Copay HD Multisig Address Derivation and Manual Transaction Creation (Draft 1)

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Overview

After the unfortunate shutdown of Coinkite, I realized that I did not actually know how to recover the value I had stored in Multisig accounts (or derive the addresses containing the value) even when in possession of sufficient information. This document is a result of the frustration I encountered when trying to remedy that and my attempt to make sure I can recover value independently of any particular service. If this type of document exists somewhere, I unfortunately did not find it. Hopefully it can save someone else the substantial amount of time it took me to figure this out.

Disclaimer

There are likely some errors, so take everything with a grain of salt. This document was written to cover my particular situation and focuses on BitPay's Copay wallet; however, the tools I used are not BitPay specific. They are all available on GitHub and will run offline.

Example Setup

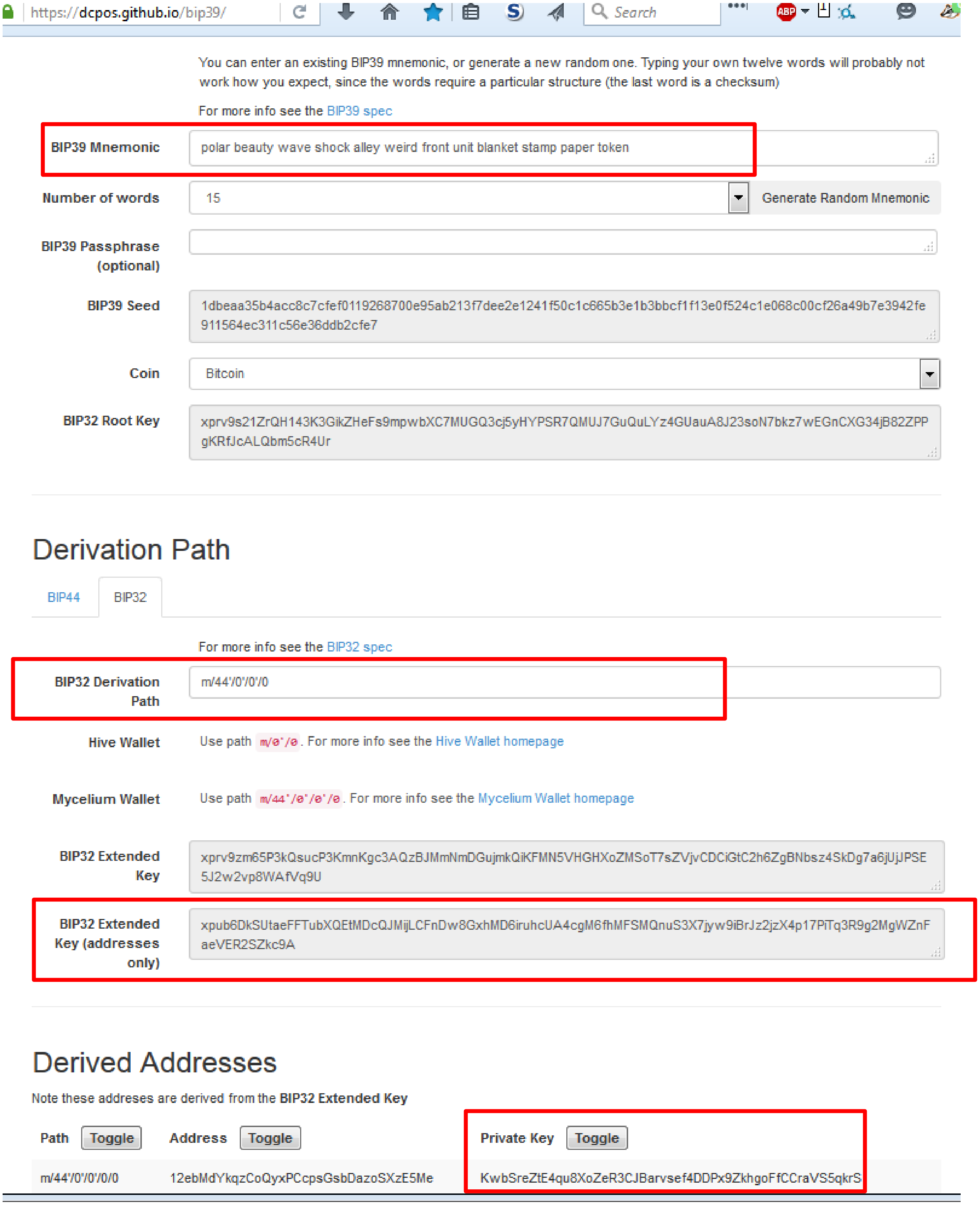
I created a 2-of-3 Copay Multisig wallet for testing. Feel free to use the same wallet to follow the document if you like, but do not transfer any bitcoin to it (unless you don't want it).

Backup Mnemonics for 2-of-3 Multisig Copay wallet used for this example:

- Copayer 0 - **polar beauty wave shock alley weird front unit blanket stamp paper token**
- Copayer 1 - **world modify train layer core grain crash come slush spare round uniform**
- Copayer 2 - **blind pear reveal wood illegal rent trip neither unfair ticket bubble lesson**

Mnemonic to BIP32 Extended Key

1. Enter mnemonic (recovery words) for the cosigner into the **BIP39 Mnemonic** field on https://dcpos.github.io/bip39/
2. Under **Derivation Path**, select the **BIP32** tab and set the **BIP32 Derivation Path** to *m/44'/0'/0'/0* *
3. Copy the **BIP32 Extended Key (addresses only)** field *
4. Note the **Private Key** column under **Derived Addresses** – this is necessary to sign a manually created transaction



You can enter an existing BIP39 mnemonic, or generate a new random one. Typing your own twelve words will probably not work how you expect, since the words require a particular structure (the last word is a checksum)

For more info see the BIP39 spec

BIP39 Mnemonic polar beauty wave shock alley weird front unit blanket stamp paper token

Number of words 15 Generate Random Mnemonic

BIP39 Passphrase (optional)

BIP39 Seed 1dbeaa35b4acc8c7cfef0119268700e95ab213f7dee2e1241f50c1c665b3e1b3bbcf1f13e0f524c1e068c00cf26a49b7e3942fe911564ec311c56e36ddb2cfe7

Coin Bitcoin

BIP32 Root Key xprv9s21ZrQH143K3GikZHeFs9mpwbXC7MUGQ3cj5yHYPSR7QMUJ7GuQuLYz4GUauA8J23soN7bkz7wEGnCXG34jB82ZPPgKRfJcALQbm5cR4Ur

Derivation Path

BIP44 BIP32

For more info see the BIP32 spec

BIP32 Derivation Path m/44'/0'/0'/0

Hive Wallet Use path `m/0'/0`. For more info see the Hive Wallet homepage

Mycelium Wallet Use path `m/44'/0'/0'/0`. For more info see the Mycelium Wallet homepage

BIP32 Extended Key xprv9zm65P3kQsucP3KmnKgc3AQzBJMmNmDGujmkQiKFMN5VHGHXoZMSoT7sZVjvCDCiGtC2h6ZgBNbsz4SkDg7a6jUjJPSE5J2w2vp8WAfVq9U

BIP32 Extended Key (addresses only) xpub6DkSUtaeFFTubXQEtMDcQJMijLCFnDw8GxhMD6iruhcUA4cgM6fhMFSMQnuS3X7jyw9iBrJz2jzX4p17PiTq3R9g2MgWZnFaeVER2SZkc9A

