Atomic Swaps on ⚡

Atomic Swaps on ⚡ (not only)

Atomic Swaps?

@kilrau

Recap – Atomic Swaps

1. Alice creates secret
2. Alice pays Bob (pending, Bob doesn't have secret)
3. Bob pays Alice (pending, Alice needs to "release" secret)
4. Alice releases secret = both payments execute atomically because depend on the same secret.

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What we are building @exchange_union

A decentralized exchange protocol

on payment channels.

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What we are building @exchange_union

A decentralized exchange protocol

on ⚡lightning⚡ & raiden.

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Combining two worlds

Trading via Atomic Swaps between

BTC, LTC & any ERC20 token (w-ETH, DAI, USDT..)

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Differences between ⚡ & Raiden

1. Invoices vs. direct payments
    - LN: payee creates secret
    - Raiden: payer creates secret
2. Routing
    - LN: Source Routing
    - Raiden: dynamic routing (like the internet)
3. Hash Algorithms
    - LN: SHA256
    - Raiden: Keccak256

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Combining two worlds

Lightning: HOLD invoices

Raiden: direct payments (+ resolver)

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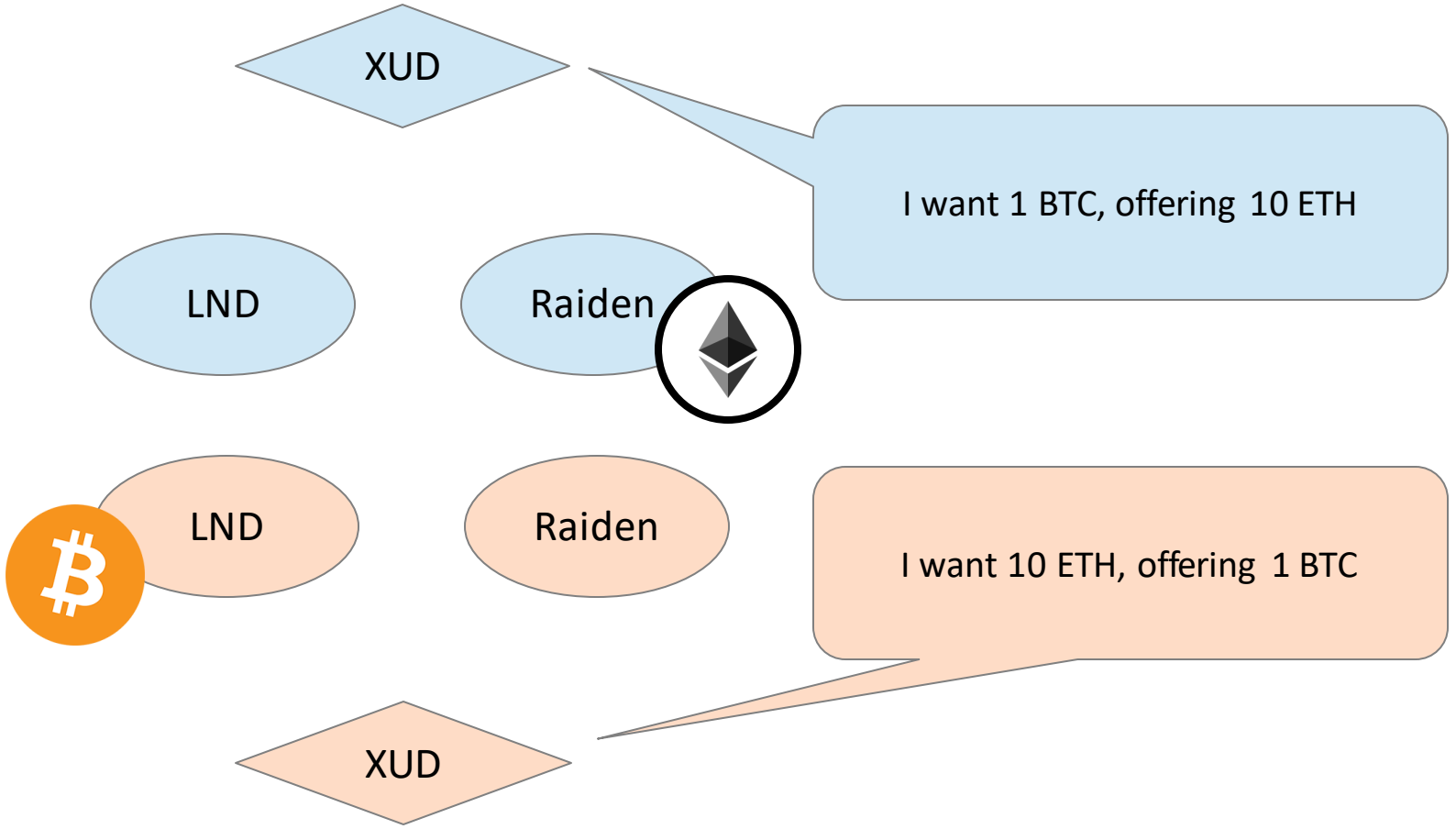
Atomic Swaps between ⚡ & Raiden

Step 0:



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Atomic Swaps between ⚡ & Raiden

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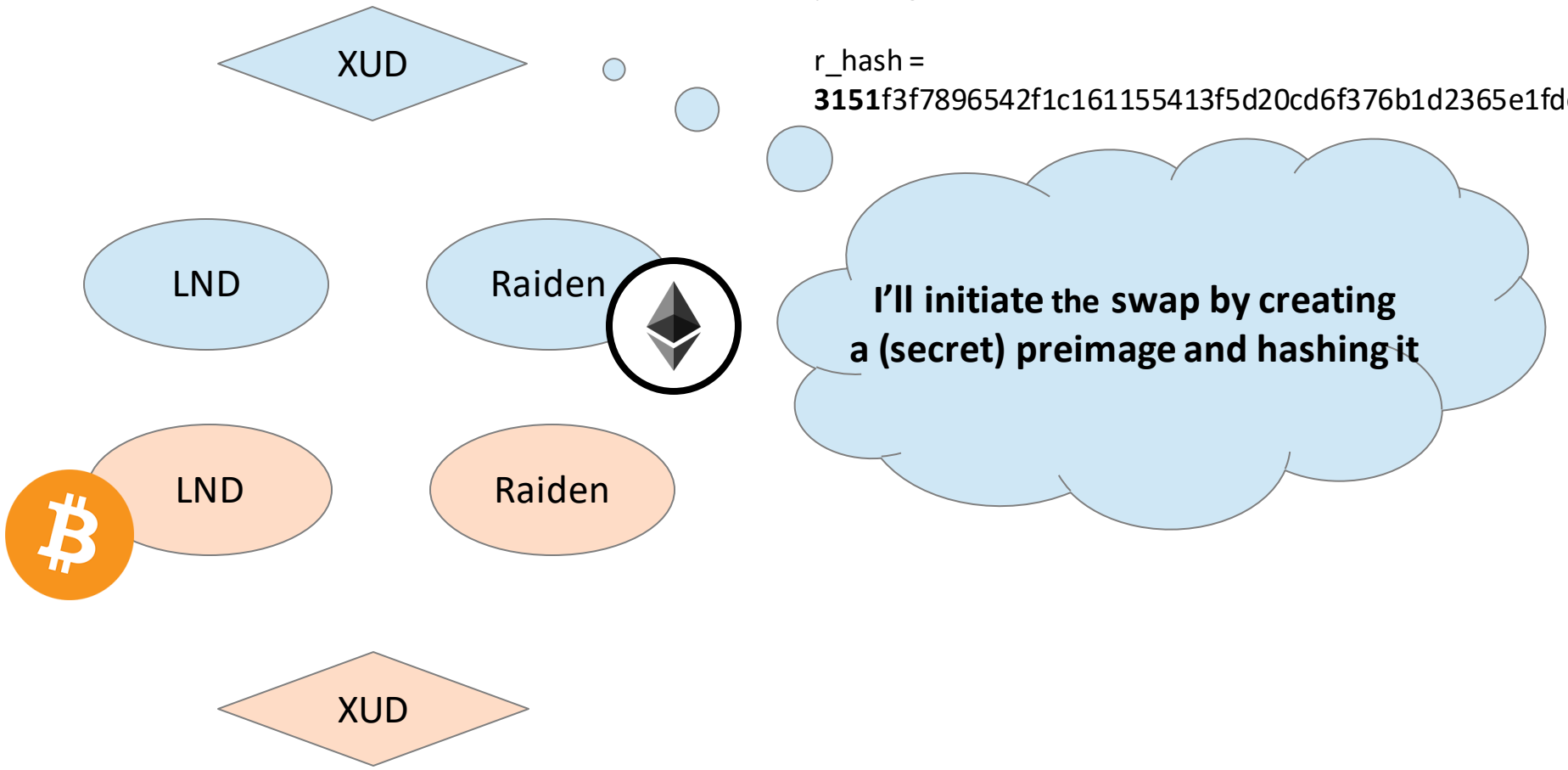

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r_hash = **3151**f3f7896542f1c161155413f5d20cd6f376b1d2365e1fde900d2218a7e990

