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BLOCKCHAIN · BEGINNER · LESSON 7 OF 13

Nodes and the Peer-to-Peer Network

The computers that keep Bitcoin running, how a payment travels between them, and why ordinary users hold real power

6 min read 6 quiz questions with answer key

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Nodes and the Peer-to-Peer Network

IN ONE SENTENCE

A node is any computer running Bitcoin's software that keeps a copy of the blockchain and checks it against the rules. Nodes connect directly to each other with no central server, pass along every new transaction and block, and reject anything that breaks the rules.

What a node actually is

In Lesson 5 we called the network one of the three parts of every blockchain. That network is made of **nodes**: ordinary computers running software that speaks Bitcoin's language. The most widely used version is called Bitcoin Core, and anyone can download it for free.

A node does three jobs. It keeps a copy of the blockchain. It checks every new transaction and block against the rules. And it passes valid information on to the other nodes it is connected to.

Running one does not take a data center. A full copy of the Bitcoin blockchain took up about 760 GB in mid-2026, so a home computer with a 1 TB or 2 TB drive is enough. Some people run a node on a small device the size of a paperback book, plugged in on a shelf. Thousands of nodes run in homes, offices and data centers across many countries, and new ones can join or leave at any time without asking anyone.

Not every node does the same work

The word node covers a few different setups, depending on how much each one stores and checks for itself:

Type	What it keeps	What it checks
Full node	The entire blockchain since 2009	Every block and transaction, from the genesis block onward
Pruned node	Only recent blocks, from about 12 GB of space	Everything, just like a full node, then deletes old blocks to save space
Light wallet	Little or nothing	Only basic details, and trusts full nodes for the rest
Mining node	The full blockchain	Everything, and also builds new blocks to compete for the reward

The important line is between nodes that check everything themselves and wallets that rely on someone else's node. A full or pruned node does not need to trust anyone: it has checked every rule with its own copy. Most phone wallets are light wallets, which is convenient but means trusting the nodes they connect to.

How a payment travels

Bitcoin is a **peer-to-peer** network. There is no central server that everyone reports to. Instead, each node connects directly to a handful of other nodes, called its peers. By default, Bitcoin Core opens connections to about eight peers of its own choosing and can accept many more.

When you send a payment, your wallet hands it to a node. That node checks it, and if it follows the rules, passes it to its peers. Each of them checks it again and passes it on to their own peers. Within seconds, the payment has reached most of the network. New blocks spread the same way.

Every node keeps its own waiting room of payments that are valid but not yet in a block. It is called the **mempool**, short for memory pool. There is no single official mempool: each node has its own, and they are usually very similar. Miners pick payments from their mempool to build the next block. Lesson 11 follows a payment through this whole journey.

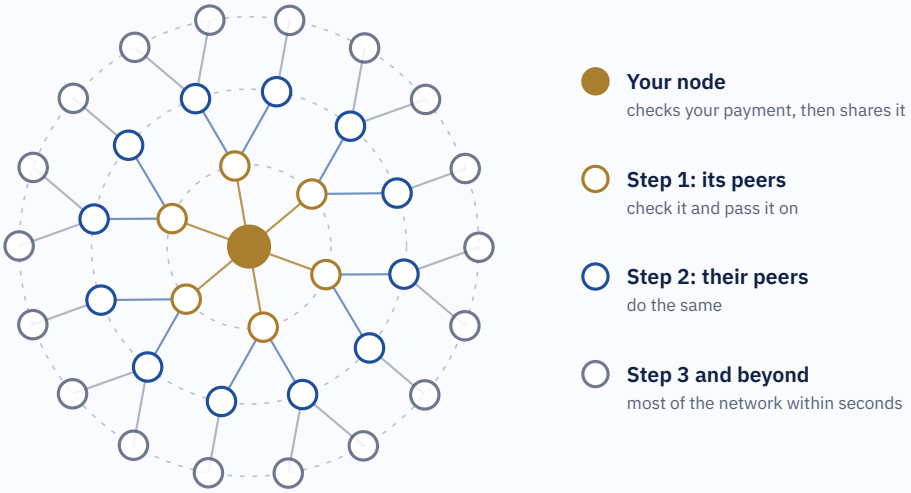


Figure 1. A payment spreads hop by hop. Each node checks it and passes it to its own peers, so it reaches most of the network within seconds, with no central server involved.

ANALOGY: KNOCK ON EIGHT DOORS

Imagine you have urgent news and a rule that you tell it to eight neighbors, and each of them tells eight more. After one round, 8 people know. After two rounds, 64. After three rounds, 512, and after four, more than 4,000. Nobody needs a loudspeaker or a central office. That is how a peer-to-peer network spreads information so fast, and why there is no single point that can be switched off to stop it.

