

# MODULO 4. LIGHTNING NETWORK

I pagamenti fulminei e l'evoluzione di Bitcoin



# Corso base su **Bitcoin**



Villaggio **Bitcoin**

## Modulo 1



## Modulo 2



## Modulo 3



## Modulo 4



# TODAY

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*Introduzione al*  
**LIGHTNING NETWORK**



- RECAP: Il protocollo, le transazioni e i wallet
- Il problema della scalabilità
- LN: principi funzionamento
- Esempi pagamenti lightning
- Prospettive future

# Bitcoin e scalabilità

## La Blockchain è efficiente?

*BTC vs sistemi pagamento fiat*



- Blocchi da **10 minuti** per validazione
- Capacità **1 MB (4 vMB)** di spazio
- Peso medio transazione: ca **300** byte
- **Fee** di transazione
- Scarsa **privacy** e fungibilità

# Bitcoin e scalabilità

Inadatta per pagamenti quotidiani



- Almeno 3 conferme
- Inefficiente
- Costi di transazione

# Bitcoin e scalabilità



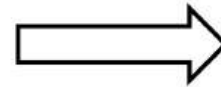
# Possibili soluzioni



*Proposta 1*

**Aumento block size?**

Size > 1 MB



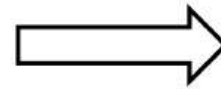
*Esempio:*



*Proposta 2*

**Diminuzione tempo conferma?**

T < 10 minuti



*Esempio:*



*Proposta 3 .....*

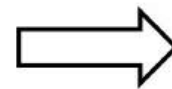
*Proposta 4 .....*

*.....*



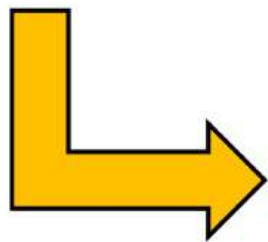
**Bitcoin *senza* Blockchain!**

**Layer 2**



# Lightning: il percorso ⚡

- Prime idee Satoshi Nakamoto
- BIP: upgrade nel 2015 e 2016
- **Block-size war** (2015-2017)
- 24 agosto 2017: **Segregated Witness**



LIGHTNING  
NETWORK



L'attuale miglior soluzione per scalare Bitcoin



# Lightning: il white paper

## The Bitcoin Lightning Network: Scalable Off-Chain Instant Payments

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[joseph@lightning.network](mailto:joseph@lightning.network)

Thaddeus Dryja  
[rx@awsomnet.org](mailto:rx@awsomnet.org)

January 14, 2016  
DRAFT Version 0.5.9.2

### Abstract

The bitcoin protocol can encompass the global financial transaction volume in all electronic payment systems today, without a single custodial third party holding funds or requiring participants to have anything more than a computer using a broadband connection. A decentralized system is proposed whereby transactions are sent over a network of micropayment channels (a.k.a. payment channels or transaction channels) whose transfer of value occurs off-blockchain. If Bitcoin transactions can be signed with a new sighash type that addresses malleability, these transfers may occur between untrusted parties along the transfer route by contracts which, in the event of uncooperative or hostile participants, are enforceable via broadcast over the bitcoin blockchain in the event of uncooperative or hostile participants, through a series of decrementing timelocks.

LIGHTNING  
NETWORK



- Proposta di un nuovo protocollo
- Costruito on top della blockchain
- Open source, distribuito e trustless



Villaggio **Bitcoin**

# Lightning: principi di funzionamento



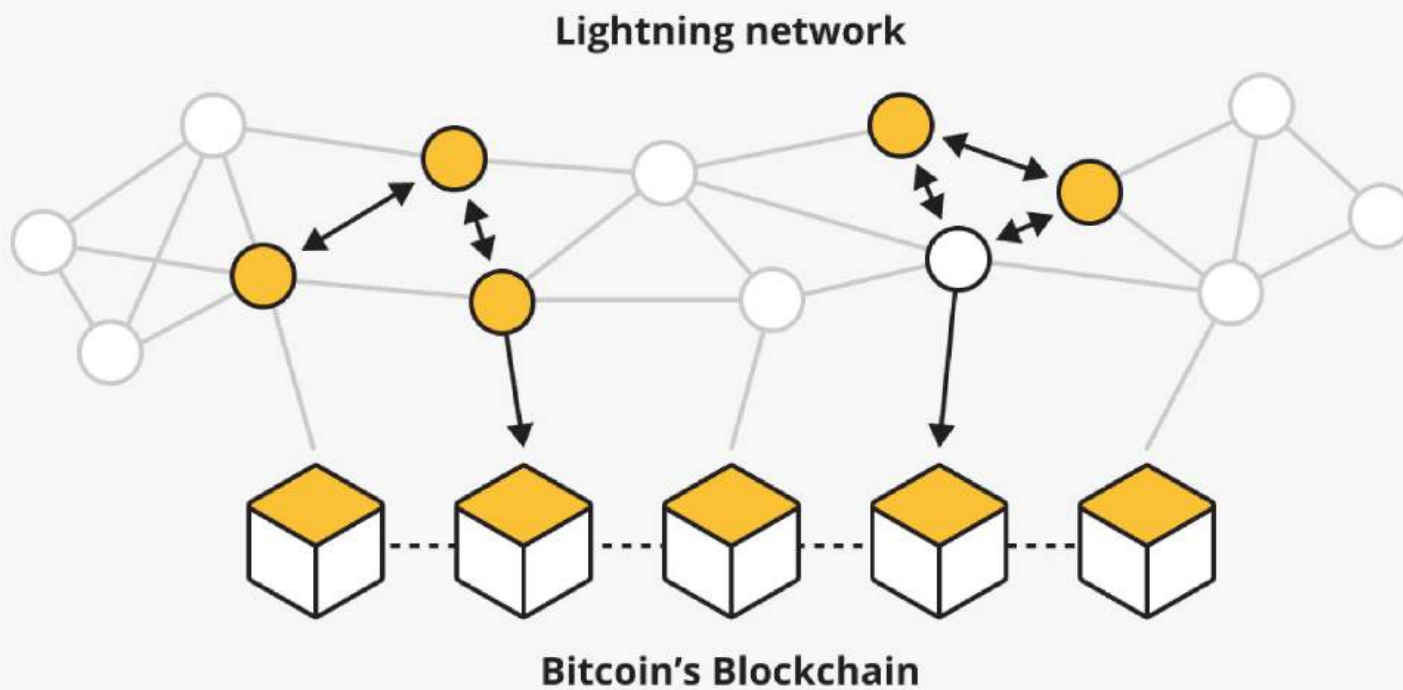
## Payment Channel

- Specifiche **BOLT**
- Rete peer-to-peer
- **Nodi** lightning
- Canali di pagamento bidirezionali