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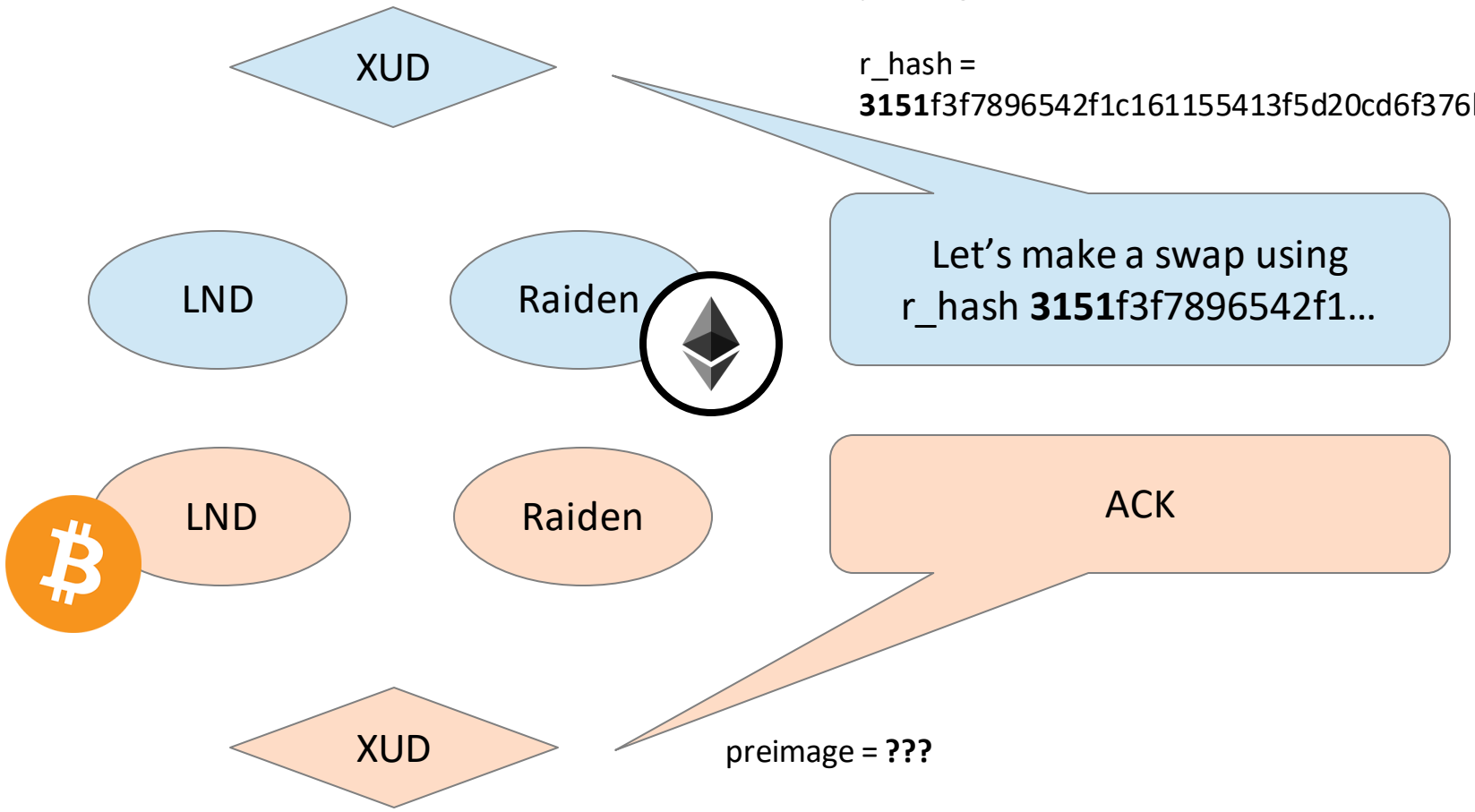
Atomic Swaps between ⚡ & Raiden

Step 1:



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preimage = **???**

r_hash =
3151f3f7896542f1c161155413f5d20cd6f376b1d2365e1fde900d2218a7e990

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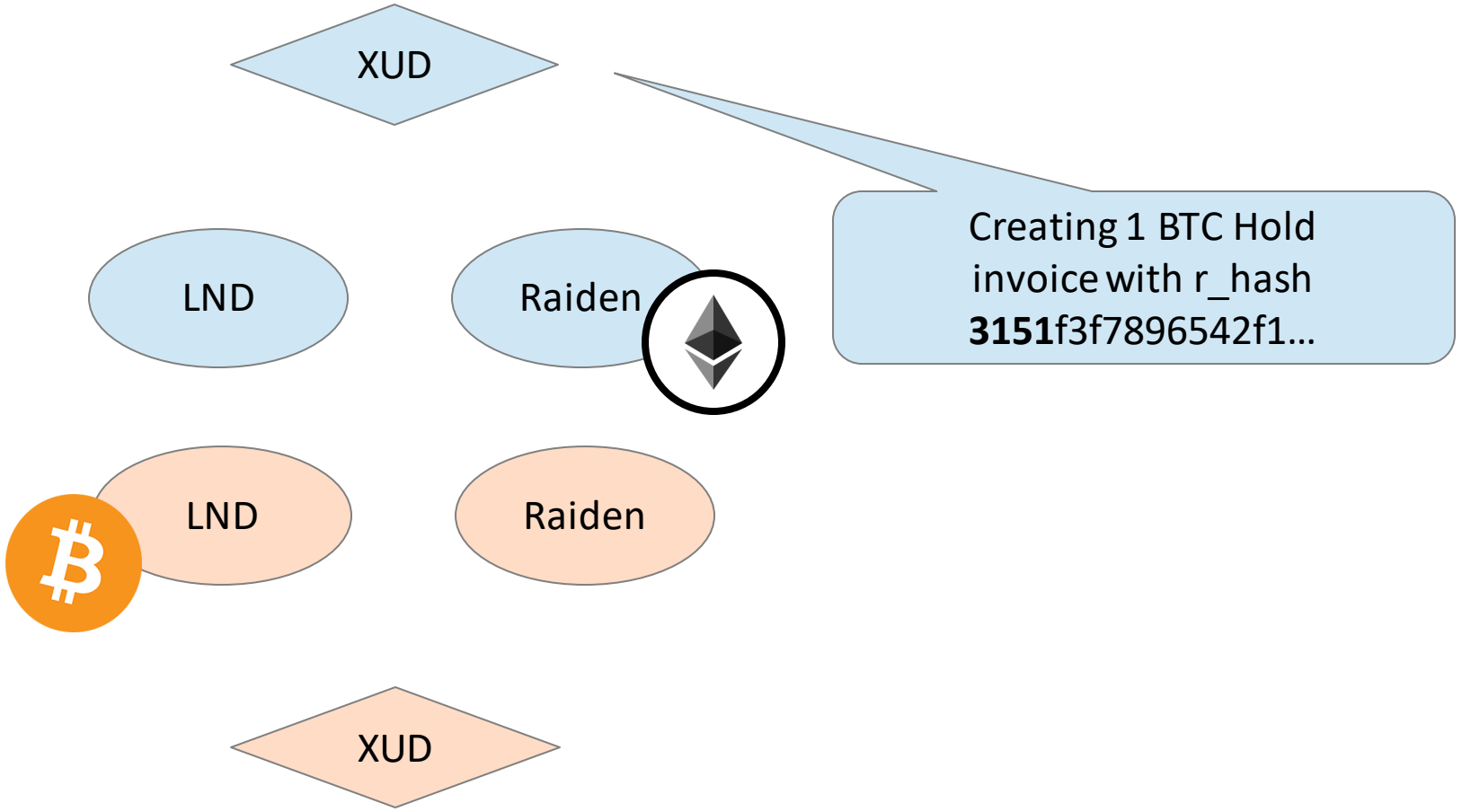
Atomic Swaps between ⚡ & Raiden

Step 2:



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Atomic Swaps between ⚡ & Raiden

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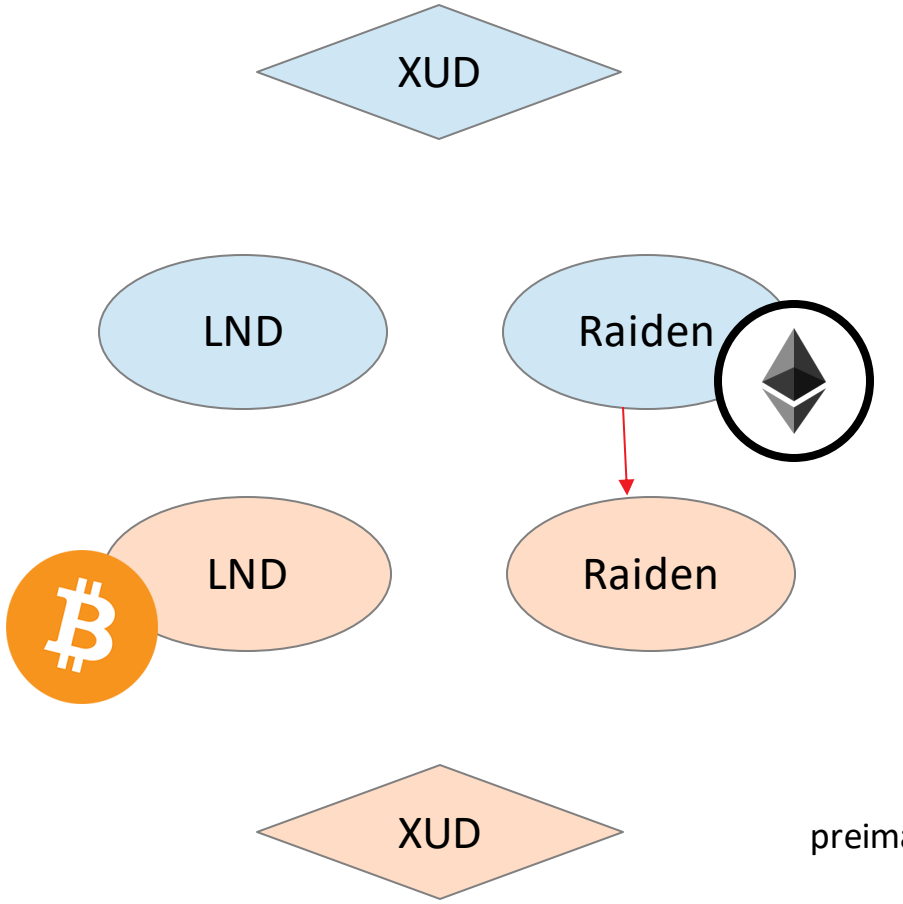

