Integration of privacy preserving primitives in hardware wallets

Simon Masson, Renaud Dubois
ZKNox

Privacy and Compliance Summit

November 19th, 2025 – Buenos Aires, DevConnect

ZKNOX team

Nicolas Bacca
20^+ years experience (10^+y web3)
Security and hardware specialist
Prev. Ledger cofounder/CTO

Renaud Dubois
20^+ years experience (3^+y web3)
Cryptographer
Prev. Ledger, Thales

Simon Masson
8^+ years experience (4^+y web3)
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Expertise and innovation to every challenge on the whole security chain:

- user end
(secure enclaves, hardware wallets),
- back end
(TEE, HSMs),
- on-chain
(smart contracts).

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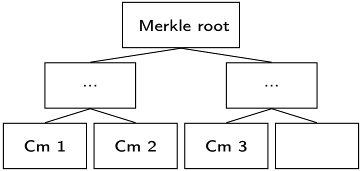
`https://zknox.eth.limo/`

`https://github.com/zknoxhq/`

Introduction: privacy in Ethereum (Railgun)

Alice
1 ETH



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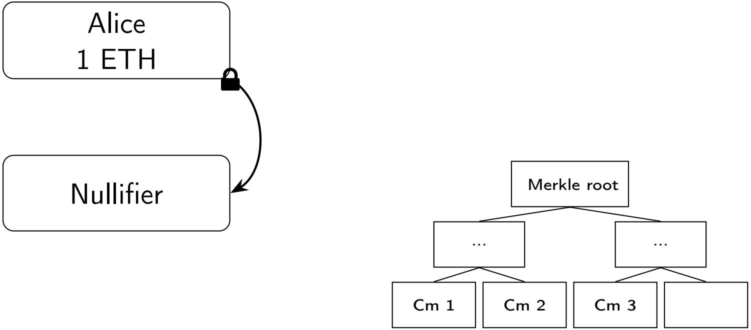

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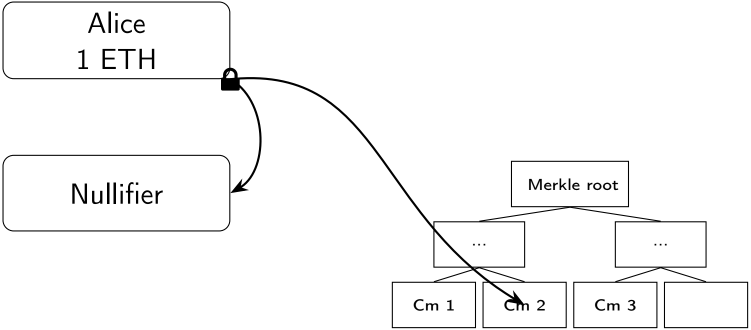

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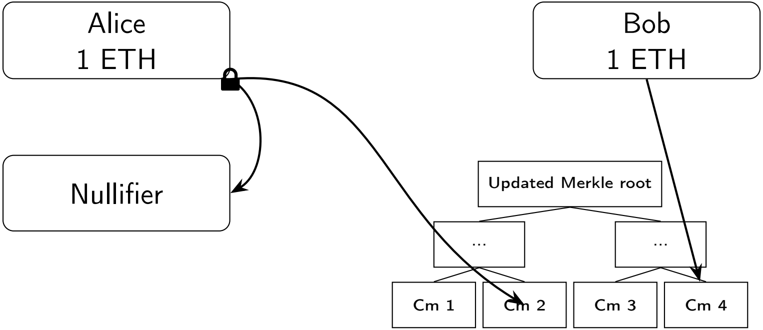

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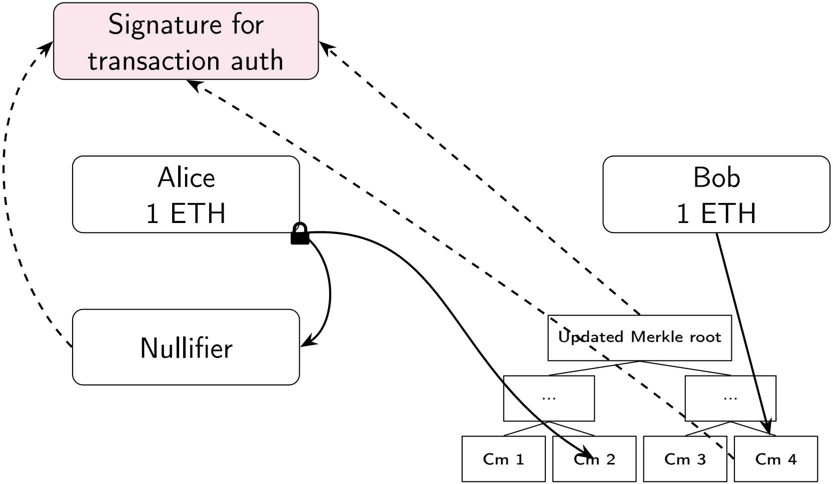

Signature for transaction auth

Alice
1 ETH

Nullifier

Bob
1 ETH

Updated Merkle root

...

...

Cm 1

Cm 2

Cm 3

Cm 4

Signature and hardware wallet

Computing a signature requires the *secret key*.

