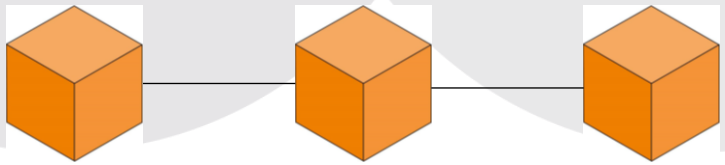
Lightning Network Workshop

SAKCHAI PRATANTIP

Why Lightning Network?

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

Bitcoin Blockchain



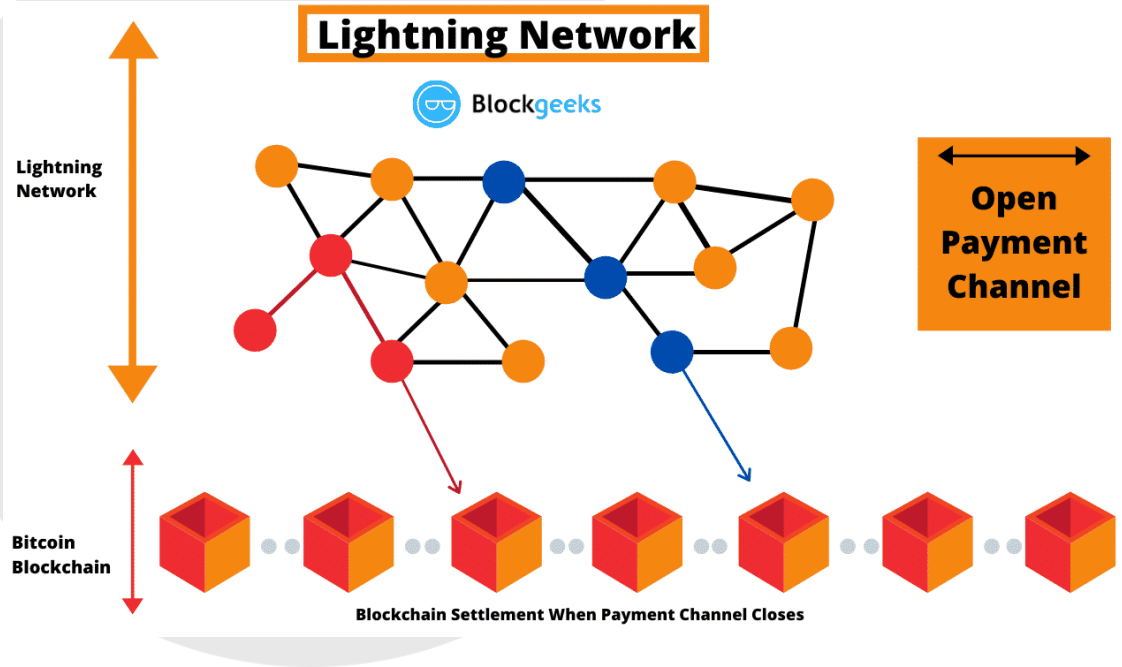
Capacity of 7 transactions per second

Lightning Network

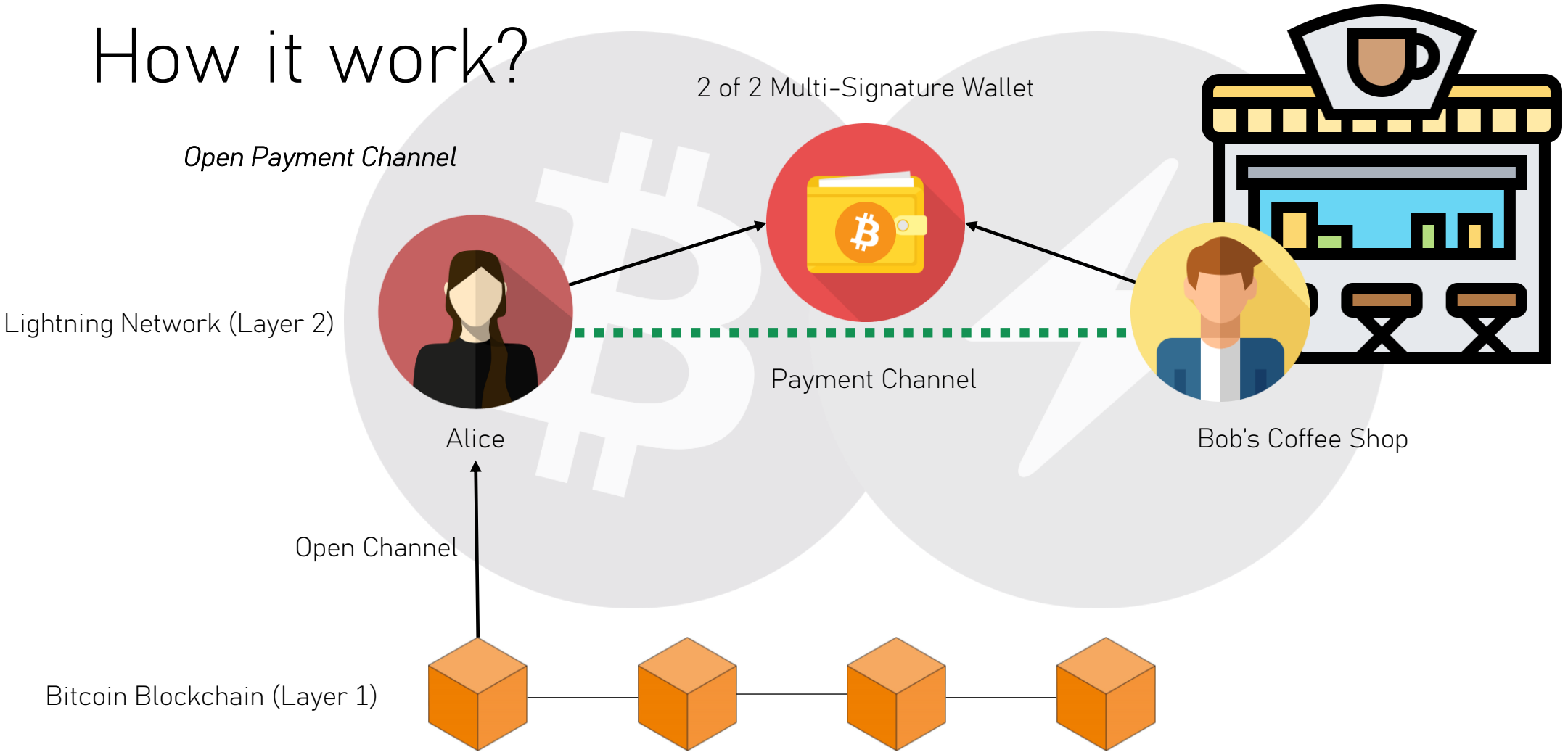
Million of transactions per second