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r_hash = **3151**f3f7896542f1c161155413f5d20cd6f376b1d2365e1fde900d2218a7e990

Pending HTLC

amount = **10 ETH**
r_hash = **3151**f3f7896542f1…

Note: This payment can route through any number of intermediary nodes on the Raiden network

preimage = **???**

r_hash = **3151**f3f7896542f1c161155413f5d20cd6f376b1d2365e1fde900d2218a7e990

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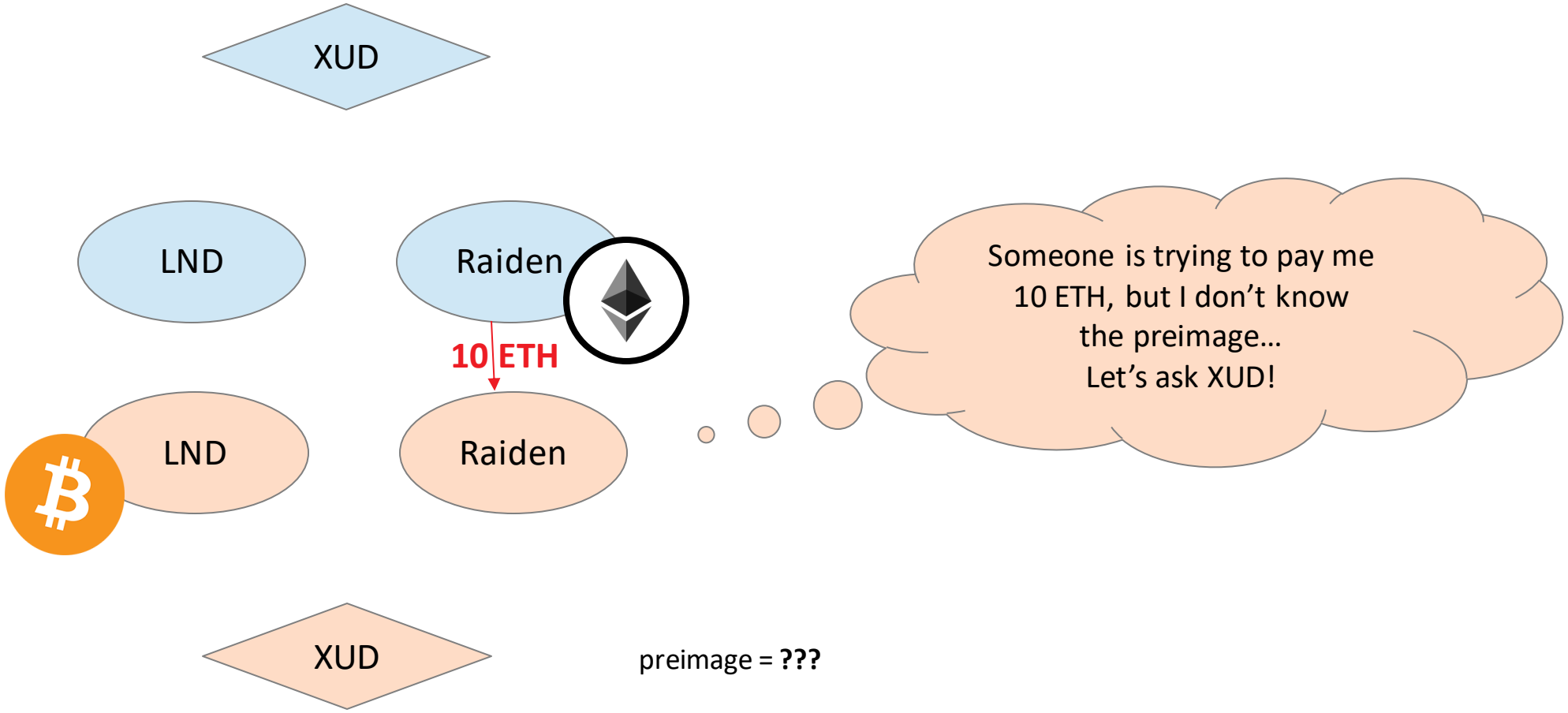
Atomic Swaps between ⚡ & Raiden

Step 3:



preimage = **???**

r_hash =
3151f3f7896542f1c161155413f5d20cd6f376b1d2365e1fde900d2218a7e990

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Atomic Swaps between ⚡ & Raiden

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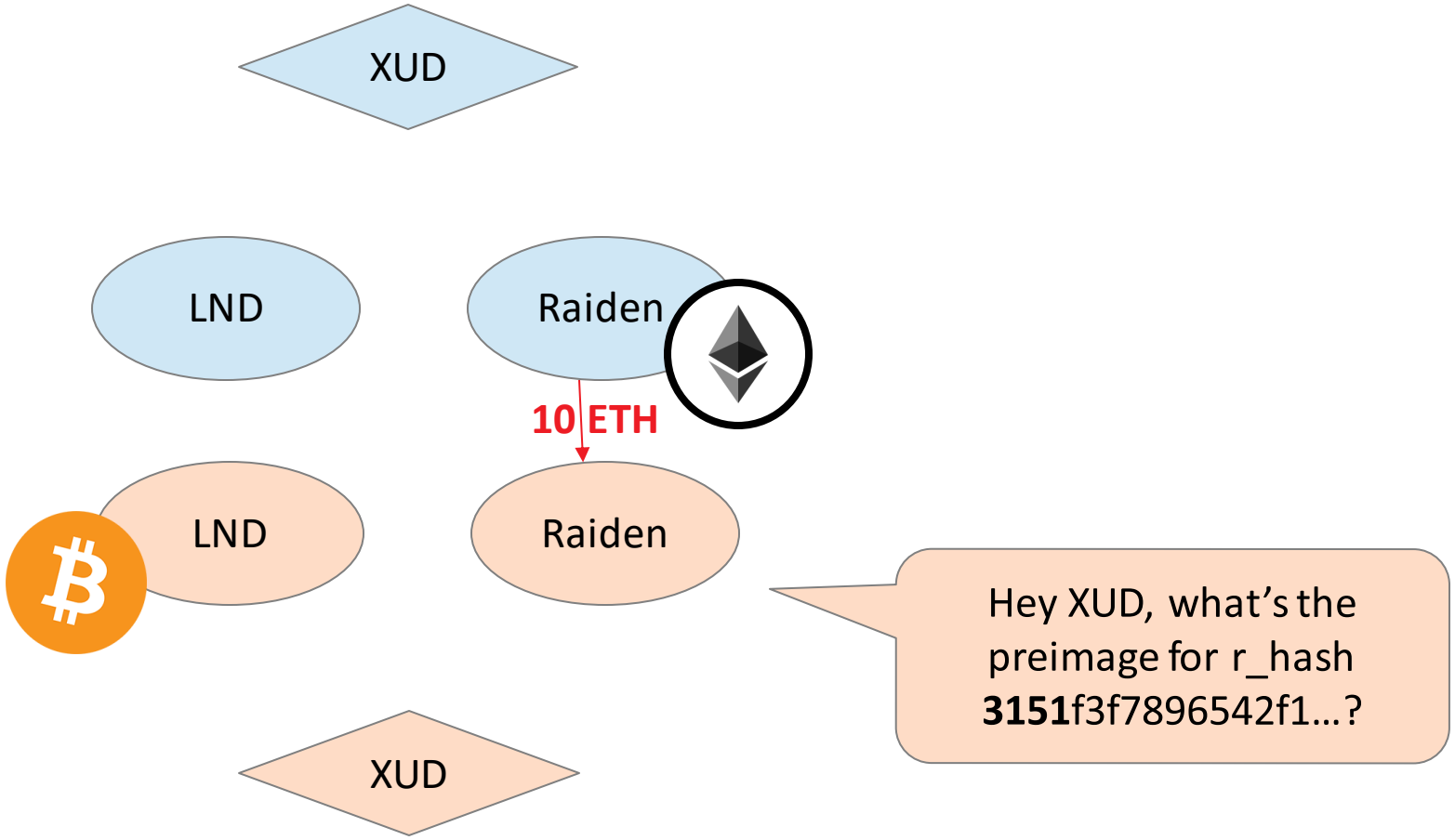

