

Will-wallet: A Peer-to-Peer Trustless custodian solution.

Yilak kidane

yilakb@lbtill.com

www.will-wallet.com

12-1-2018

Abstract: Bitcoin protected by unbreakable cryptography. This attribute makes it a secure way to store wealth, but also creates the risk that when Bitcoin owner pass without passing on the private key, his heirs may discover his wallet only to realize that they will never gain access to the wealth inside. To prevent this, the owner must ensure someone gets a copy of the private key or entrusting it with a commercial service that manages them. Some of these methods come with their own perils and difficult to rely on.

Will-wallet: Aiming to solve problems we encounter when it comes to digital asset custody. The solution proposed in this paper improve your digital assets to be transferred safely to the rightful heirs without trusting 3rd party and enables you to maintain full Control of your fund, make some changes if necessary, without any concern of losing asset or bear unnecessary costs.

The following example below illustrates, how this can be achieved by using will-wallet on Bitcoin network.

Create address: <http://will-wallet.com/#newAddress>

1st Will sender address

Address

bc1qdg6z5ulq036k7f6jkfzup6addvpna0qlaxsz5h

Redeem Script

6a342a73e07c756f2752b245c0ebad6b033ebc1f

Address Public key

02d7d0ff64ebc5bb53a579f49e3a1c22b953994c2a3343fe05cd981c43b82d437f

Private key

L4S2cgu1YjUP7M1F87wG6kjUyCXtjvXAsNqNNrncR7qeqWpdNSM2

2nd will sender address (optional but recommended)

Address

bc1qceq6s66e3f7emydcfalxur6tpdvdzkl7hskwn Redeem Script

c641a86b598a7d9d91b84f7e6e0f4b0b58d158df

Public key

03147f71af984c870fd036e7eb276ed121f76b3dd95e6261a3c6bbe5c6a154184d

Private key

L2TktDeSDZHgeNdzqCe3xG1jZNzNA2E69nrG3XC8fbhaxxmwmRuu

Will receiver address (For practical, real-world application receiver only need to provide public key)

Address bc1q33s636j9pvmstvfhujxvh0u50n8kwpgcnyfvq6s

Redeem Script

8c61a8ea450b370626fc919977f28f99ece0a313

Public key

03c886136a0e2038ed318a541fc3aa54a4b3922f70caef209c51cc91f9f801fb54

Private key

L5TXCc9fX1GJ1fb3YQqLDRJt8y3RfTcyCkM88YAdhkApcv6Vgf

Step 1

Create Multisig Address <http://will-wallet.com#newMultiSig>

Create a multi signature address using (will receiver address_1st address Will sender, 2nd address will sender.)

Crating (2, 3) Multisig address, enables you to control the two private keys needed to make some change if necessary, after we set up the will to be transferred on a specific future date, during that time you have full control of the fund to adjust or sign it to different receiver if needed

The screenshot shows the 'New Multisig Address' form on the Will-Wallet website. The form is titled 'New Multisig Address Secure multisig address'. It includes a sidebar with navigation links: HOME, Transaction, Verify, Sign, Broadcast, Entrusting, BTI, and About. The main content area has a yellow background. It contains a section for 'Public keys' with three input fields for public keys and a dropdown for 'Enter the amount of signatures required to release the coins' set to 2. Below this is a 'Redeem Script' section with a text area containing a long hexadecimal string. At the bottom, there is a 'Shareable URL' section with a text area containing a long URL. A 'Submit' button is located at the bottom right of the form.

New Multisig Address: 3LWvXsUYJWihjZ53wMniaqB8z76Coe3ahv

Redeem Script

522103c886136a0e2038ed318a541fc3aa54a4b3922f70caef209c51cc91f9f801fb542102d7d0ff64ebc5bb53a579f49e3a1c22b953994c2a3343fe05cd981c43b82d437f2103147f71af984c870fd036e7eb276ed121f76b3dd95e6261a3c6bbe5c6a154184d53ae

