Mimblewimble: Private, Massively-Prunable Blockchains

Andrew Poelstra

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January 27, 2016

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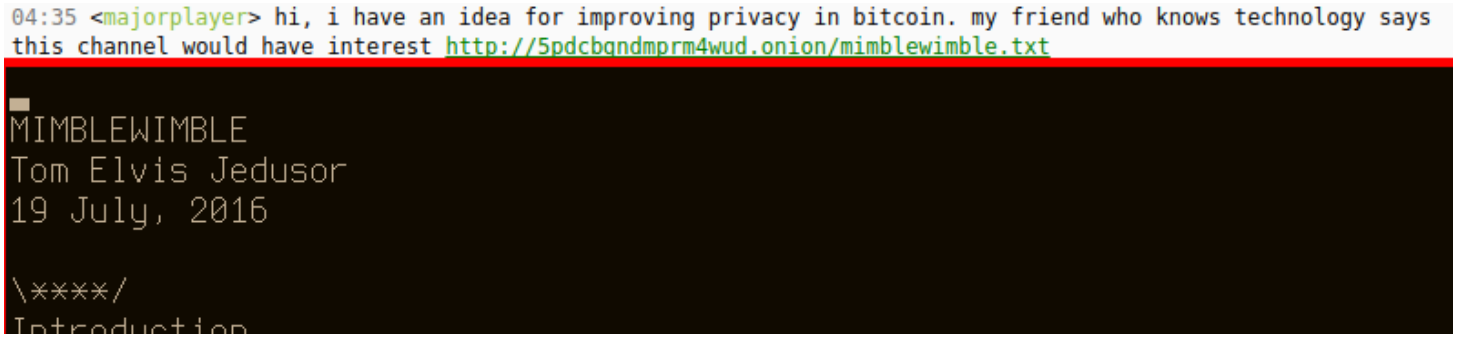
- Mimblewimble outputs (and inputs) are inherently scriptless.

History

- 04:30 UTC, August 2nd, 2016: "Tom Elvis Jedusor" posts a .onion link to a text file on IRC and disappears



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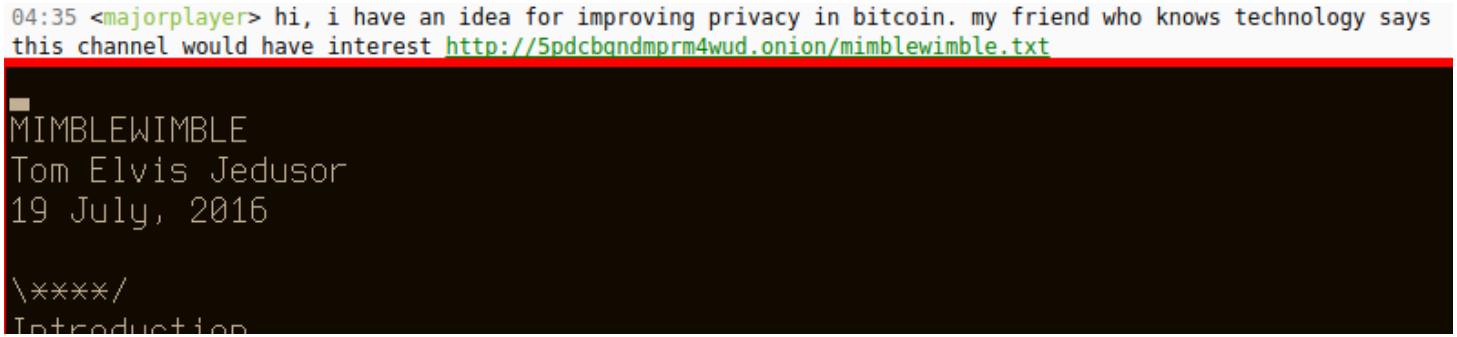

