Lightning Network Workshop
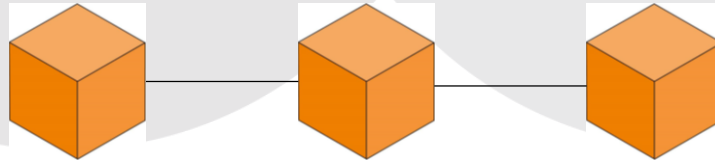
SAKCHAI PRATANTIP

Why Lightning Network?

Bitcoin Blockchain

Lightning Network

On average 1,700 transactions per second
Capacity of 65,000 transactions per second

Million of transactions per second

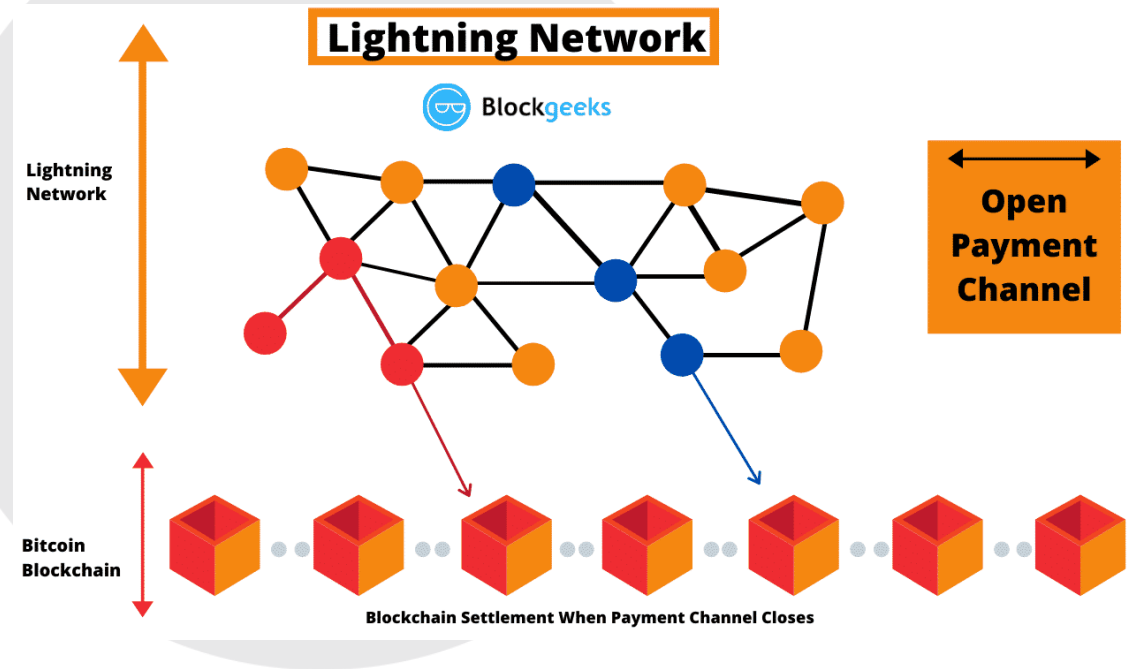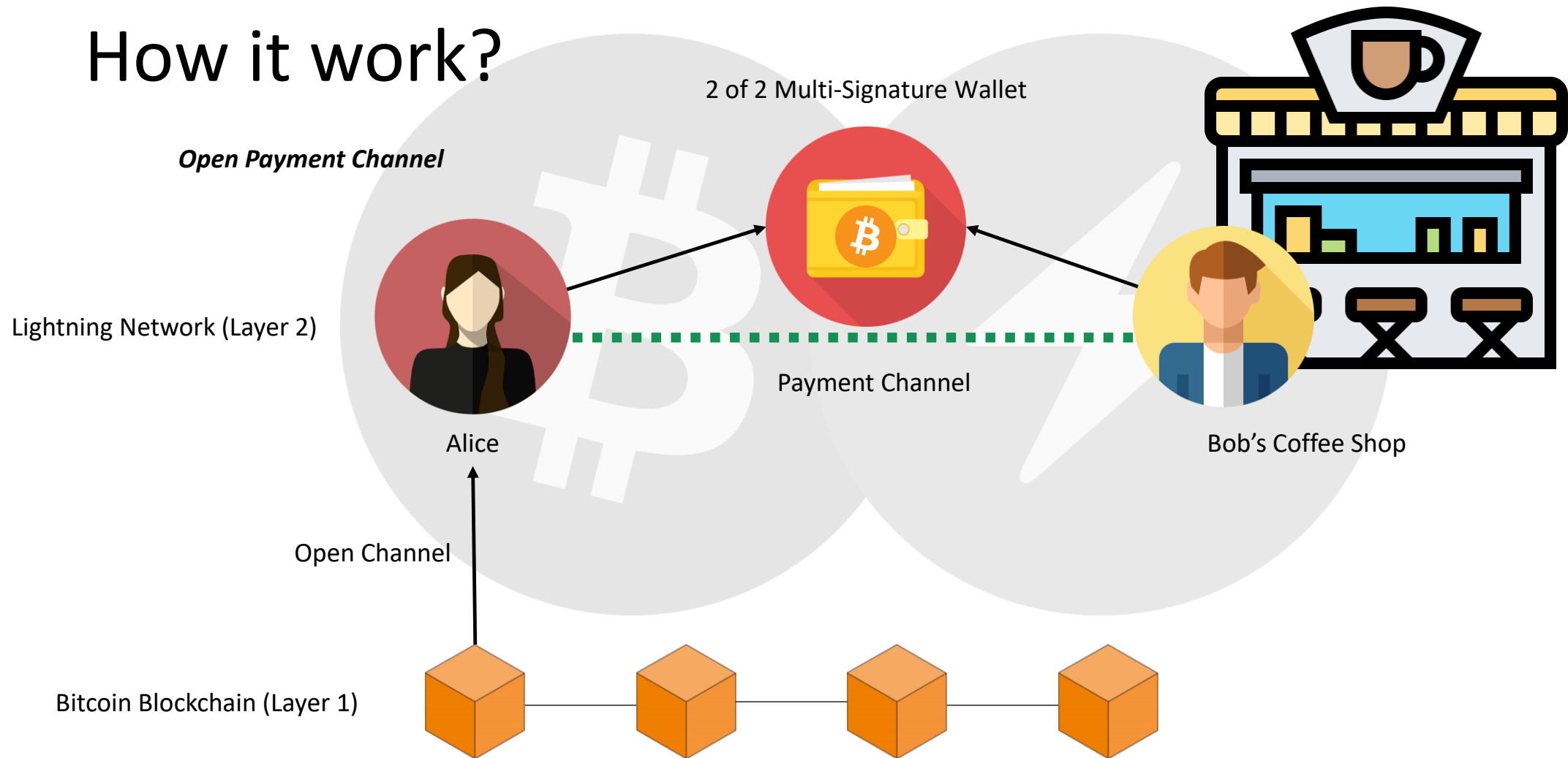Capacity of 7 transactions per second
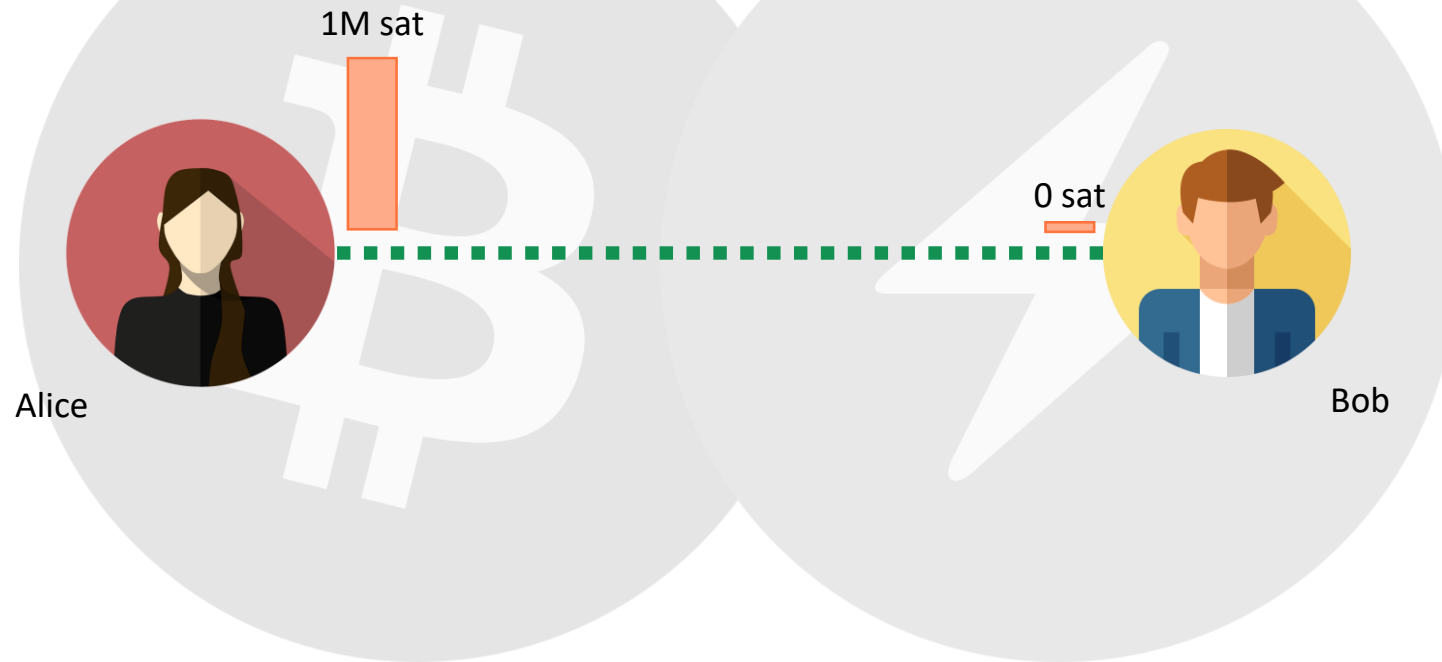
What is Lightning Network?