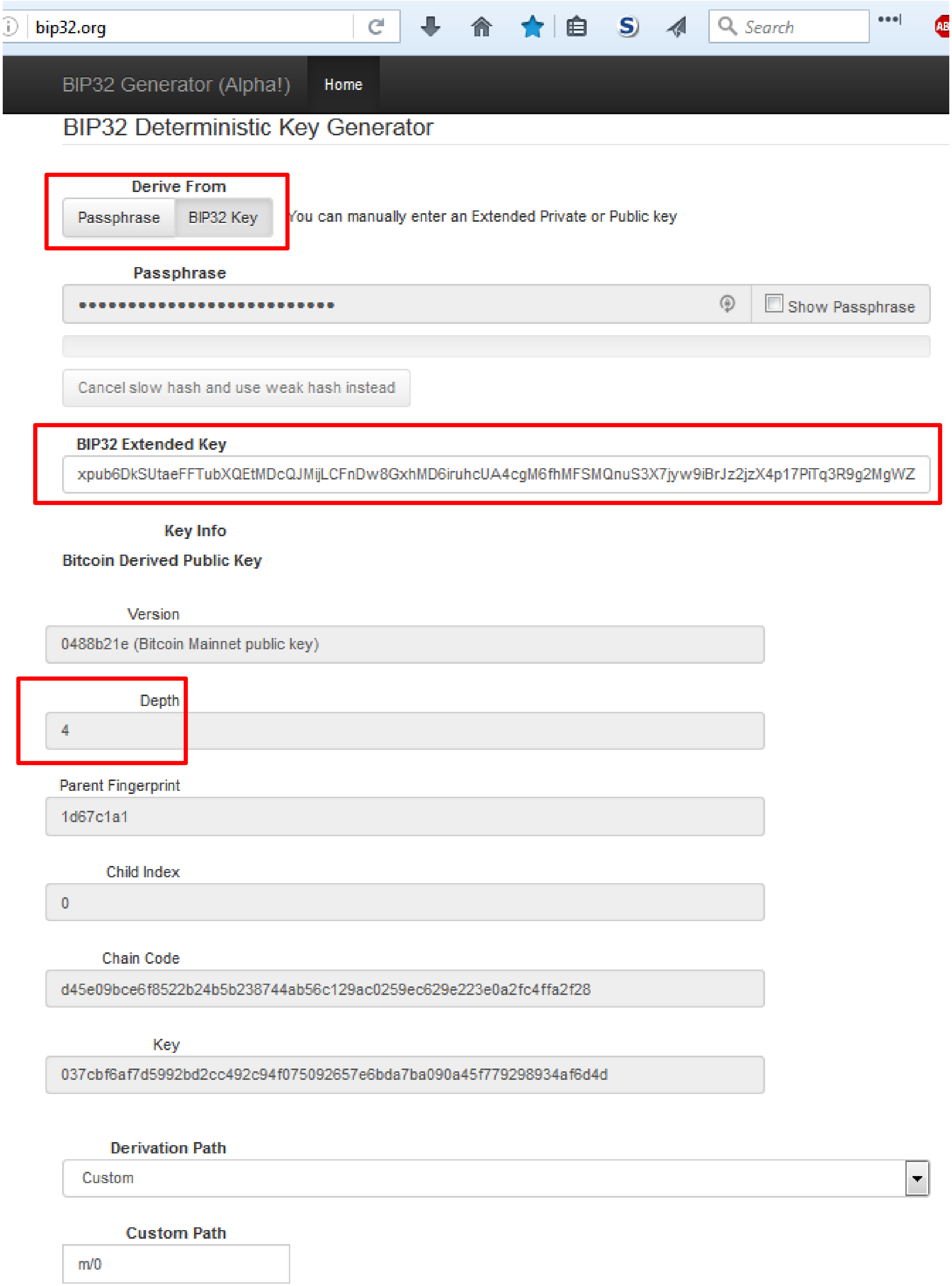
Derived Addresses

Note these addreses are derived from the **BIP32 Extended Key**

Path Toggle	Address Toggle	Private Key Toggle
m/44'/0'/0'/0/0	12ebMdYkqzCoQyxPCcpsGsbDazoSXzE5Me	KwbSreZtE4qu8XoZeR3CJBarvsef4DDPx9ZkhgoFfCCraVS5qkrS

BIP32 Key to Public Key

5. Open http://bip32.org/ and change the **Derive From** option to ***BIP32 Key***
6. Enter the BIP32 Extended Key
    a. The Depth should be 4 (if it is 0, the BIP32 Root Key was copied in step 3 instead of the BIP32 Extended Key)



BIP32 Deterministic Key Generator

Derive From

You can manually enter an Extended Private or Public key

Passphrase

••••••••••••••••••••••••••

□ Show Passphrase

BIP32 Extended Key

xpub6DkSUtaeFFTubXQEtMDcQJMijLCFnDw8GxhMD6iruhcUA4cgM6fhMFSMQnuS3X7jyw9iBrJz2jzX4p17PiTq3R9g2MgWZ

Key Info

Bitcoin Derived Public Key

Version

0488b21e (Bitcoin Mainnet public key)

Depth

4

Parent Fingerprint

1d67c1a1

Child Index

0

Chain Code

d45e09bce6f8522b24b5b238744ab56c129ac0259ec629e223e0a2fc4ffa2f28

Key

037cbf6af7d5992bd2cc492c94f075092657e6bda7ba090a45f779298934af6d4d

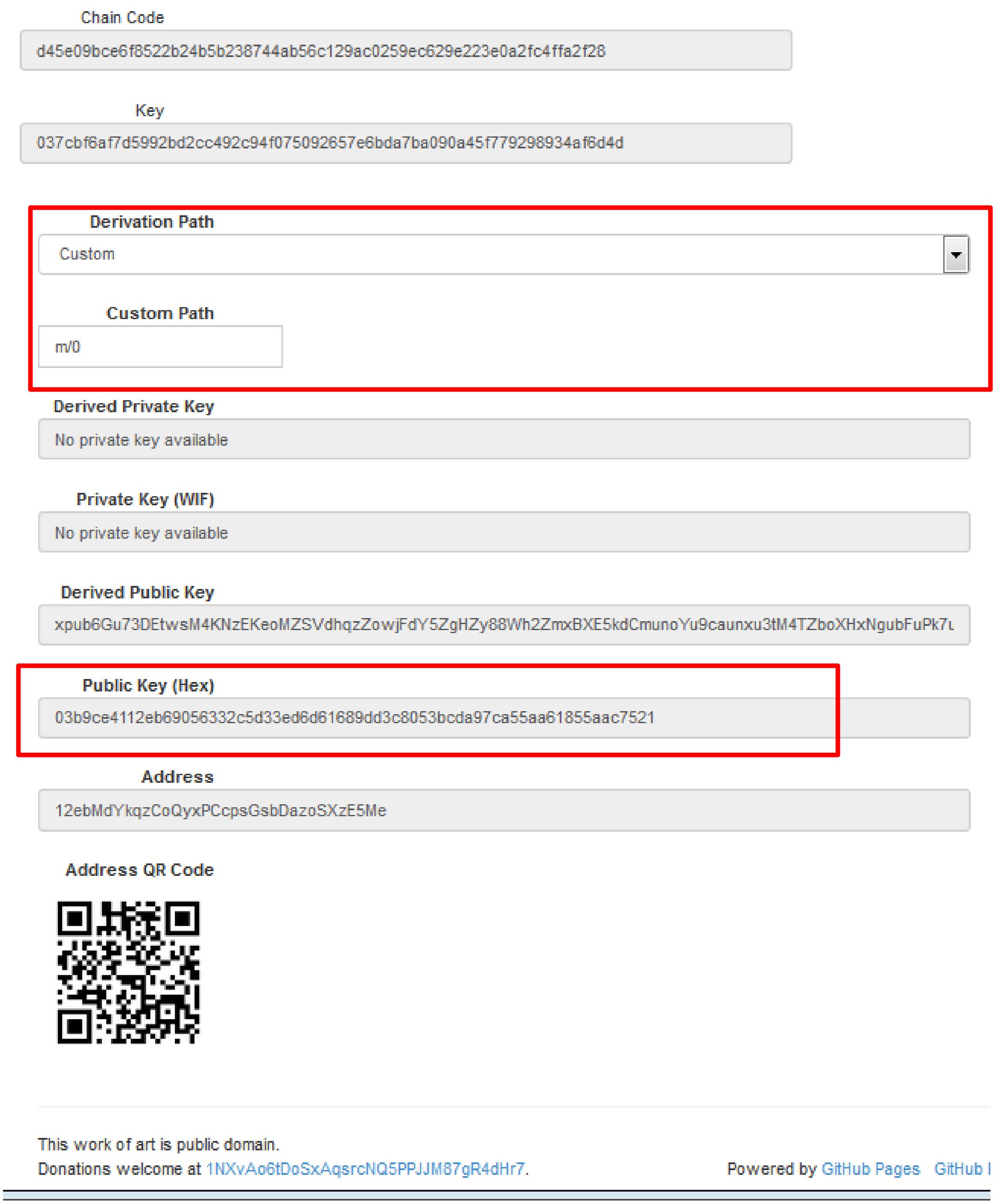
Derivation Path

Custom

Custom Path

m/0

7. Change the **Derivation Path** to ***Custom***
8. Change the **Custom Path** field to ***m/0*** to get the details for the first Key (2nd key is m/1, 3rd is m/2, etc.)
    a. Note that the full path of this key is m/44'/0'/0'/0/0 because path m/0 of the BIP32 Extended key m/44'/0'/0'/0 (from Steps 2 and 3) was used



Chain Code

d45e09bce6f8522b24b5b238744ab56c129ac0259ec629e223e0a2fc4ffa2f28

Key

037cbf6af7d5992bd2cc492c94f075092657e6bda7ba090a45f779298934af6d4d

Derivation Path

Custom

Custom Path

m/0

Derived Private Key

No private key available

Private Key (WIF)

No private key available

Derived Public Key

xpub6Gu73DEtwsM4KNzEKeoMZSVdhqzZowjFdY5ZgHZy88Wh2ZmxBXE5kdCmunoYu9caunxu3tM4TZboXHxNgubFuPk7u

Public Key (Hex)

03b9ce4112eb69056332c5d33ed6d61689dd3c8053bcda97ca55aa61855aac7521

Address

12ebMdYkqzCoQyxPCcpsGsbDazoSXzE5Me

Address QR Code

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Donations welcome at 1NXvAo6tDoSxAqsrcNQ5PPJJM87gR4dHr7.

