



Distributed Ledger Technologies beyond the Blockchain



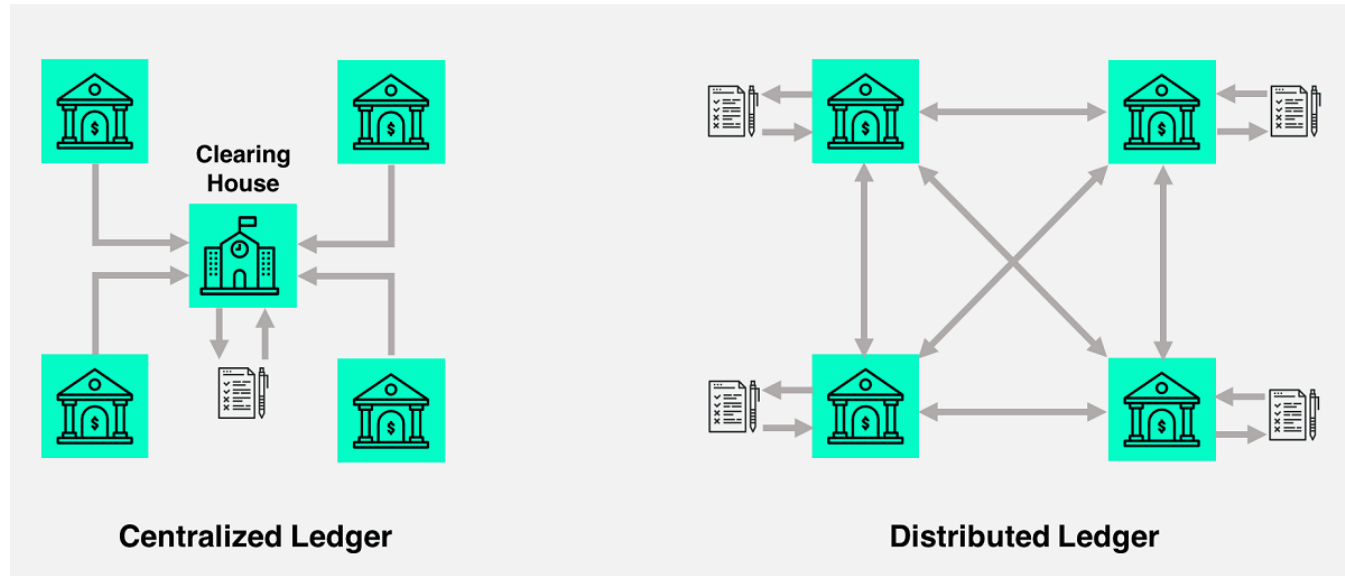
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Distributed Ledger

- A database that is updated and held by every member independently in a network space
- Any central authority does not control it, which offers transparency
- It is hard for hackers to tamper the distributed and traceable database