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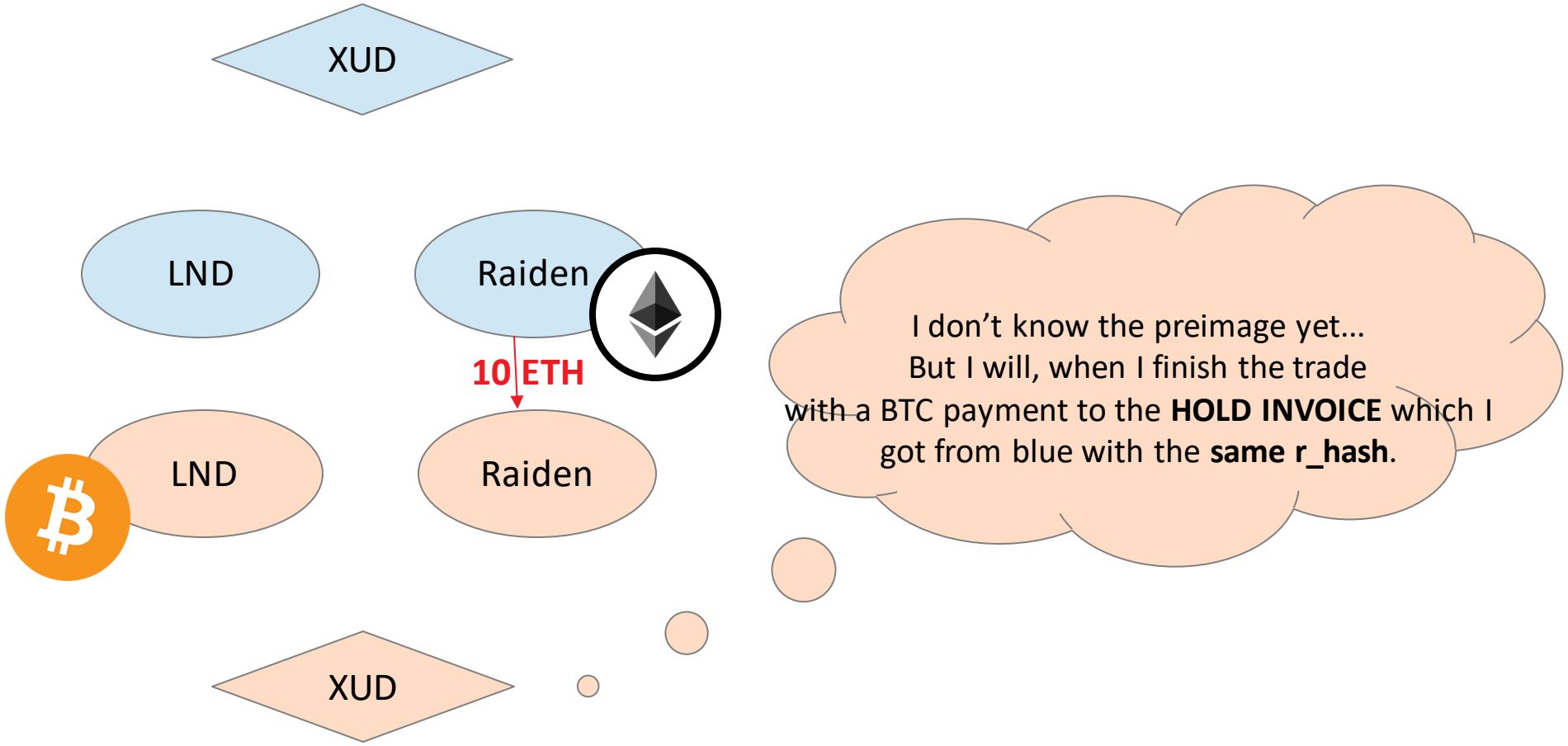
Atomic Swaps between ⚡ & Raiden

Step 4:



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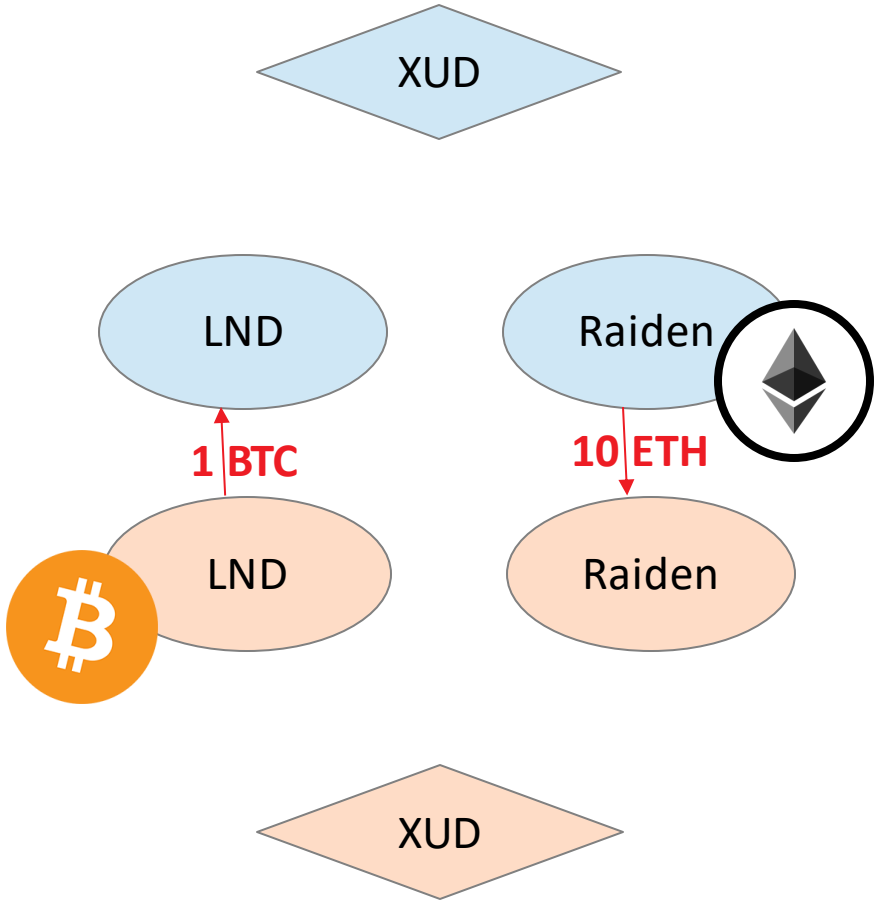
Atomic Swaps between ⚡ & Raiden

Step 4:



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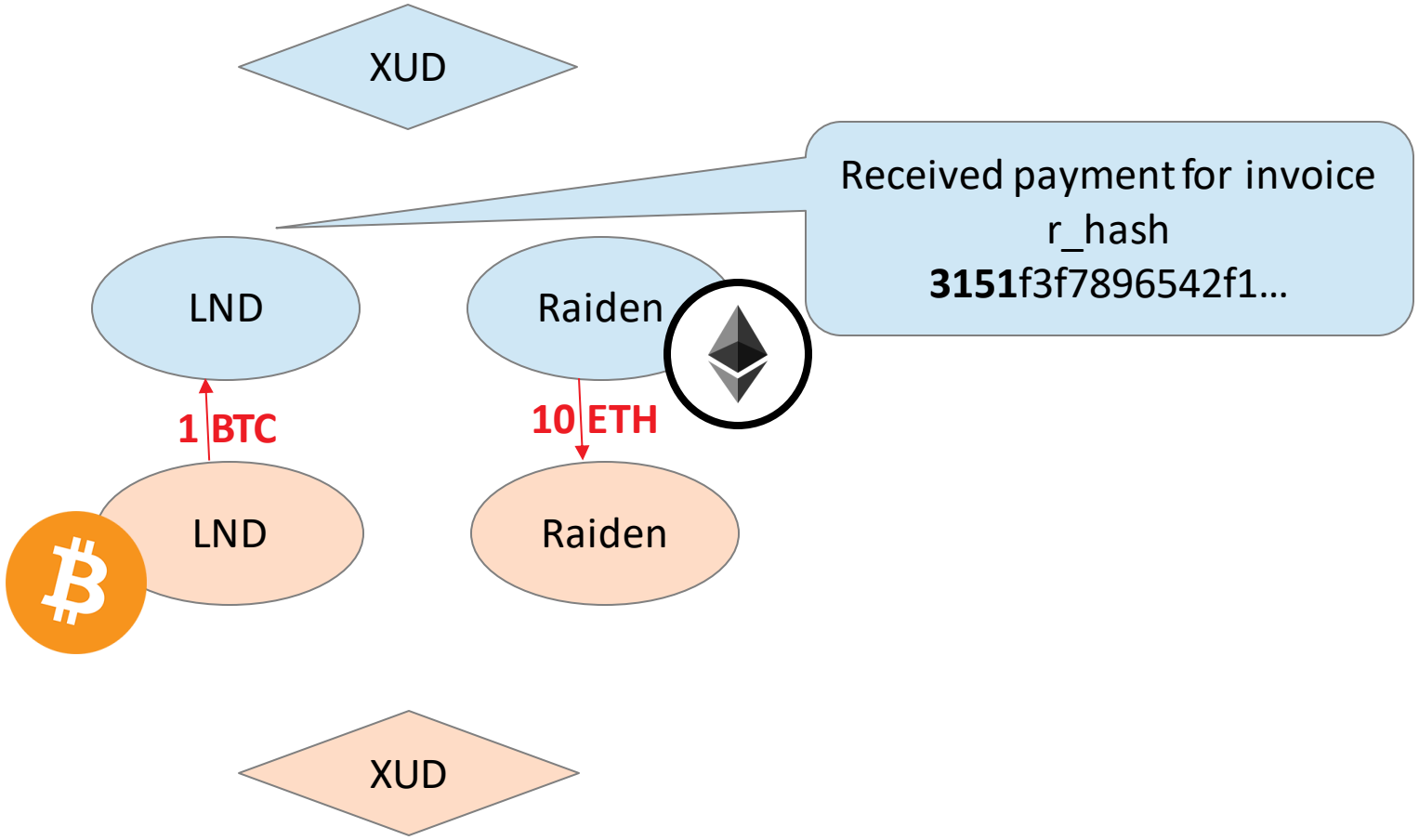
Atomic Swaps between ⚡ & Raiden