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9. Copy the **Public Key (Hex)** field and save it for use later when creating the multisig address
10. Go back to Step 1 and repeat for the next cosigner until the Public key for all cosigners has been obtained
    a. The same derivation path must be used for each cosigner key in order to generate the multisig address used by the wallet (i.e. m/44'/0'/0'/0/0 from all cosigners)
11. Once public keys are found for all cosigners, continue with step 12.

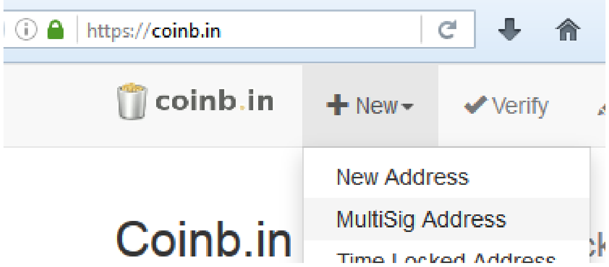
Public Keys to Multisig Addresses

12. The multisig address is based on the Public Keys of each copayer. The order of the keys is critical – entering the same keys in a different order results in a different multisig address. To get the address that corresponds to the one generated by the Copay wallet, the Public Keys are sorted from smallest to largest numerically
    a. For these keys the order is 023…, 039…, 03b… because 023… < 039… < 03b… as shown in the adjusted table below

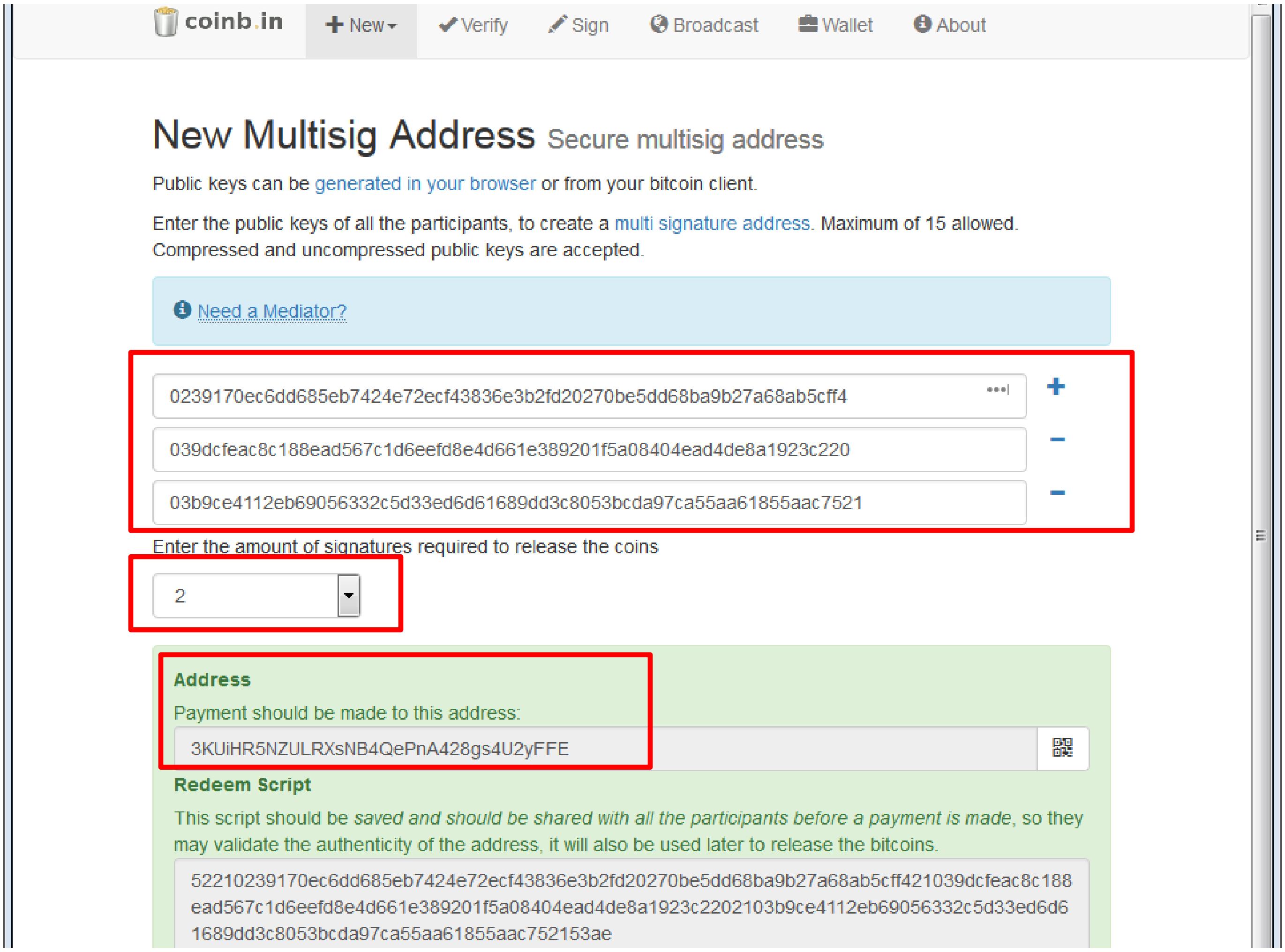
<table>
<tr><th colspan="3">Information from Derivation path m/44’/0’/0’/0/0</th></tr>
<tr><th>Copayer</th><th>Address</th><th>Public Key (Hex)</th></tr>
<tr><td>0</td><td>12ebMdYkqzCoQyxPCcpsGsbDazoSXzE5Me</td><td>03b9ce4112eb69056332c5d33ed6d61689dd3c8053bcda97ca55aa61855aac7521</td></tr>
<tr><td>1</td><td>14CyHaVetHyADBpUyrax3wVPkDoJvSvbUj</td><td>0239170ec6dd685eb7424e72ecf43836e3b2fd20270be5dd68ba9b27a68ab5cff4</td></tr>
<tr><td>2</td><td>12u5XXV2YYPbTLbiqwqcidiQmruFyFH2Gx</td><td>039dcfeac8c188ead567c1d6eefd8e4d661e389201f5a08404ead4de8a1923c220</td></tr>
</table>

<table>
<tr><th colspan="3">Sorted by Public Key (Hex) smallest to largest</th></tr>
<tr><th>Copayer</th><th>Address</th><th>Public Key (Hex)</th></tr>
<tr><td>1</td><td>14CyHaVetHyADBpUyrax3wVPkDoJvSvbUj</td><td>0239170ec6dd685eb7424e72ecf43836e3b2fd20270be5dd68ba9b27a68ab5cff4</td></tr>
<tr><td>2</td><td>12u5XXV2YYPbTLbiqwqcidiQmruFyFH2Gx</td><td>039dcfeac8c188ead567c1d6eefd8e4d661e389201f5a08404ead4de8a1923c220</td></tr>
<tr><td>0</td><td>12ebMdYkqzCoQyxPCcpsGsbDazoSXzE5Me</td><td>03b9ce4112eb69056332c5d33ed6d61689dd3c8053bcda97ca55aa61855aac7521</td></tr>
</table>

13. Go to https://coinb.in and select New -> MultiSig Address (or https://coinb.in/#newMultiSig)



14. Enter the Public Keys in the sorted order, select the number of signatures required (in this example, it was a 2-of-3 wallet, so the amount of signatures required is 2), and Click **Submit**
    a. Link to the address generated in this example: https://coinb.in/?verify=52210239170ec6dd685eb7424e72ecf43836e3b2fd20270be5dd68ba9b27a68ab5cff421039dcfeac8c188ead567c1d6eefd8e4d661e389201f5a08404ead4de8a1923c2202103b9ce4112eb69056332c5d33ed6d61689dd3c8053bcda97ca55aa61855aac752153ae#verify



New Multisig Address Secure multisig address

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

Enter the public keys of all the participants, to create a multi signature address. Maximum of 15 allowed. Compressed and uncompressed public keys are accepted.