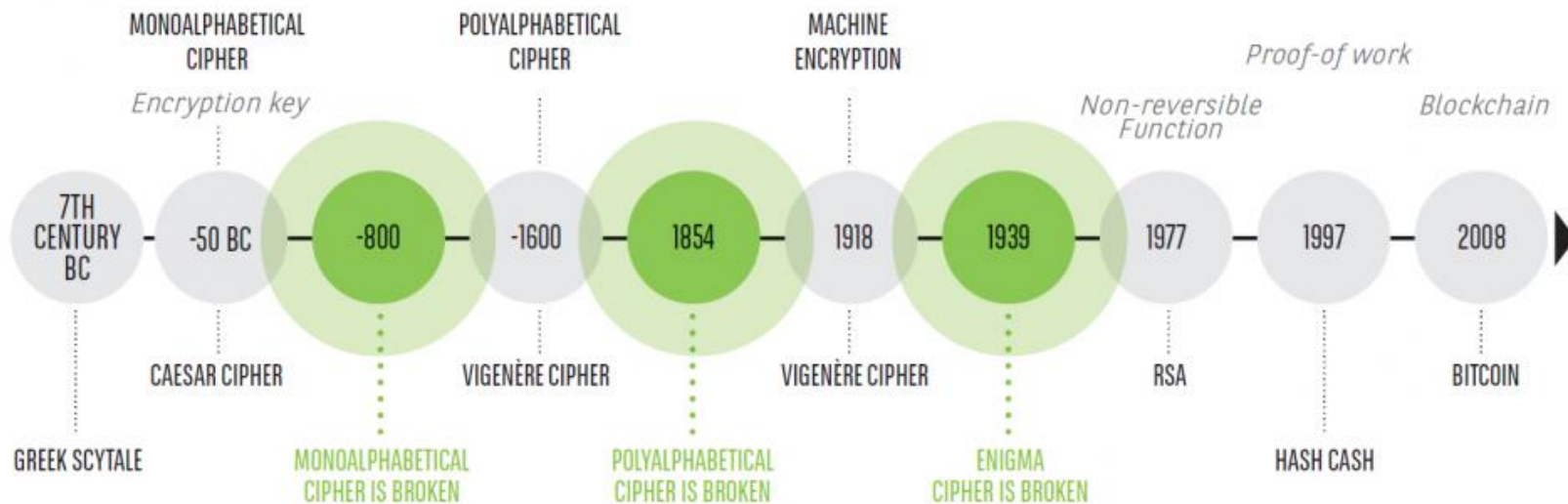
Ledgers Evolution





Influence of Cryptography

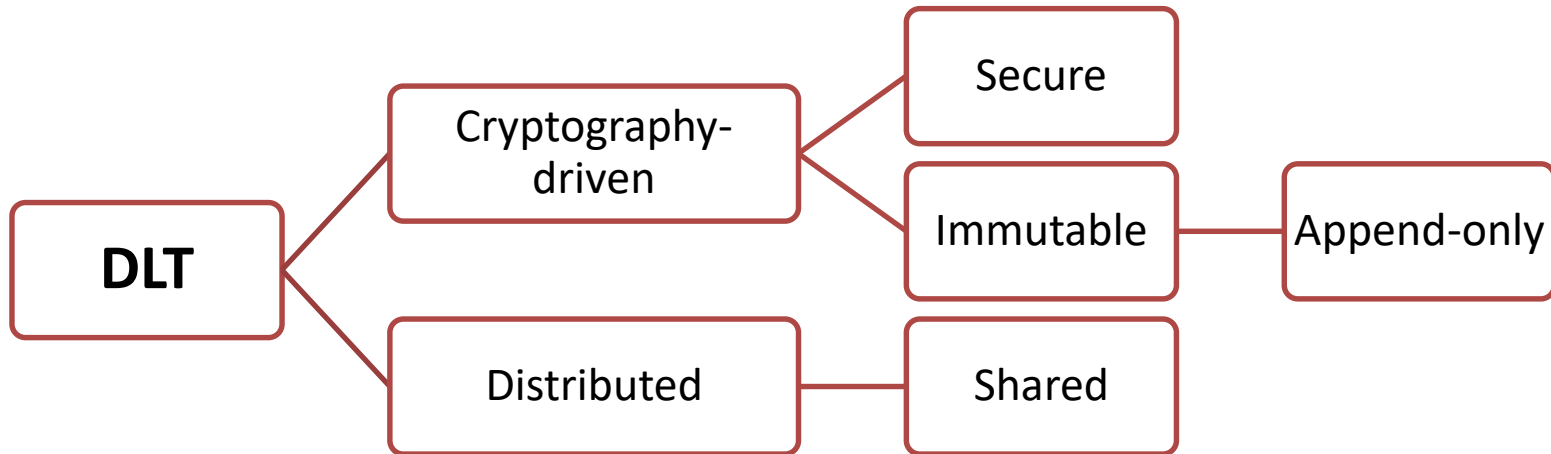
TRANSPOSITION ENCRYPTION → SUBSTITUTION ENCRYPTION → PUBLIC-KEY CRYPTOGRAPHY → CRYPTOCURRENCY