Step 5:



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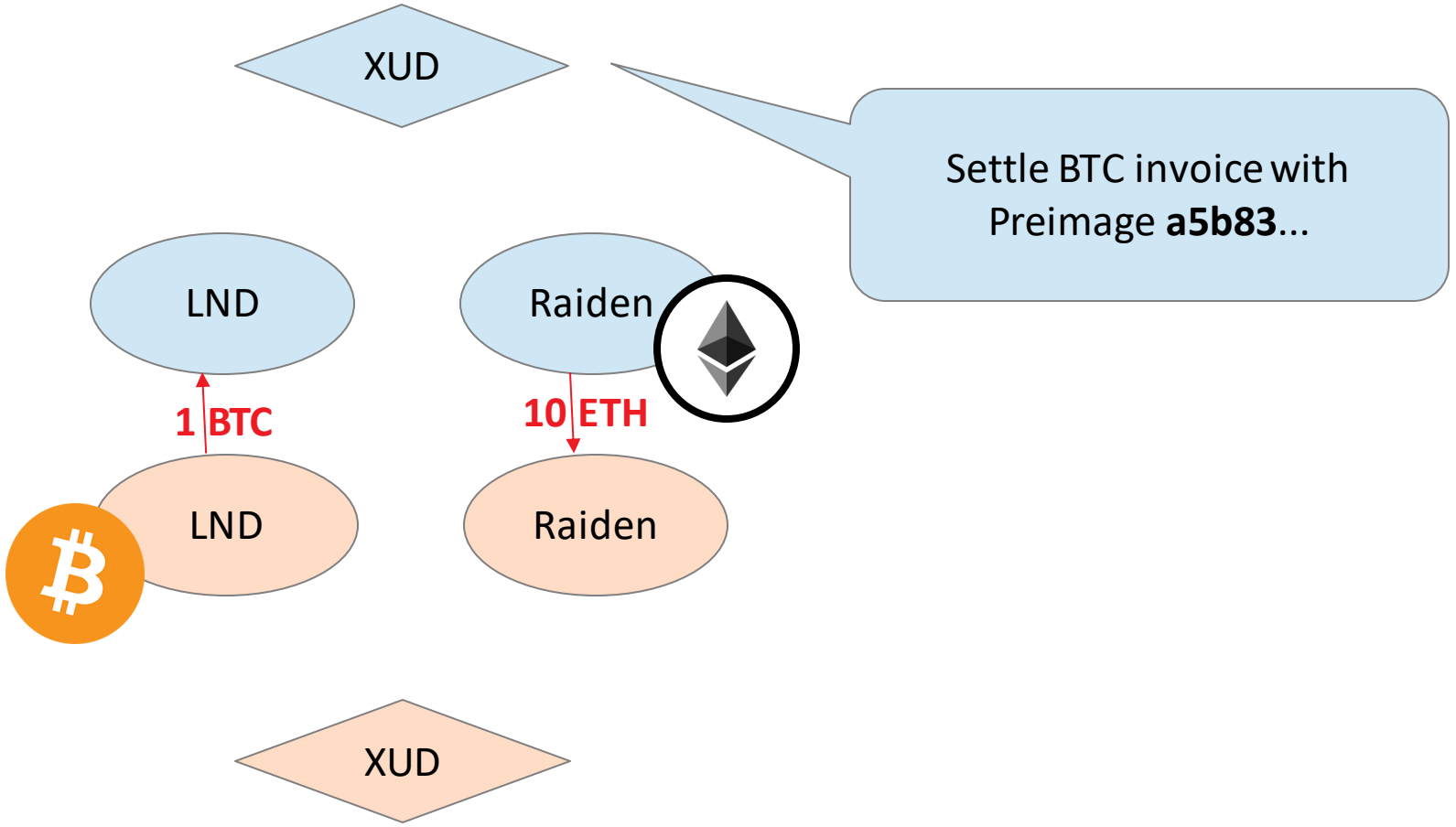
Atomic Swaps between ⚡ & Raiden

Step 6:



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Atomic Swaps between ⚡ & Raiden

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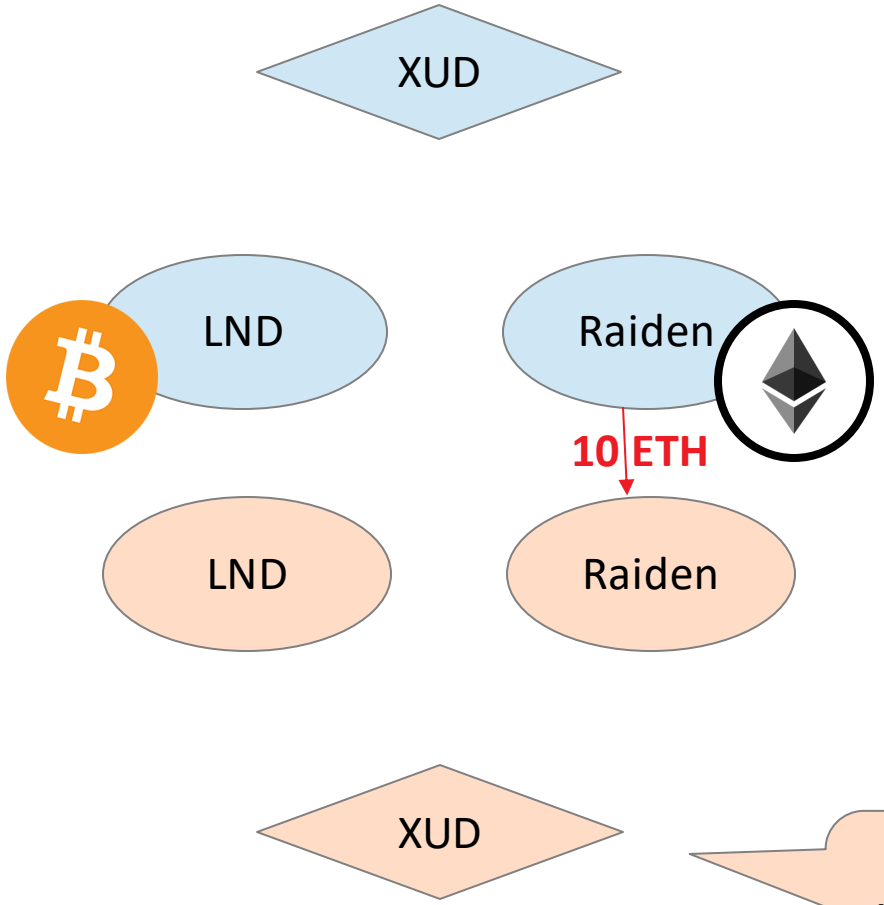

Preimage revealed

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Atomic Swaps between ⚡ & Raiden

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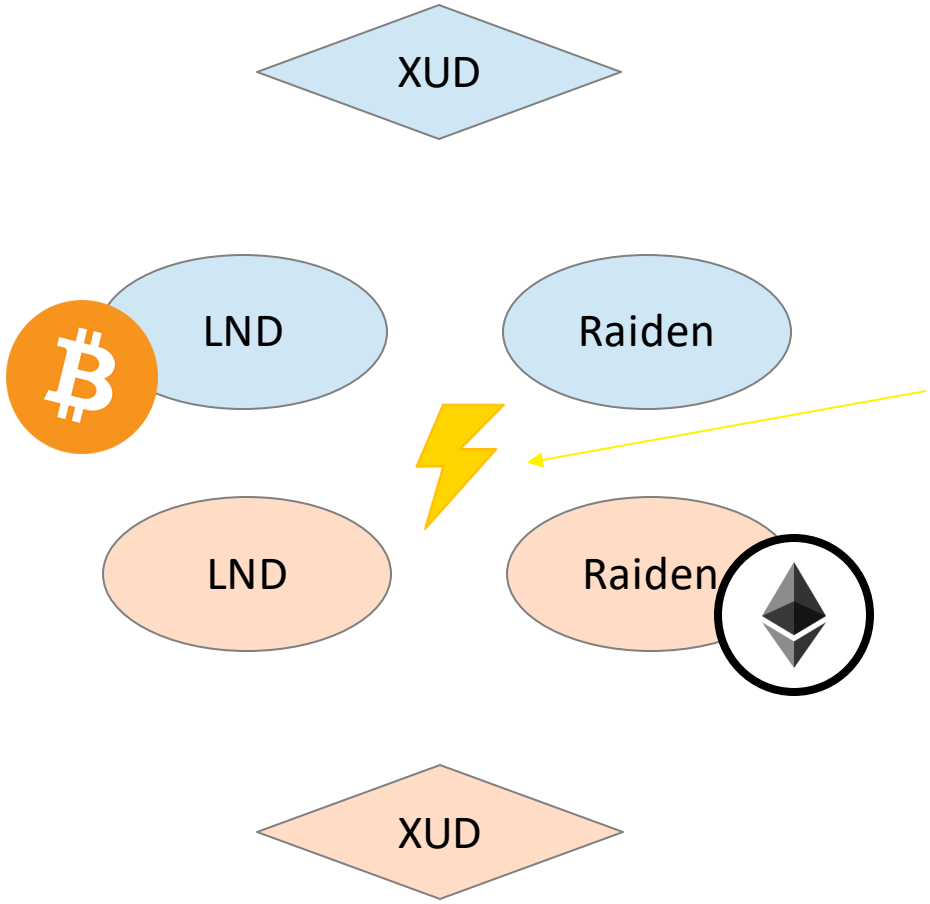

Preimage revealed

BTC Lightning & ETH Raiden payment settled!