<http://will-wallet.com#verify>

The screenshot shows the 'Verify' form on the Will-Wallet website. The form is titled 'Verify transactions and other scripts'. It includes a sidebar with navigation links: HOME, Transaction, Verify, Sign, Broadcast, Entrusting, and About. The main content area has a yellow background. It contains a section for 'Enter the raw transaction, redeem script, pubkey, hd address or wif key to convert it into a readable format that can be verified manually.' with a text area containing a long hexadecimal string. Below this is a 'Redeem Script' section with a text area containing the same string. At the bottom, there is a 'Multi Signature Address' section with a text area containing the address '3LWvXsUYJWihjZ53wMniaqB8z76Coe3ahv'. Below that is a 'Required Signatures' section with a dropdown set to 2. At the bottom, there is a 'Signatures Required from' section with a table of six input fields for signatures.

Step 2

Send the desired amount of digital asset like to include in the will to the newly produce Multisig address.



Step 3

Create a new transaction: <http://will-wallet.com/#newTransaction>

Create a transaction to the Will receiver address: `bc1q33s636j9pvmsvfhuixvh0u50n8kwpgcnyfvq6s` using the Multisig redeem script from step 1.

In this step, if we have more fund in the address then we like to include in this will or we need to send for several will receiver we can adjust that by including our return address or other receiver address.

For this example, only one receiver gets the entire fund.

HOME

Transaction

Verify

Sign

Broadcast

Entrusting

BTI

About

wallets

Legacy

SagWit

MultiSig

Browser

Time Lock

HD

Transaction

Create a new transaction

Use this page to create a raw transaction

Address, WIF key or Redeem Script

522103c886136af392270c9ef209c51cc91f9f801fb542102d7d0ff64ebc5bb53a579f49e3a1c22b953994c2a3343fe05cd981c43b82d437f2103147f71af984c870fd036e7eb276ed121f76b3dd95e6261a3c6bbe5c6a154184d53aeffffffff0180bb000000000001600148c61a8ea450b370626fc919977f28f99ece0a31300000000

Load

Retrieved unspent inputs from address 3LWxJdYJWkz253wMniaqB8r76Cea3dv

Advanced Options

Outputs (0.0004000)

Inputs (0.0004000)

Enter the address and amount you wish to make a payment to.

Address

Amount

bclq33s636j9pvmvfhujxvh0u50n8kwpgeyfvq6s

0.0004

Transaction Fee

0.00000000

Transaction

The transaction below has been generated and encoded. It can be broadcasted once it has been signed.

0100000001b5c09310348976438921f5bedde9d562dfa41eec5fe894d921a78b07251e700a01000000069522103c886136a0e2038ed318a541fc3aa54a4b392270caef209c51cc91f9f801fb542102d7d0ff64ebc5bb53a579f49e3a1c22b953994c2a3343fe05cd981c43b82d437f2103147f71af984c870fd036e7eb276ed121f76b3dd95e6261a3c6bbe5c6a154184d53aeffffffff0180bb000000000001600148c61a8ea450b370626fc919977f28f99ece0a31300000000

Size: 187 bytes

Submit

Raw transaction

0100000001b5c09310348976438921f5bedde9d562dfa41eec5fe894d921a78b07251e700a01000000069522103c886136a0e2038ed318a541fc3aa54a4b392270caef209c51cc91f9f801fb542102d7d0ff64ebc5bb53a579f49e3a1c22b953994c2a3343fe05cd981c43b82d437f2103147f71af984c870fd036e7eb276ed121f76b3dd95e6261a3c6bbe5c6a154184d53aeffffffff0180bb000000000001600148c61a8ea450b370626fc919977f28f99ece0a31300000000

Verify

HOME

Transaction

Verify

Sign

Broadcast

Entrusting

Verify

transactions and other scripts

Enter the raw transaction, redeem script, pubkey, hd address or wif key to convert it into a readable format that can be verified manually.