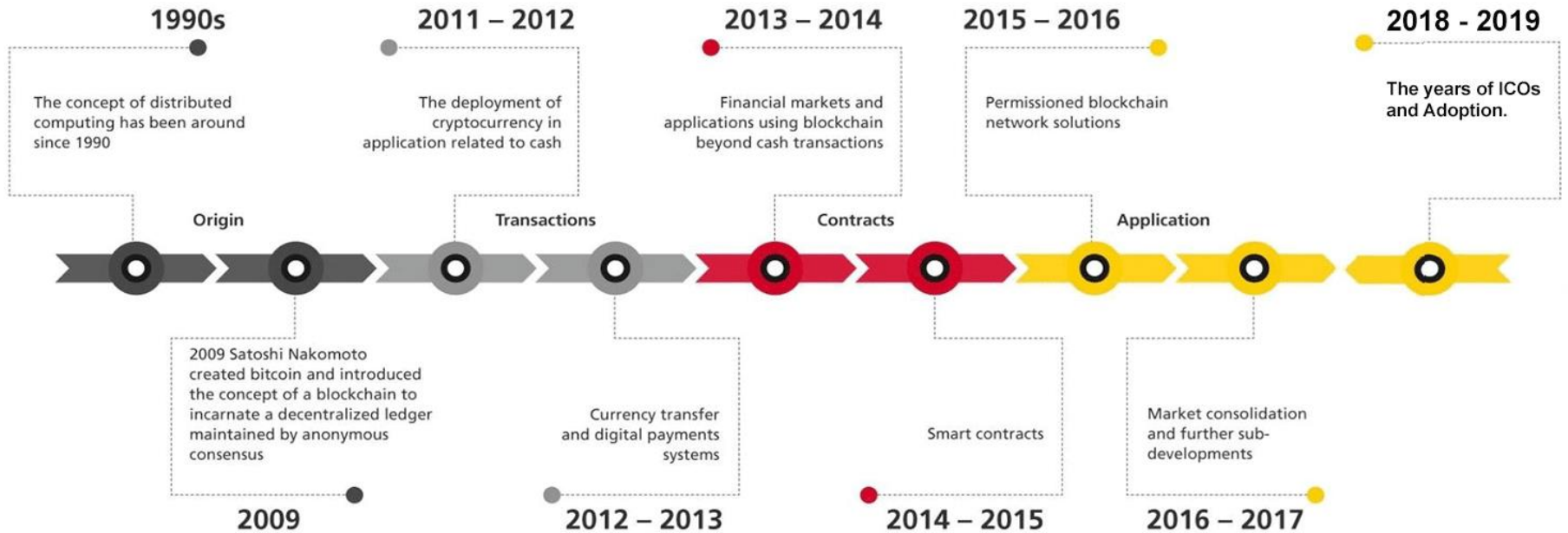
Key Properties of Distributed Ledger Technology (DLT)

- Utilization of cryptography to create immutable and secure storage
- Append-only to provide full transactional history
- No single place to store data – each peer has its copy of the ledger





Blockchain History





Types of DLT

corda



HYPERLEDGER

Permissioned

Users need to have access granted to participate

Permissionless

Users do not need permission to participate

Hybrid

Owners can distinguish public and private aspects



ethereum



Technologies Explained

Blockchain

- Transactions are stored in a chain of blocks
- The most popular DLT variant nowadays

Hashgraph

- Transactions are stored in a parallel structure
- Transactions may have the same timestamp