What is Lightning Network?

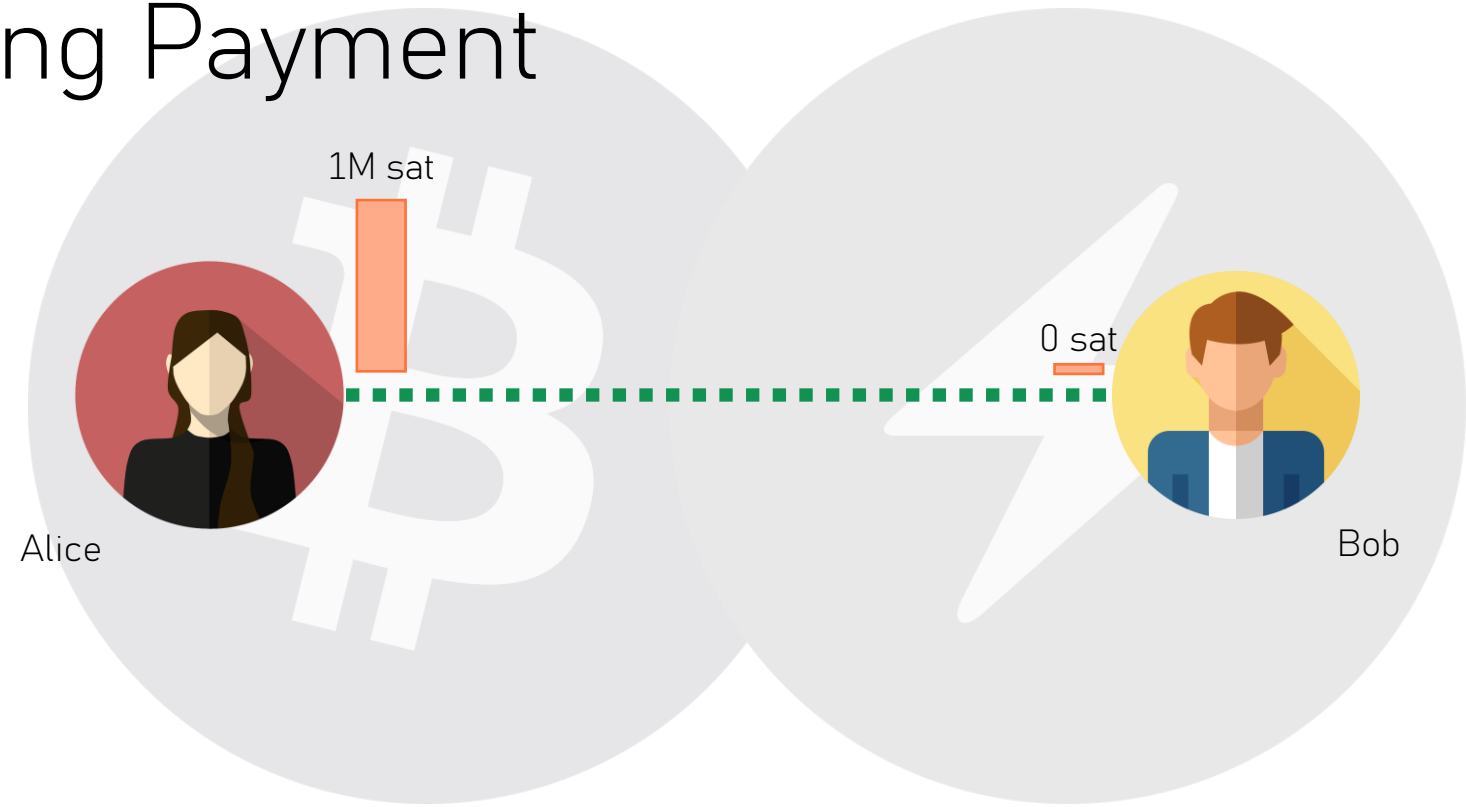
- A second layer added to Bitcoin's (BTC) blockchain
- Not blockchain
- Network of Payment Channels
- Allows users to send or receive Bitcoin quickly and cheaply by moving transactions off of the main blockchain



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)