0100000001b5c09310348976438921f5bedde9d562dfa41eec5fe894d921a78b07251e700a01000000069522103c886136a0e2038ed318a541fc3aa54a4b392270caef209c51cc91f9f801fb542102d7d0ff64ebc5bb53a579f49e3a1c22b953994c2a3343fe05cd981c43b82d437f2103147f71af984c870fd036e7eb276ed121f76b3dd95e6261a3c6bbe5c6a154184d53aeffffffff0180bb000000000001600148c61a8ea450b370626fc919977f28f99ece0a31300000000

Transaction Script

The above script has been decoded

Version: 1

Transaction Size: 187 bytes

Lock time: 0

Inputs

Txid	N	Script	Signed?	MultiSig?
0a701e25078ba721d994e85fec1ea4df62d5e9ddbef52189437689341093c0b5	1	522103c886136af		2 of 3

Outputs

Address	Amount	Script
bclq33s636j9pvmvfhujxvh0u50n8kwpgeyfvq6s	0.00040000	00148c61a8ea450

Step 4

Sign transaction: <http://will-wallet.com/#sign>

Using 1st privet key of Will sender we sign the Raw transaction

Private Key (WIF key): L4S2cgu1YjUP7M1F87wG6kJUyCXtJvXAsNqNNrncR7qeqWpdNSM2

This transaction has been signed with one private key.

```
0100000001b5c09310348976438921f5bedde9d562dfa41eec5fe894d921a78b07251e700a01000000b40047304402204f43340fba2f561be039d2deb5a2df0d9491a6b5771350539693a8346073f4a3022025c6195cd91b24f374538913241f4a86c544c9dfa6beb670e7eaa960f5bfb2a014c69522103c886136a0e2038ed318a541fc3aa54a4b3922f70caef209c51cc91f9f801fb542102d7d0ff64ebc5bb53a579f49e3a1c22b953994c2a3343fe05cd981c43b82d437f2103147f71af984c870fd036e7eb276ed121f76b3dd95e6261a3c6bbe5c6a154184d53aeffffffff0180bb00000000000001600148c61a8ea450b370626fc919977f28f99ece0a31300000000
```

Step 5

Using 3RD PARTY smart contract, delayed text/email message or personal custodian, set up to deliver the raw transaction to [Will receiver](#) at a specific future date or circumstance.

The need for the 3RD party here is precisely what you chose, but it comes after the contract being enforced, not before. For that reason, the fund is safe even if the raw transaction held by a 3rd party or become public.

The above Signed raw transaction can't be executed without one of the remaining two privet keys. One held by the receiver and the other held by the sender. In case the receiver gets the raw transaction before the intended time, we can include time lock to the receiver address.

When the [will receiver](#) gets the half signed raw transaction, can now Proceed to sign it with his/her privet key and broadcast to receive the digital asset.

HOME Transaction Verify Sign Broadcast Entrusting BTI About

wallets
Legacy
SegWit
MultiSig
Browser
Time Lock
HD

Sign Transaction

once a transaction has been verified

Once you have verified a transaction you can sign and then broadcast it into the network.

Private key

[Masked Private Key] Show

[Raw Transaction Hex String]

☒ Advanced Options

Signed transaction

The above transaction has been signed.

[Signed Transaction Hex String]

Size: 324 bytes

Submit

Fully Signed transaction ready to be broadcast

1st signed by one of the sender privet key.

2nd signed by will receiver privet key.

0100000001b5c09310348976438921f5bedde9d562dfa1eec5fe894d921a78b07251e700a01000000fc00473044022073450bc3b02e66292ab337e4687d280c91c871d2bec6ae4e4ee155c3d9a8596f02203bda45efa49d754f8447b09654ff9346e809eb2756eadf82967b8b16947939550147304402204f43340fba2f561be039d2deb5a2df0d9491a6b5771350539693a8346073f4a3022025c6195cd91b24f374538913241f4a86c544c9dfa6beb670e7eaff960f5bfb2a014c69522103c886136a0e2038ed318a541fc3aa54a4b3922f70caef209c51cc91f9f801fb524102d7d0ff64ebc5bb53a579f49e3a1c22b953994c2a3343fe05cd981c43b82d437f2103147f71af984c870fd036e7eb276ed121f76b3dd95e6261a3c6bbe5c6a154184d53aeffffffff0180bb0000000000001600148c61a8ea450b370626fc91997728f99ece0a31300000000

[Verify](http://will-wallet.com/#verify) <http://will-wallet.com/#verify>

HOMETransactionVerifySignBroadcastEntrusting

Verify transactions and other scripts

Enter the raw transaction, redeem script, pubkey, hd address or wif key to convert it into a readable format that can be verified manually.