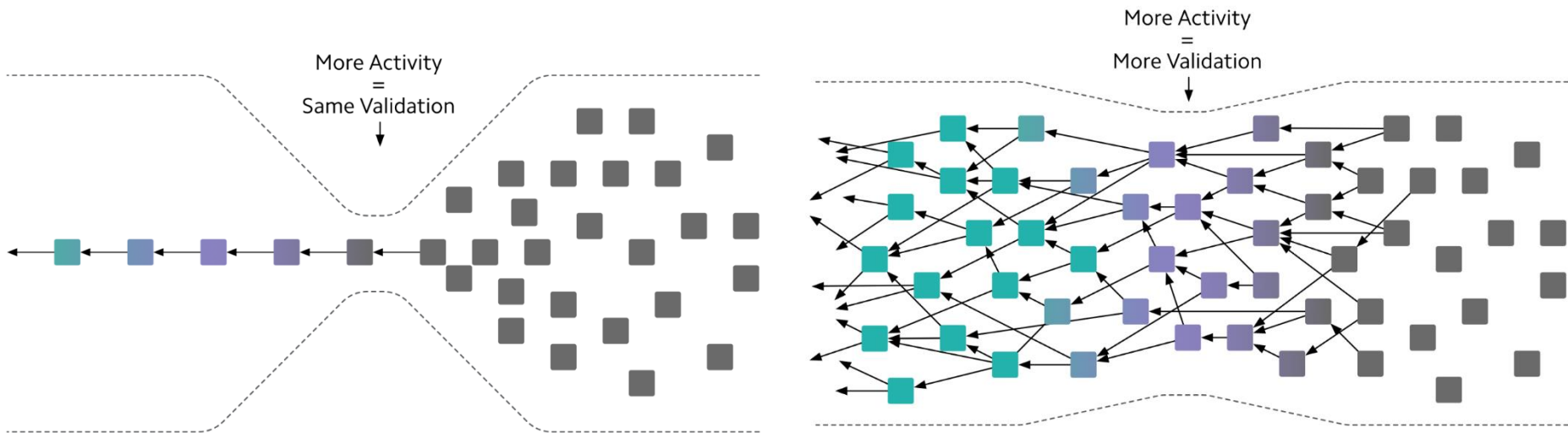
DAG

- Transactions are stored in a Directed Acyclic Graph (DAG)
- Each transaction is linked to at least two previous ones

Holochain

- Agent-centric structure for decentralized application
- Each agent has its own chain without need of consensus

Blockchain vs. Graph-based DLTs



Utilization of DLT over the World

Growing number of blockchain initiatives around the world



Source: Asian Banker Research



Programmable DLT Platforms

SMART CONTRACT PLATFORMS

PUBLIC (PERMISSIONLESS)

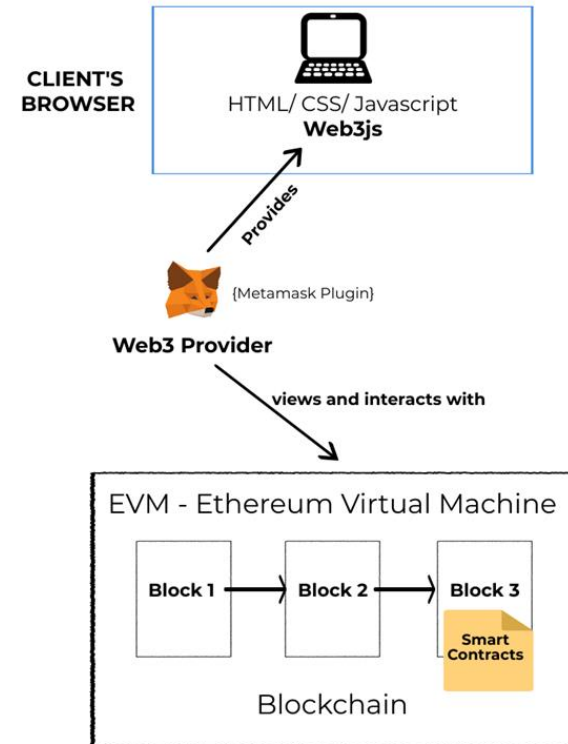


PRIVATE (PERMISSIONED)



What is Ethereum?

- The most known blockchain-based DLT platform (after Bitcoin ofc.)
- First production “programmable blockchain” platform that supports **Smart Contracts** to create decentralized applications (**DApps**)
- Permissionless for the main network but can be used for private networks
- Supports multiple clients of different nature (through the command line, programmatically using JavaScript **Web3** library, using web and mobile clients)