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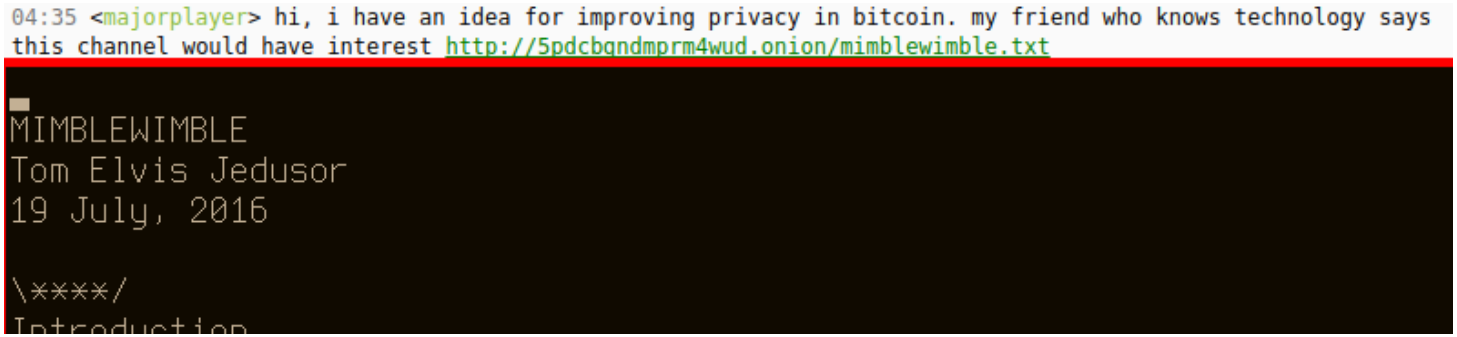

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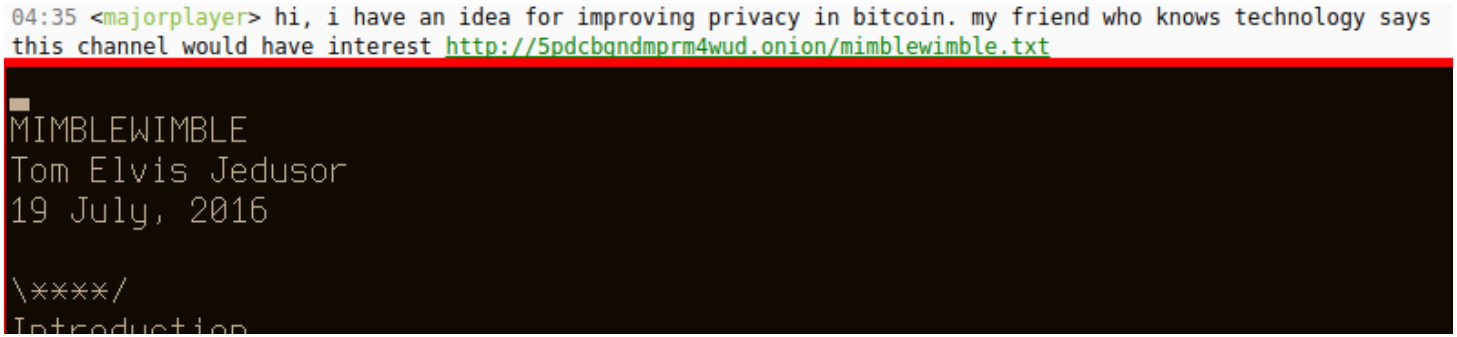

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- October 8th: paper shows Avi Kularni's and my work extending/formalizing this; presented at Scaling Bitcoin Milan

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- The next day, Ruben Somsen messaged me on Reddit explaining how to get non-expiring bidirectonal channels.

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- Outputs: confidential transaction outputs (group elements, which blind and commit to amounts), plus rangeproofs.
- Kernel: algebraically, difference between outputs and inputs (group element); morally a multisignature key for all transacting parties.
- Kernel signature: the kernel must sign itself to prove that the transaction is honestly constructed; by signing other blockchain-enforced data we can add additional functionality (e.g. locktimes).