Need a Mediator?

0239170ec6dd685eb7424e72ecf43836e3b2fd20270be5dd68ba9b27a68ab5cff4

039dcfeac8c188ead567c1d6eefd8e4d661e389201f5a08404ead4de8a1923c220

03b9ce4112eb69056332c5d33ed6d61689dd3c8053bcda97ca55aa61855aac7521

Enter the amount of signatures required to release the coins

2

Address

Payment should be made to this address:

3KUiHR5NZULRXsNB4QePnA428gs4U2yFFE

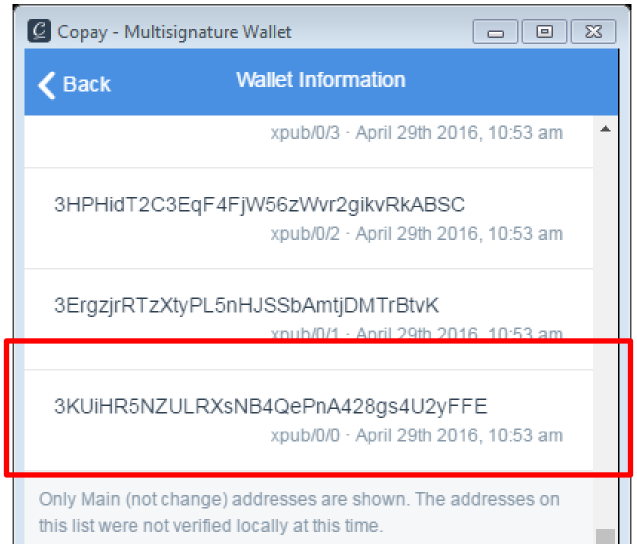
Redeem Script

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.

52210239170ec6dd685eb7424e72ecf43836e3b2fd20270be5dd68ba9b27a68ab5cff421039dcfeac8c188ead567c1d6eefd8e4d661e389201f5a08404ead4de8a1923c2202103b9ce4112eb69056332c5d33ed6d61689dd3c8053bcda97ca55aa61855aac752153ae

Redeem Script (this is necessary to manually create a spend transaction):
52210239170ec6dd685eb7424e72ecf43836e3b2fd20270be5dd68ba9b27a68ab5cff421039dcfeac8c188ead567c1d6eefd8e4d661e389201f5a08404ead4de8a1923c2202103b9ce4112eb69056332c5d33ed6d61689dd3c8053bcda97ca55aa61855aac752153ae

15. The returned address is **3KUiHR5NZULRXsNB4QePnA428gs4U2yFFE** which matches xpub/0/0 shown in Copay -> Wallet Preferences -> Advanced -> Wallet Information



xpub/0/3 · April 29th 2016, 10:53 am

3HPHidT2C3EqF4FjW56zWvr2gikvRkABSC
xpub/0/2 · April 29th 2016, 10:53 am

3ErgzjrRTzXtyPL5nHJSSbAmtjDMTrBtvK
xpub/0/1 · April 29th 2016, 10:53 am

3KUiHR5NZULRXsNB4QePnA428gs4U2yFFE
xpub/0/0 · April 29th 2016, 10:53 am

Only Main (not change) addresses are shown. The addresses on this list were not verified locally at this time.

Recovering funds by manually constructing a transaction

This step assumes that the redeem script has already been obtained using the steps above and the private keys are available (see Mnemonic to BIP32 Extended Key section regarding obtaining private keys). For the example, the bitcoin associated with xpub/0/10 will be transferred to a new address.

Derivation Path: M/44'/0'/0'/0/10

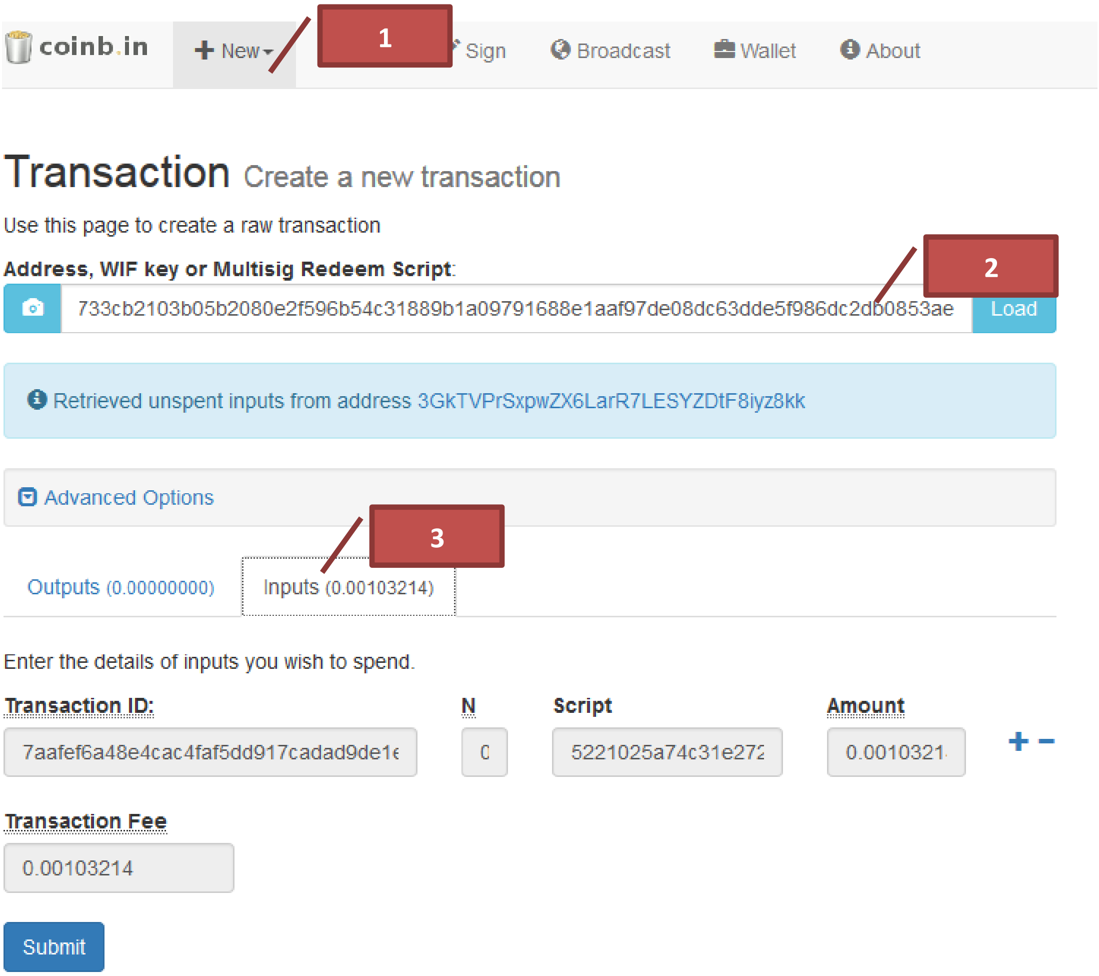
Multisig Address: 3GkTVPrSxpwZX6LarR7LESYZDtF8iyz8kk

Redeem script (Coinb.in Verify Page):

```
5221025a74c31e272a8f0c93e42bb1ca29677bcb0074396692219566653951d8037ddd42102694a59a4494970919b5a46da52d9916cab882e33b27b4e0bd94e2914705733cb2103b05b2080e2f596b54c31889b1a09791688e1aaf97de08dc63dde5f986dc2db0853ae
```

Create the Spend Transaction

1. On coinb.in, Click **New** -> **Transaction**
2. Paste the redeem script into the **Address, WIF key or Multisig Redeem Script:** field and click **Load**
3. Once the unspent funds inputs are retrieved, click on the **Inputs** tab to see the details



Transaction Create a new transaction

Use this page to create a raw transaction

Address, WIF key or Multisig Redeem Script: 733cb2103b05b2080e2f596b54c31889b1a09791688e1aaf97de08dc63dde5f986dc2db0853ae