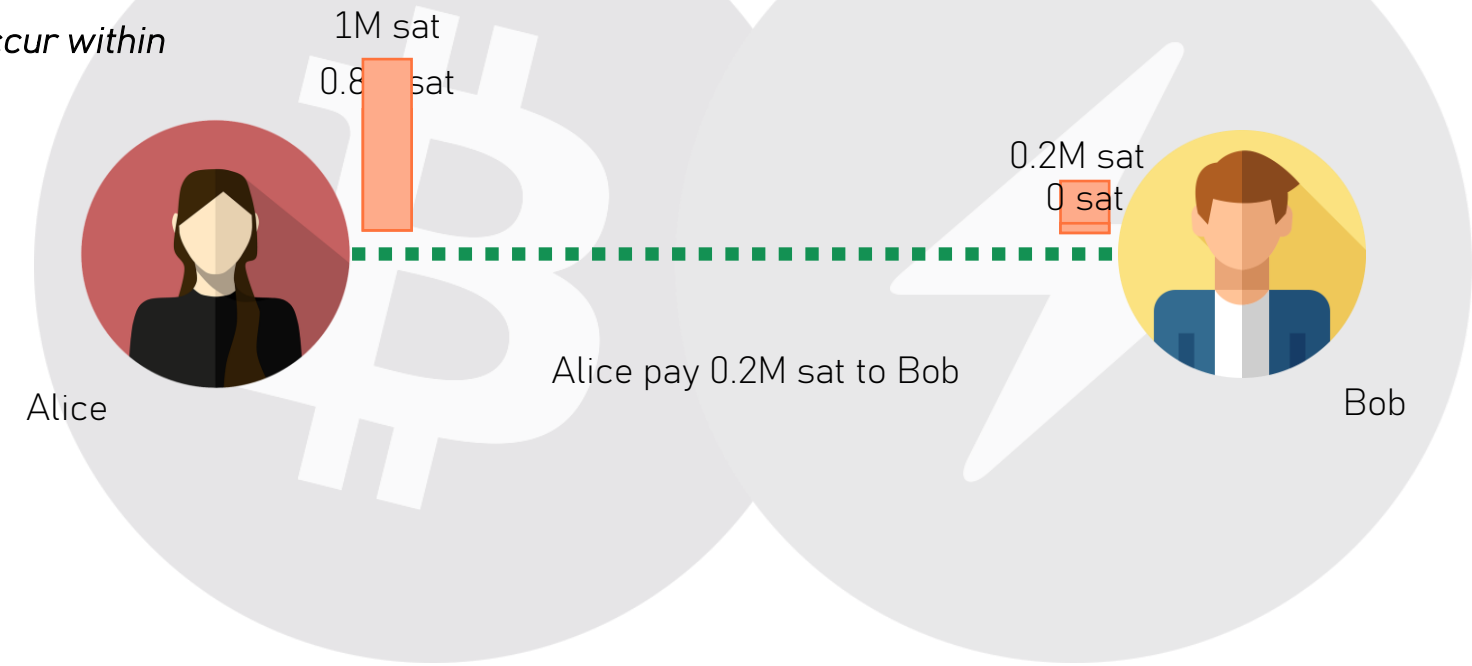
Lightning Payment



1 Bitcoin = 100M sat

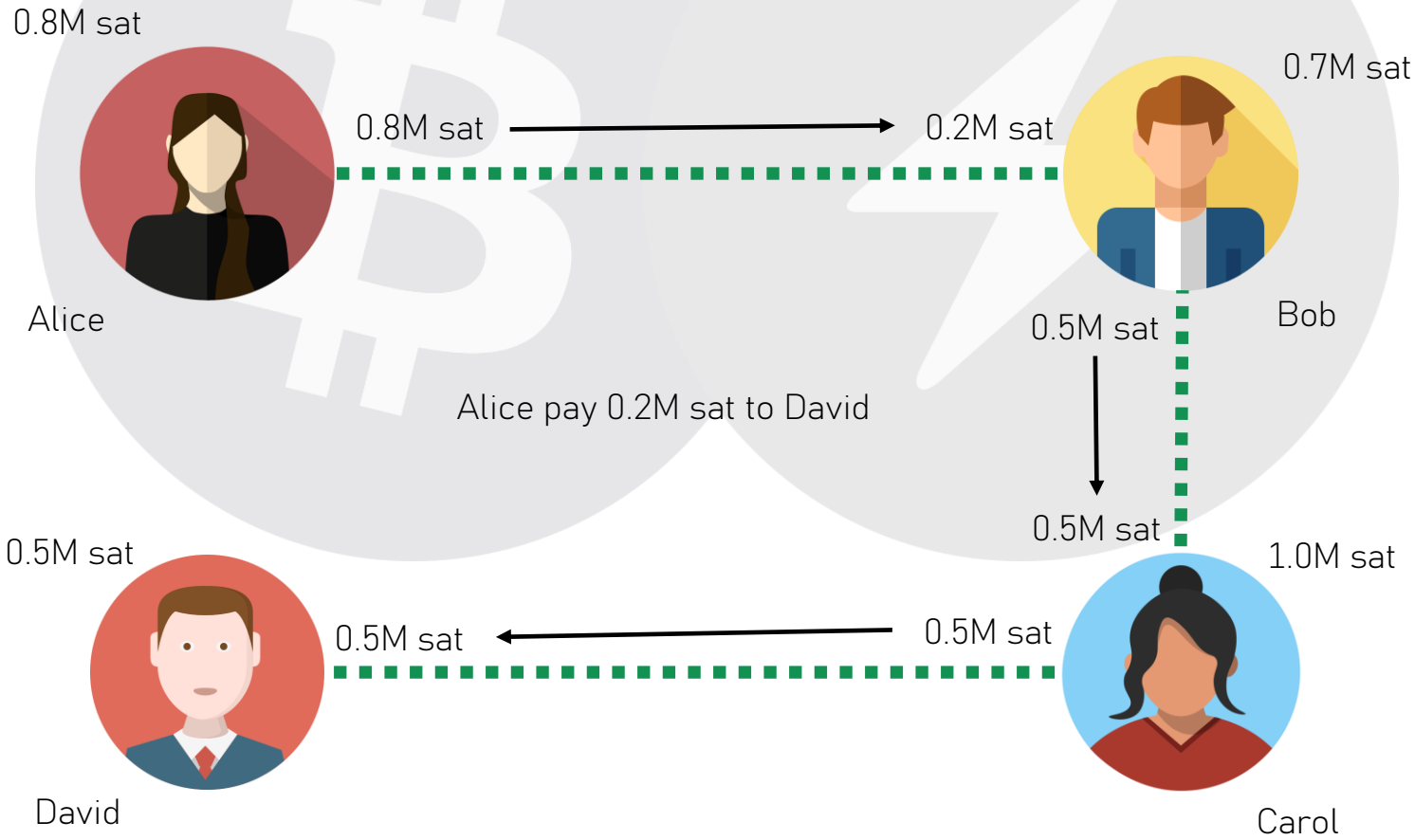
Lightning Payment