- A second layer added to Bitcoin's (BTC) blockchain

- Not blockchain

- Network of Payment Channels

- Allows users to send or receive Bitcoin quickly and cheaply by moving transactions off of the main blockchain

How it work?

2 of 2 Multi-Signature Wallet

Open Payment Channel

Lightning Network (Layer 2)

Payment Channel

Alice

Bob's Coffee Shop

Open Channel

Bitcoin Blockchain (Layer 1)

Lightning Payment

1M sat

0 sat

Alice

Bob

1 Bitcoin = 100M sat

Lightning Payment
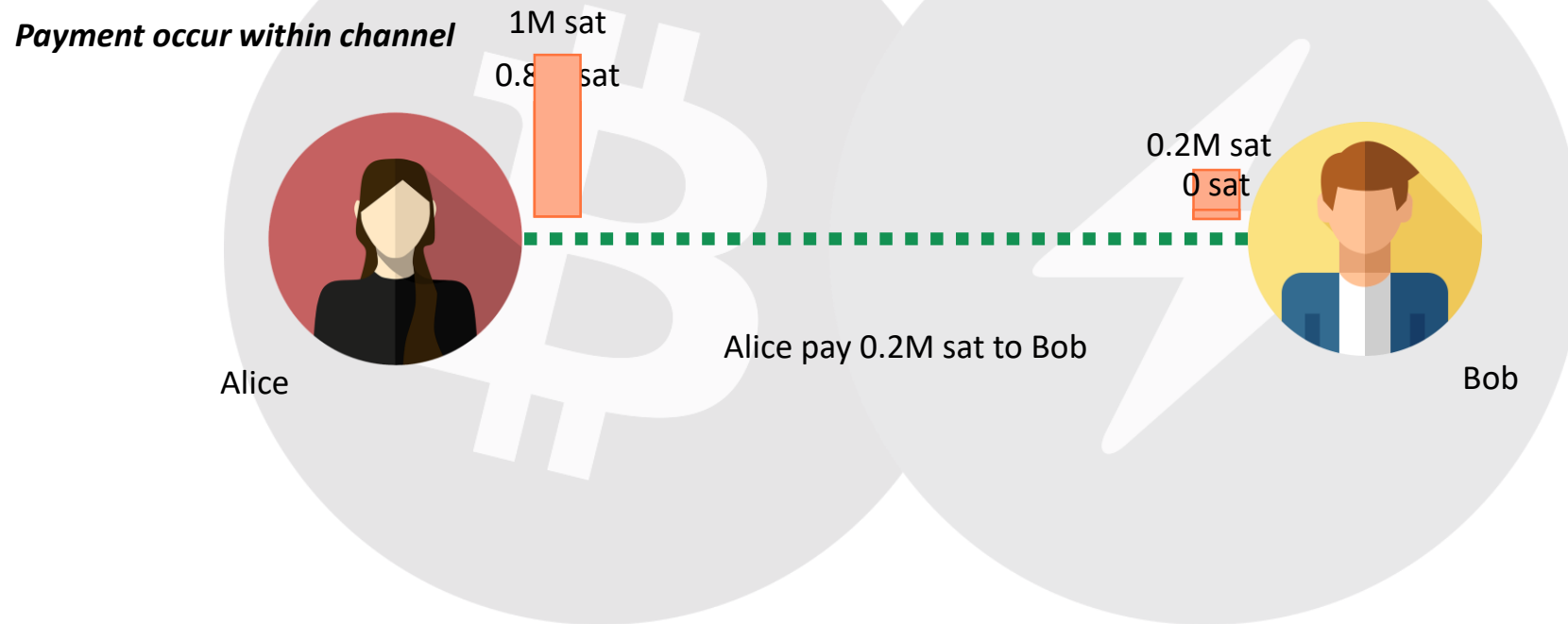
Payment occur within channel