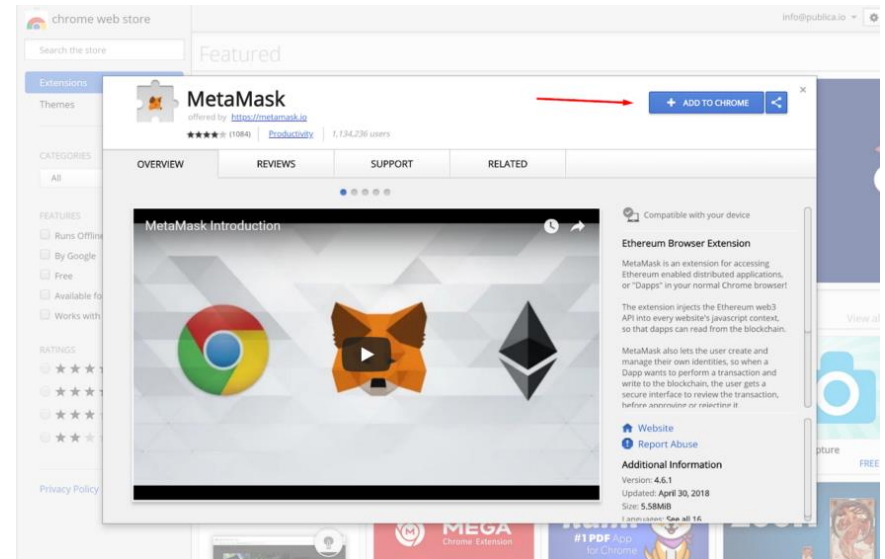
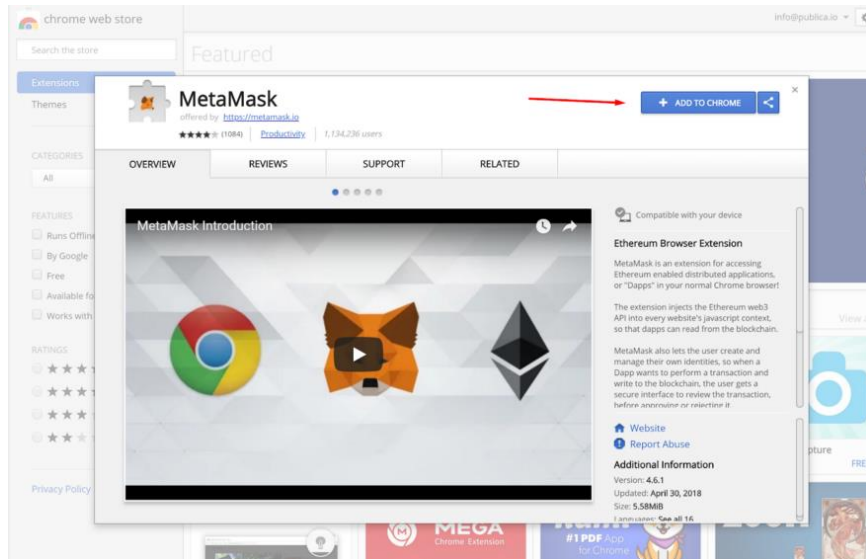
Begin Using Ethereum

- To access any of Ethereum networks, either main or test/private, you need a Web3 provider for your web browser
- Literally de-facto standard plugin for Google Chrome is **Metamask**, now also available as the stand-alone mobile application
- Opera and Firefox also have Metamask in their plugin stores





Install Metamask





Create an Account

MetaMask | chrome-extension://nkbihfboegaeaoehlfnkodbefgpgknn/home.html#initialize/create-password

Create Password

New Password (min 8 chars)

Confirm Password

CREATE

Import with seed phrase



MetaMask | chrome-extension://nkbihfboegaeaoehlfnkodbefgpgknn/home.html#initialize/backup-phrase



Secret Backup Phrase

Your secret backup phrase makes it easy to back up and restore your account.

WARNING: Never disclose your backup phrase. Anyone with this phrase can take your Ether forever.