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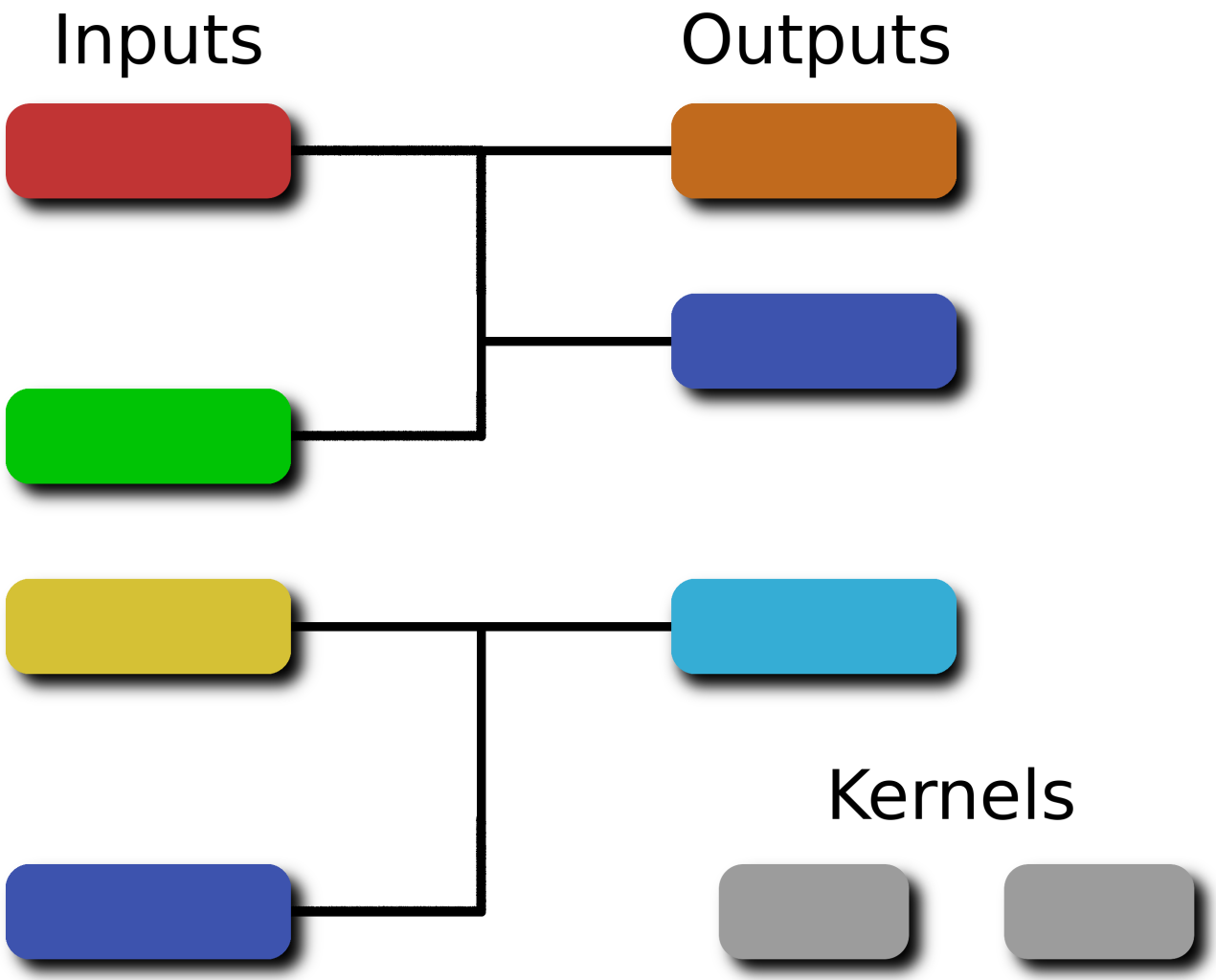