0100000001b5c09310348976438921f5bedde9d562dfa41eeca5fe894d921a78b07251e700a010000000fc00473044022073450bc3b02e66292ab337e4687d280c91c871d2bec6ae4e4ee155c3d9a8596fd2203bda45efa49d754f8447b09654ff9346e809eb2756eadf82967b8b16947939550147304402204f43340fba2f561be039d2deb5a2df0d9491a6b5771350539693a8346073f4a3022025c6195cd91b24f374538913241f4a86c544c9dfa6beb670e7eaa9f960f5bfb2a014c69522103c886136a0e2038ed318a541fc3aa54a4b3922f70caef209c51cc91f9f801fb542102d7d0ff64ebc5bb53a579f49e3alc22b953994c2a3343fe05cd981c43b82d437f2103147f71af984c870fd036e7eb276ed121f76b3dd95e6261a3c6bbe5c6a154184d53aeffffffff0180bb0000000000001600148c61a8ea450b370626fc919977f28f99ece0a313000000000

Transaction Script

The above script has been decoded

Version: 1

Transaction Size: 334 bytes

Lock time: 0

Inputs

Txid	N	Script	Signed?	MultiSig?
0a701e25078ba721d994e85feclea4df62d5e9ddbef52189437689341093c0b5	1	00473044022073	2	2 of 3

Outputs

Address	Amount	Script
bc1q33s636j9pvmvfuhjxvhDu050n8kwpgcnrfvq6s	0.00048000	00148c61a8ea450b370626fc91

[Broadcast](http://will-wallet.com/#broadcast) <http://will-wallet.com/#broadcast>

HOMETransactionVerifySignBroadcastEntrustingBTIAbout

wallets

Legacy

SegWit

MultiSig

Browser

Time Lock

HD

Broadcast Transaction into the bitcoin network

Enter your hex encoded bitcoin transaction

0100000001b5c09310348976438921f5bedde9d562dfa41eeca5fe894d921a78b07251e700a010000000fc00473044022073450bc3b02e66292ab337e4687d280c91c871d2bec6ae4e4ee155c3d9a8596fd2203bda45efa49d754f8447b09654ff9346e809eb2756eadf82967b8b16947939550147304402204f43340fba2f561be039d2deb5a2df0d9491a6b5771350539693a8346073f4a3022025c6195cd91b24f374538913241f4a86c544c9dfa6beb670e7eaa9f960f5bfb2a014c69522103c886136a0e2038ed318a541fc3aa54a4b3922f70caef209c51cc91f9f801fb542102d7d0ff64ebc5bb53a579f49e3alc22b953994c2a3343fe05cd981c43b82d437f2103147f71af984c870fd036e7eb276ed121f76b3dd95e6261a3c6bbe5c6a154184d53aeffffffff0180bb0000000000001600148c61a8ea450b370626fc919977f28f99ece0a313000000000

txid: c4d35d1ef81ae495292c55787403b4ed9e7f93395d063fdc46a10600b219c833

Submit

txid: c4d35d1ef81ae495292c55787403b4ed9e7f93395d063fdc46a10600b219c833

<https://www.blockchain.com/btc/tx/c4d35d1ef81ae495292c55787403b4ed9e7f93395d063fdc46a1060b219c833>

BLOCKCHAIN

c4d35d1ef81ae495292c55787403b4ed9e7f93395d063fdc46a1060b219c833

3LVvXsUYJWihjZ53wMniaqB8z76Coe3ahv
(0.0005 BTC - Output)

bc1q33s636j9pvmsvfhuixvh0u50n8kwpgcnyfvq6s -
(Unspent)

0.00048 BTC

0.00048 BTC

Summary

Size334 (bytes)

Weight1336

Received Time2019-01-23 20:20:05

Included In Blocks559810 (2019-01-23 23:22:05 + 182 minutes)

Confirmations104

VisualizeView Tree Chart

Inputs and Outputs

Total Input0.0005 BTC

Total Output0.00048 BTC

Fees0.00002 BTC

Fee per byte5.988 sat/B

Fee per weight unit1.497 sat/WU

Estimated BTC Transacted0.00048 BTC

ScriptsHide scripts & coinbase

Now as you can see the fund is in the [Will receiver](#) address.