Payment occur within channel



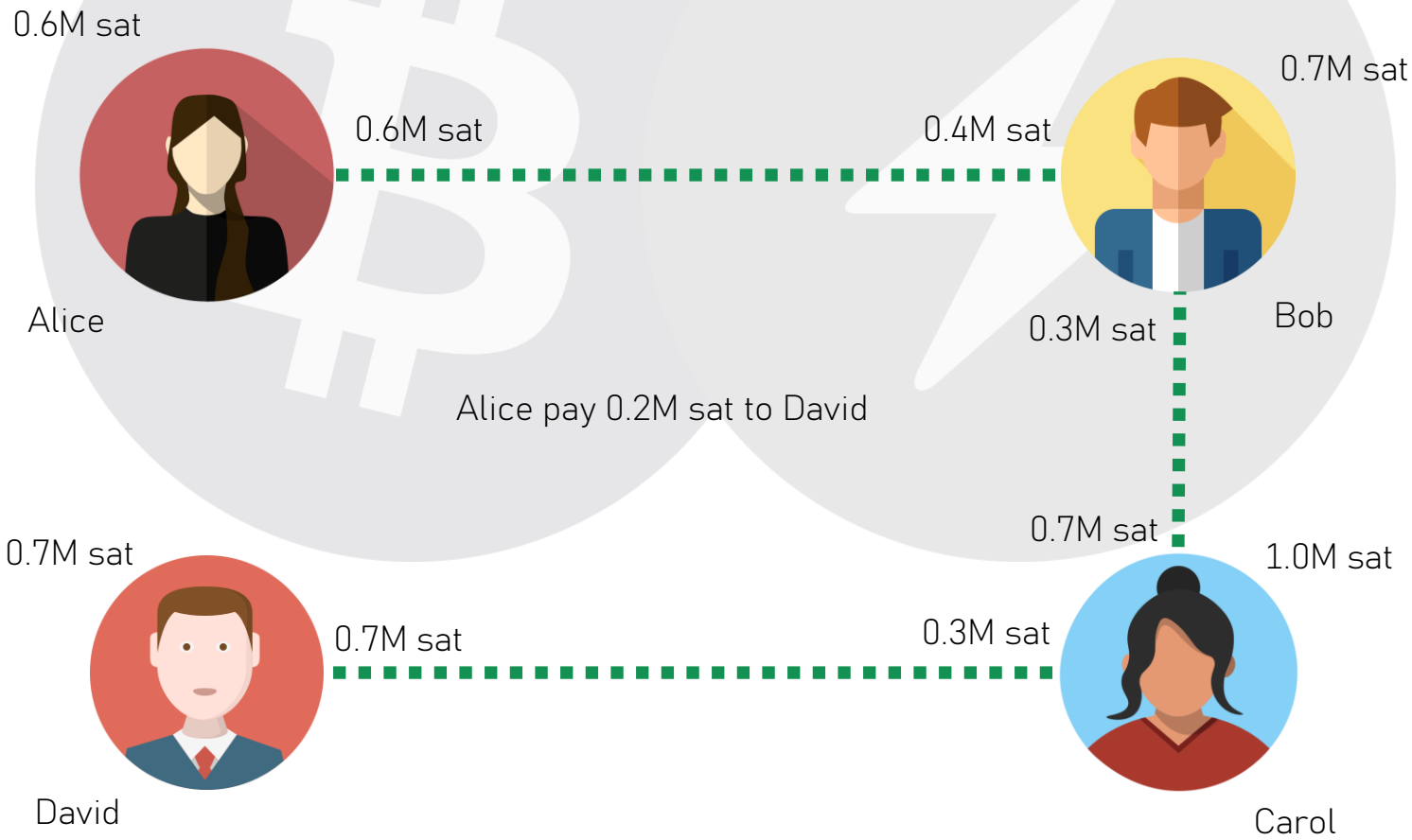
1 Bitcoin = 100M sat

Multi-hop Payment