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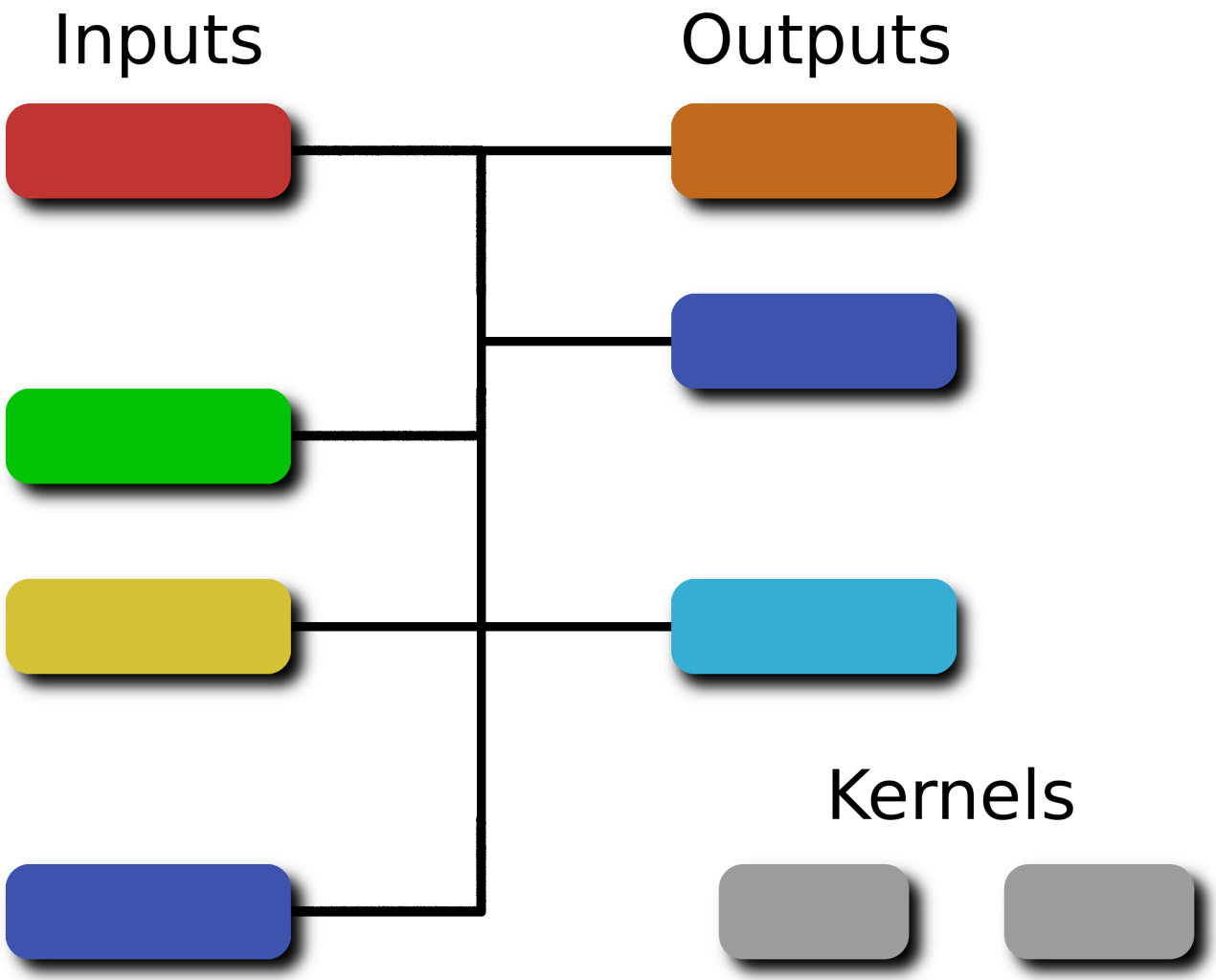