DONE...

Option

To solve early release of fund in the case of receiver get the raw half signed transaction before the intended time or we like to give the raw transaction to the receiver without involving 3rd party to hold until the intended time.

Include Step 2.5

OP_CHECKLOCKTIMEVERIFY: <http://will-wallet.com/#newTimeLocked>

Create New Time Locked Addresses from the original Public keys of the [Will receiver](#) and the fund can be released only after a certain specific date the sender set up.

OP_CHECKLOCKTIMEVERIFY (OP_HODL) to create a time locked address where the funds cannot be spent until a set date and time has passed.

Public key of receiver :03c886136a0e2038ed318a541fc3aa54a4b3922f70caef209c51cc91f9f801fb54

[HOME](#)
[Transaction](#)
[Verify](#)
[Sign](#)
[Broadcast](#)
[Entrusting](#)
[BTI](#)
[About](#)

wallets

Legacy

SegWit

MultiSig

Browser

Time Lock

HD

New Time Locked Address

Coins can be released only after a certain date

Use `OP_CHECKLOCKTIMEVERIFY (OP_NODL)` to create a time locked address where the funds are unspendable until a set date and time has passed

Public keys can be generated in your browser or from your bitcoin client

Enter the public key that will be able to unlock the funds after the a certain date

Enter the ☒ **date and time** or ☐ **blockheight** required to release the coins

Address

Payment should be made to this address:

Redeem Script

This script should be *saved* and *should be shared with all the participants* before a payment is made, so they may validate the authenticity of the address. It will also be used later to release the bitcoins

Shareable URL

Submit

Fund release date set by sender 01/01/2025 00:00 transaction should be made to this receiver

address: 32twaD5B69wwMUMUpQwErCeMuEoD4sgLBC

Redeem Script

This script should be saved and should be shared with all the participants before a payment is made, so they may validate the authenticity of the address, it will also be used later to release the bitcoins.

04e0d97467b1752103c886136a0e2038ed318a541fc3aa54a4b3922f70caef209c51cc91f9f801fb54ac Required

Signature

1DoGbP2mQG2ShFQxL5gTirnbv8vt7HTU4G

[HOME](#)
[Transaction](#)
[Verify](#)
[Sign](#)
[Broadcast](#)
[Entrusting](#)

Verify transactions and other scripts

Enter the raw transaction, redeem script, pubkey, hd address or wif key to convert it into a readable format that can be verified manually.

Redeem Script

The above redeem script has been decoded

Hadl Address

Required Signature

Unlock Time

Submit

Then repeat the same process from Step 3.

Will wallet:

Provide much more versatility, security and flexibility without 3rd party trust.

1. Digital asset can be released any time before the receiver receives the signed transaction by the sender if necessary.
2. The fund can be used any time before the receiver execute the transaction. If the fund replaced with adequate funding the transaction still be executable upon broadcast.
3. If things change, receiver no longer need it or lost his personal wallet private key it can be resigned to a different receiving address, with the two pk the sender hold.
4. We can also include more than one wallet address in one transaction for someone want his asset to be divided between several receivers.
5. Only one receiver required to sign the second signature and broadcast the transaction. All receive the fund into their personal wallet simultaneously.

Conclusion

Will wallet solve the problem of transferring inheritance or any found upon unfortunate circumstance like the holder of digital asset passing or any reasons restrict the holder to transfer his/her asset if setup ahead. The possibility of this method is not limited to the above use case, it can be implemented in different custodian solution like estate transferal, monthly payout trust fund, insurance payout and exchanges. It also can be implemented for any digital asset support multi signature wallet.

References

[1] "<https://github.com/OutCast3k/coinbin/>."

[2] Tomoya Ishizaki, " <https://github.com/bitcoin/bips/blob/master/bip-0065.mediawiki> "