

Lightning Network is a “second layer” payment protocol that operates on top of the Bitcoin blockchain and allows for near-instant, incredibly cheap Bitcoin transactions. The Lightning Network is a mesh of nodes connected through a network of bidirectional payment channels.

In order to transact on the Lightning Network, a user must open a payment channel by committing a funding transaction on the Bitcoin Blockchain. Once a channel is funded, the user can transact with other lightning nodes indefinitely, so long as their channel is funded. Once the user is finished with their transactions, they can close the channel by sending a close-out transaction on the main Bitcoin blockchain.

Let’s walk through an (imperfect) analogy. Lightning works a lot like a bar tab. If you’re planning to post-up at the bar and double-fist ice-cold crispies for a few hours, it doesn’t make sense to pay each time you get another round. If you’re paying in cash, this would require the server to get correct change for each transaction. Worse, if you’re paying with credit, the server would need to run your card and get a signature every time. You want to drink without interruption, but the bar owner wants to make sure you don’t run off with a free buzz, so what do you do? You open a tab.

When you open a tab, the bartender will keep track of what you’re drinking, and you won’t pay until you decide you’re done for the night. In order to prevent getting stiffed, the bartender may keep your credit card or even your identification. If you forget to close your tab, the bartender will charge your account for the drinks and likely give himself a fat tip, and you’ll have to take the walk of shame the following morning to pick up your cards and what is left of your pride.

When you start your tab and hand over your credit card, you are effectively opening a payment channel. The bartender keeps tabs on how much you owe, and updates the state of your payment channel every time you order another beer. When you’re done, the bartender swipes your card, you add your tip, and you close the tab and close your payment channel. In addition to being efficient, there is only a small amount of trust involved. Once the bartender has your card, the bar is more or less guaranteed to get paid. You can check the tab at the end of the night and ensure that you’re paying the correct amount. If the amount is wrong, you’d likely have to talk with the owner. If the two of you still disagree on the amount owed, you may need to take the complaint to your credit card company.

With the Lightning Network, you open a channel by sending a Bitcoin transaction on the Bitcoin blockchain, and commit a certain amount of funds to a lightning channel. Once funded, you can transact with anyone on the Lightning Network that shares an open channel with you. You can transact indefinitely until you are finished or out of funds, then post a closing transaction to the blockchain. The Lightning protocol uses a combination of smart contracts, time-locked transactions, multi-sig addresses, game theory, and more to ensure proper routing and payment. There are many great resources that explain the network in detail, but the main takeaways are as follows:

- 1 Lightning allows for instant, cheap transactions.
- 2 Security is enforced by blockchain smart contracts, without creating on-blockchain

transactions for individual payments.

The Lightning Network will not only save you a few bucks if you transact frequently, but it effectively allows for non-linear scaling of Bitcoin in general. If enough consumers/merchants use Lightning, Bitcoin will be capable of Billions of Lightning transactions per second. The implications of this statement are massive. Not only can Bitcoin scale better than traditional payment systems like Visa, Lightning will allow for “streaming money”, machine-to-machine micropayments, and other solutions that have not yet been envisioned.

Joseph Poon and Thaddeus Dryja wrote the initial Lightning white paper a couple of years back. The specification was announced after the white paper, and it is currently under development by multiple parties (Elements Project, Lightning Labs, and ACINQ). For all intents and purposes, Lightning should be treated as Beta-level software that is not ready for public release. If you decide to open a lightning channel, only a small amount should be used at this time, and you should be prepared to lose funds.

That being said, Lightning is live on mainnet Bitcoin and you can fund a channel and make real-life purchases right now.

The Lightning Network is currently front and center in the Bitcoin scaling debate. Big-blockers (BCH camp) are convinced that Blockchains can scale simply by increasing the blocksize when more capacity is needed. Small blockers (BTC camp) are convinced that more elegant solutions like SegWit, Schnorr Signatures, MAST and Lightning Network will allow for exponential scalability that can truly compete with and ultimately outperform legacy payment rails.

Those who argue that LN is too complicated for ordinary users are being short-sighted. When the Lightning Network went live in December, it was too difficult for many users (including me) to use, even with a guide. However, in just a couple of months, ACINQ has put out this incredibly easy to use Eclair wallet. While the software and protocol are certainly not ready for mass adoption at this time, developers are working around the clock on UI and user improvements.

Is Lightning the end-all-be-all solution for Bitcoin? No. I like to think of lightning as a complementary payment option. With fiat, I've got cash in investments, checking accounts, and my wallet, all with varying degrees of liquidity and security. I see Lightning serving more as the cash in your wallet for the short term. You can hit the ATM, pay a fee, and have a wallet full of cash for small purchases in the physical world. Online, you'll open a lightning channel, pay a fee, then transact with little to no fees until you need to top up your wallet again. Eclair has already made the wallet pretty seamless, putting the BTC wallet and lightning channels in the same app. I wouldn't be surprised if Bitcoin wallets are soon available which totally hide the lightning back end from the user.

The Lightning Network is an incredible idea that is just getting started. The inner workings are beautiful and complex.

For further reference please refer to the [Lightning Network](#) video presentation from Andreas Antonopoulos.