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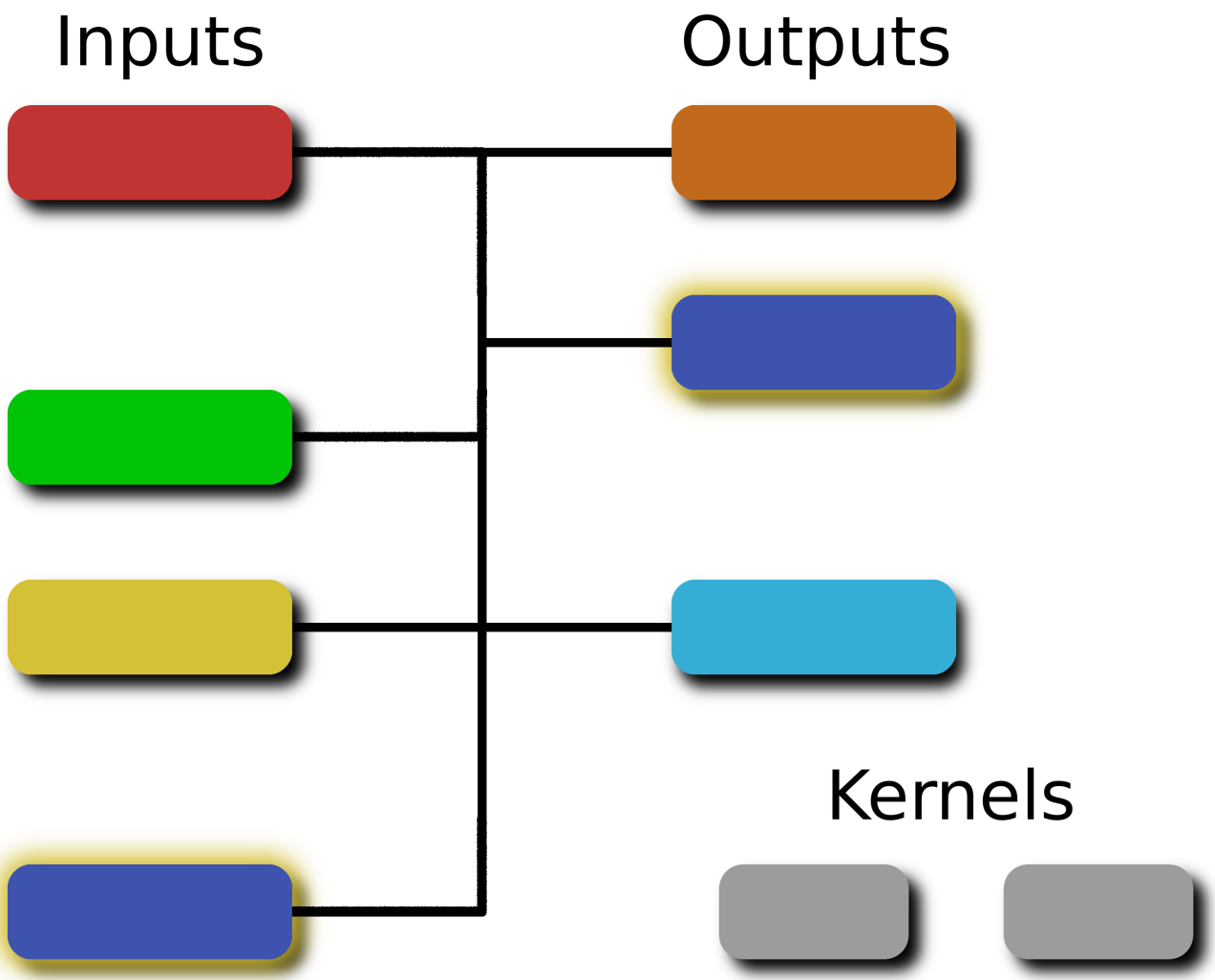