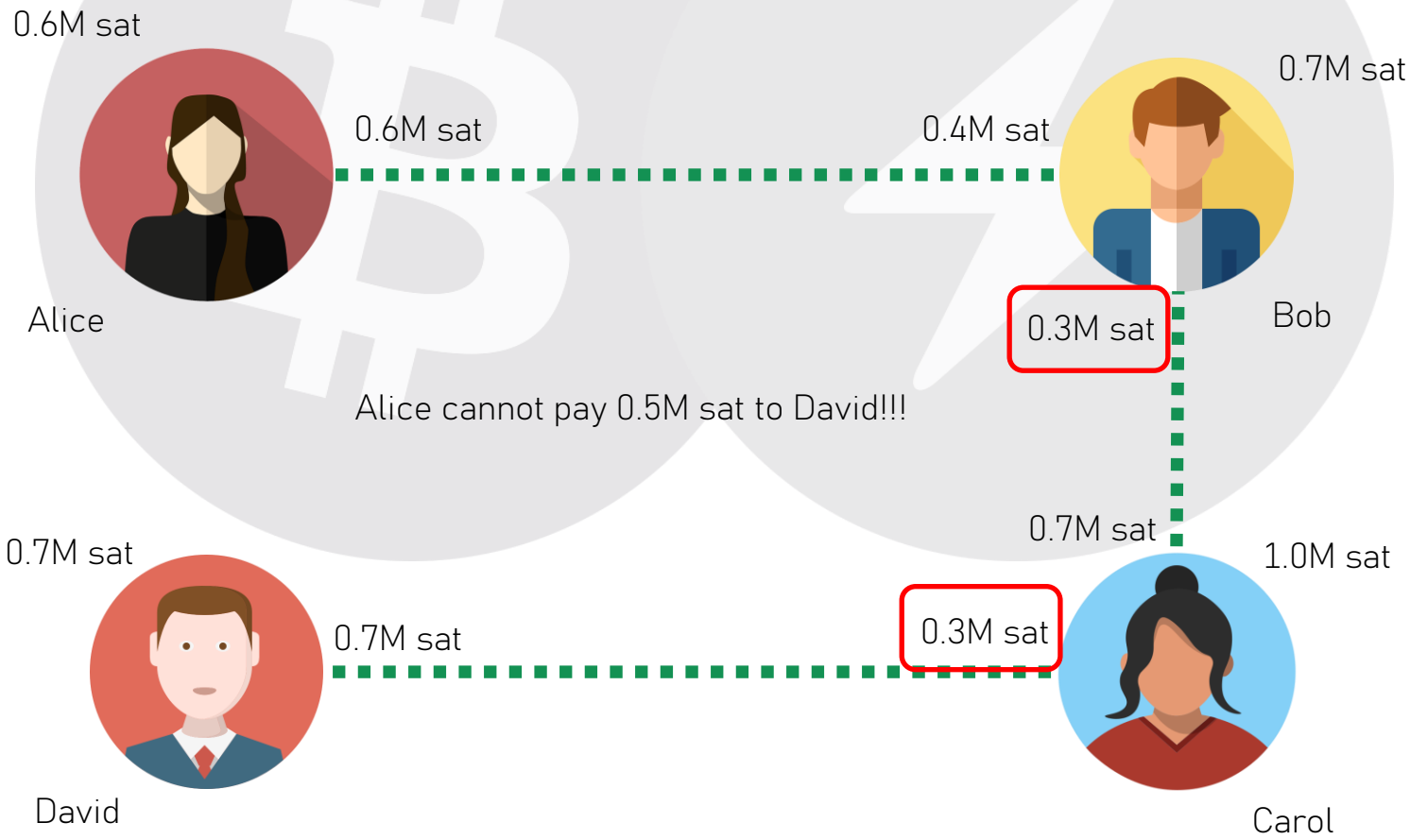
1 Bitcoin = 100M sat

Multi-hop Payment



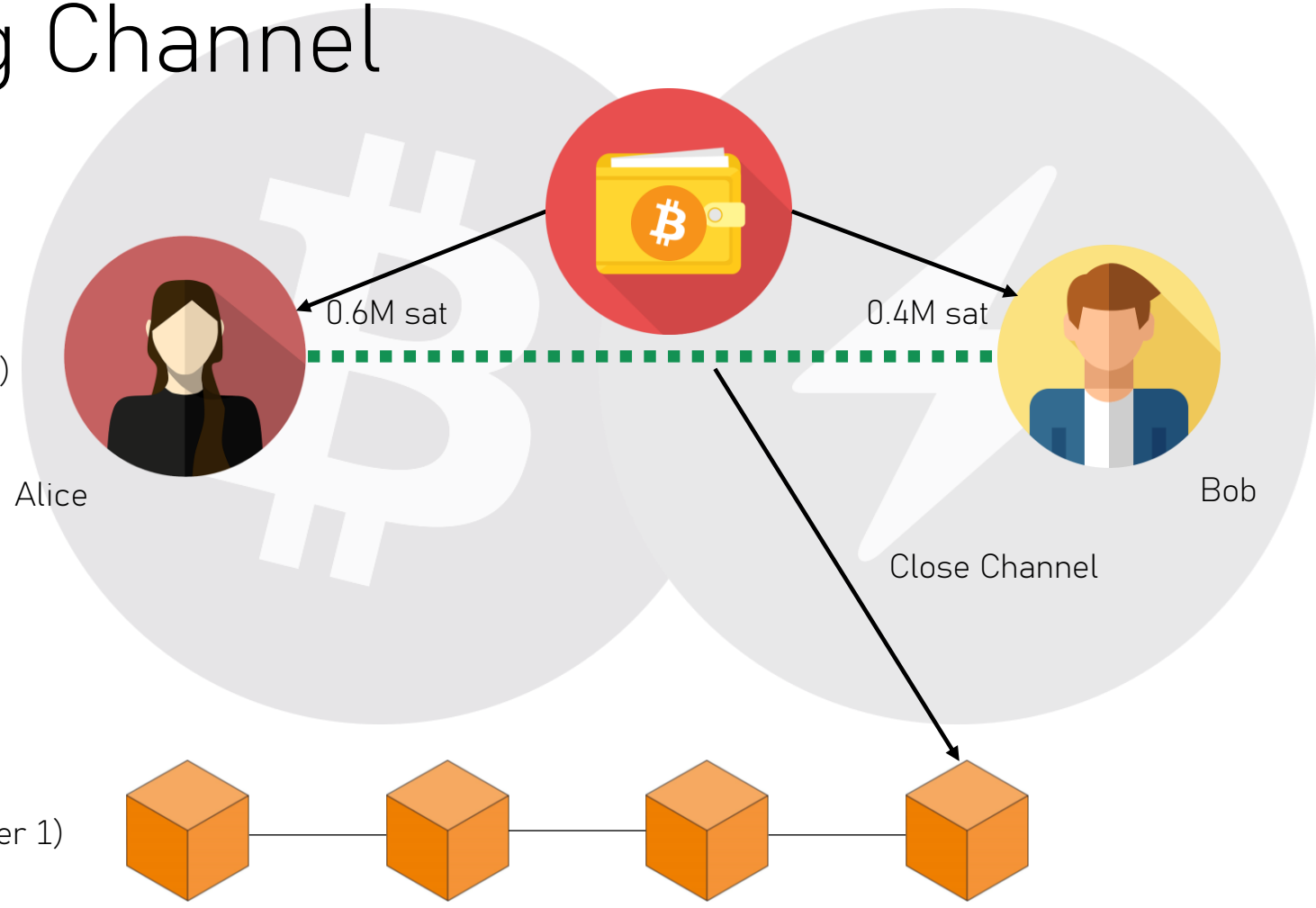
1 Bitcoin = 100M sat