Retrieved unspent inputs from address 3GkTVPrSxpwZX6LarR7LESYZDtF8iyz8kk

Advanced Options

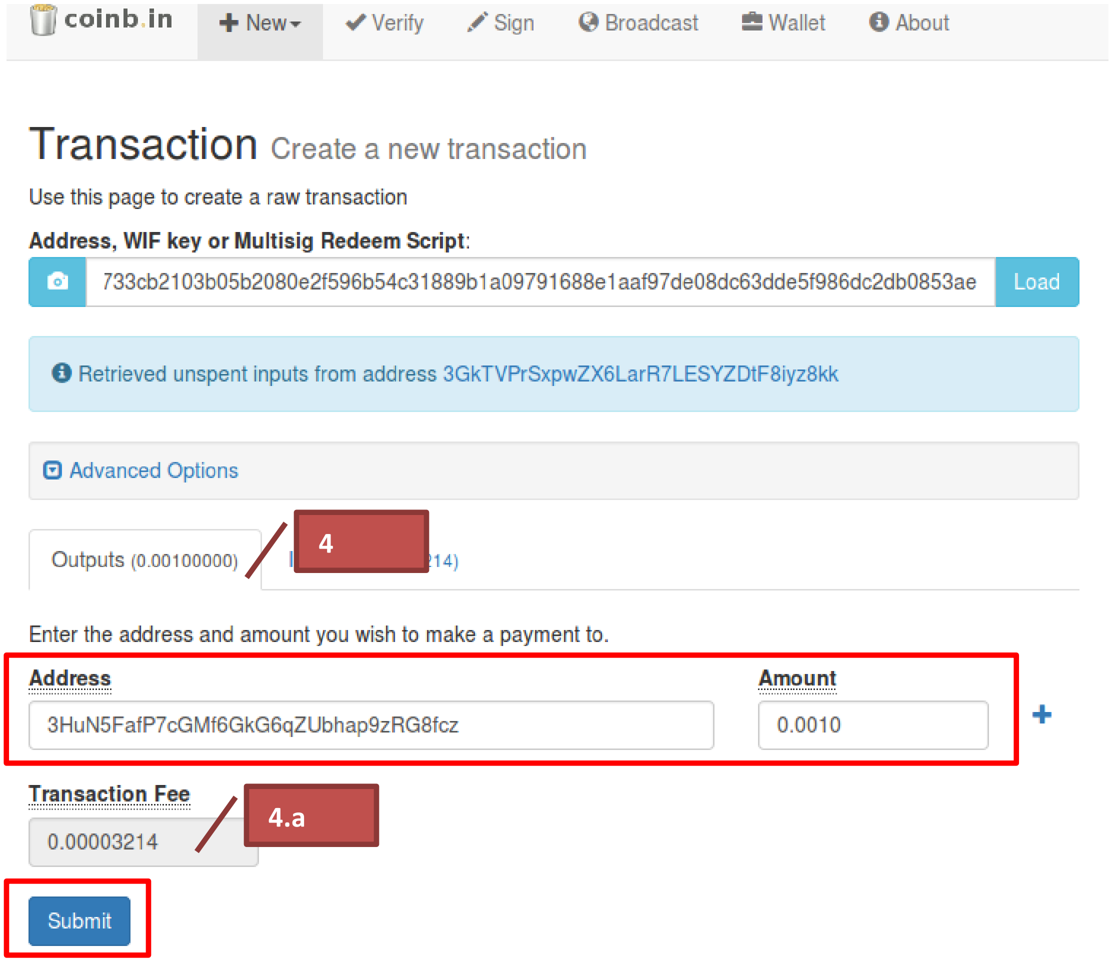
Outputs (0.00000000) Inputs (0.00103214)

Enter the details of inputs you wish to spend.

Transaction ID:	N	Script	Amount
7aafef6a48e4cac4faf5dd917cadad9de1	0	5221025a74c31e272	0.0010321

Transaction Fee: 0.00103214

4. Click the **Outputs** tab, enter the address and amount for each destination (can be split and sent to multiple destinations), then click **Submit** to generate the unsigned transaction.
    a. WARNING: make sure the Transaction Fee is a reasonable amount



Transaction Create a new transaction

Use this page to create a raw transaction

Address, WIF key or Multisig Redeem Script: 733cb2103b05b2080e2f596b54c31889b1a09791688e1aaf97de08dc63dde5f986dc2db0853ae

Retrieved unspent inputs from address 3GkTVPrSxpwZX6LarR7LESYZDtF8iyz8kk

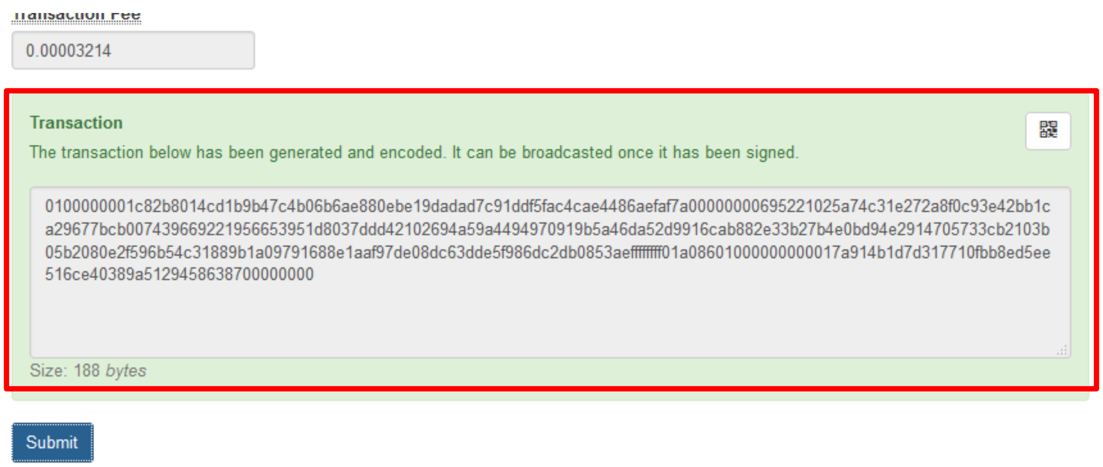
Outputs (0.00100000) I 214)

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

Address: 3HuN5FafP7cGMf6GkG6qZUbhap9zRG8fcz

Amount: 0.0010

Transaction Fee: 0.00003214



Transaction Fee: 0.00003214

Transaction

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

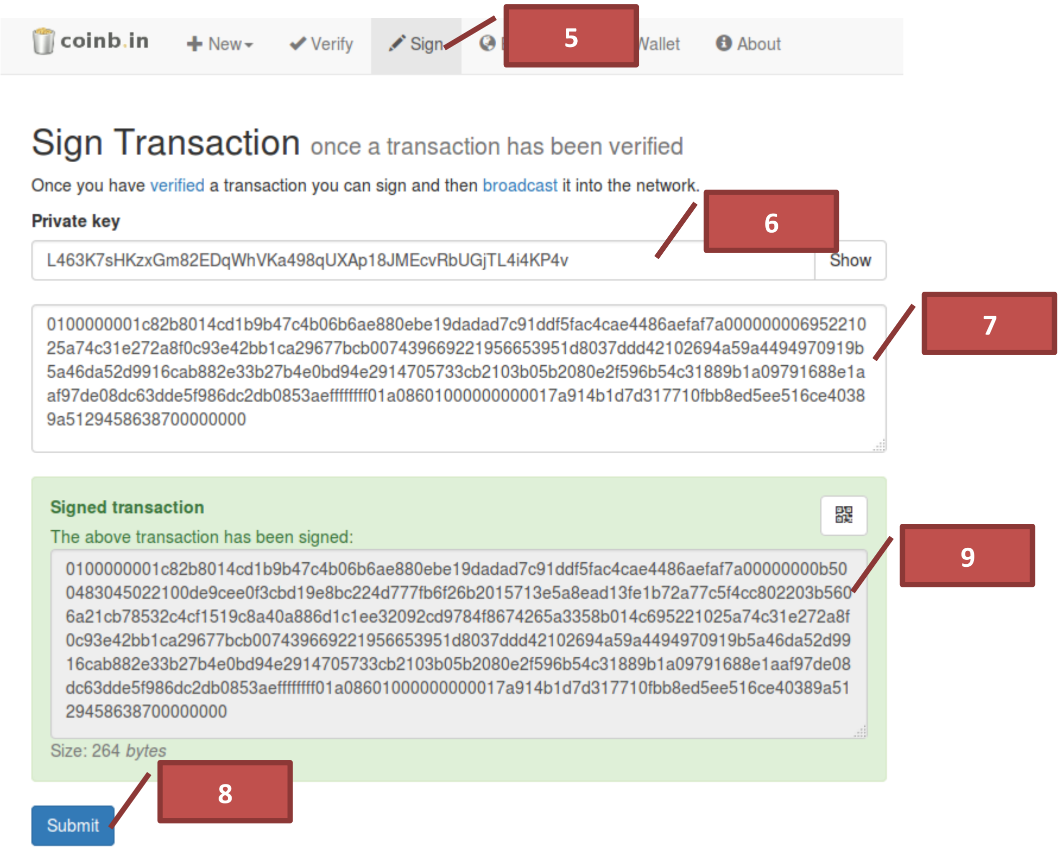
```
0100000001c82b8014cd1b9b47c4b06b6ae880ebe19dadad7c91ddf5fac4cae4486aefaf7a00000000695221025a74c31e272a8f0c93e42bb1c
a29677bcb007439669221956653951d8037ddd42102694a59a4494970919b5a46da52d9916cab882e33b27b4e0bd94e2914705733cb2103b
05b2080e2f596b54c31889b1a09791688e1aaf97de08dc63dde5f986dc2db0853aeffffffff01a08601000000000017a914b1d7d317710fbb8ed5ee
516ce40389a5129458638700000000
```