1M sat

0.8 sat

Alice

0.2M sat

0 sat

Bob

Alice pay 0.2M sat to Bob

1 Bitcoin = 100M sat

Multi-hop Payment

0.8M sat

0.8M sat → 0.2M sat

Alice

0.7M sat

Bob

0.5M sat

Alice pay 0.2M sat to David

0.5M sat

0.5M sat

1.0M sat

David

0.5M sat ← 0.5M sat

Carol

1 Bitcoin = 100M sat

Multi-hop Payment

0.6M sat

0.6M sat   0.4M sat   0.7M sat

Alice

Bob

0.3M sat

Alice pay 0.2M sat to David

0.7M sat   0.7M sat   1.0M sat

0.7M sat   0.3M sat

David

Carol
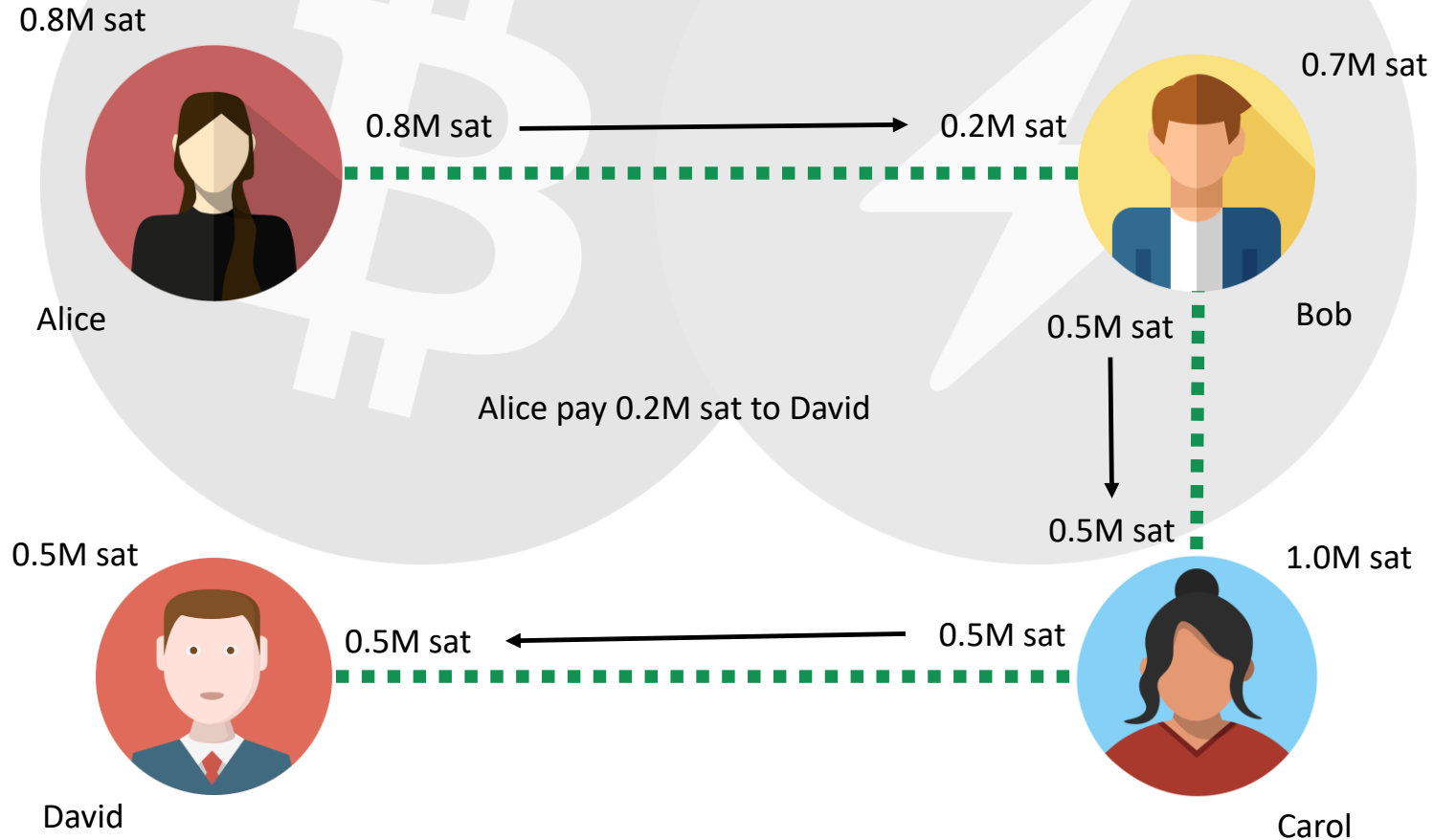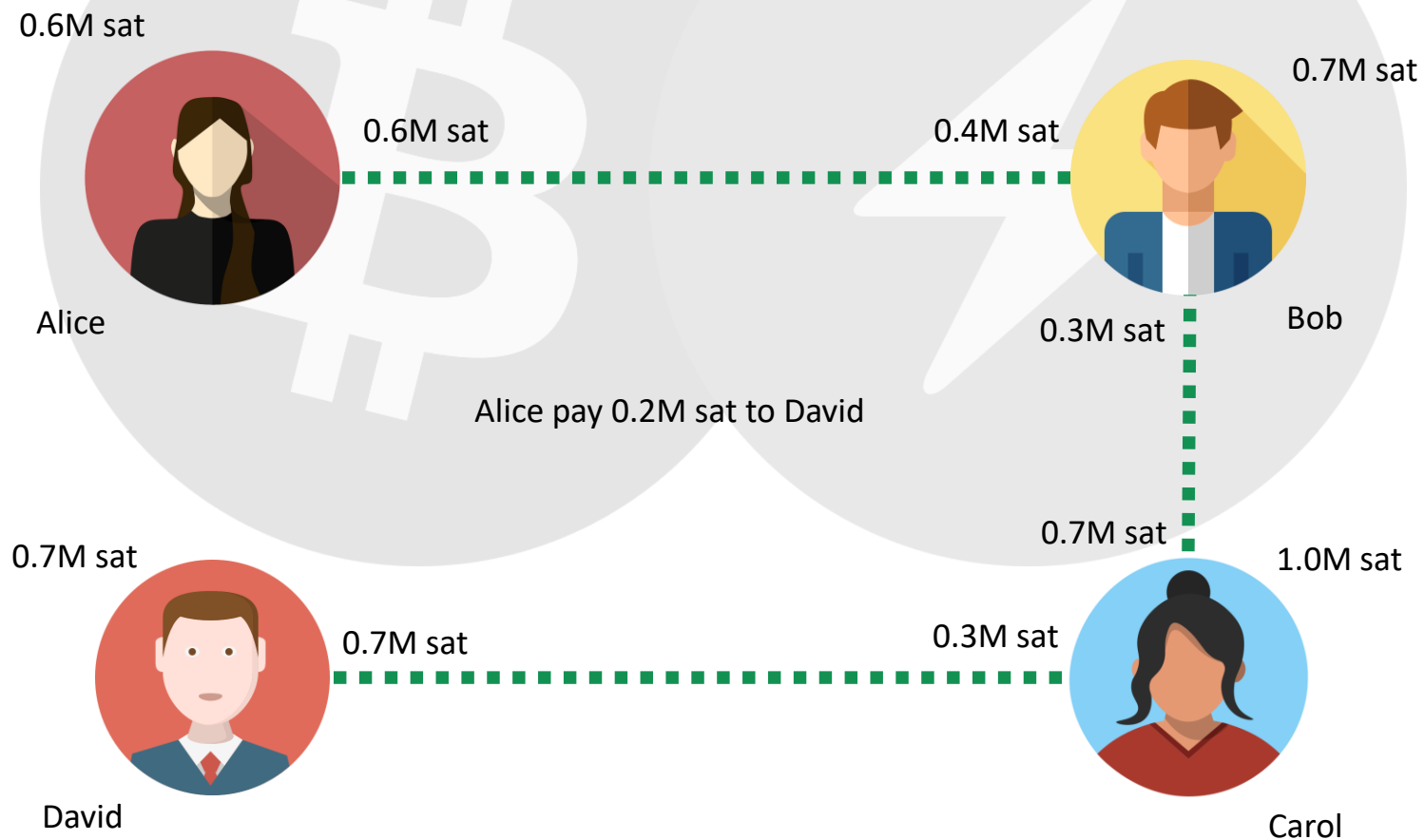
1 Bitcoin = 100M sat

