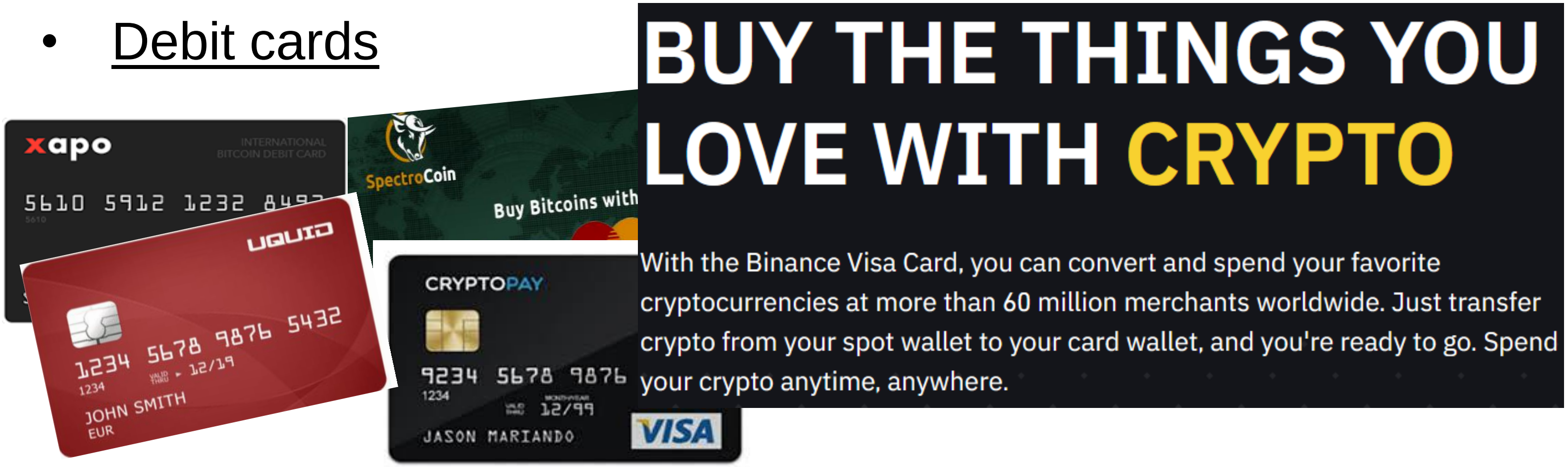
Cleans coins in 30 minutes

Easy

No account needed

Les cartes prépayées

- Debit cards



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- Vouchers

FORGET THE RING, WE NEED BITCOIN.
B. Rich
HEDGEYE