

Towards Lightning Network Development

@waltermaffy / Cubo+

Who am I

Walter Maffione

- AI Software Engineer
- Head of R&D at BitPolito, bitcoin-only student team
- Trying to build my own start-up on AI and LN

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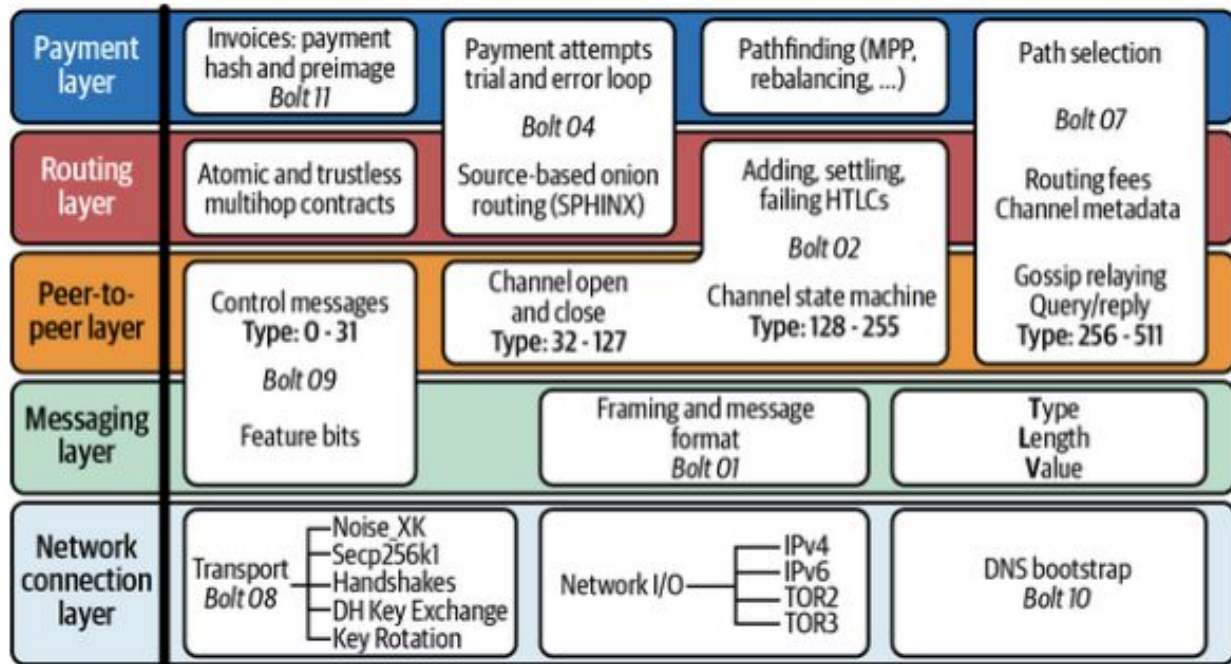
Github: [waltermaffy](https://github.com/waltermaffy)

Overview

- LN overview
- Lightning Payments
- Dev Environments
- LNBITS overview
- Some code
- Challenge for you
- Q&A

Lightning Overview

- **Who**
 - Bitcoin users, merchant, developers, agents
- **What**
 - Off-chain payment protocol based on a network of payment channels between nodes
- **When**
 - Proposed in 2015, first implementation in 2018
- **Where**
 - LND, Core Lightning, eclair, LDK
- **Why**
 - Scalability, Speed, Cost, Privacy



Lightning Network Tools

- <https://mempool.space/it/lightning>
- <https://amboss.space/>
- <https://lnrouter.app/graph>

You need a node

- **Cloud Infrastructure**
 - [Voltage](#), G-Cloud, AWS
- **DIY**
 - Workstation, Home server
 - Raspberry
 - [RaspiBolt](#), [Raspibltitz](#), [Umbrel](#)
- **Someone else (custodial)**
 - [LndHub](#), [BTCPay Server](#)
- **Hosted self-sovereign**
 - [Greenlight](#)
- **Mobile**
 - LDK, neutrino, [Breez-SDK](#)

Some insights

Managing a Lightning node is complex, as is [liquidity](#) management.

- **Node Management:**
 - [Thunderhub](#), [RTL](#)
 - Watchtowers, Cloud Infra, Backups
- **Liquidity Management:**
 - Auto rebalance channels and intelligent tools (e.g. [rebalance-lnd](#), [lndg](#))
 - Not announced channels (No routing) eg. on mobile

Lightning Payments

and micro-payments

You need a Payment App (Lightning Wallet)



BOLT-11 Invoice

A simple, extendable, QR-code-ready protocol for requesting payments over Lightning

[The Lightning Invoice](#)

Pro:

- Most common
- Node-to-node payments

Cons:

- Bad UX
- Non-reusable

LNURL

[LNURL](#) are a set of standards based on HTTP + JSON that enables a good UX in payments.

- **LNURL-Pay**: static url/QR for payments
- **LNURL-Withdraw**: get sats by scanning a QR
- **LNURL-Auth**: easy privacy oriented auth service

[A curated list of awesome lnurl things.](#)

Pro:

- Static and reusable-pay links
- You can do a lot

Cons:

- You need a service **online and trusted**

WebLN

[WebLN](#) & [Alby](#)

Standards to abstract LN interaction from the client

Javascript library that enables easy communication between **web-apps & lightning wallets**.

Examples: BTC Map, StackerNews, Bolt.fun

Pro:

- Good UX
- Easy to interact
- No 3-party required

Cons:

- Browser client
- Need fallback to others protocol if user has not a compatible client

Other payments

- [Lightning Address](#)
- [Keysend](#)
- [Bolt12](#)
- [LSAT](#)
- e-cash (cashu, fedimint)
- Zaps

LN Applications

Lightning enables micro-payments, new types of applications are born

Podcasting 2.0

- Breez, Fountain

Gaming

- [Zebedee](#), THNDR

Video Streaming

- Impervious, Keet.io

Finance

- Kollider, LNM, Bolz

Development Environments

Bitcoin Networks

- **Mainnet**
 - Live and operational network, real production env, real digital scarcity and value
- **Testnet**
 - Mimic mainnet functionality, no real value, allows developers to test new features
- **Regtest**
 - Local sandbox testing environment, full control over blockchain, mining, etc
- **Signet**
 - Public testing environment with more realistic behaviour than testnet

Polar

<https://lightningpolar.com/>



PLEBNET PLAYGROUND

[Plebnet Playground Sandbox Docker Package](#)

Docker package which allows users to use and test bitcoin and lightning technologies without the financial risk involved with running on the mainnet chain.

Multiple GUI interfaces are included

Demo LNBITS

Lightning Challenge

Challenge

Add Lightning payments to an existing app! It could be anything you want, use your imagination and add micro-payments to services.

Requirements:

- Multi-user and authentication
- Use at least 2 different payment protocol (eg. LNURL, WebLN, ...)
- Use your own Lightning node
- Provide a front-end to interact with it

Ex. Translation, VideoGame, Podcast player, Video Streaming, e-book commerce, ChatGPT

Resources

- <https://docs.lightning.engineering/>
- <https://docs.corelightning.org/docs/app-development>
- <https://webln.dev/>
- <https://docs.lnbits.org/>
- <https://docs.zebedee.io/docs/zebedee-api/overview>
- <https://bitcoin.design/guide/getting-started/introduction/>

Q&A