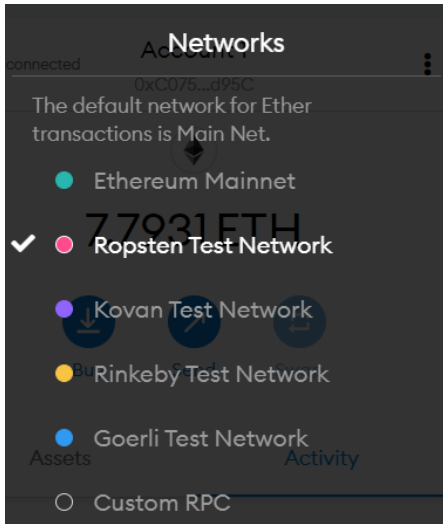
CLICK HERE TO REVEAL SECRET WORDS

NEXT



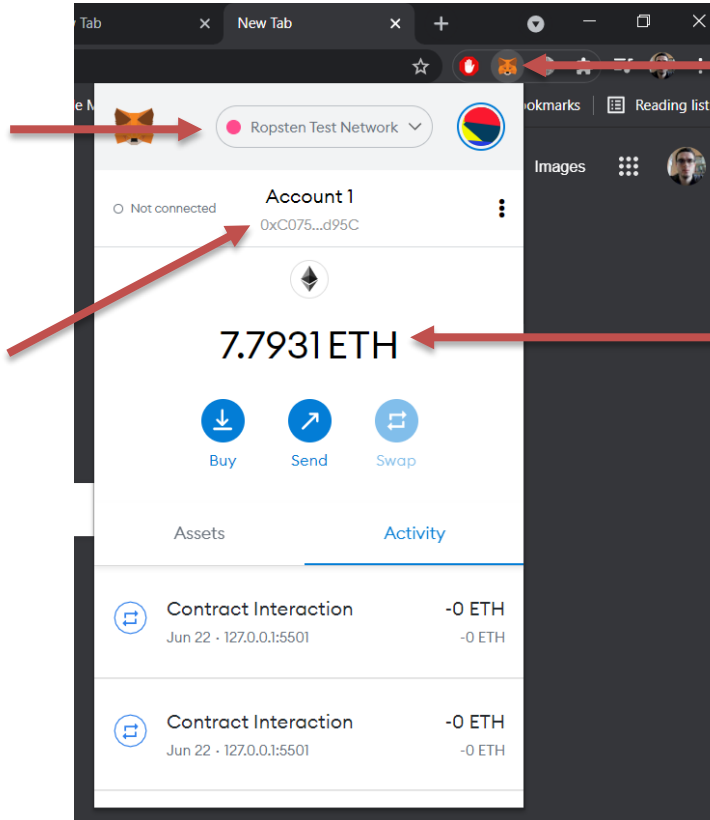
Then What?

- Choose Ethereum network you are going to use:



Currently used network

Your Ethereum address, the same for all networks



Now Metamask is one of your Chrome extensions

Your Ethereum balance in ETH – the currency inside the network used to pay for transactions and services



Get Free ETH for Experiments

- There are free “faucets” that distribute testnet ETH for developers to pay for transactions when they test DApps
- Go to <https://faucet.ropsten.be/> to acquire some Ropsten testnet ETH
- Enter your account address and click the “Send me test Ether” button

Ropsten Ethereum Faucet

Enter your testnet account address

0xC0753Fff03d88B34B9538d0A93D64831EE85d95C

Send me test Ether

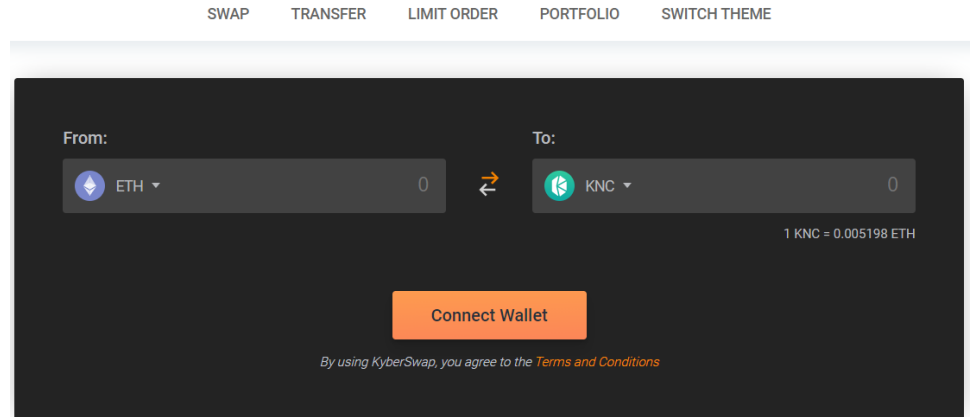
Assets Activity

	Contract Interaction	-0.053154 E...
	May 28 · ropsten.kyber.network	-0.053154 ETH
	Receive	1 ETH
	May 28 · From: 0x6874...fc85	1 ETH
	Set Sell Price	-0 ETH
	May 13 · ropsten.etherscan.io	-0 ETH