Liquidity Problem

0.6M sat

0.6M sat

0.4M sat

0.7M sat

Alice

Bob

0.3M sat

Alice cannot pay 0.5M sat to David!!!

0.7M sat

0.7M sat

1.0M sat

0.7M sat

0.3M sat

1 Bitcoin = 100M sat

David

Carol

Closing Channel

Lightning Network (Layer 2)

0.6M sat

0.4M sat

Alice

Bob

Close Channel

Bitcoin Blockchain (Layer 1)

1 Bitcoin = 100M sat

Transaction Summary

Lightning Network (Offchain)

Alice: 0.002BTC → Bob

Alice: 0.002BTC → David

Net Change: Alice -0.004BTC

Opening Transaction

Alice: 0.010BTC

Bob: 0.000BTC

2-of-2 multisig

Closing Transaction

2-of-2 multisig

Alice: 0.006BTC

Bob: 0.004BTC

On Bitcoin Blockchain

1 Bitcoin = 100M sat

Steps for payment

Alice

2. Alice scan invoice for payment.

David

1. David create invoice for receiving
Exp. lnbc1802341534dfs102d13...

Routing Fee

Alice pay 10k to David
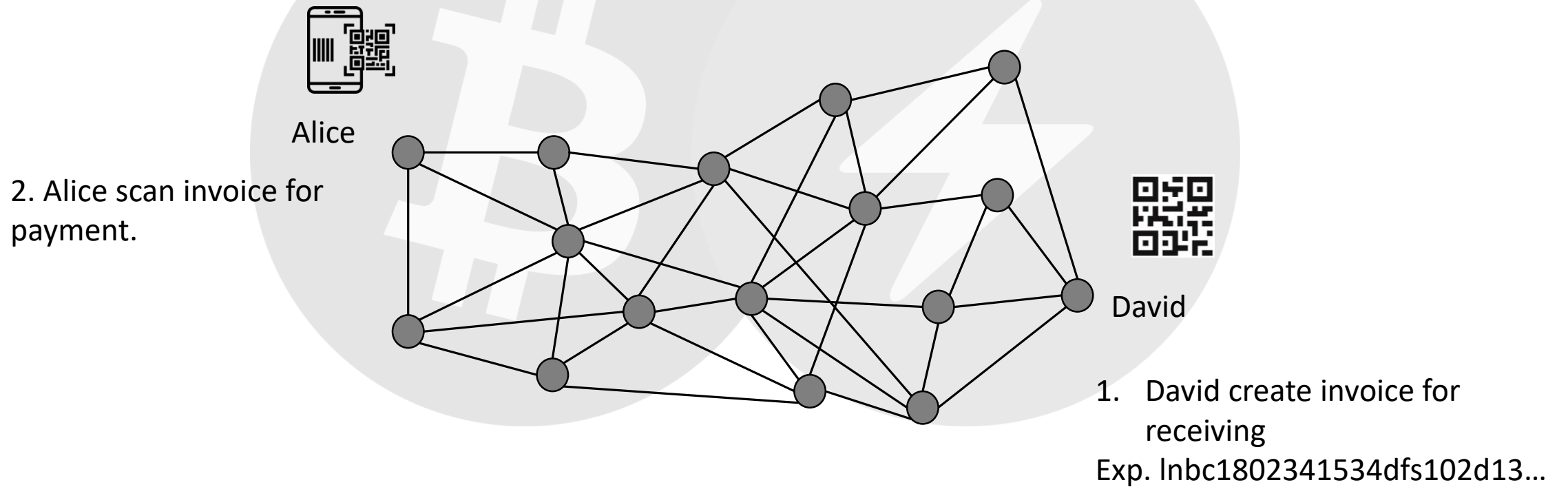
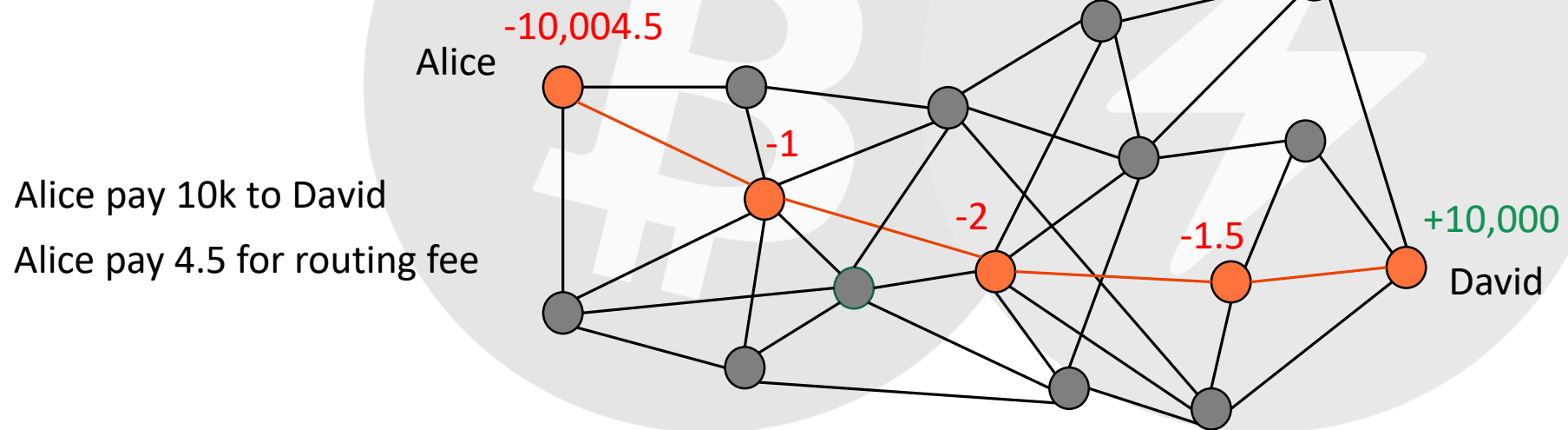Alice pay 4.5 for routing fee