# Lightning: principi di funzionamento

Nodi lightning e canali di pagamento costruiti sopra la blockchain



# Lightning: principi di funzionamento

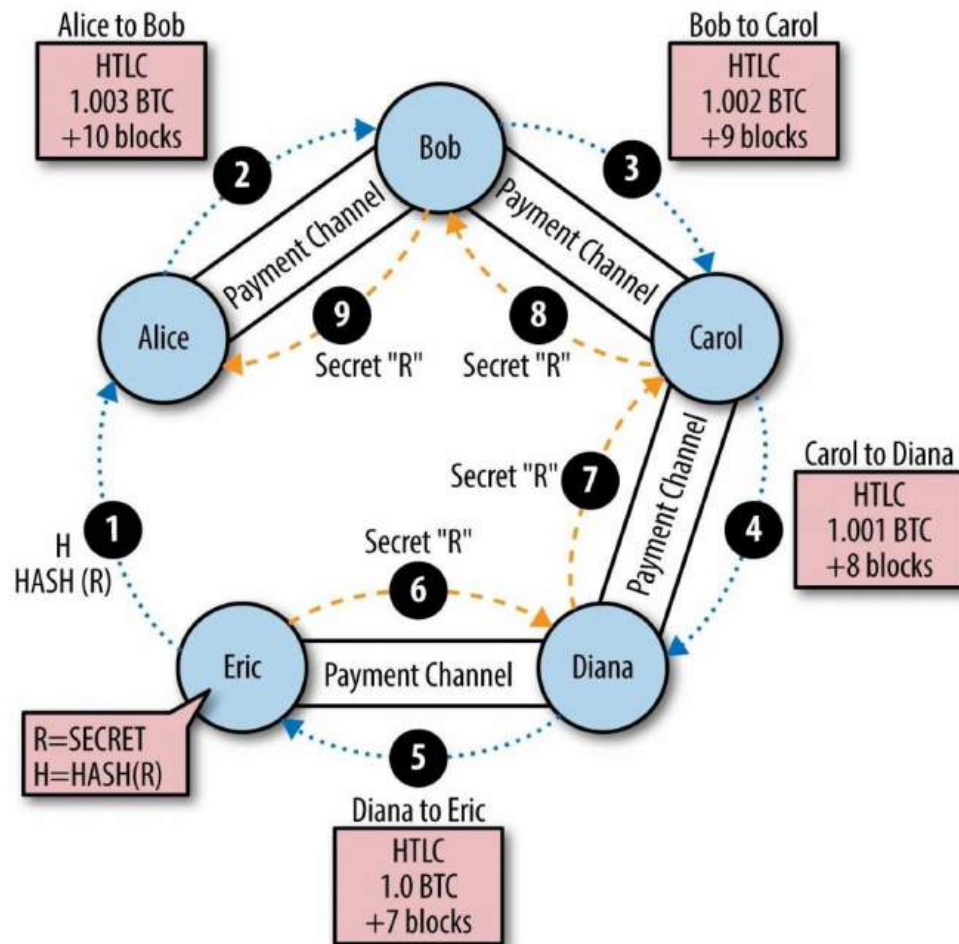


## Payment Channel e Routing

- Specifiche **BOLT**
- Rete peer-to-peer
- **Nodi** lightning
- Canali di pagamento bidirezionali
- Meccanismo di punizione
- Contrattini digitali (HTLCs) e **routing**



# Lightning: principi di funzionamento

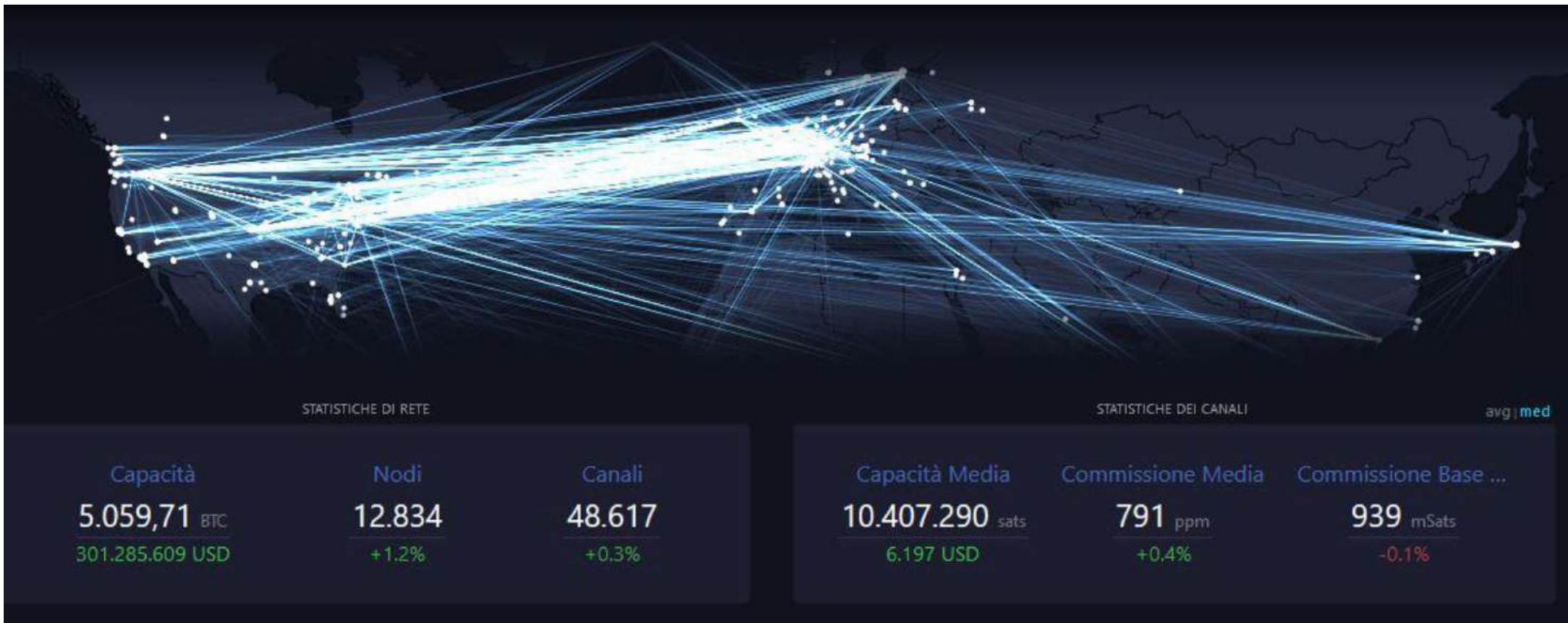


## Payment Channel e Routing

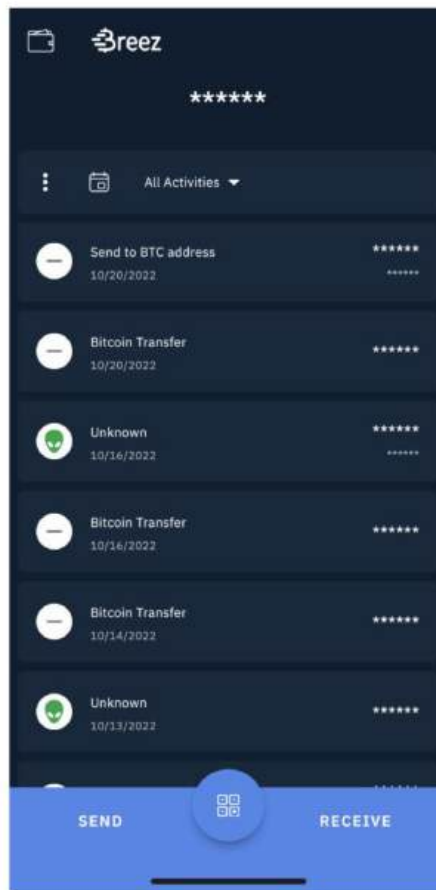
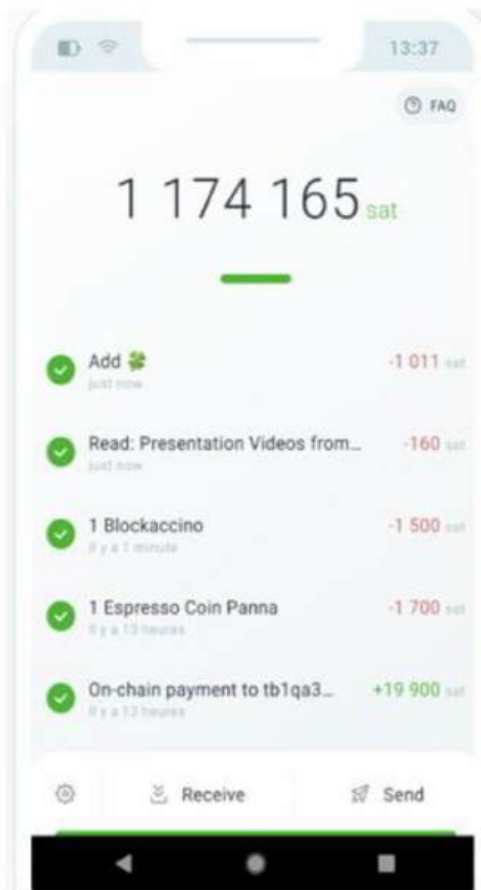
- Specifiche BOLT
- Rete peer-to-peer
- Nodi lightning
- Canali bidirezionali
- Meccanismo di punizione
- HTLCs