Why running a node gives you a vote

Miners build blocks, but they do not decide the rules. Every node checks every block, and a block that breaks the rules its node is running is simply ignored, no matter how much computing power went into it. A miner who produces such a block wastes the electricity and earns nothing.

This makes the people who run nodes, including ordinary users, the final judges of what counts as Bitcoin. To change the rules, enough of them have to choose to install new software. Nobody can force it on them.

A REAL EXAMPLE: THE 2017 SPLIT

In 2017, Bitcoin users disagreed about how to handle growing demand. One group wanted much bigger blocks, so on 1 August 2017 they split off with their own rules and created a separate coin, Bitcoin Cash. Later that year, a plan backed by many large companies and miners to double Bitcoin's block size, known as SegWit2x, was called off in November after it failed to win enough support from the people running nodes. The rules stayed as they were because the nodes did not adopt the change.

Why this matters for traders

- **Splits can create new coins.** When Bitcoin Cash split off in August 2017, anyone holding bitcoin at that moment also received the same amount of the new coin, if their exchange or wallet supported it. Splits like this bring sharp volatility and questions about which exchanges will list or credit the new asset.
- **Exchanges are node operators too.** Your deposit only counts once the exchange's own nodes see it in a block. During network upgrades or unusual congestion, exchanges often pause deposits and withdrawals. If funds seem stuck, checking the transaction on a block explorer usually tells you whether the delay is on the network or at the exchange.
- **A crowded mempool means higher fees.** When many payments are waiting, people bid higher fees to get into the next block. Watching mempool size on a public site gives an early sign of busy periods, which often coincide with big market moves.

Key terms

Node	A computer running Bitcoin software that keeps a copy of the blockchain, checks it against the rules and passes on new data.
Full node	A node that has downloaded and checked every block since the genesis block, without trusting anyone else.
Pruned node	A node that checks everything like a full node but deletes old blocks afterwards to save disk space.
Light wallet	A wallet that does not check everything itself and relies on full nodes for most of the work.
Peer-to-peer	A network where computers connect directly to each other, with no central server in charge.

Mempool	Each node's waiting room for valid transactions that have not yet been included in a block.

Key takeaways

1. A node is any computer running Bitcoin software that stores the blockchain, checks it against the rules and shares new data.
2. Full and pruned nodes check everything themselves. Light wallets are convenient but rely on other nodes.
3. Nodes connect directly to a handful of peers, and new payments and blocks spread from peer to peer within seconds.
4. Each node keeps its own mempool of valid payments waiting to be included in a block.
5. Nodes, not miners, decide which rules count, which is why rule changes need wide support from the people running them.

Test yourself

Circle one answer for each question. The answer key with explanations is on the next page. You can also take this quiz online at markettalks.info and see your score instantly.

1. What does a Bitcoin node do?

- A It sets the price of bitcoin
- B It stores the blockchain, checks it against the rules and passes on new data
- C It holds customers' coins like a bank
- D It only mines new blocks

2. What is the main difference between a full node and a light wallet?

- A A full node checks every rule itself, while a light wallet relies on other nodes
- B A light wallet stores more data than a full node
- C Only light wallets can send payments
- D A full node needs permission to join the network

3. How does a new payment reach the rest of the network?

A. It is sent to a central Bitcoin server
B. Miners collect it from each wallet
C. Each node checks it and passes it to its peers, who do the same
D. It is emailed to every node

4. What is the mempool?

A. A list of all Bitcoin users
B. A single official database run by miners
C. The storage space for the full blockchain
D. Each node's waiting room for valid payments not yet in a block

5. What happens if a miner produces a block that breaks the rules?

A. Nodes accept it because a miner made it
B. Nodes reject it, and the miner earns nothing
C. The rules change to match the block
D. The block is added but marked as invalid

6. Why was the SegWit2x plan called off in 2017?

A. Miners refused to build bigger blocks
B. A government banned it
C. It did not win enough support from the people running nodes
D. The software had a bug

Answer key

1 B

It stores the blockchain, checks it against the rules and passes on new data

A node keeps a copy of the blockchain, checks every transaction and block against the rules, and relays valid data to its peers.

2 A

A full node checks every rule itself, while a light wallet relies on other nodes

A full node verifies everything with its own copy and trusts no one. A light wallet saves space and effort by relying on full nodes for most of the checking.

3 C

Each node checks it and passes it to its peers, who do the same

Peer-to-peer relay means each node passes valid payments to the peers it is connected to. In a few rounds, the payment reaches most of the network.

4 D

Each node's waiting room for valid payments not yet in a block

Every node keeps its own mempool. Miners choose payments from it when they build the next block.

5 B

Nodes reject it, and the miner earns nothing

Nodes check every block. A block that breaks the rules is ignored, no matter how much work went into it, so the miner gets no reward.

6 C

It did not win enough support from the people running nodes

Even with backing from large companies and miners, a rule change only works if node operators choose to run it. Without that support, the plan was cancelled.

SOURCES

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