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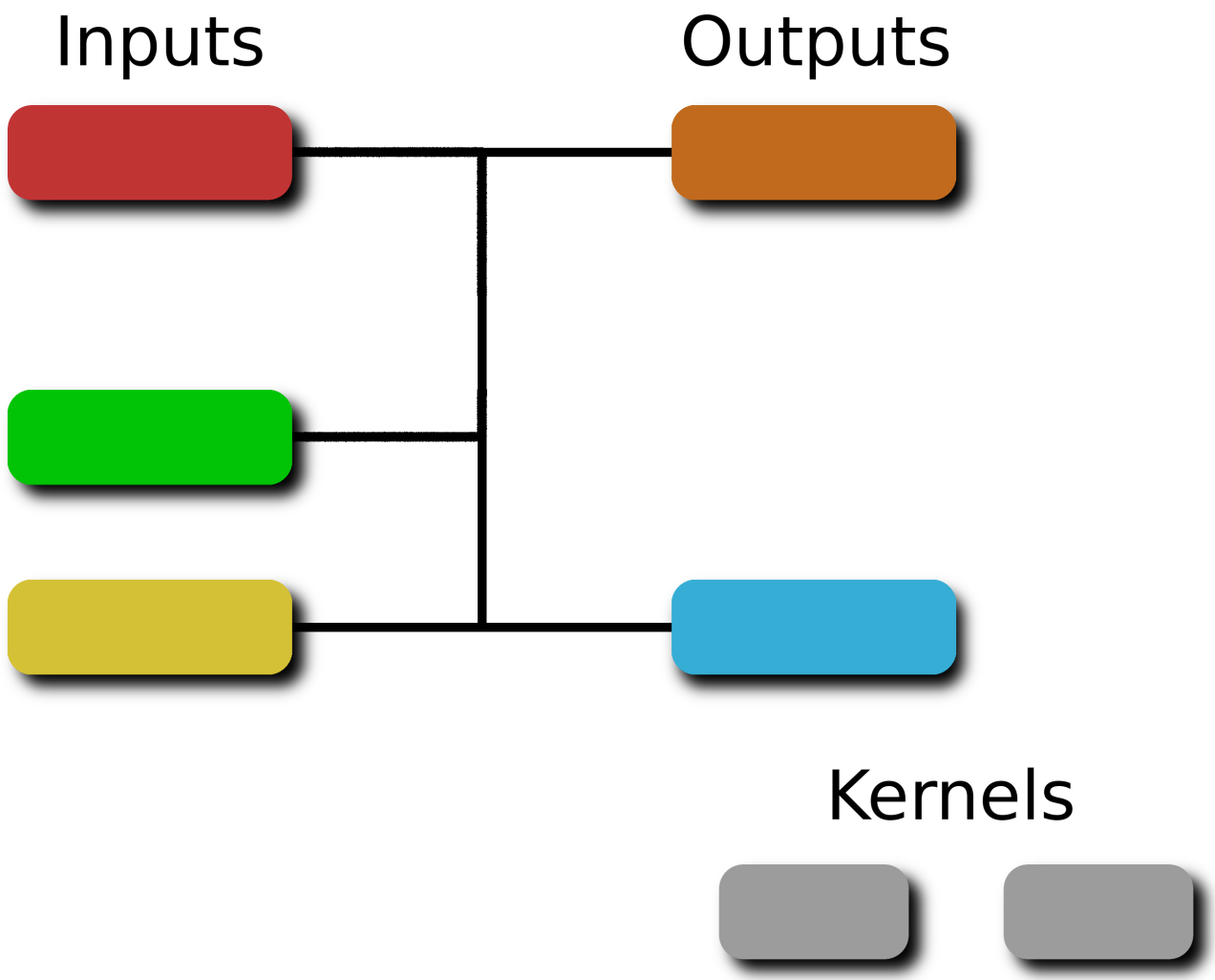