# Lightning: l'architettura

Una rete di canali di pagamento



# Wallet Lightning



Wallet of Satoshi



Breez



Muun



Phoenix



Simple Bitcoin Wallet



Blink



BitBanana



Zeus

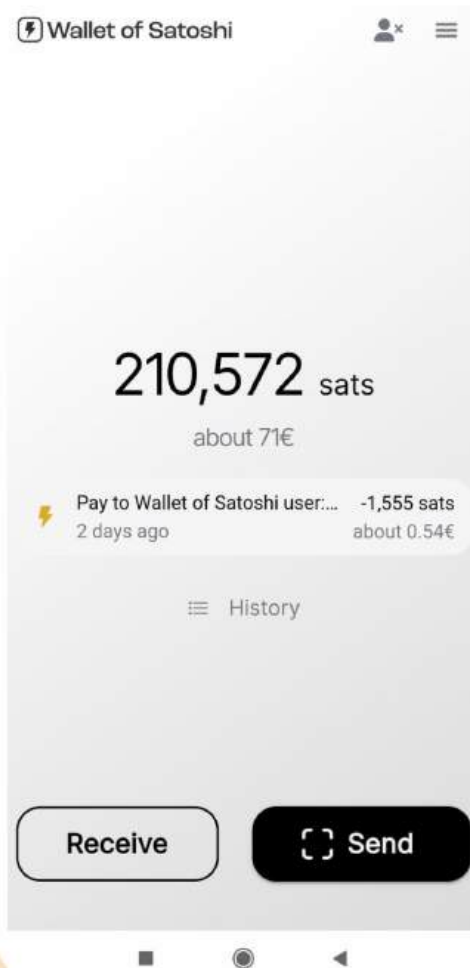


Relai



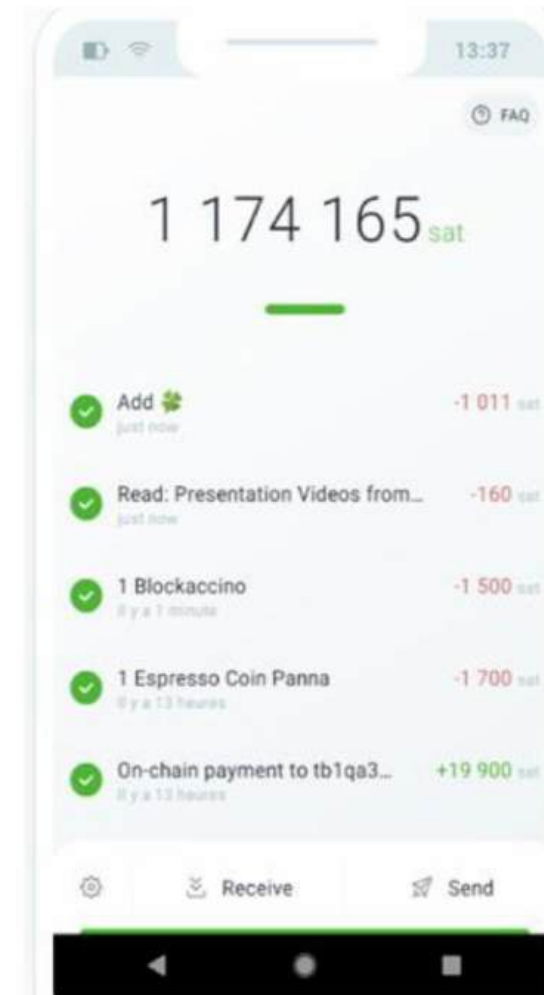
Blixt

# Wallet Lightning



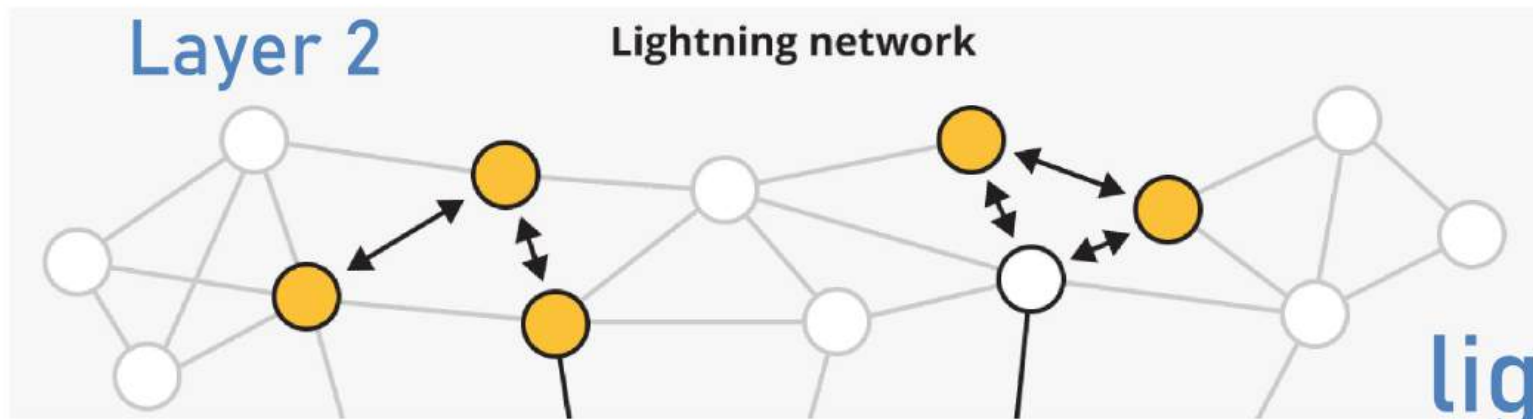
## Tipologie:

- CUSTODIAL VS NON-CUSTODIAL
- «Not your **node**, not your coin»
- **Submarine swap** tra fondi onchain e fondi LN