What is Lightning Node?

- A node is software that connects to the blockchain network and exchanges the most up-to-date blockchain data. (Bitcoin Node)

- A Lightning node (LN) links to the main blockchain network such as Bitcoin and the Lightning Network, itself.

A Lightning Network node has two responsibilities.

- Monitor the underlying blockchain (bitcoin)

- Interact with other Lightning Network nodes to transact money

Purpose of Running LN Node

- To be a full, active participant in the Lightning Network, not just an end user

- To run an ecommerce store or receive income via Lightning payments

- To earn income from Lightning routing fees or by renting channel liquidity

- To develop new services, applications, or plug-ins for the Lightning Network

- To increase your financial privacy while using Lightning

- To use some apps built on top of Lightning, like Lightning-powered instant messaging apps

- For financial freedom, independence, and sovereignty

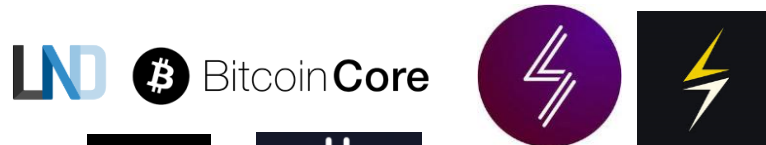# Profitability from Lightning Network

- Routing Fee

- Loop in/out (Swap between Lightning & Bitcoin On-Chain)