Size: 188 *bytes*

Unsigned Transaction:
0100000001c82b8014cd1b9b47c4b06b6ae880ebe19dadad7c91ddf5fac4cae4486aefaf7a00000000695221025a74c31e272a8f0c93e42bb1ca29677bcb007439669221956653951d8037ddd42102694a59a4494970919b5a46da52d9916cab882e33b27b4e0bd94e2914705733cb2103b05b2080e2f596b54c31889b1a09791688e1aaf97de08dc63dde5f986dc2db0853aeffffffff01a08601000000000017a914b1d7d317710fbb8ed5ee516ce40389a5129458638700000000

Sign the Spend Transaction

5. Click on the **Sign** menu item
6. Paste the private key for one of the associated multisig account members – Copayer 2 shown here (Note: Private keys are normally hidden – the Show button was clicked for this example).
    a. The key must correspond to the derivation path determined by the multisig address – M/44'/0'/0'/0/10 in this case).
7. Paste the unsigned transaction
8. Click **Submit** to sign the transaction with the private key
9. A new signed transaction will be displayed



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

L463K7sHKzxGm82EDqWhVKa498qUXAp18JMEcvRbUGjTL4i4KP4v

```
0100000001c82b8014cd1b9b47c4b06b6ae880ebe19dadad7c91ddf5fac4cae4486aefaf7a000000006952210
25a74c31e272a8f0c93e42bb1ca29677bcb00743966922195665395 1d8037ddd42102694a59a4494970919b
5a46da52d9916cab882e33b27b4e0bd94e2914705733cb2103b05b2080e2f596b54c31889b1a09791688e1a
af97de08dc63dde5f986dc2db0853aeffffffff01a08601000000000017a914b1d7d317710fbb8ed5ee516ce4038
9a5129458638700000000
```

Signed transaction

The above transaction has been signed:

```
0100000001c82b8014cd1b9b47c4b06b6ae880ebe19dadad7c91ddf5fac4cae4486aefaf7a00000000b50
0483045022100de9cee0f3cbd19e8bc224d777fb6f26b2015713e5a8ead13fe1b72a77c5f4cc802203b560
6a21cb78532c4cf1519c8a40a886d1c1ee32092cd9784f8674265a3358b014c695221025a74c31e272a8f
0c93e42bb1ca29677bcb007439669221956653951d8037ddd42102694a59a4494970919b5a46da52d99
16cab882e33b27b4e0bd94e2914705733cb2103b05b2080e2f596b54c31889b1a09791688e1aaf97de08
dc63dde5f986dc2db0853aeffffffff01a08601000000000017a914b1d7d317710fbb8ed5ee516ce40389a51
29458638700000000
```

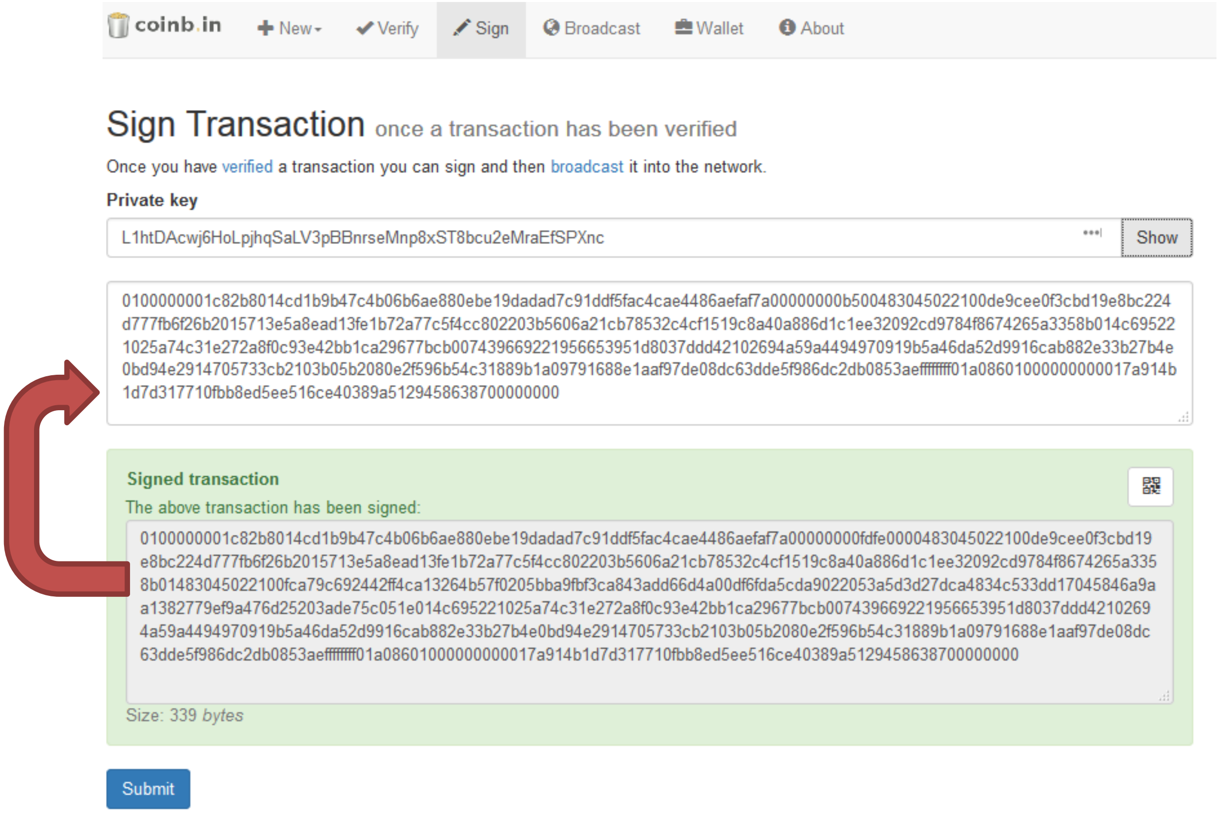
Size: 264 *bytes*

Information from Derivation path m/44’/0’/0’/0/10		
Copayer	**Address**	**Private Key**
0	1N7bBvso3QXc4VWEi7nLCqFGP8p9yqy56z	L1htDAcwj6HoLpjhqSaLV3pBBnrseMnp8xST8bcu2eMraEfSPXnc
1	1PwM4YaFBsoKhEF7RiqLL8bZQmuRKydrEX	L4EYTAxJ8grT6xKGW9bcghVYWrvBCadSc4boCZicWB4GnGEx8m2H
2	1D3CsVtskAqDAkW2r2tPjm9hFnpQjpKm2x	L463K7sHKzxGm82EDqWhVKa498qUXAp18JMEcvRbUGjTL4i4KP4v

New transaction (Original transaction signed with the private key from the Copayer 2)

0100000001c82b8014cd1b9b47c4b06b6ae880ebe19dadad7c91ddf5fac4cae4486aefaf7a00000000b5004830450 22100de9cee0f3cbd19e8bc224d777fb6f26b2015713e5a8ead13fe1b72a77c5f4cc802203b5606a21cb78532c4cf1 519c8a40a886d1c1ee32092cd9784f8674265a3358b014c695221025a74c31e272a8f0c93e42bb1ca29677bcb007 439669221956653951d8037ddd42102694a59a4494970919b5a46da52d9916cab882e33b27b4e0bd94e2914705 733cb2103b05b2080e2f596b54c31889b1a09791688e1aaf97de08dc63dde5f986dc2db0853aeffffffff01a0860100 0000000017a914b1d7d317710fbb8ed5ee516ce40389a5129458638700000000

10. If the minimum number of signers has not been met (i.e. 2 out of 3 for this account), copy the new signed transaction and paste it into the script field, then sign the new transaction with the next private key