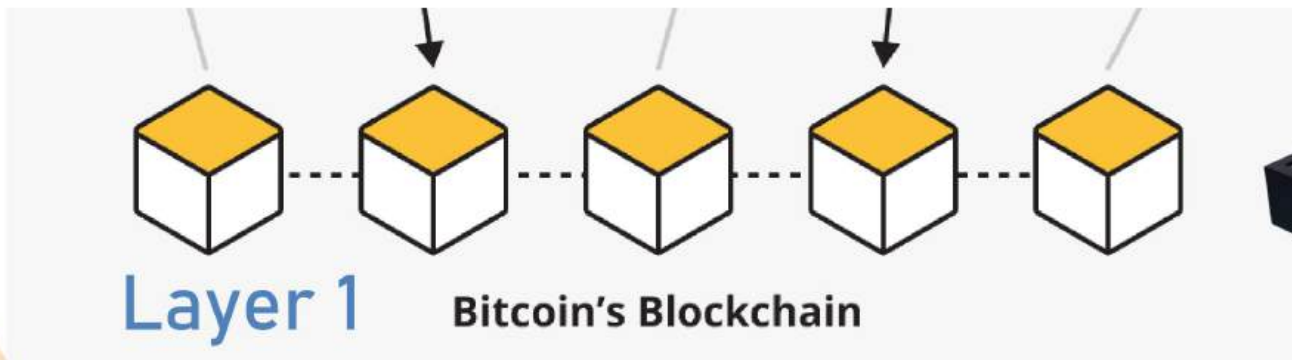
# Scambi onchain e lightning



lightning



onchain



# Lightning wallet



# LIGHTNING NETWORK

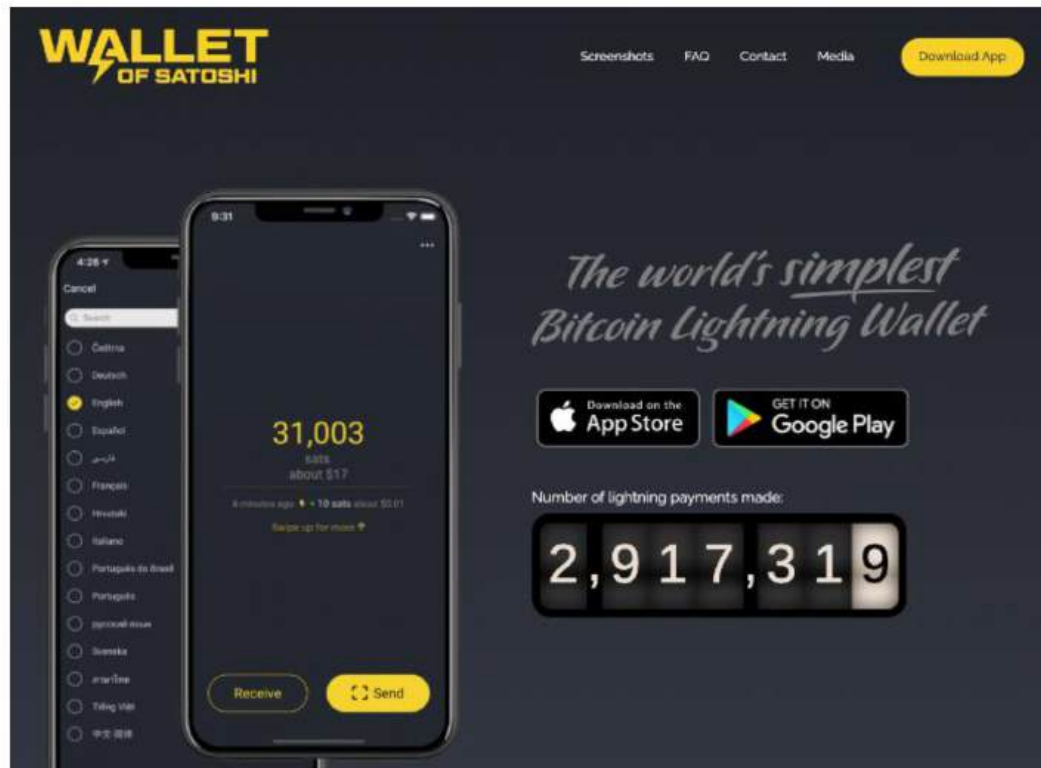
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IN ACTION!

# LIGHTNING NETWORK

## Custodial LN wallet



# WALLET OF SATOSHI



# LIGHTNING NETWORK

RICEVERE  
PAGAMENTI

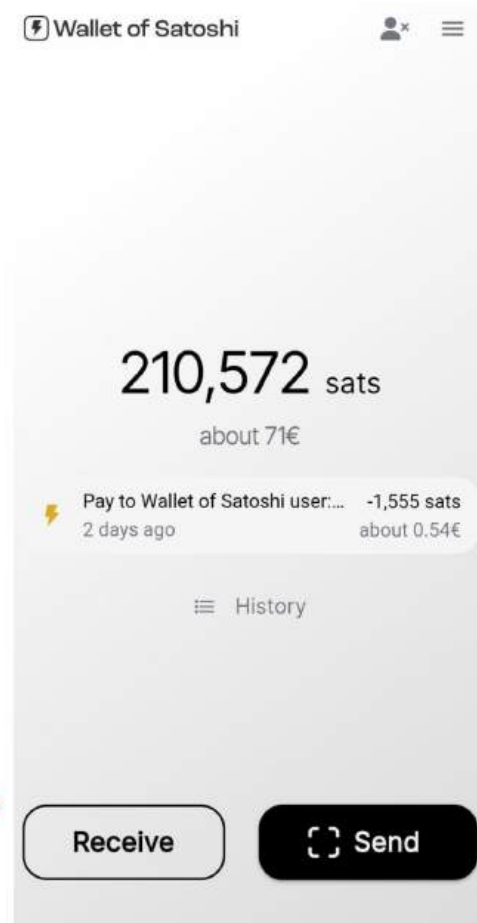


# LN - Ricevere pagamenti

**GENERARE  
L'INVOICE LN**

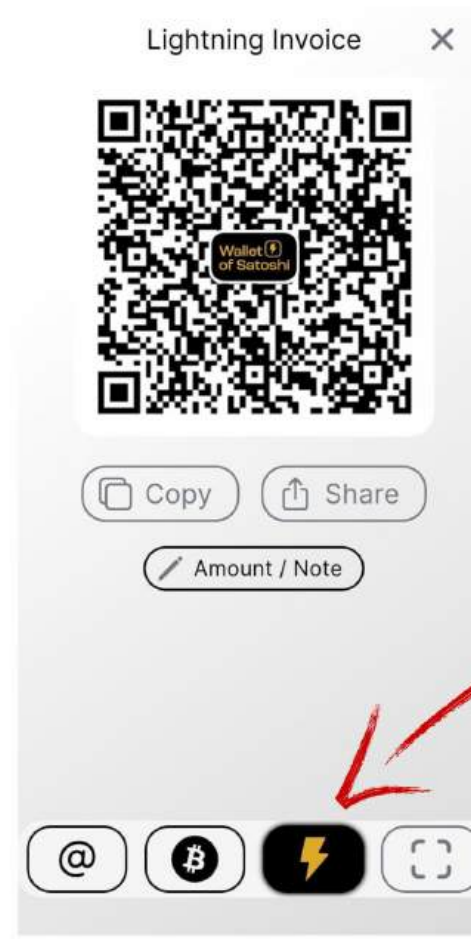
## STEP 1

Vai su  
«Receive»



## STEP 2

Seleziona  
l'icona del  
fulmine (LN)