Liquidity Problem



1 Bitcoin = 100M sat

Closing Channel

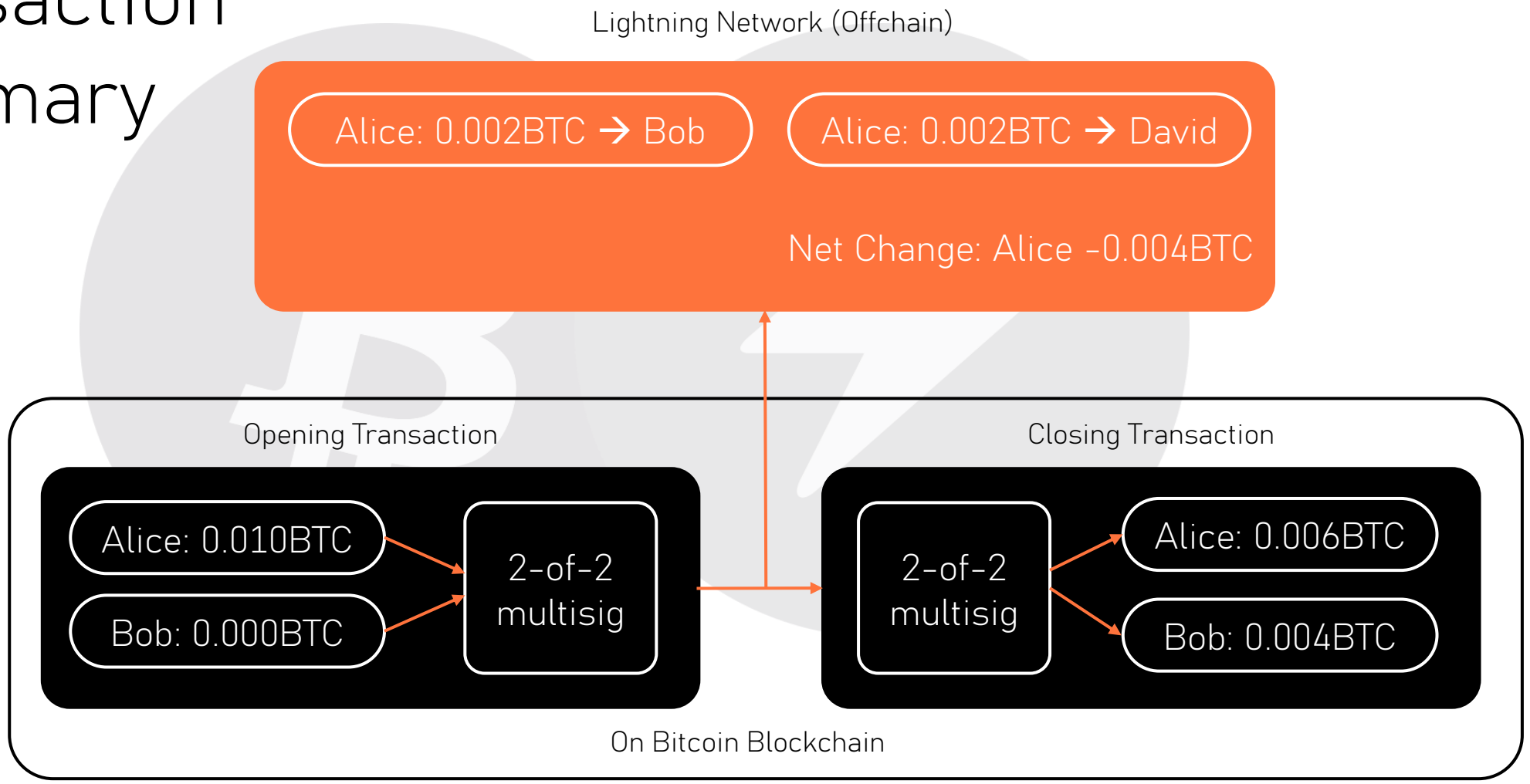


Lightning Network (Layer 2)