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

L1htDAcwj6HoLpjhqSaLV3pBBnrseMnp8xST8bcu2eMraEfSPXnc

```
0100000001c82b8014cd1b9b47c4b06b6ae880ebe19dadad7c91ddf5fac4cae4486aefaf7a00000000b500483045022100de9cee0f3cbd19e8bc224
d777fb6f26b2015713e5a8ead13fe1b72a77c5f4cc802203b5606a21cb78532c4cf1519c8a40a886d1c1ee32092cd9784f8674265a3358b014c69522
1025a74c31e272a8f0c93e42bb1ca29677bcb007439669221956653951d8037ddd42102694a59a4494970919b5a46da52d9916cab882e33b27b4e
0bd94e2914705733cb2103b05b2080e2f596b54c31889b1a09791688e1aaf97de08dc63dde5f986dc2db0853aeffffffff01a08601000000000017a914b
1d7d317710fbb8ed5ee516ce40389a5129458638700000000
```

Signed transaction

The above transaction has been signed:

```
0100000001c82b8014cd1b9b47c4b06b6ae880ebe19dadad7c91ddf5fac4cae4486aefaf7a00000000fdfe0000483045022100de9cee0f3cbd19
e8bc224d777fb6f26b2015713e5a8ead13fe1b72a77c5f4cc802203b5606a21cb78532c4cf1519c8a40a886d1c1ee32092cd9784f8674265a335
8b01483045022100fca79c692442ff4ca13264b57f0205bba9fbf3ca843add66d4a00df6fda5cda9022053a5d3d27dca4834c533dd17045846a9a
a1382779ef9a476d25203ade75c051e014c695221025a74c31e272a8f0c93e42bb1ca29677bcb007439669221956653951d8037ddd4210269
4a59a4494970919b5a46da52d9916cab882e33b27b4e0bd94e2914705733cb2103b05b2080e2f596b54c31889b1a09791688e1aaf97de08dc
63dde5f986dc2db0853aeffffffff01a08601000000000017a914b1d7d317710fbb8ed5ee516ce40389a5129458638700000000
```

Size: 339 *bytes*

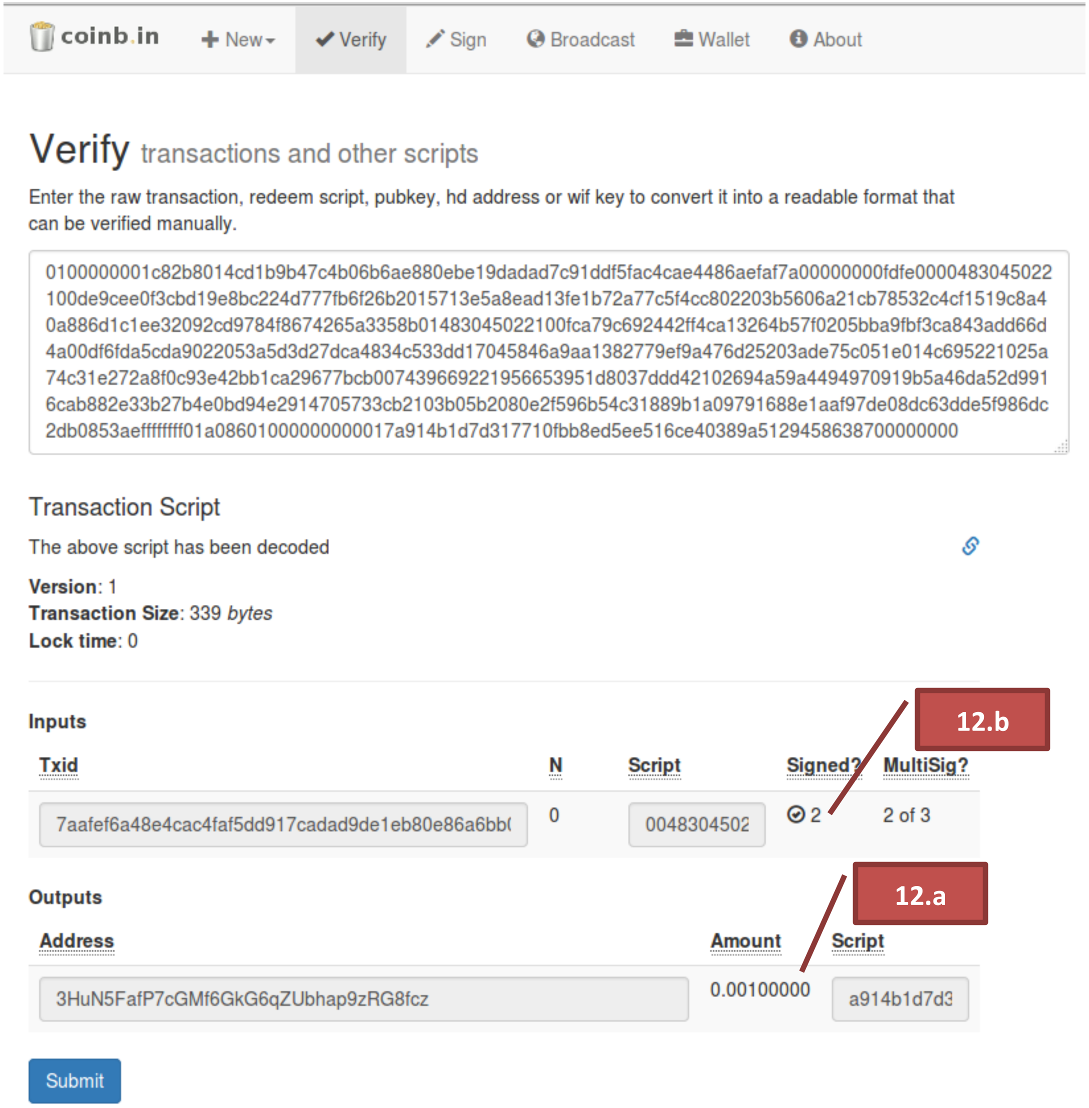
New Transaction 2 (First signed transaction signed by Copayer 0)

0100000001c82b8014cd1b9b47c4b06b6ae880ebe19dadad7c91ddf5fac4cae4486aefaf7a00000000fdfe0000483045022100de9cee0f3cbd19e8bc224d777fb6f26b2015713e5a8ead13fe1b72a77c5f4cc802203b5606a21cb78532c4cf1519c8a40a886d1c1ee32092cd9784f8674265a3358b01483045022100fca79c692442ff4ca13264b57f0205bba9fbf3ca843add66d4a00df6fda5cda9022053a5d3d27dca4834c533dd17045846a9aa1382779ef9a476d25203ade75c051e014c695221025a74c31e272a8f0c93e42bb1ca29677bcb007439669221956653951d8037ddd42102694a59a4494970919b5a46da52d9916cab882e33b27b4e0bd94e2914705733cb2103b05b2080e2f596b54c31889b1a09791688e1aaf97de08dc63dde5f986dc2db0853aeffffffff01a08601000000000017a914b1d7d317710fbb8ed5ee516ce40389a5129458638700000000

11. Repeat step 10 until a sufficient number of keys have signed the transaction

Verify the Spend Transaction

12. Click on **Verify**, paste the signed transaction into the field, and click **Submit**
    a) Check the transaction info (address, amount, etc.)
    b) Verify that it has been signed by at least the minimum number of signers



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.

```
0100000001c82b8014cd1b9b47c4b06b6ae880ebe19dadad7c91ddf5fac4cae4486aefaf7a00000000fdfe0000483045022
100de9cee0f3cbd19e8bc224d777fb6f26b2015713e5a8ead13fe1b72a77c5f4cc802203b5606a21cb78532c4cf1519c8a4
0a886d1c1ee32092cd9784f8674265a3358b01483045022100fca79c692442ff4ca13264b57f0205bba9fbf3ca843add66d
4a00df6fda5cda9022053a5d3d27dca4834c533dd17045846a9aa1382779ef9a476d25203ade75c051e014c695221025a
74c31e272a8f0c93e42bb1ca29677bcb00743966922195665395 1d8037ddd42102694a59a4494970919b5a46da52d991
6cab882e33b27b4e0bd94e2914705733cb2103b05b2080e2f596b54c31889b1a09791688e1aaf97de08dc63dde5f986dc
2db0853aeffffffff01a08601000000000017a914b1d7d317710fbb8ed5ee516ce40389a5129458638700000000
```

Transaction Script

The above script has been decoded

Version: 1
Transaction Size: 339 *bytes*
Lock time: 0

Inputs

Txid	N	Script	Signed?	MultiSig?
7aafef6a48e4cac4faf5dd917cadad9de1eb80e86a6bb(	0	0048304502	✓ 2	2 of 3