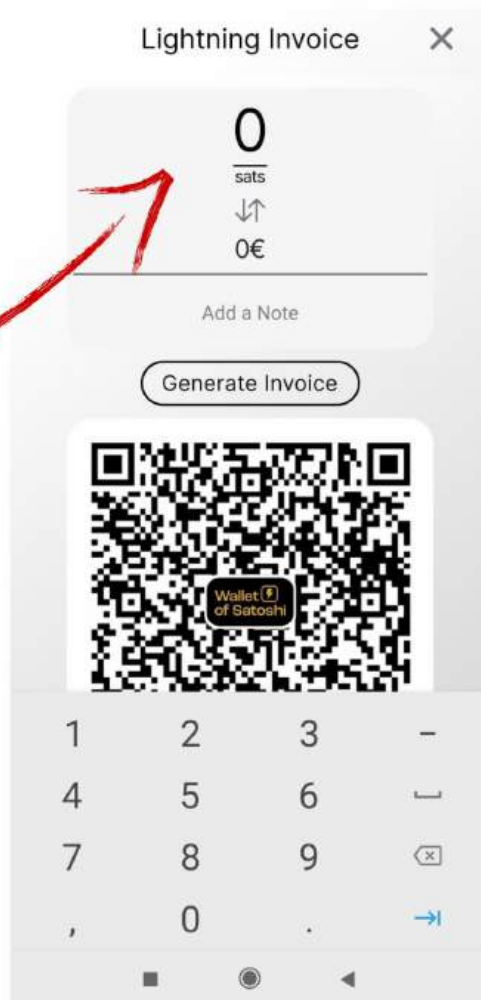


# LN - Ricevere pagamenti

GENERARE  
L'INVOICE LN

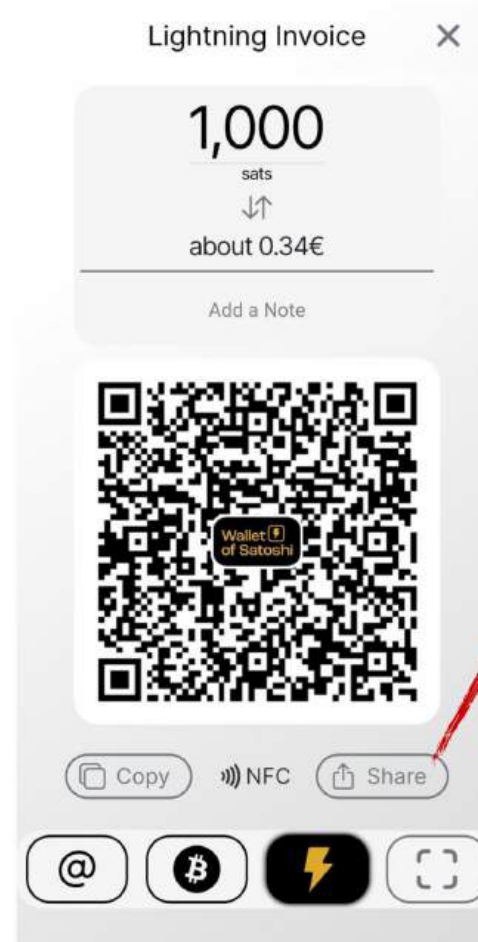
## STEP 3

Digita  
l'importo  
che vuoi  
ricevere



## STEP 4

Condividi l'**invoice** a  
chi deve pagarti



```
Inbc10u1pnvr75rpp5zathyweravzpkn7cmzzv  
w9gdmwmjzzg3dwne0lvmg7a4ghp3r0vsdqq  
cqzszxqyz5vqsp5tvpzt4w5vvcz5dxtf3gtzy3pf  
7rg2hsj38x50280yfnfd0m54xds9qxpqysgqnn  
5d60xmm9g99jvn5cg0kpsf3xt3prdy0avssgs6  
5vvr8rtl9cg9zqyxw4dezhn3qvwfnchs29xrn  
m4l690kxep8a93m7p9flpsysp7w5apg
```

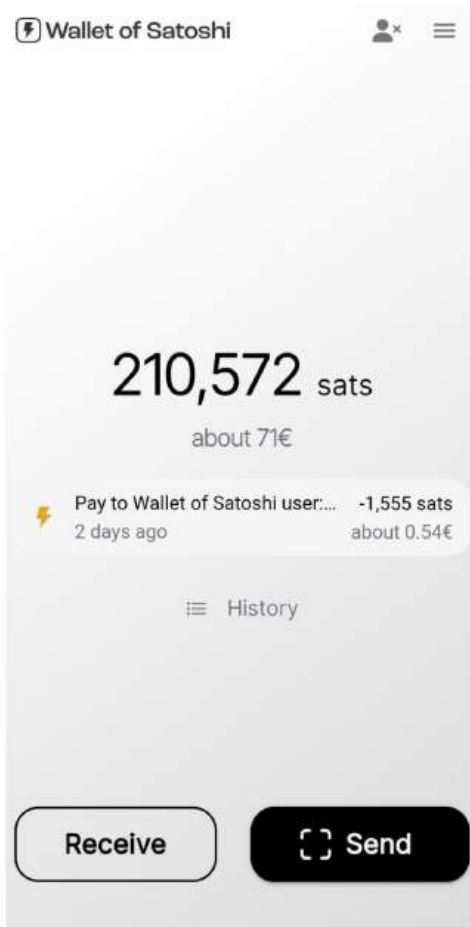
# LIGHTNING NETWORK

EFFETTUARE  
PAGAMENTI



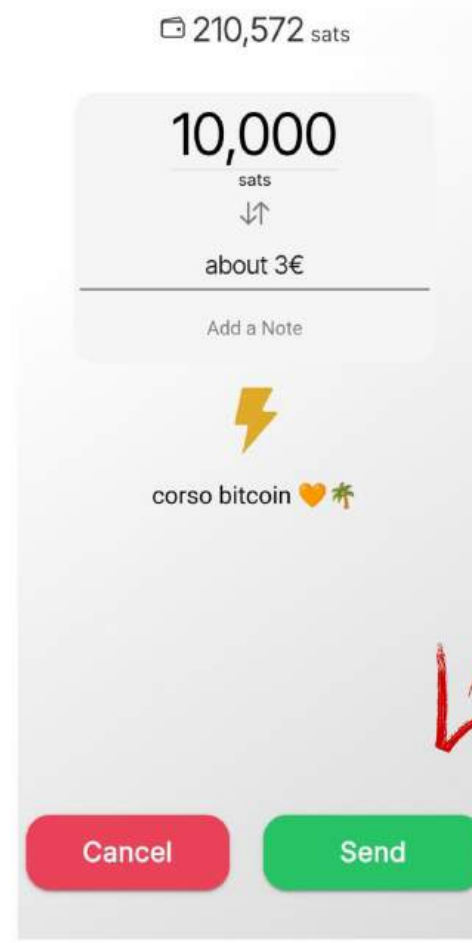


# LN - effettuare pagamenti



## STEP 1

Vai su «Send»  
e scansiona  
l'invoice  
(QR code  
oppure copia  
la stringa)