Note: This payment can route through any number of intermediary nodes on the BTC & LTC lightning network

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DEMO

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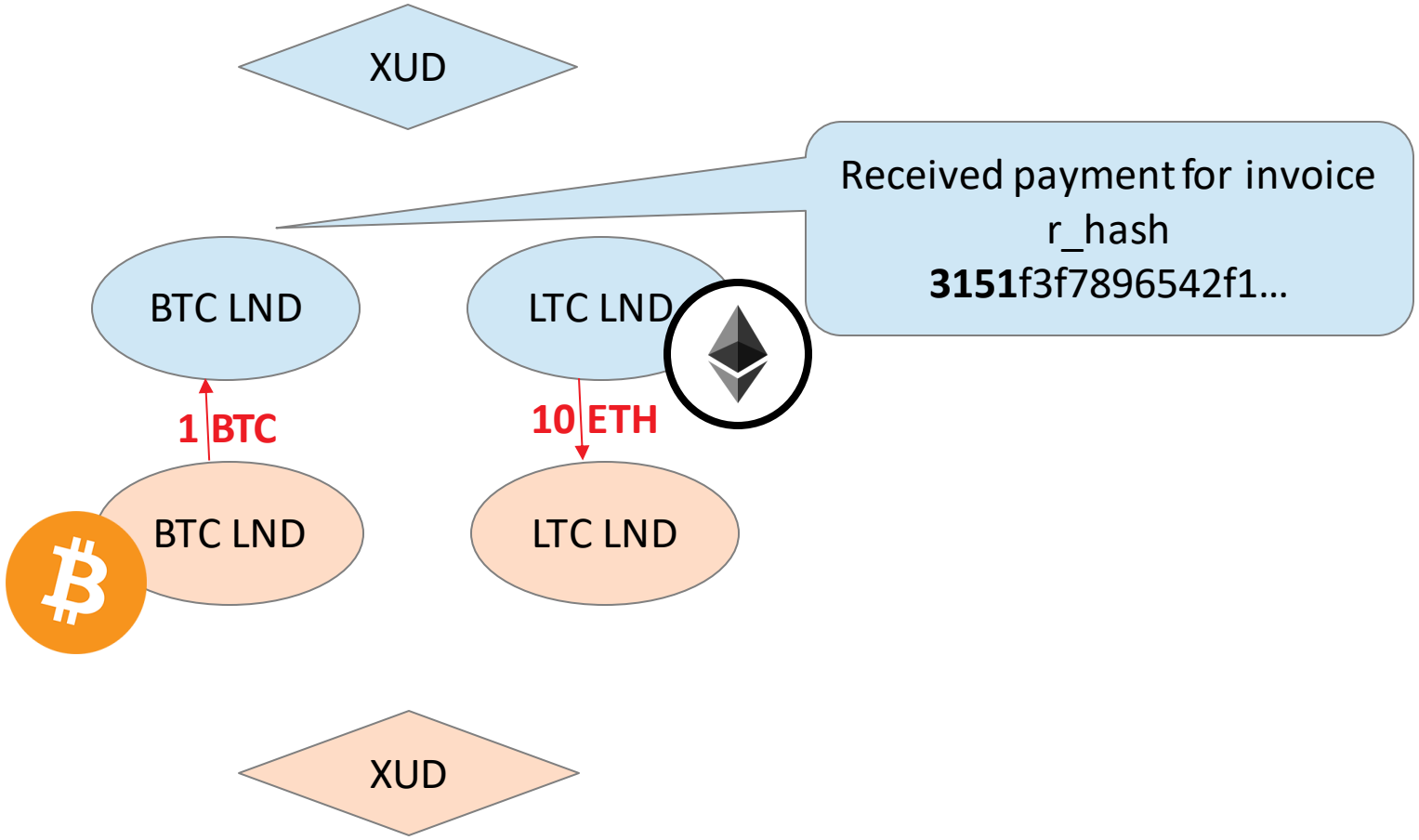
Sign up for early access to Bug Bounty

bit.do/xubounty

But there is a BUT

Step 5:



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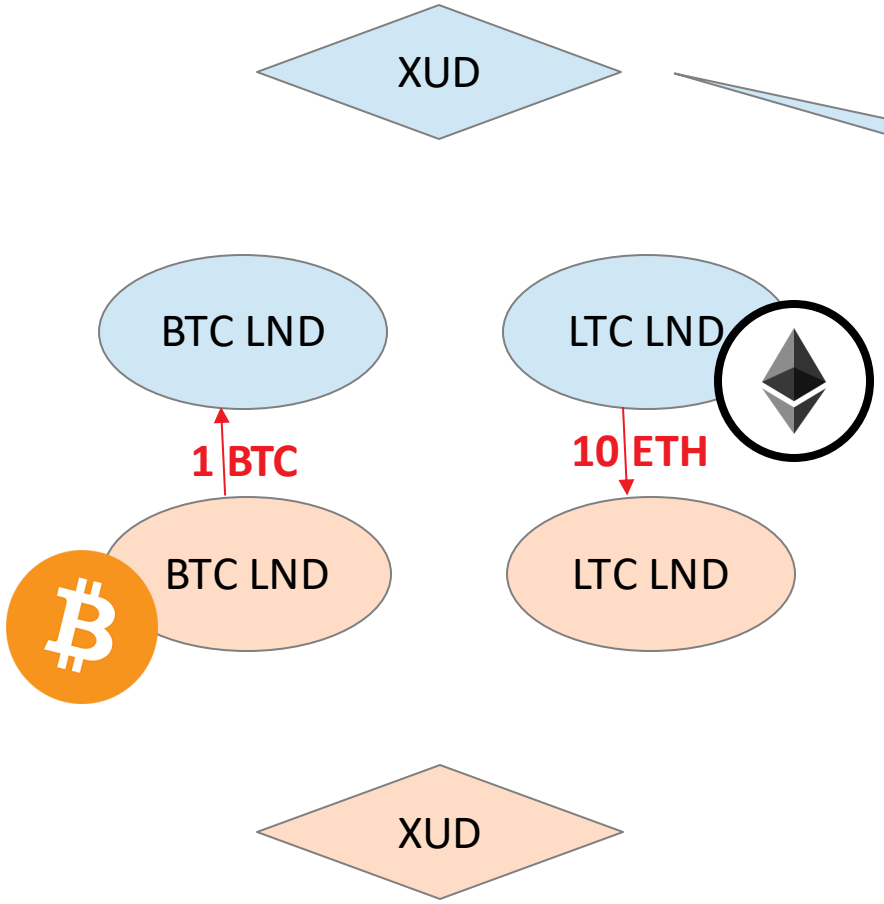

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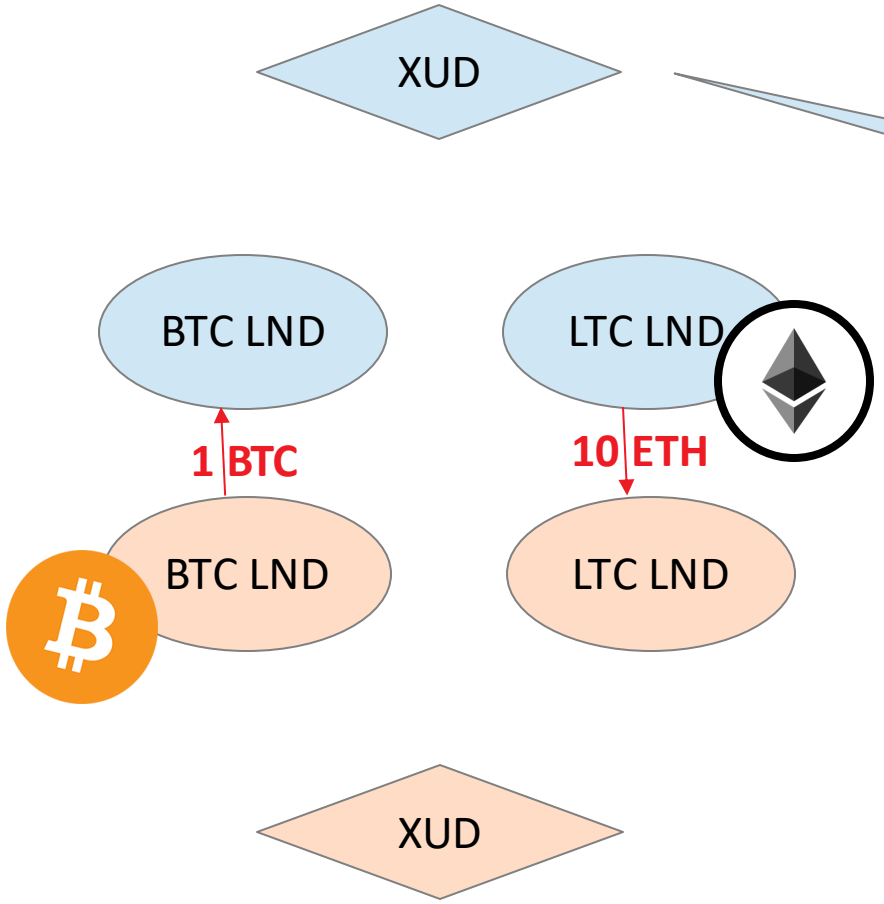
But there is a BUT