Outputs

Address	Amount	Script
3HuN5FafP7cGMf6GkG6qZUbhap9zRG8fcz	0.00100000	a914b1d7d3

Broadcast the Spend Transaction

WARNING

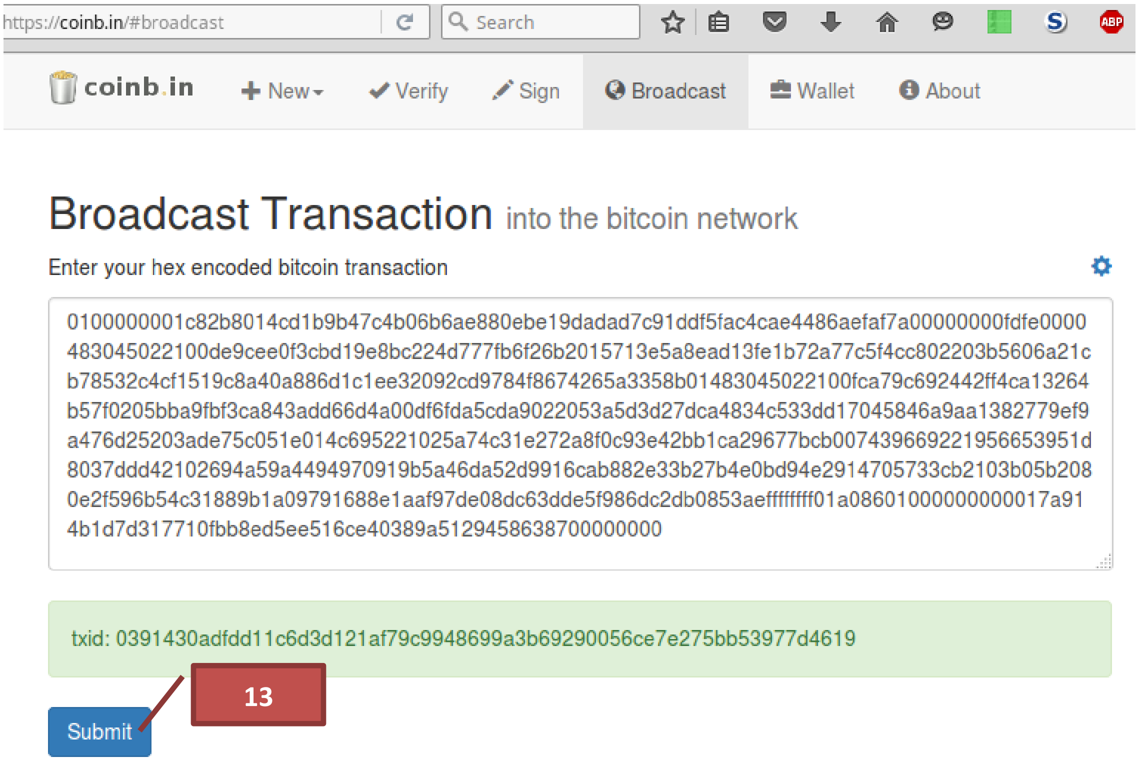
THE NEXT STEP TRANSMITS THE TRANSACTION TO THE BITCOIN NETWORK. MISTAKES IN THE TRANSACTION WILL BE IRREVOCABLE ONCE THE TRANSACTION IS BROADCAST.

DO NOT DO THIS UNTIL YOU HAVE DOUBLE CHECKED THE DESTINATION ADDRESSES AND AMOUNTS.

***** REMEMBER THAT ANY AMOUNT NOT EXPLICITLY SENT TO A NEW ADDRESS WILL BE BECOME PART OF THE TRANSACTION FEE (I.E. IT WILL GO TO THE MINER, NOT TO YOU OR YOUR INTENDED RECIPIENT). *****

13. Read the warning shown above – especially the part regarding the fee. Do not send a transaction where all or most of you bitcoin is in the fee (for example - https://www.reddit.com/r/Bitcoin/comments/1s9nb8/guy_sent_a_1_btc_fee_by_accident/)

14. If you are certain the transaction is correct, Click **Broadcast**, paste the transaction, and click **Submit**
    a. If the transaction is successfully broadcast, the txid will be displayed. Otherwise an error will be displayed.



Broadcast Transaction into the bitcoin network

Enter your hex encoded bitcoin transaction

```
0100000001c82b8014cd1b9b47c4b06b6ae880ebe19dadad7c91ddf5fac4cae4486aefaf7a00000000fdfe0000
483045022100de9cee0f3cbd19e8bc224d777fb6f26b2015713e5a8ead13fe1b72a77c5f4cc802203b5606a21c
b78532c4cf1519c8a40a886d1c1ee32092cd9784f8674265a3358b01483045022100fca79c692442ff4ca13264
b57f0205bba9fbf3ca843add66d4a00df6fda5cda9022053a5d3d27dca4834c533dd17045846a9aa1382779ef9
a476d25203ade75c051e014c695221025a74c31e272a8f0c93e42bb1ca29677bcb00743966922195665395 1d
8037ddd42102694a59a4494970919b5a46da52d9916cab882e33b27b4e0bd94e2914705733cb2103b05b208
0e2f596b54c31889b1a09791688e1aaf97de08dc63dde5f986dc2db0853aeffffffff01a08601000000000017a91
4b1d7d317710fbb8ed5ee516ce40389a5129458638700000000
```

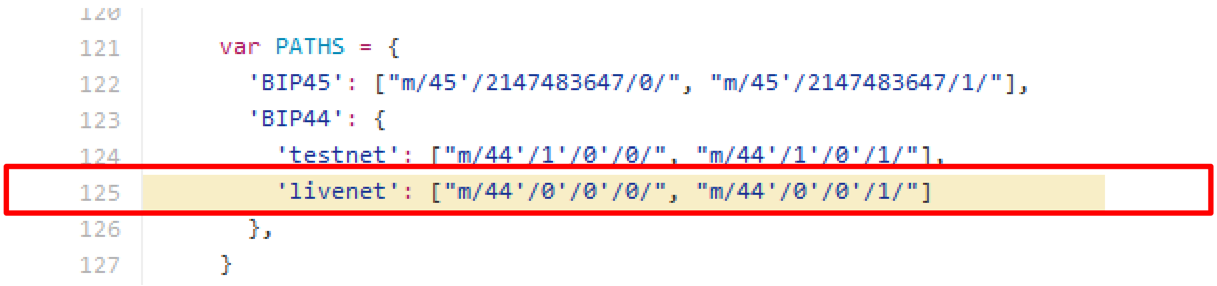
txid: 0391430adfdd11c6d3d121af79c9948699a3b69290056ce7e275bb53977d4619

15. At this point, the transaction should be recognized by the receiving wallet and viewable on a block explorer like Blockchain.info, block.io, etc. - https://blockchain.info/tx/0391430adfdd11c6d3d121af79c9948699a3b69290056ce7e275bb53977d4619

Additional Notes

Step 2

- For Copay, *m/44'/0'/0'**/0*** is the derivation path for main addresses. Change addresses are derived from *m/44'/0'/0'**/1***. This was found (at the time of writing) in the source for the Copay Recovery (https://github.com/bitpay/copay-recovery/blob/gh-pages/js/services.js#L125).



```
120
121     var PATHS = {
122       'BIP45': ["m/45'/2147483647/0/", "m/45'/2147483647/1/"],
123       'BIP44': {
124         'testnet': ["m/44'/1'/0'/0/", "m/44'/1'/0'/1/"],
125         'livenet': ["m/44'/0'/0'/0/", "m/44'/0'/0'/1/"]
126       },
127     }
```

- Use ***m/44'/1'/0'*** for Testnet. Not sure why Mainnet requires an added **/0** on the end

Step 3 - Note: the BIP32 Extend Key could also be used but using the public “addresses only” key avoids exposing the private key

References

BIP 39 Mnemonic Code Converter

- GitHub Repository - https://github.com/dcpos/bip39
- Online version - https://dcpos.github.io/bip39/

BIP32 Deterministic Key Generator

- GitHub Repository - https://github.com/bip32/bip32.github.io
- Online Version - http://bip32.org/

Coinbin

- GitHub Repository - https://github.com/OutCast3k/coinbin/
- Online Versions - https://coinb.in/ or http://4zpinp6gdkjfplhk.onion/ (Tor only)

Bitcore Playground - https://bitcore.io/playground/

Copay Recovery Tool

- GitHub Repository - https://github.com/bitpay/copay-recovery
- Online Version - https://bitpay.github.io/copay-recovery/