



NPTEL ONLINE CERTIFICATION COURSES

Blockchain and its applications

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Lecture 46: Blockchain Interoperability - I

CONCEPTS COVERED

- Basic Concept of Asset and Data Transfer
- Asset Transfer in Permissionless Blockchain
- Cross Chain Transfer and Exchange of Asset
- Trusted Third Party



KEYWORDS

- Interoperability
- Asset Transfer
- Cross Chain Transfer
- Trusted Third Party
- Asset Exchange



Interoperability in Permissionless and Permissioned Blockchains

- Permissionless Blockchain
 - Asset Transfer
 - Crypto currency driven
- Permissioned Blockchain
 - Data Transfer
 - Consensus-driven

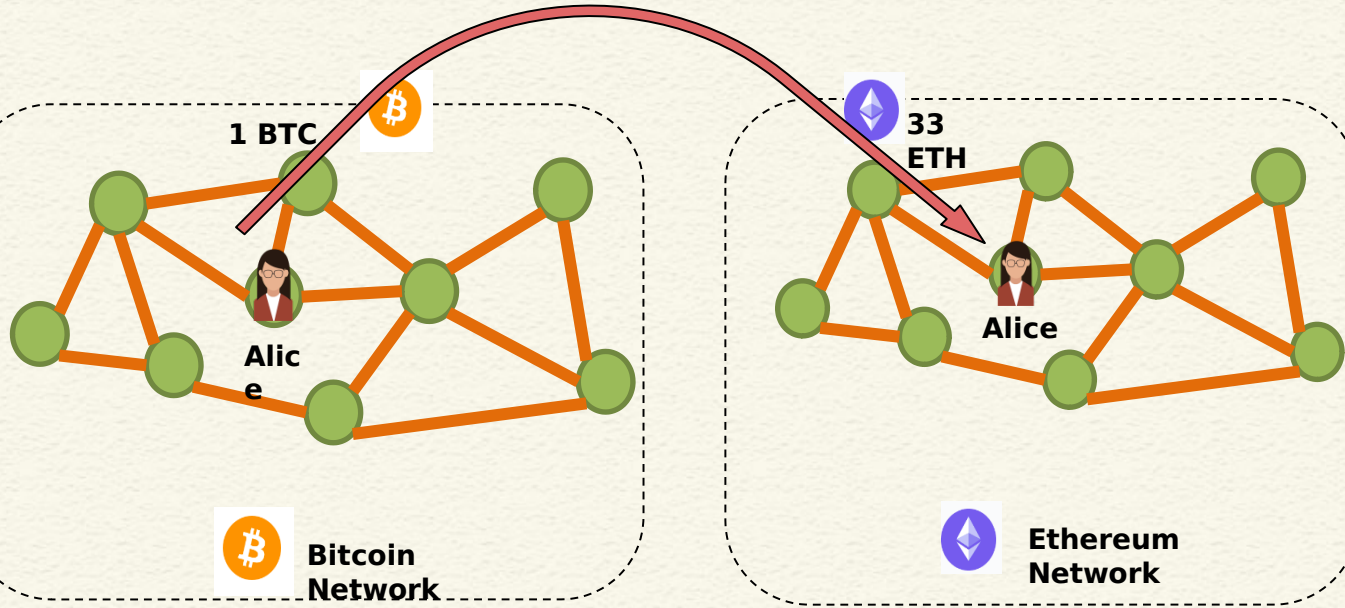


Public Blockchains as Isolated Silos

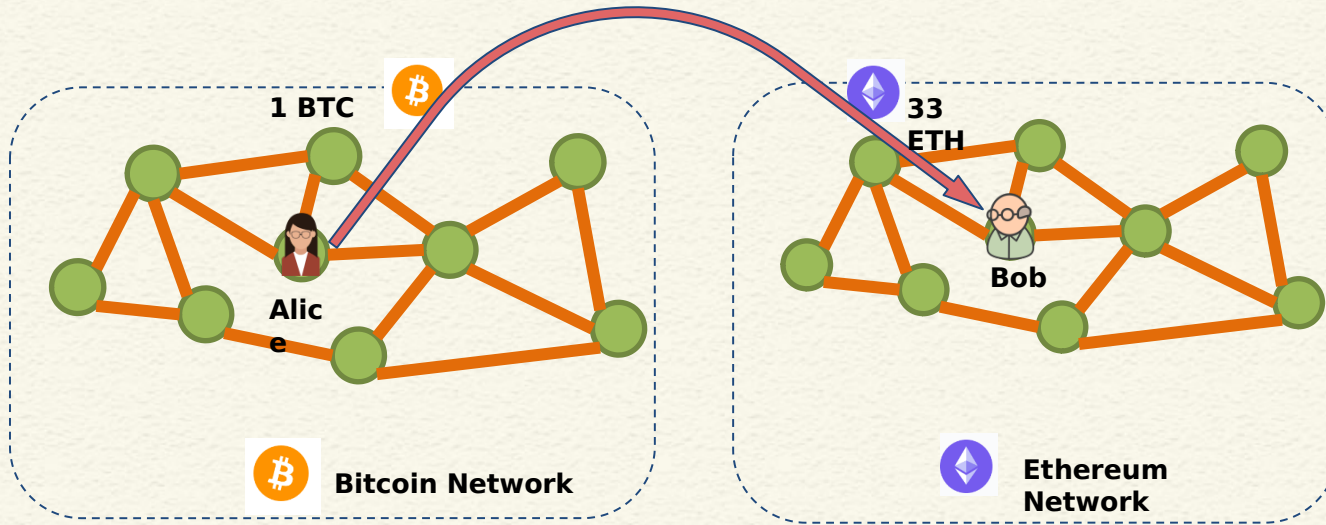
- Blockchain-based cryptocurrencies enable secure and trustless currency transactions between parties.
- There are currently **over 2000 different cryptocurrencies in operation**.
- Separate blockchain networks with often different protocols and standards
- **Continue to operate in complete isolation from one another.**