- Rent/Sell Inbound Liquidity

- Cloud Services for LN Node

- Consulting Services for LN Node Professional

Node Implementation
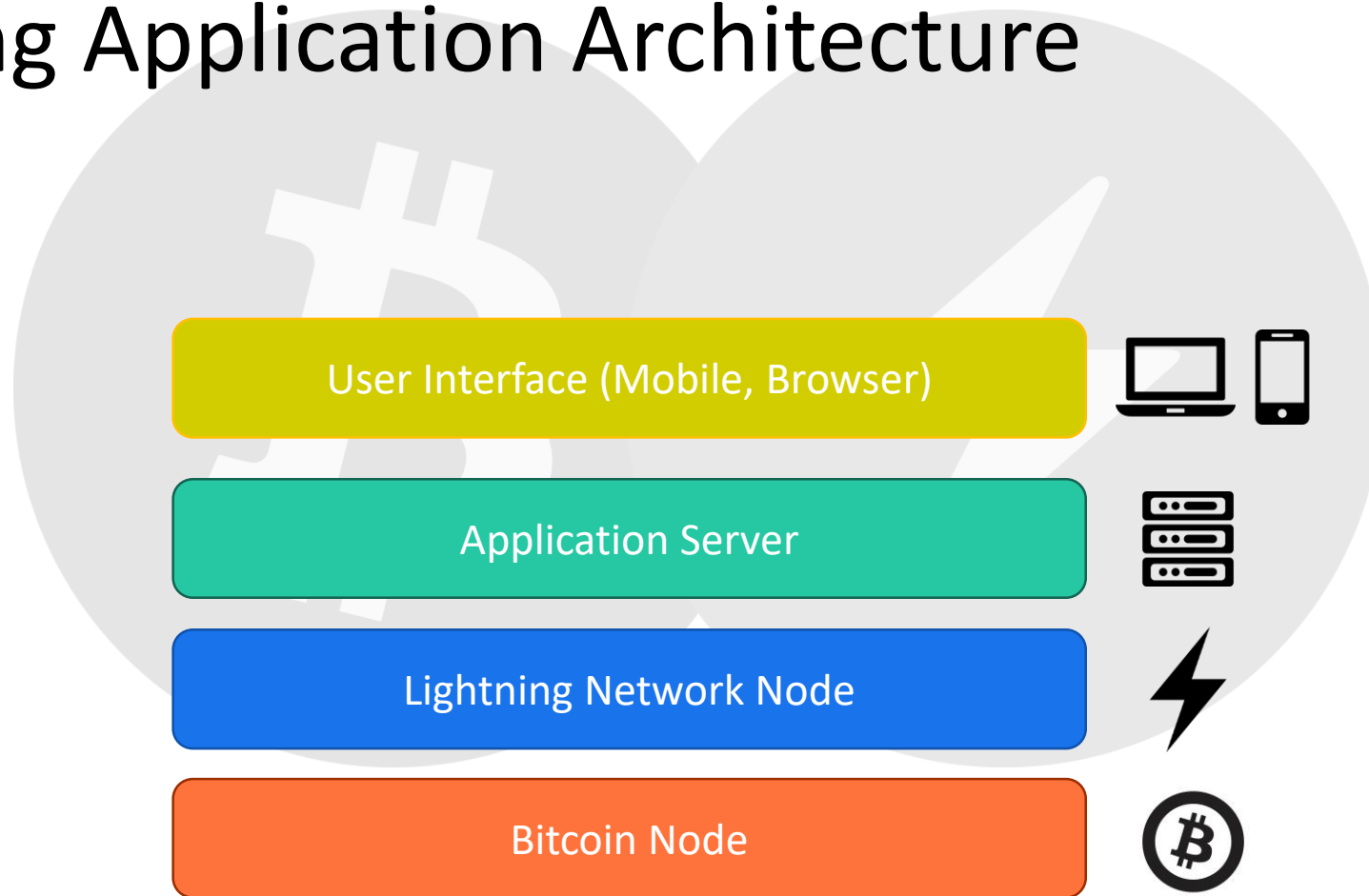
Do It Yourself

Out of the box

Cloud Services

Bitcoin On-chain vs Lightning Network

Bitcoin On-Chain	Lightning Network
Addresses	Invoice
Transaction	Payment
Change Outputs	No Change
Mining Fees	Routing Fees
Public Bitcoin Transactions	Private Lightning Payments
Waiting for Confirmations	Instant Settlement
Large Value Payment	Small Value Payments
Satoshis	Millisatoshis (0.001 Satoshis)

Lightning Application Architecture

User Interface (Mobile, Browser)