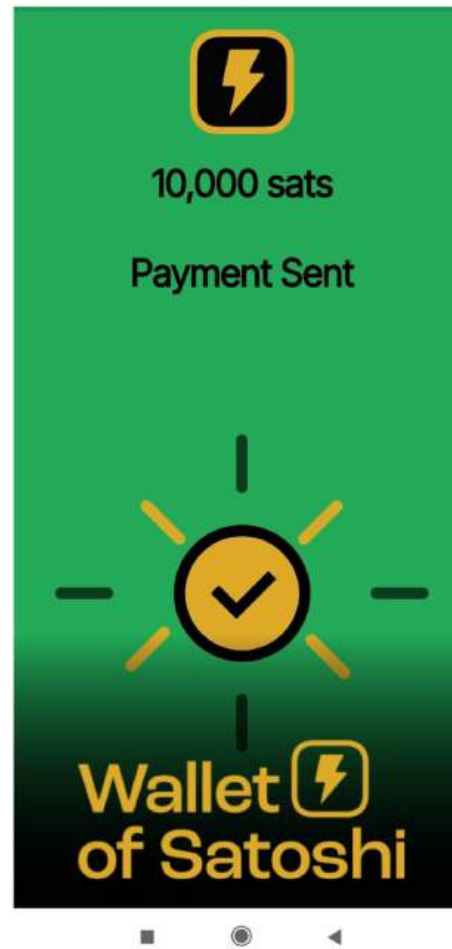
## STEP 2

Controlla  
l'importo e  
conferma

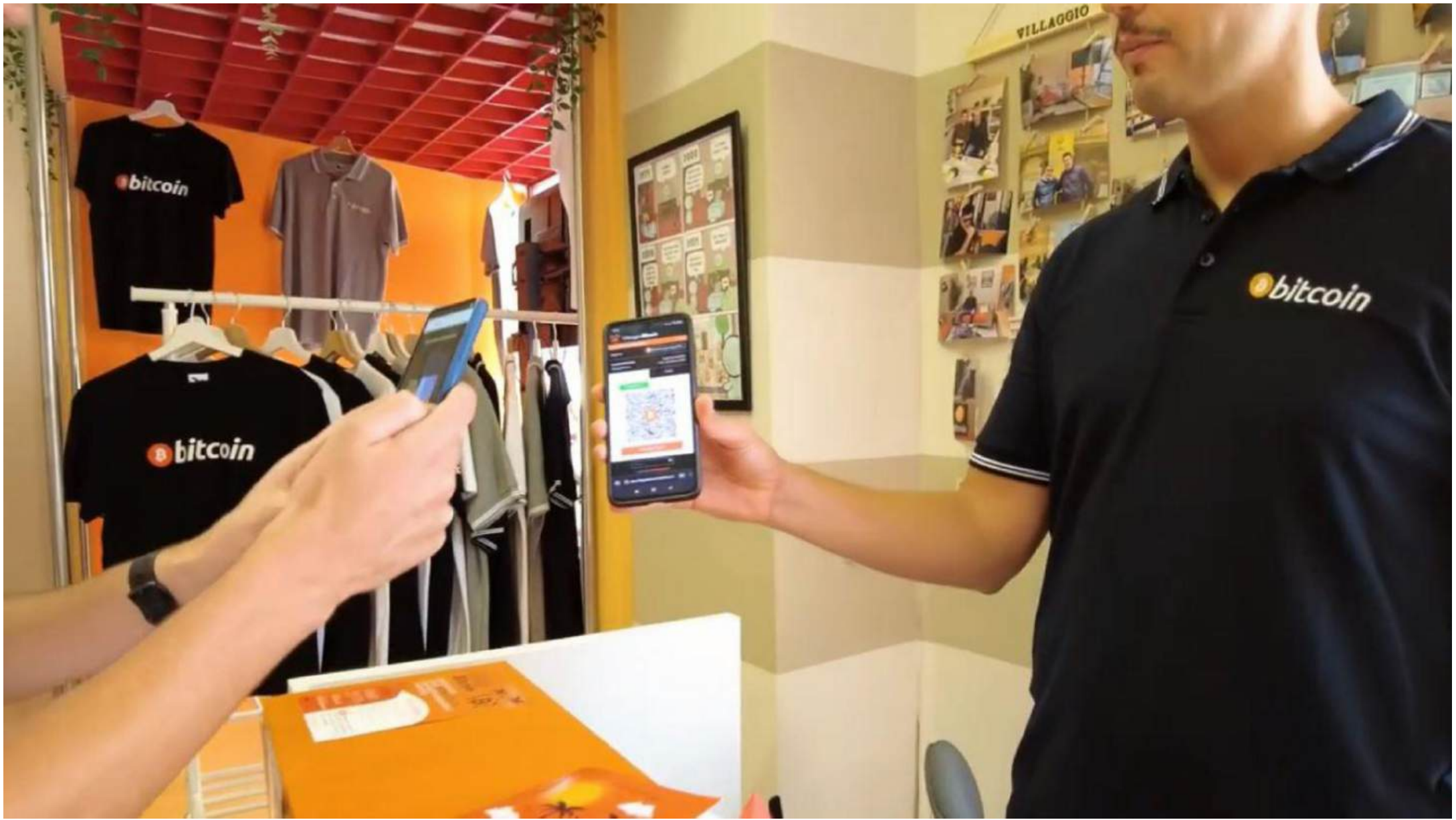
# LN - effettuare pagamenti

## STEP 3

Attendi la conferma del pagamento



Fatto! 



# Lightning: pro e contro



## PROs

- ✓ Pagamenti off-chain (scalabilità)
- ✓ Pagamenti istantanei
- ✓ Commissioni pressoché nulle
- ✓ Micropagamenti (sub-satoshi!)
- ✓ Privacy migliore

## CONs

- ✗ Hot wallet
- ✗ Non semplice da utilizzare
- ✗ Senza nodo LN, custodial
- ✗ Non adatto per alti importi
- ✗ Backup e sicurezza



**LIGHTNING BITCOIN**



Villaggio **Bitcoin**

# LN: sviluppi e applicazioni

Lightning Network è un'industria in crescita e in continua evoluzione

WALLETS & EXCHANGES		Custodial wallets	Exchanges supporting Lightning deposits/withdrawals	Wallet interface	INFRASTRUCTURE	Lightning API	Node infrastructure	Node management software	
<b>Non-custodial wallets</b> Phoenix Zreez Zeus muun Mutiny Bitkit ELECTROM	<b>Neobanks</b> Cash App Strike bitnob Bipa belo Chivo XAPO BANK NOAH	Wallet of Satoshi Blixt Wallet LNbits blink Cashu Satoshi NAYUTA coins VIPSats AmberApp Current SPARK WALLET WALLETAND	RIVER Buda BITAROO BITFINEX okcoin CoinCorner OKEX vBTC SIMPLEFX kraken BLIP PrimeBit BINANCE osmo BitcoinVN Pelerin Rain coinfinity LUNOCOIN ripio Pouch.ph	Alby Joule Lightsats Non-fiat exchanges supporting Lightning SIDESHIFT.AI south X change FIXED & FLOAT ZIGZAG	<b>Implementations</b> LIGHTNING LABS Blockstream ACINQ ELECTROM LIGHTNING DEVELOP	<b>Development</b> Spiral chaincode Polar Talaia Labs	RIVER LIGHTNING opennode LIGHTSPARK IBEX Zreez Alby	Galoy VOLTAGE BLOCKDAEMON GREENLIGHT Bitnoder	VLS Torq MYNODE Umbrel START9 RIDE THE LIGHTNING RASPI BLITZ ThunderHub Citadel PYBLOCK bolt.observer
<b>USE CASES</b> Gaming THUNDER ZEBEDEE Pok	<b>Rewards and Earnings</b> Apollo sMiles Mash FOLD Slice opentip The Bitcoin Company CryptoParrot joltz VIDN Satsback.com	<b>Marketplaces with Lightning deposits/withdrawals</b> Bitrefill Civkit niceHASH <b>Crowdfunding</b> GEYSER _OpenSats	<b>P2P Marketplaces</b> OSHI Gigsats BitEscrow microlancer	<b>Lightning native finance</b> Nmarkets Boltz Kollider LOBOSATS STROOM Loft <b>Lightning native browser</b> IMPERVIOUS	<b>Merchant payment processing</b> BTCPAY bitpay Speed syn0ta flexa LNPAY ElenPAY coingate Neutronpay The Bolt Card Satimoto Swiss Bitcoin Pay MCON Bolt Ring zaprite Scrib Cometh	Machankura Loop Zeezy FLOW Blocktank LQWD THOR LN3IG lightning.network+ AFRICA FREE ROUTING In2me.com Lightning Pool	<b>EMPOWERMENT</b> Startup accelerator Wolf	<b>Data &amp; Analytics</b> AMBOSS mempool BTCMap.org Royllo TML BITCOIN VISUALS SparkSeer LnRouter	
<b>Podcast and Streaming</b> Fountain PODCAST INDEX podfans SHOCKNET Conshax WAVLAKE	<b>Social apps</b> damus Amethyst SPHINX primal JUGGERNAUT ZICO	<b>Community tech</b> Fedi Smart contracts RGB	<b>Communities</b> PiebLab Diamond Hands	Created by <b>RIVER</b> Villaggio Bitcoin					