Cross Chain Asset Transfer

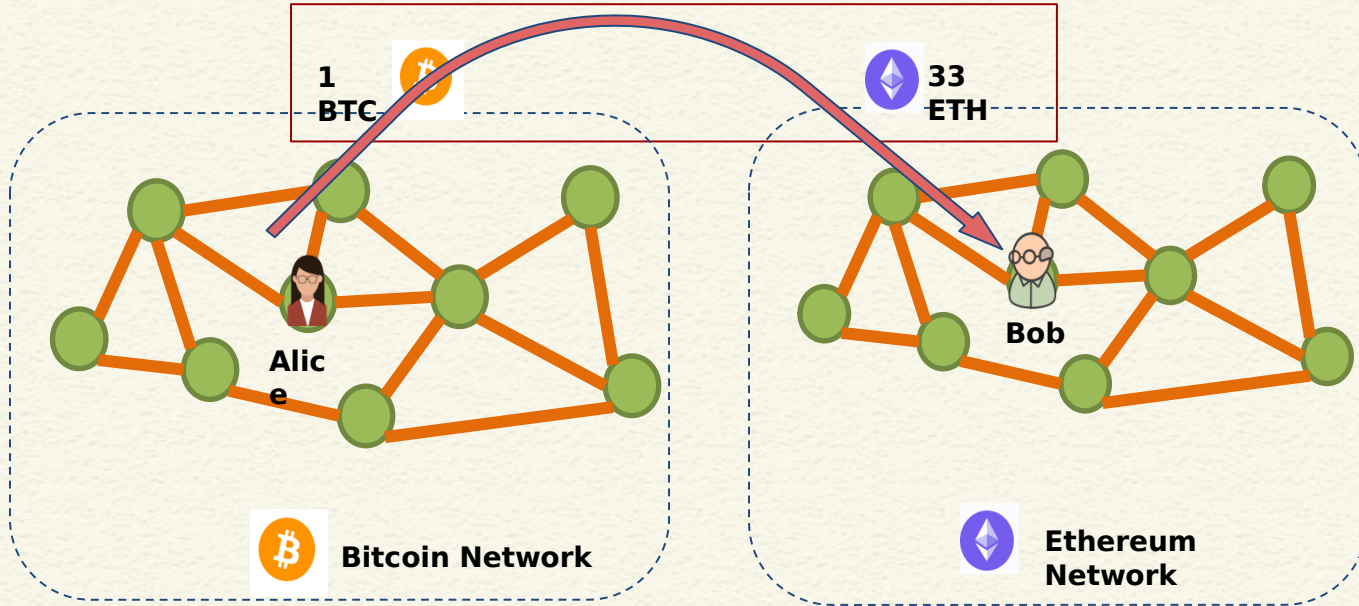


Cross Chain Asset Transfer



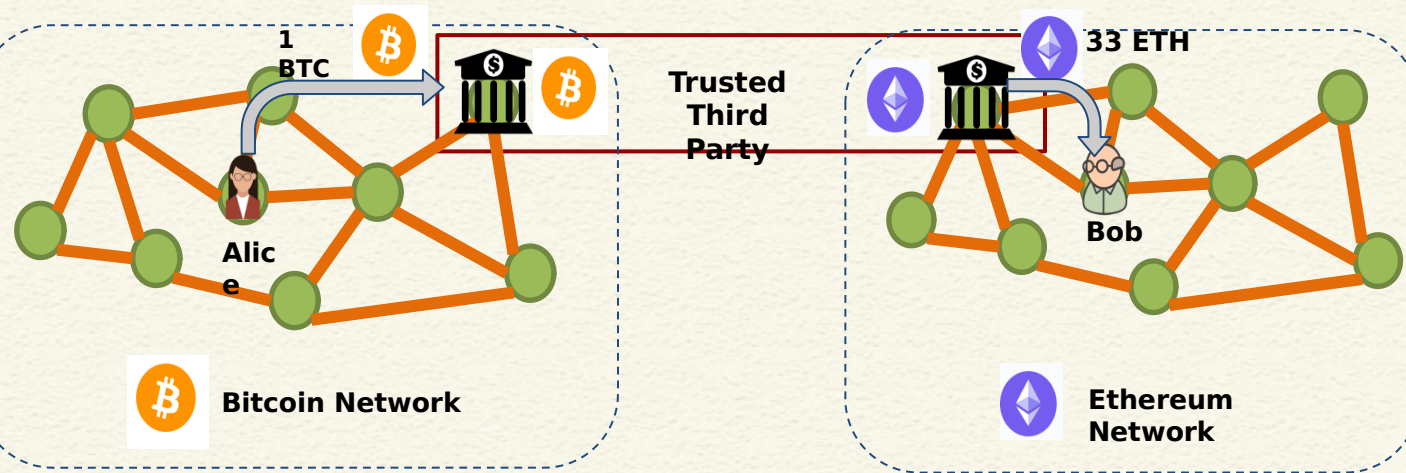
Possible between different account holders also

Cross Chain Asset Transfer



To do the transfer, **Alice** must use some **third party who owns** ≥ 33 ETH

Cross Chain Asset Transfer - TTP



TTP based Asset Transfer

- There are hundreds of centralized cryptocurrency exchanges now.
- **Centralized**, users transfer ownership of their funds to the sole control of the exchange administrator.
- **Fast**, once the deposit is done, the transfer to the destination network is often very fast (in milliseconds).

<https://bitcointalk.org/index.php?topic=576337>

<https://www.reuters.com/article/us-bitcoin-mtgox-wallet-idUSBREA2K05N20140321>

<https://www.reuters.com/article/us-bitfinex-hacked-hongkong-idUSKCN10E0KP>



TTP based Asset Transfer

- **Lack of security:** There has been **numerous cases of theft** from centralized exchanges.
- **650,000 bitcoins lost** when the **MtGox** exchange shut down in 2014.