Step 5:



Up to timeout (hours, up to one week)

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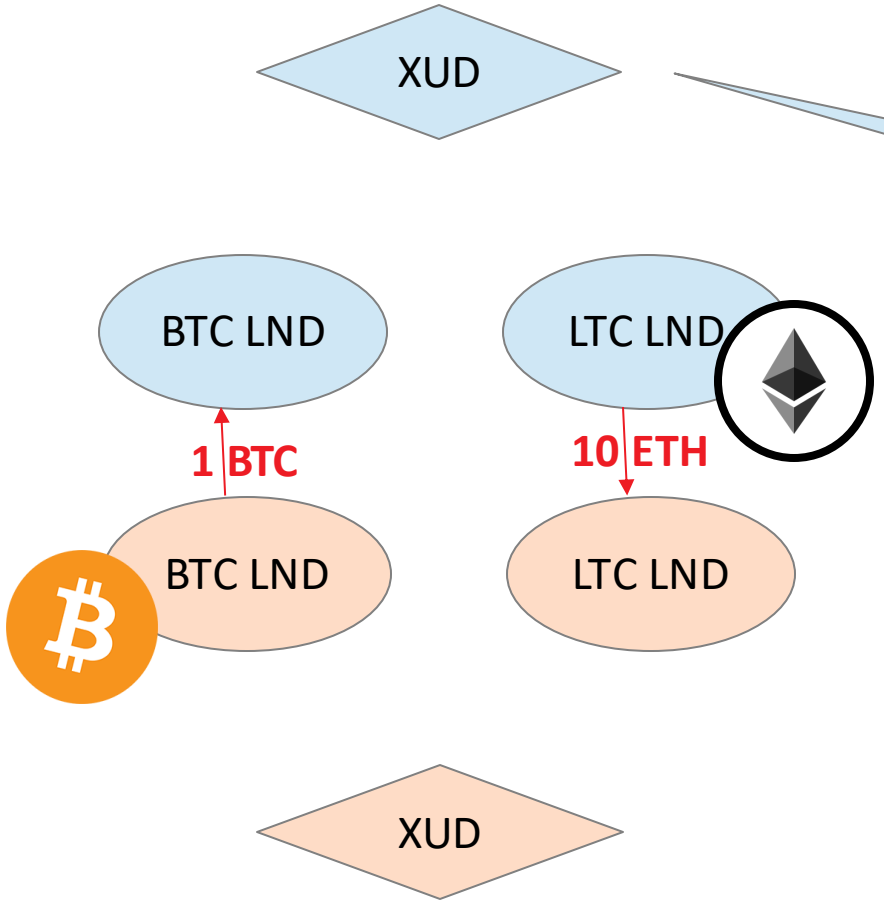
But there is a BUT

Step 5:



IF ETH vs. BTC went up

wait for timeout to get ETH back

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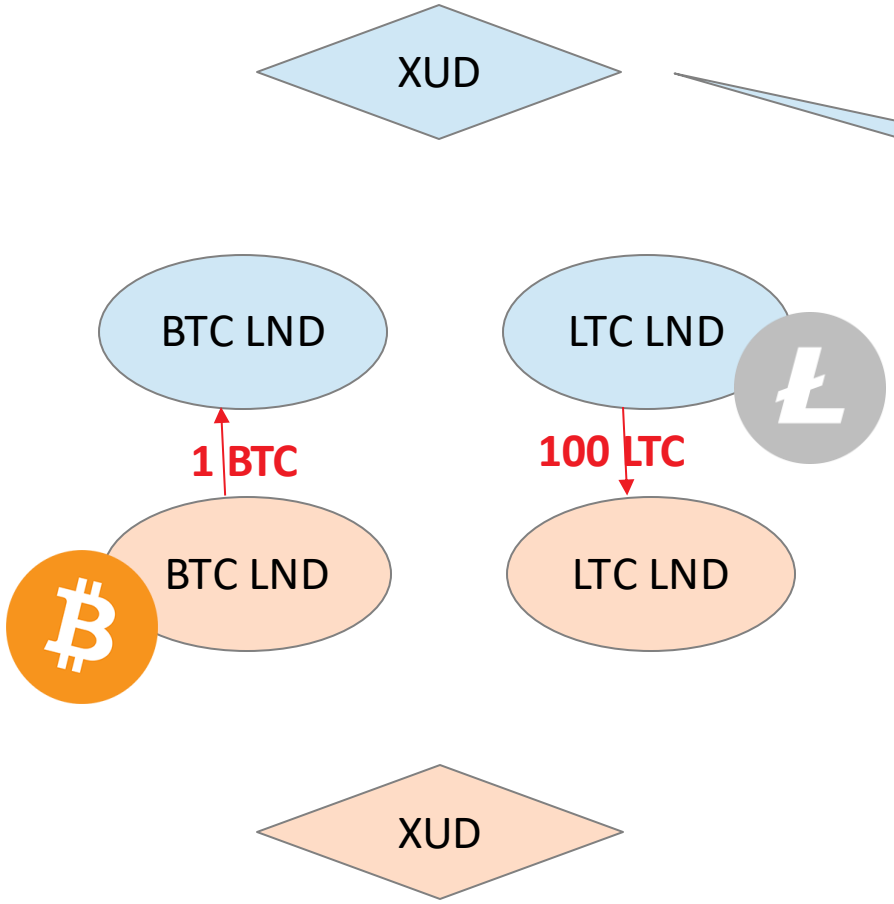
But there is a BUT

Step 5:



IF ETH vs. BTC went up

wait for timeout to get ETH back

ELSE

release preimage

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But there is a BUT

Option: right to execute a trade or not in the future

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But there is a BUT

Option: right to execute a trade or not in the future

The **problem**: it's for **free**

But there is a BUT

Option: right to execute a trade or not in the future

The **problem**: it's for **free**

"Free Option Problem"

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Free Option Problem

Good news: Conceptually solved for on-chain atomic swaps

Free Option Problem

Good news: Conceptually solved for on-chain atomic swaps

Bad News: Still unsolved for lightning-based atomic swaps

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Free Option Problem On-Chain

Conceptually solved. How?

Free Option Problem On-Chain

Punishment.

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Free Option Problem On-Chain

Punishment.

Both parties **A & B stake collateral** in target asset in additional HTLCs which use the **same preimage** as in atomic swap.

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Free Option Problem On-Chain

Punishment.

Both parties **A & B stake collateral** in target asset in additional HTLCs which use the **same preimage** as in atomic swap.

Both get collateral back, if preimage is released timely (measured in blocks).

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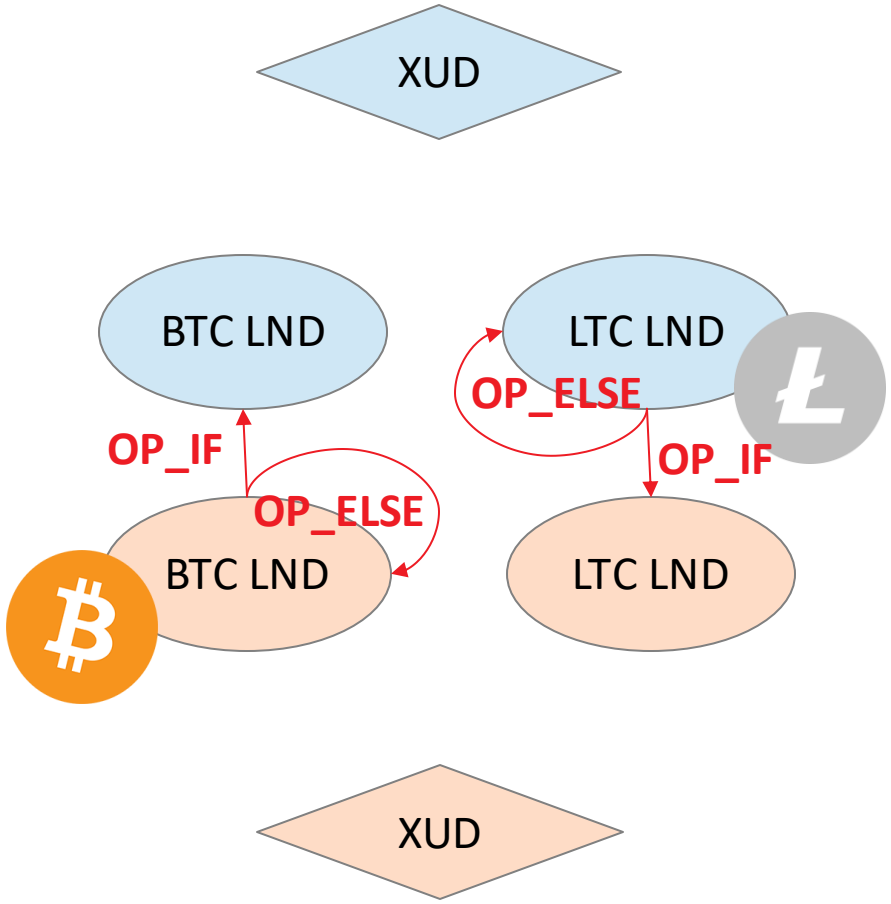
Free Option Problem On-Chain