Application Server

Lightning Network Node

Bitcoin Node

Bitcoin Lightning Wallet

SPARK WALLET

muun

WALLET OF SATOSHI

Blixt Wallet

blue

Phoenix

Breez

ZEUS

coinos

tippin.me

NAYUTA

SHOCKNET

DOWNLOAD WALLET APP ON
MOBILE PHONE

WALLET
OF SATOSHI

blue wallet

Workshop #1

Download on the App Store

GET IT ON Google Play

Workshop #2

Workshop #3

LNURL

Lightning Address

Bolt Card (NFC Card)
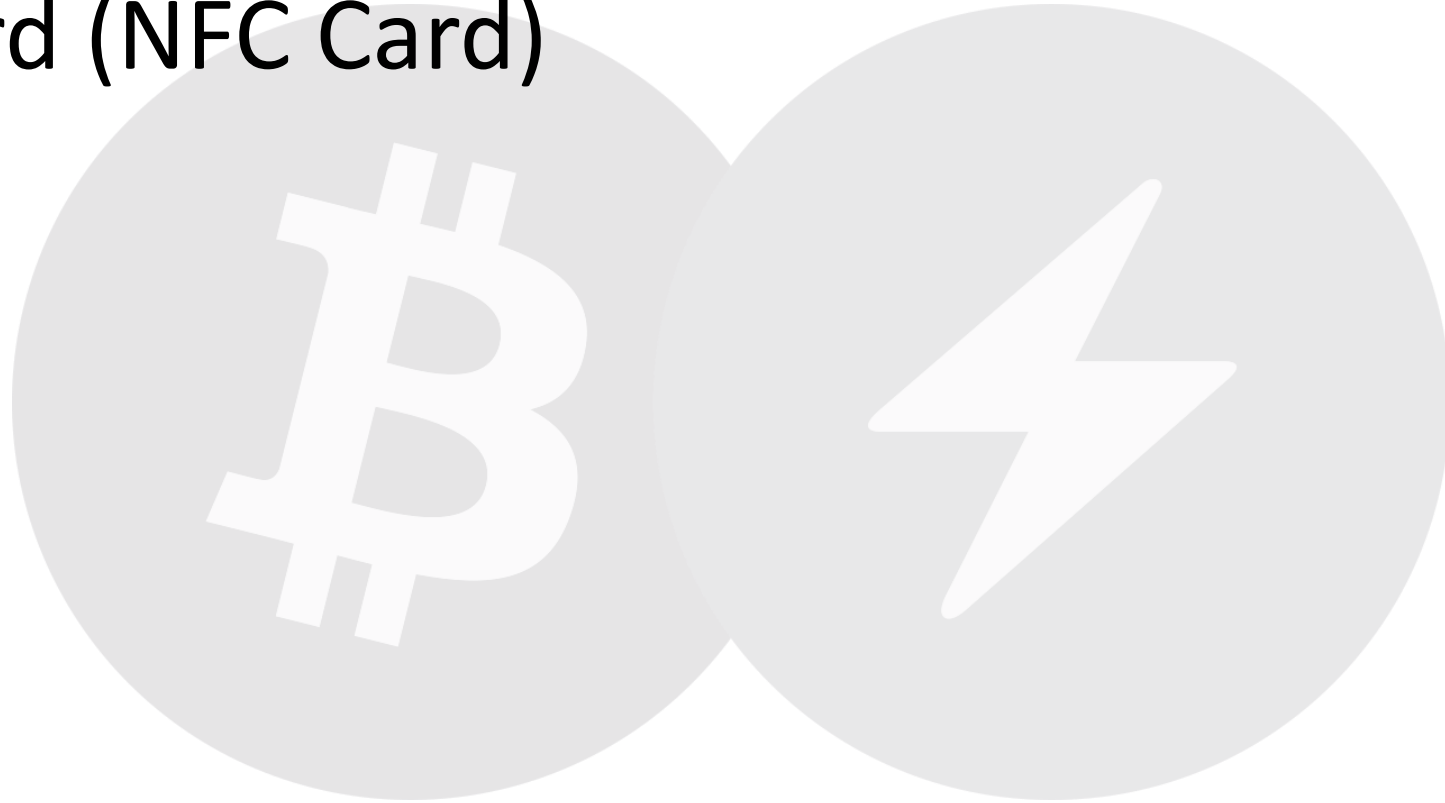
Bolt Card (NFC Card)
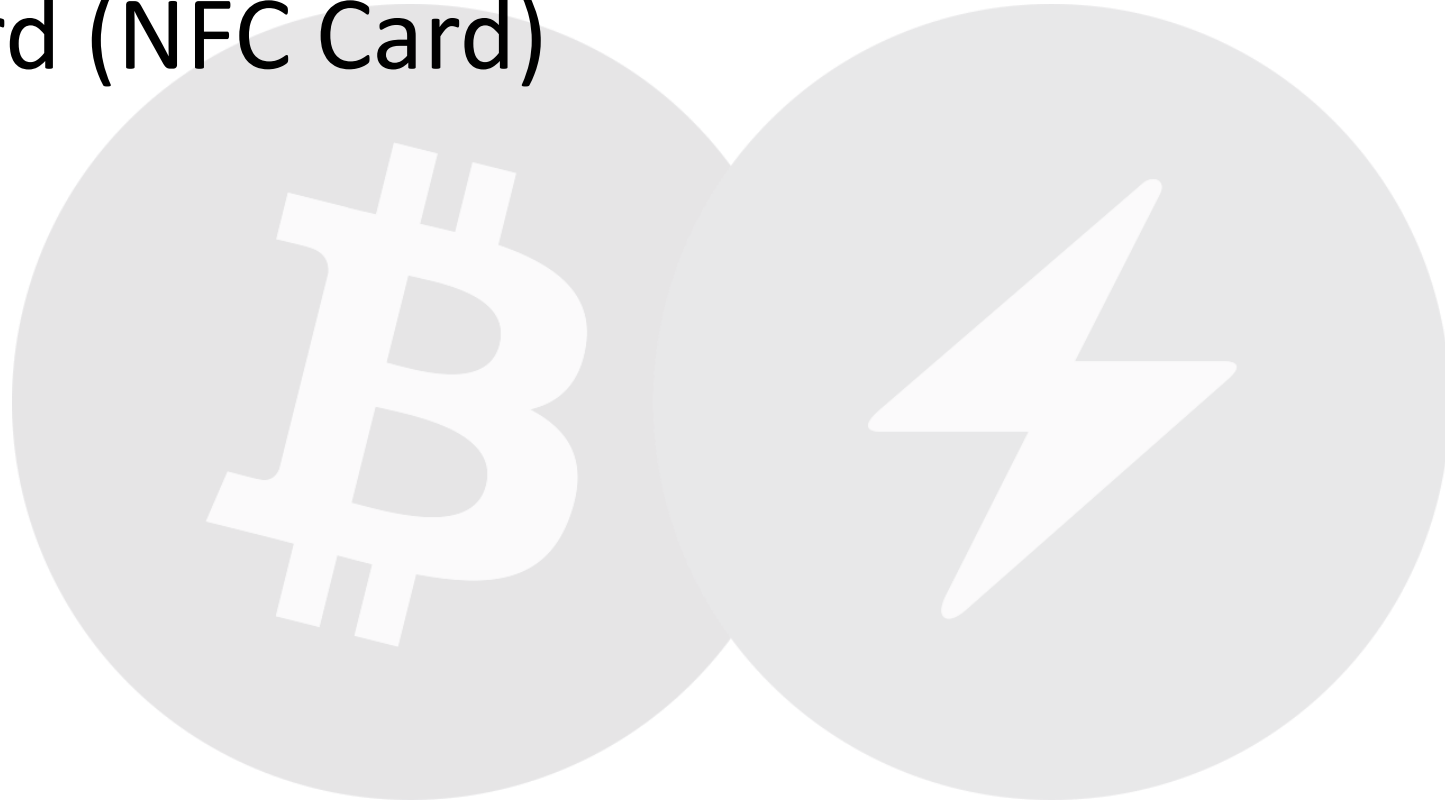
References

- Mastering Lightning Network - https://github.com/lnbook/lnbook

- River Finance : Insights From the 4th Largest Lightning Network Node - https://river.com/learn/files/river-lightning-report.pdf

- LNURL Github - https://github.com/lnurl/luds

- Bolt Card - https://www.coincorner.com/TheBoltCard

- Bitcoin ⚡ Lightning IRL examples - https://darthcoin.substack.com/p/bitcoin-lightning-irl-examples

- BOLT 12 AND LNURL: WHAT IS THE FUTURE FOR BITCOIN'S LIGHTNING NETWORK? - https://bitcoinmagazine.com/technical/bolt12-lnurl-and-bitcoin-lightning

- HOW TO SET UP A LIGHTNING NETWORK NODE - https://bitcoinmagazine.com/guides/how-to-set-up-a-lightning-network-node

Thank You

- This Presentation : https://github.com/teemie1/LNWorkshop/blob/main/LNWorkshop_BCT.pdf