# Bitcoin for **business**

## Attività commerciali che accettano pagamento in btc

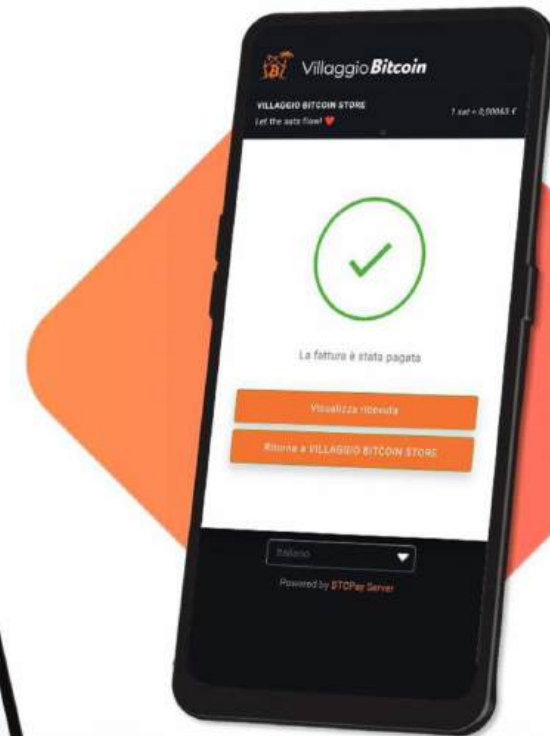
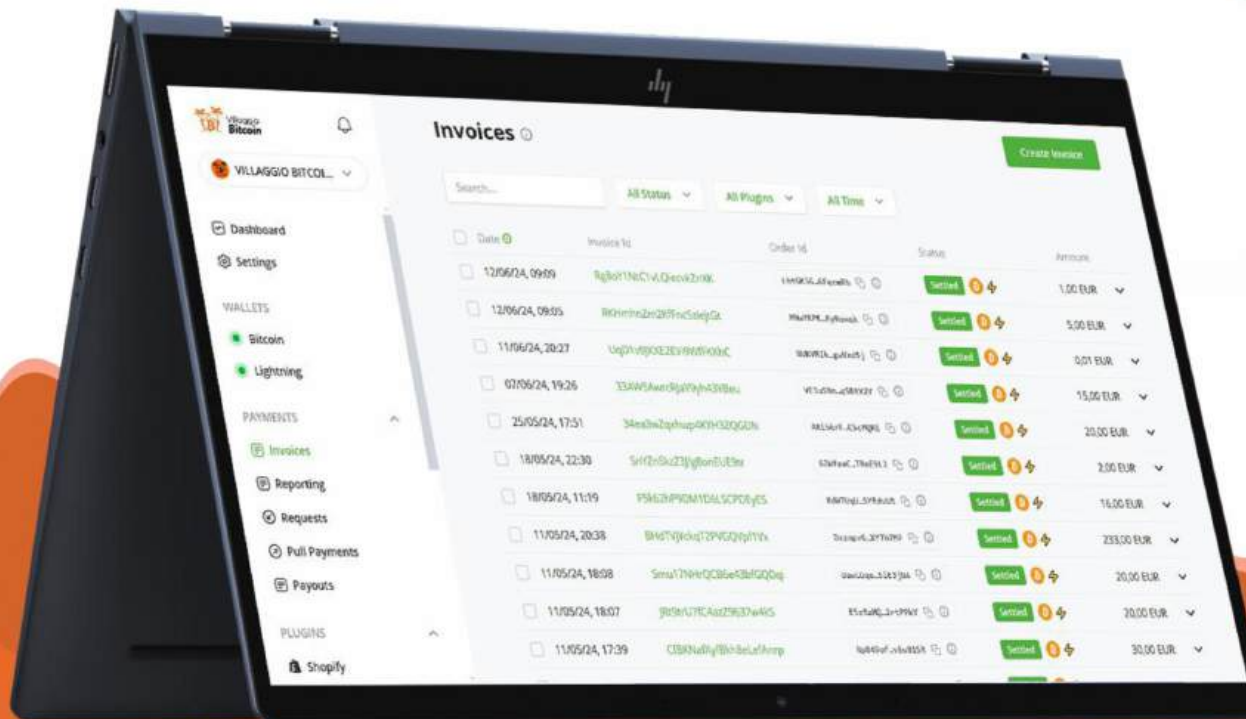
- Apposito software di incasso
- Negozio, e-commerce, p.iva, ...





# Bitcoin for **business**

## Software di incasso per attività commerciali





# Lightning Network

## Rivoluzione dei pagamenti



- ✓ Zero intermediari
- ✓ Zero costi di incasso
- ✓ Zero burocrazia
- ✓ Visibilità
- ✓ Trasparenza
- ✓ Controllo dei fondi
- ✓ Mercato globale



# LN: sicurezza e sviluppi

- Piccoli importi e **prove** di utilizzo
- Approfondisci il **funzionamento**
- Scegli i tuoi **wallet**
- Prova a pagare in qualche e-commerce o **attività commerciale** che accetta satoshi
- Sicurezza e **privacy**
- Valuta di avere un **full node** Bitcoin e un **nodo Lightning!**

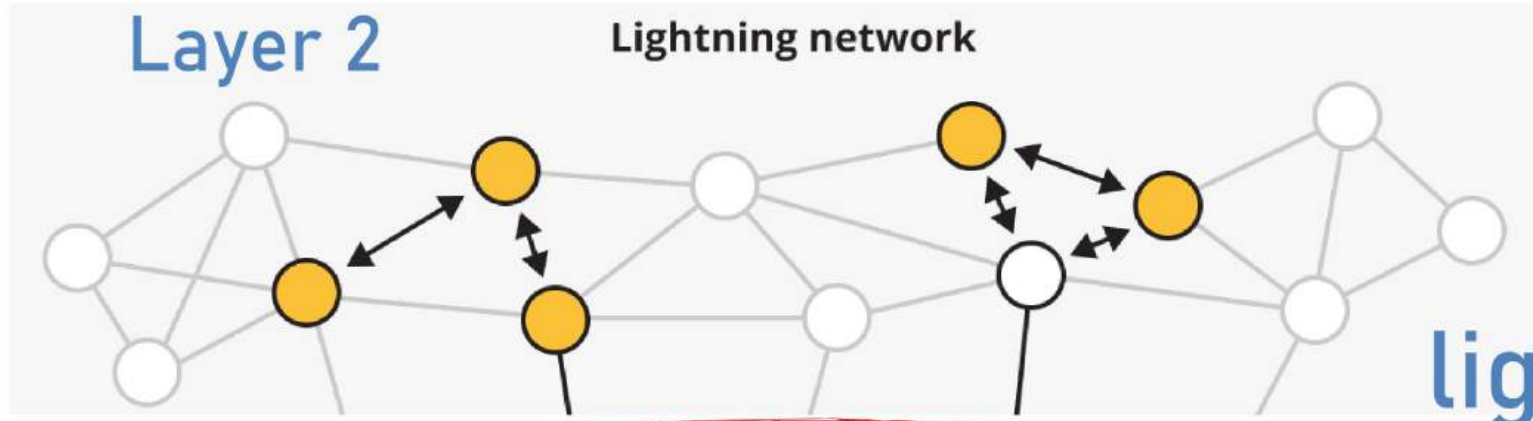


## KEEP IN MIND:

Lightning è tuttora in fase di sviluppo!