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It can be split into different signers using threshold signatures (FROST: ia.cr/2020/852)
We rather want to sign with a hardware wallet for a better security:

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We implement Railgun EdDSA signer in a Ledger application.

Demonstration

Let's see how it works in practice (sorry for the UX)

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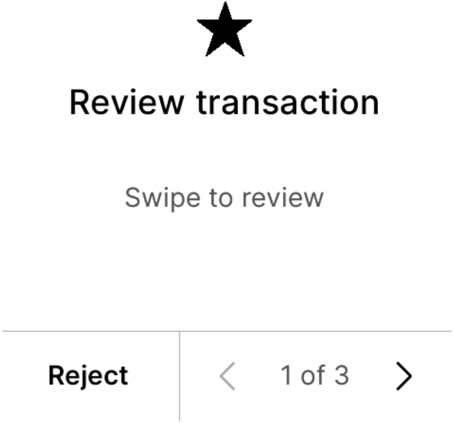

Review transaction

Swipe to review

Demonstration

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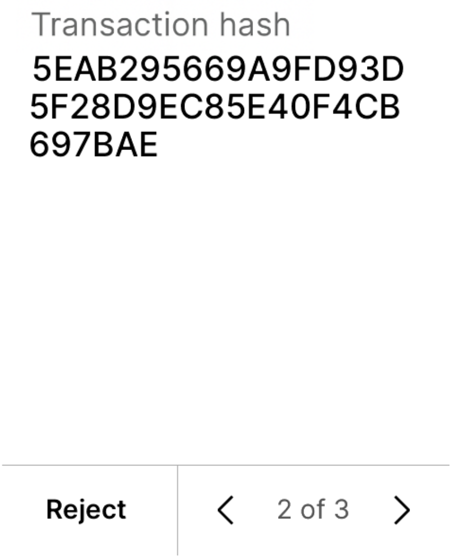

Transaction hash

5EAB295669A9FD93D
5F28D9EC85E40F4CB
697BAE

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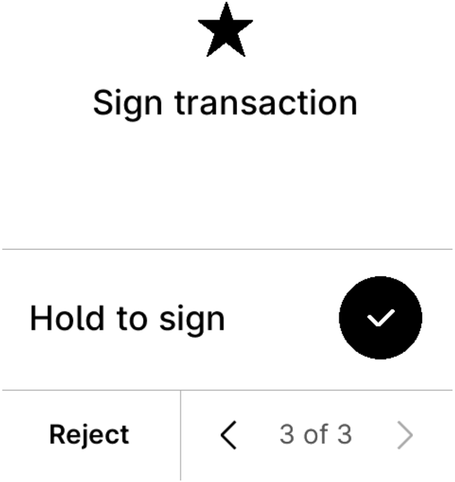

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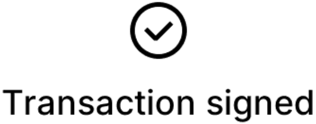
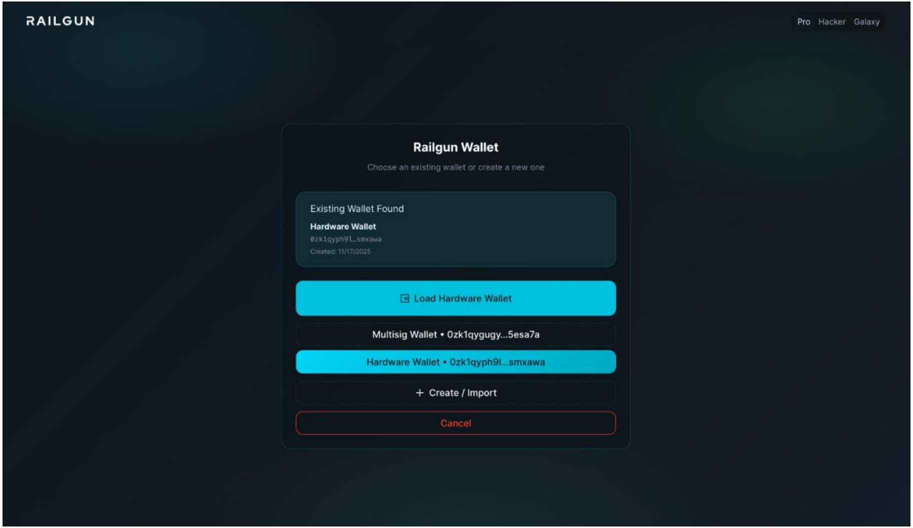


Transaction signed

Demonstration

Let's see how it works in practice : Railgun integration (thanks to Zy0n)


RAILGUN
Pro
Hacker
Galaxy
Load Hardware Wallet
Multisig Wallet • 0zk1qygugy...5esa7a
Hardware Wallet • 0zk1qyph9l...smxawa
+ Create / Import
Cancel

Railgun Wallet

Choose an existing wallet or create a new one

Existing Wallet Found

Hardware Wallet

0zk1qyph9l…smxawa

Created: 11/17/2025

Demonstration

Let's see how it works in practice : Railgun integration (thanks to Zy0n)

soon in

Kohaku

Conclusion and perspectives

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Thank you for your attention.