Try DeFi

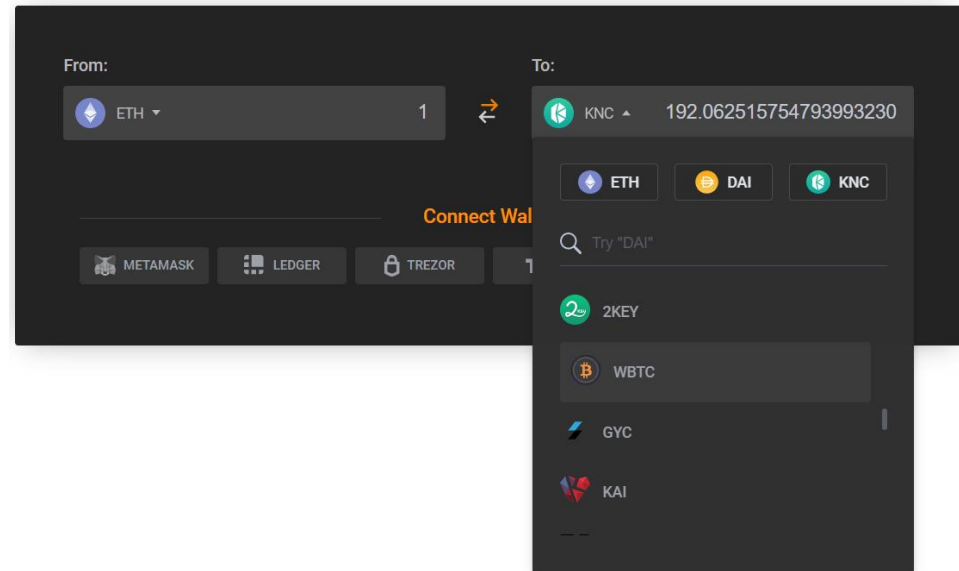
- **DeFi** term stands for the “Decentralized Finances” – finance services and applications created using a decentralized architecture, mostly the blockchain-based and deployed on **Ethereum, Tron** or **Binance Smart Chain** platforms
- Visit <https://ropsten.kyber.network/> to access the Ropsten-based DeFi application where you can exchange various cryptocurrencies
- Click the “Connect Wallet” button to access the DApp





Exchange Ethereum to Bitcoin

- Give all the permissions to this DApp in your Metamask
- Now you can try to exchange your ETH (obtained using the faucet earlier) to another crypto
- For example enter certain amount of ETH (less than your balance ofc.) into the "From" input and select "**WBTC**" currency in the "To" input
- Therefore, you are intending to swap ETH with "**wrapped**" **Bitcoin** coins that mean the same in Ethereum network as they mean in the original Bitcoin network





Confirm Swap

- When the exchange pair is selected, click the “Swap Now” button
- Check the swap information one more time (check every detail since transactions are irreversible)
- Click the “Confirm” button to agree with the exchange terms

From: **ETH** 1

To: **WBTC** 0.02667934

ETH Balance: 7.793055 ETH

25% 50% 100%

1 WBTC = 37.48217 ETH

Advanced ▾

Swap Now

Swap Confirm

My Wallet: 0xC0753 ... 85d95C | Kyber Network Proxy: 0xd719c ... 3039C4

From: **1 ETH** → To: **0.026679... WBTC**

High network congestion. Please double check gas fee (~0.001141 ETH) before confirmation.