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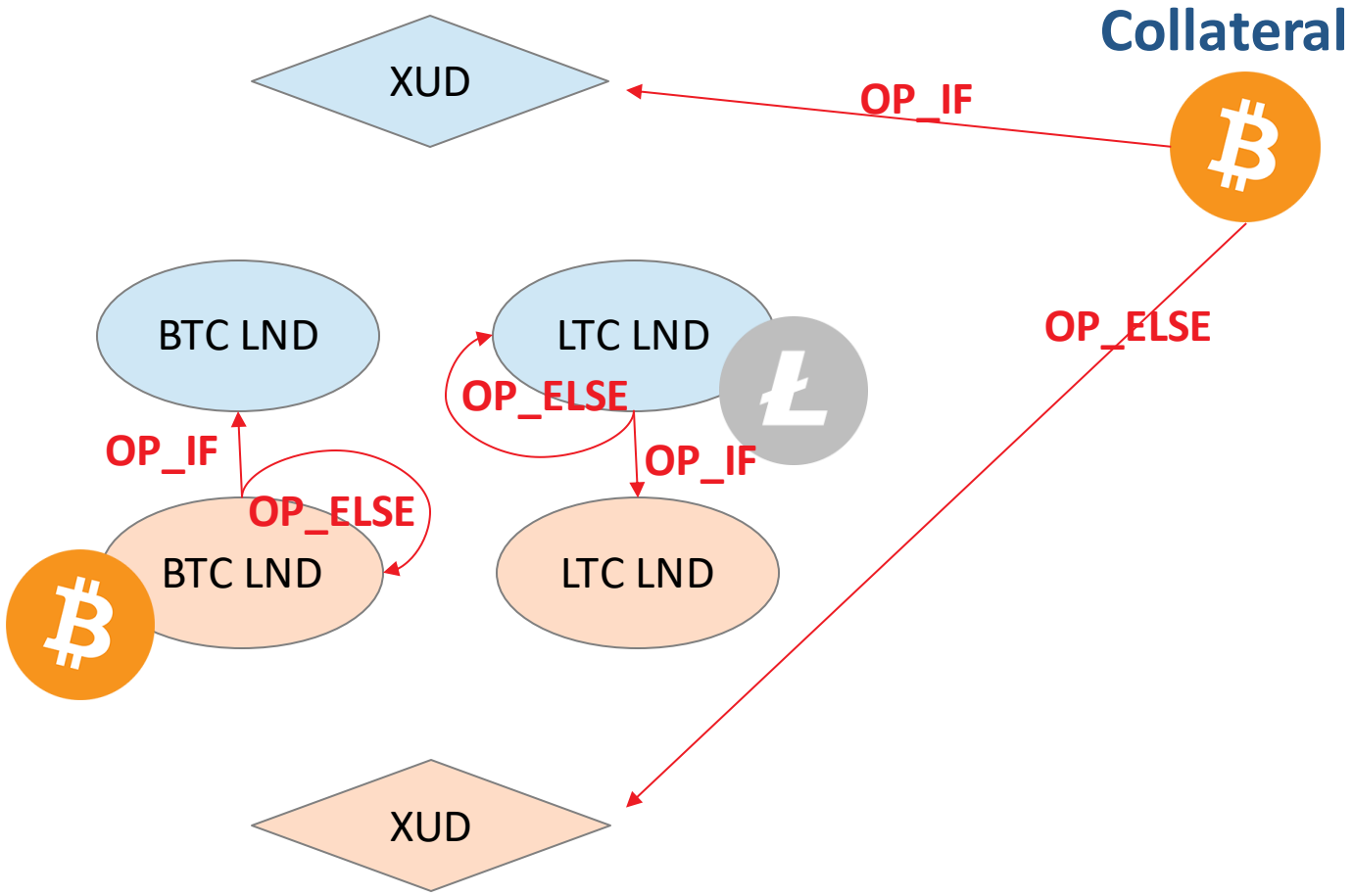
Free Option Problem On-Chain



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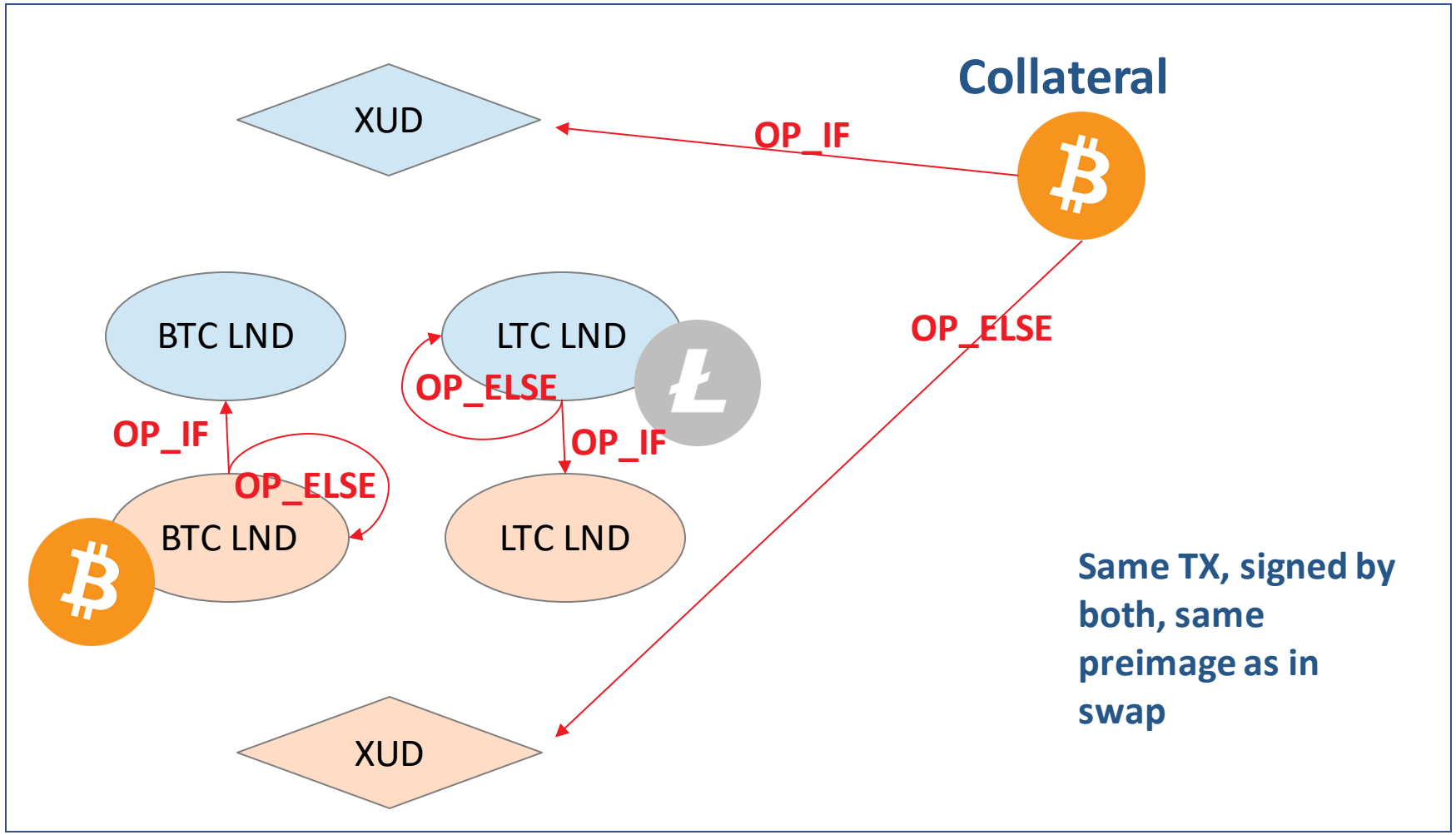
Free Option Problem On-Chain



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Free Option Problem on LN

Why not do the same on LN?

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Free Option Problem on LN

Problem:

- Uniquely attribute fault

Free Option Problem on LN

Problem:

- Uniquely attribute fault
- Needed: effective timeout of e.g. 10 seconds. Not hours or days.

Free Option Problem on LN

Problem:

- Uniquely attribute fault
- Needed: effective timeout of e.g. 10 seconds. Not hours or days.
- https://lists.linuxfoundation.org/pipermail/lightning-dev/2018-December/001752.html

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Open Research Question

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Open Research Question

Join: gitter.im/exchangeunion/FOP

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THX!

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