- Users of the Bitfinex exchange lost approximately **120,000 bitcoins** in 2016

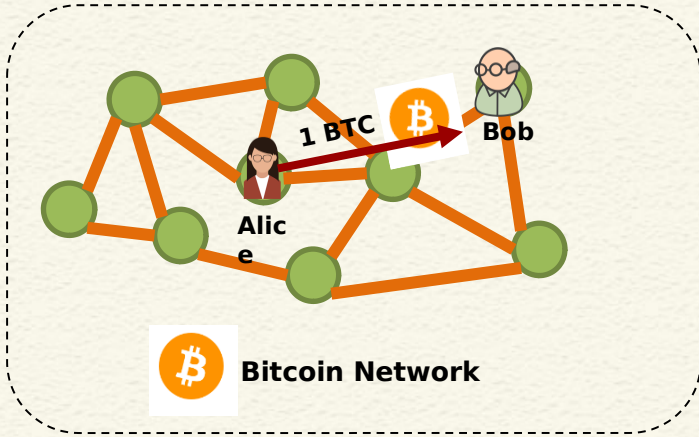
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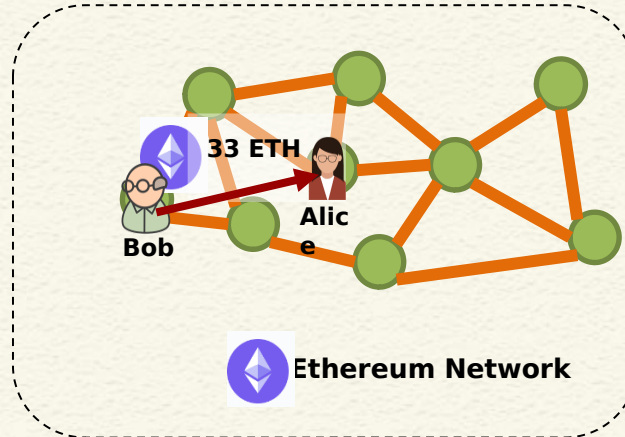
<https://www.reuters.com/article/us-bitfinex-hacked-hongkong-idUSKCN10E0KP>



Asset Exchange



1



2

Transfer in both the networks from Alice to Bob (1) and from Bob to Alice (2) must be **ATOMIC**

Asset Exchange - Problems

- Without the presence of any Escrow, the funds are in control of the sender and receiver parties.
- One party might **abort** the exchange after receiving funds.
- Synchronization problems between the two networks, as well as sender and receiver.
- Difficulty in agreement on exchange rates which may keep on changing every second.



CONCLUSIONS

- Introduced the basic concepts of interoperability
- Asset transfer in permissionless blockchains
- Trusted third party based asset transfer
- Asset exchange and its challenges



REFERENCES

- Web resources and research papers as mentioned from time to time



*Thank
you*