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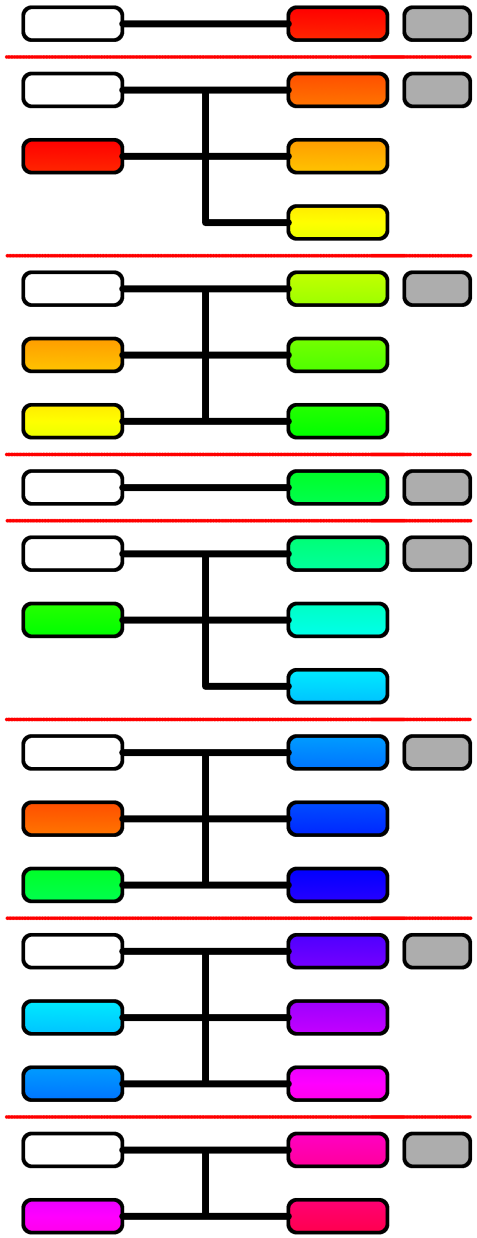

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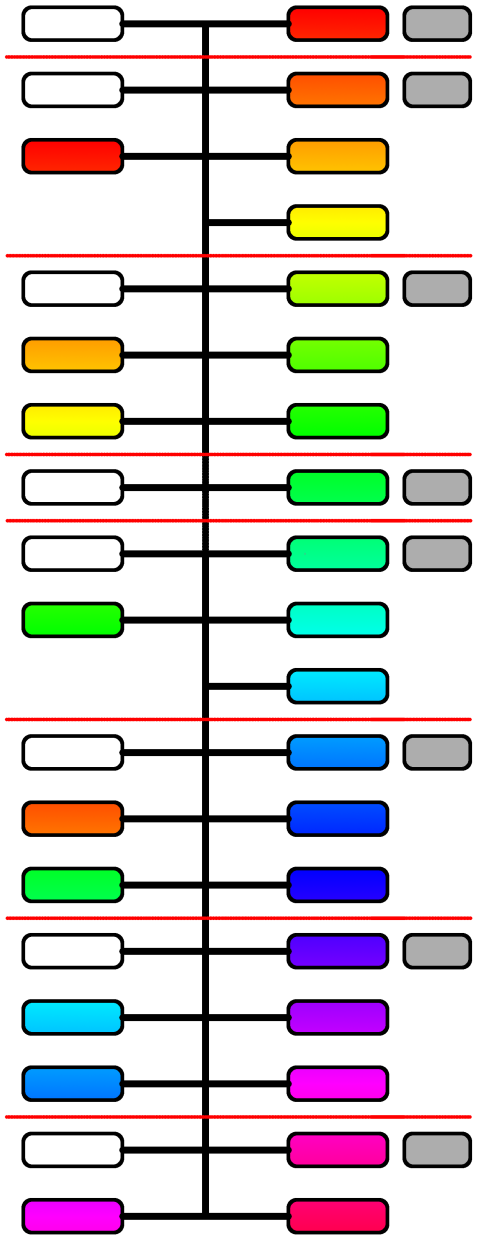