Bitcoin Blockchain (Layer 1)

1 Bitcoin = 100M sat

Transaction Summary

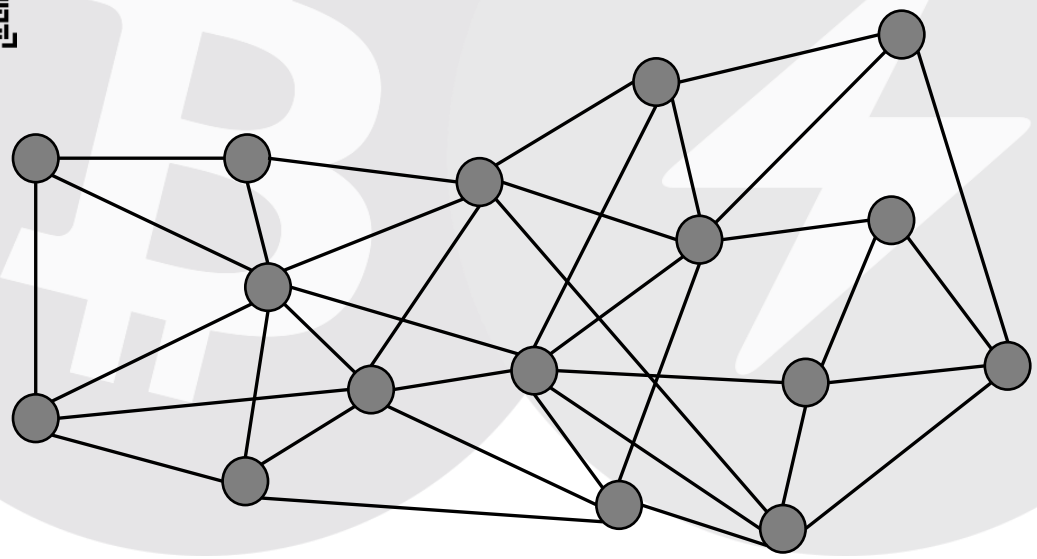


1 Bitcoin = 100M sat

Steps for payment

Alice

2. Alice scan invoice for payment.



David

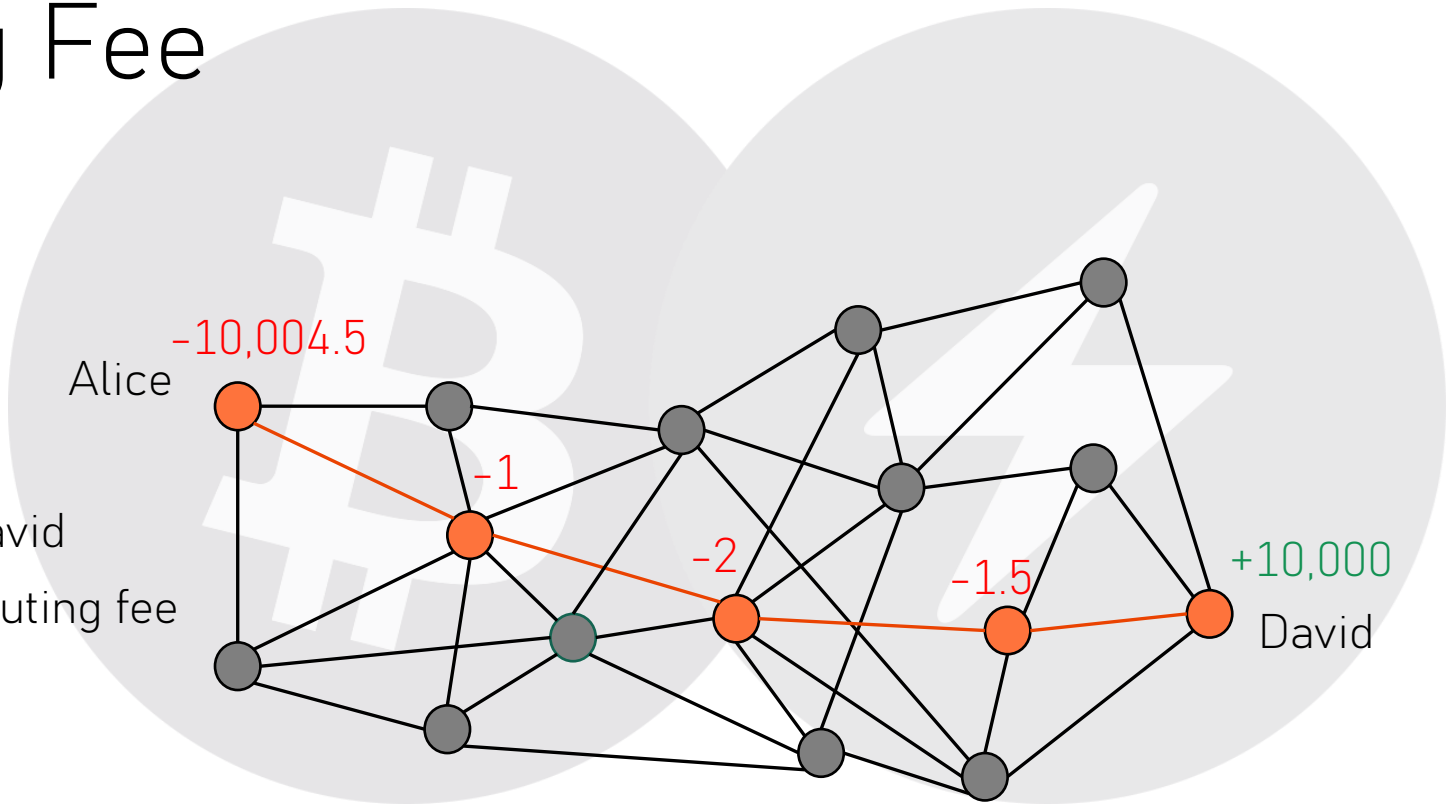
1. David create invoice for receiving

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

RASPI BLITZ MYNODE

LND BitcoinCore

RIDE THE LIGHTNING ThunderHub electrs

Out of the box

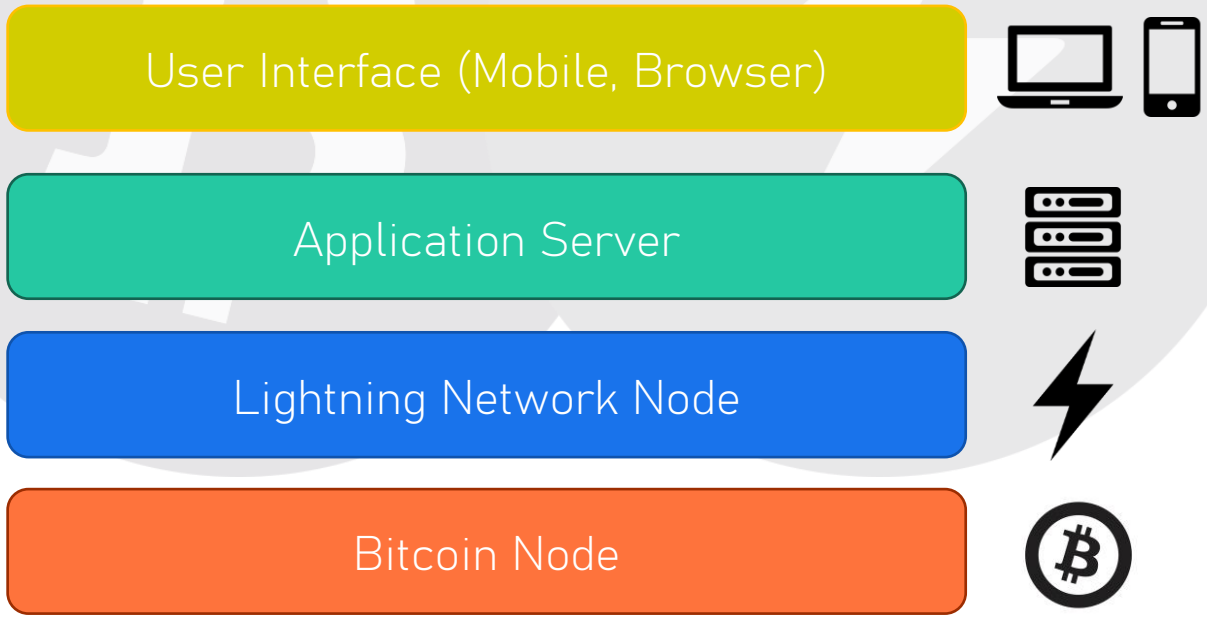
Cloud Services

VOLTAGE

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



Bitcoin Lightning Wallet

DOWNLOAD WALLET APP ON
MOBILE PHONE

WALLET OF SATOSHI

blue wallet

Workshop #1

Download on the App Store

GET IT ON Google Play

PAY BITCOIN TO INVOICE

Workshop #2

LNURL

- Invoice – One code can use only once, difficult to use.
- LNURL – Reusable code for payment & withdrawal
  - LNURLw – Withdraw bitcoin from LNURL
  - LNURLp – Pay bitcoin to LNURL
- LNURL – Not native on Lightning Network, required web server to operate, use invoice in backend

Example: LNURL1DP68GURN8GHJ7MRWWAHHY6MNDPHH...

GET BITCOIN FROM LNURL-W QR CODE

Use Wallet App to Scan QR Code for Getting SAT!!!!

Workshop #3

PAY BITCOIN TO LNURL-P QR CODE

Workshop #4

- LNURL1DP68GURN8GHJ7MRWWAHHY6MNDPHHQTNYW43KKERWWVHX7UN89AKXUATJD3CZ7CTSDYHHVVF0D3H82UNV9UCS3422UC

Lightning Address