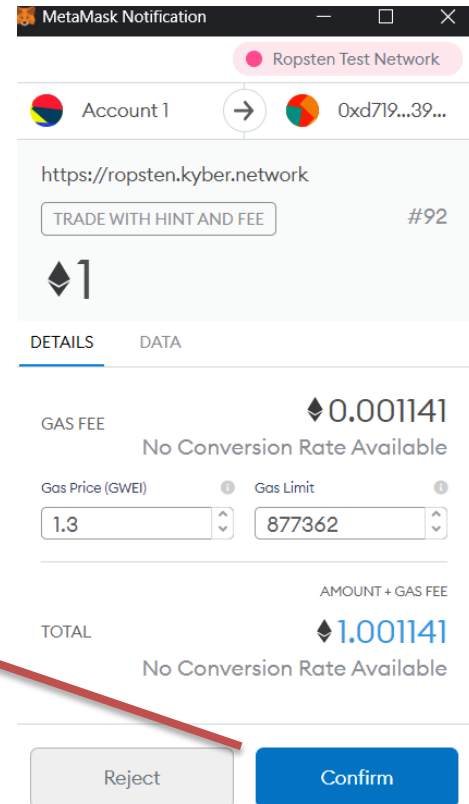
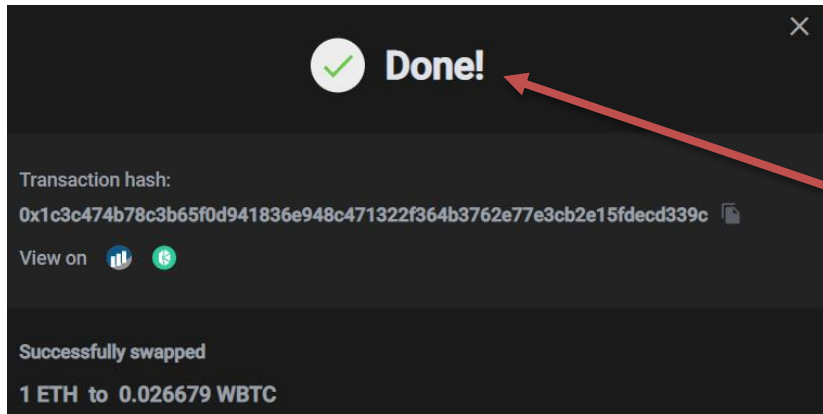
Max Transaction Fee ⓘ: **0.001141 ETH** 1.3 Gwei (Gas Price) * 877362 (Gas Limit)

Cancel **Confirm**



Sign the Transaction

- Your Metamask will be opened automatically to ask your signature, so the transaction will be broadcasted to a network and exchange completed





Check Exchange Result

SWAP TRANSFER LIMIT ORDER PORTFOLIO SWITCH THEME

Visit the
"Portfolio" page

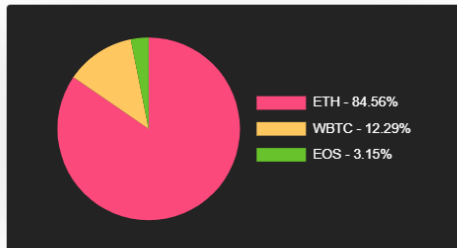
Balance Supported tokens

ETH USD

8.032632 ETH

Metamask: 0xc0753fff03d88...d95c

CHANGE



All Tokens

Search



Name | Bal

ETH ↓ | USD

Token	Balance
ETH	6.79225 E
WBTC	0.987468 E
EOS	0.252913 E
MATIC	---
USDT	---

Your purchased
coins are here

😊 Please give us [feedback](#) on our new features so that we can serve you better

Portfolio Performance

24H 7 Days 1 Month 3 Months

... loading...



What is Next?

- Try the main network, real exchanges, and DeFi services (NOT FINANCIAL ADVICE)
- Try **NFT** (Non-Fungible Token) collectibles, digital arts, and tokenized assets
- Create your own crypto-token on the Ethereum test or main network
- Create your smart contract and decentralized application





**Department of Software Engineering and Management Information Technology
Faculty of Computer Science and Software Engineering**

**THANK YOU FOR YOUR ATTENTION!
ANY QUESTIONS?**