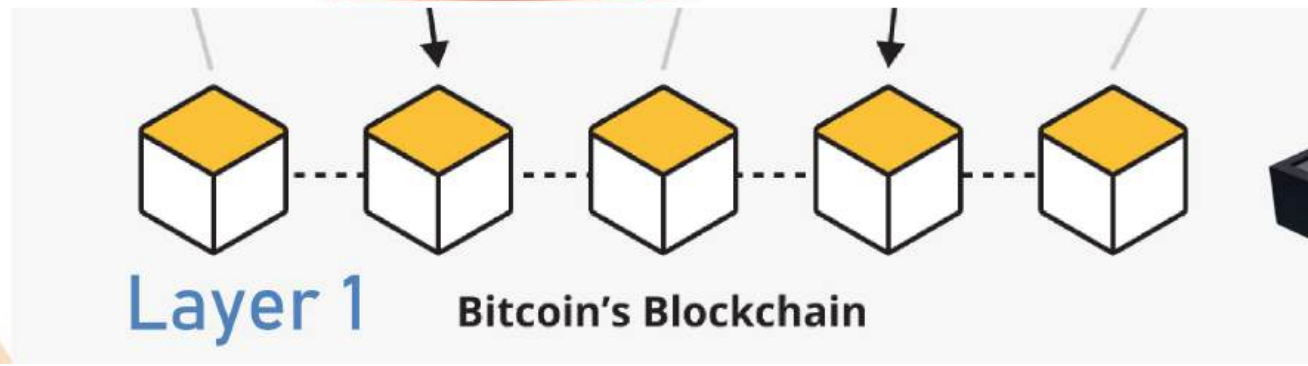


# Bitcoin e Lightning Network



lightning

**Protocollo LNP/BP**



onchain



# Bitcoin e Lightning Network



Fin the **Money**, fix the **World!**

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Thank **you!**

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Villaggio **Bitcoin**



[www.villaggiobitcoin.it](http://www.villaggiobitcoin.it)



[t.me/villaggiobitcoin](https://t.me/villaggiobitcoin)

# Corso base su **Bitcoin**



Villaggio **Bitcoin**

## Modulo 1



## Modulo 2



## Modulo 3



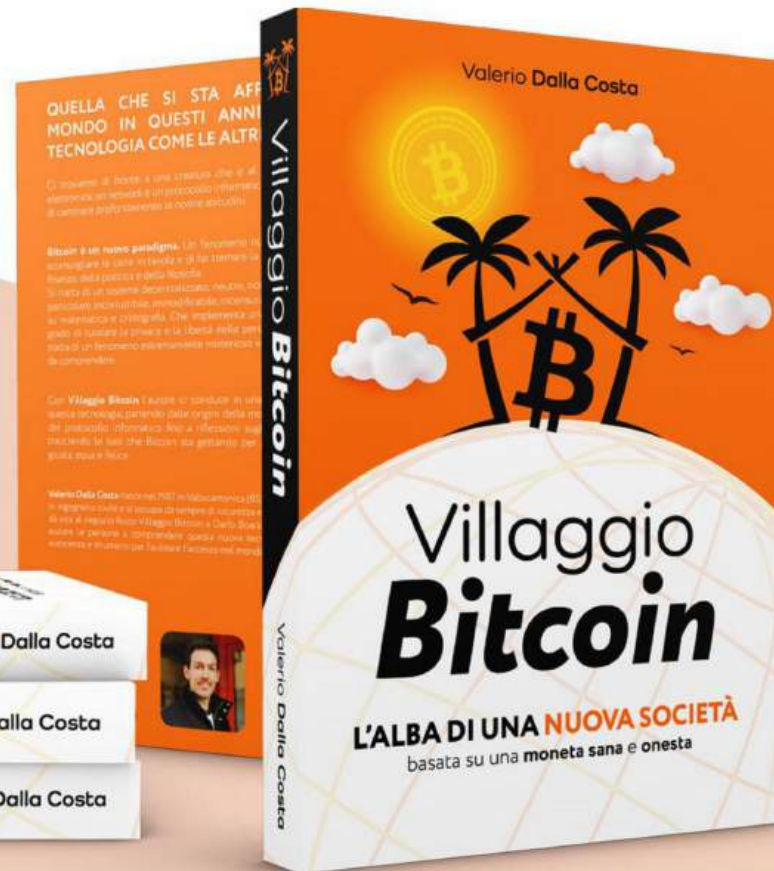
## Modulo 4



# Bitcoin book

# Villaggio Bitcoin

Il libro **completo**  
per comprendere  
il mondo Bitcoin



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# Bitcoin book

## 21 Pensieri

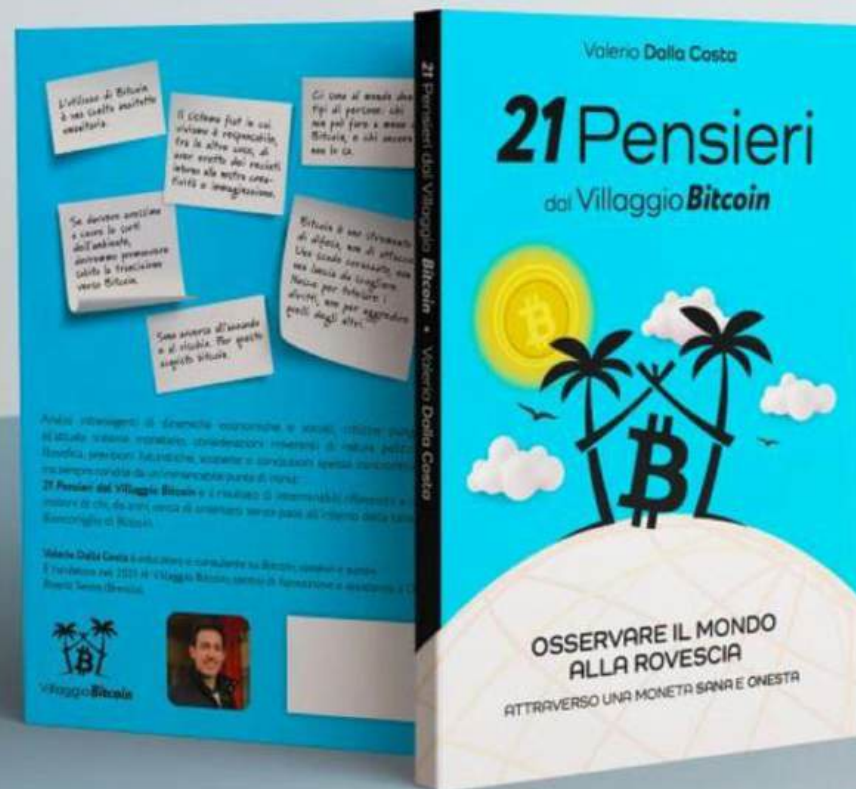
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