- The Lightning Address is an Internet Identifier that allows anyone to send you Bitcoin over the Lightning Network. No scanning of QR codes or pasting invoices necessary.
- Use LNURLp in backend process

Example: **teemie1@lnbc.cz**

PAY BITCOIN TO LIGHTNING ADDRESS

Pay bitcoin to Lightning Address:

teemie1@lnbc.cz

Workshop #5

Bolt Card (NFC Card)

- Just NFC Card
- Use for bitcoin lightning payment
- Use LNURL in backend process

PAY BITCOIN WITH BOLT CARD
(NFC CARD)

Workshop #6

Other Use Case

- Pay with NFC Card: https://twitter.com/blackcoffeebtc/status/1571171856123559936?s=19
- Compare NFC payment cards https://twitter.com/Bridge2Bitcoin/status/1593572699552587777
- Beer tape LNURL: https://twitter.com/MichaelRihani/status/1490891558224564226
- Offline LNURL PoS: https://mobile.twitter.com/DrShift3/status/1587067907556646912
- Mobile payment: https://nitter.net/hampus_s/status/1512158918197268494
- McDonald receive BTC LN: https://nitter.net/BitcoinMagazine/status/1577000896172433408
- Direct currency conversion in Malaysia: https://www.youtube.com/watch?v=bVC4795helY

PAY BITCOIN IN THB

Workshop #7

References

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- Mastering Lightning Network – https://github.com/lnbook/lnbook
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- ₿itcoin ⚡ 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