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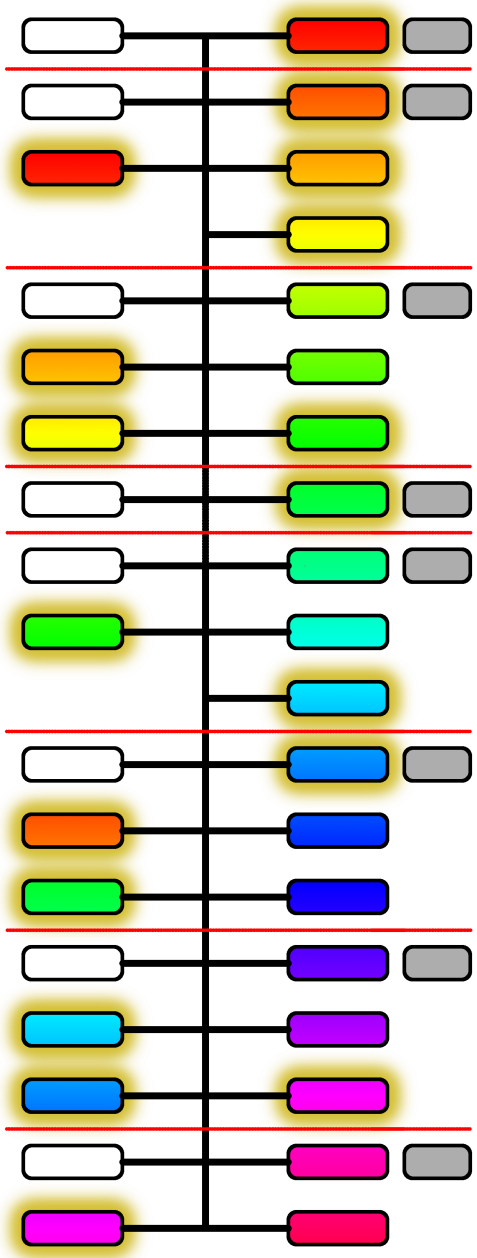

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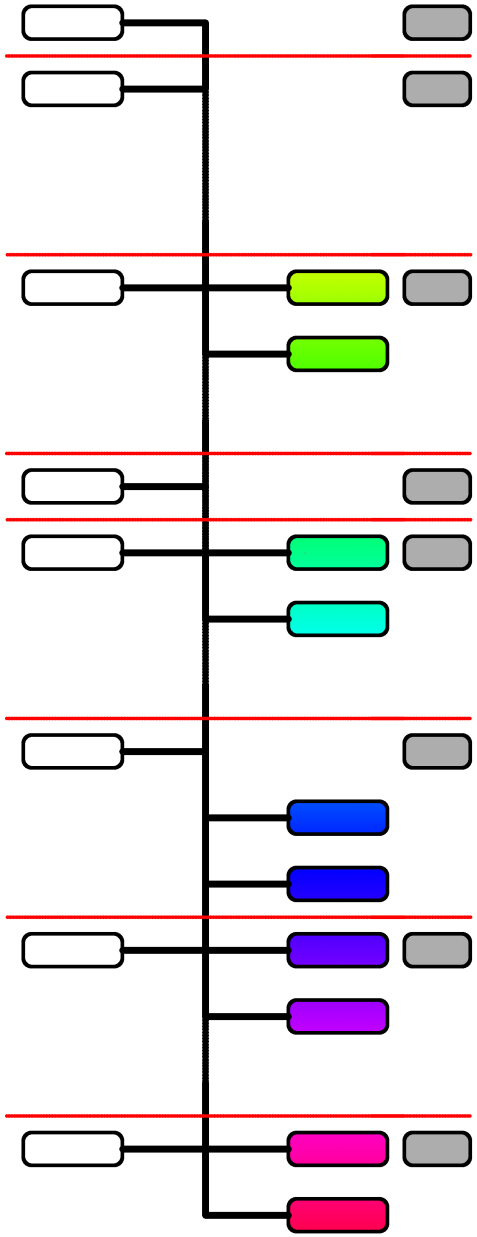

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- MimbleWimble gives us CT and requires storing: 15Gb of transaction kernels, headers etc.; 2Gb of unspent outputs, and 100Gb of UTXO rangeproofs.
- In pre-segwit Bitcoin, none of this is separable "witness data" which can be dropped in exchange for trust. In MW the rangeproofs are, leaving less than 20Gb of normative blockchain space.

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- The current state of all coins reflects zero net theft and inflation.
- *The exact structure of each individual transaction does not need to be publicly verifiable.*

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- The seller, to complete the transaction and take the coins, must reveal the preimage.
- This primitive is the basis of: cross-chain atomic swaps, ZKCP's, Lighting Channels, TumbleBit, and more.

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- This can be done algebraically such that the two signatures are not related in a publicly verifiable way (and is deniable)
- Since the locktimed transaction never touches the blockchain unless something goes wrong, the default case is that the atomic swap is indistinguishable from any other transaction.

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Thank You

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