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Fork (blockchain)

In blockchain, a **fork** is defined variously as:

- "what happens when a blockchain diverges into two potential paths forward"
- "a change in protocol" or
- a situation that "occurs when two or more blocks have the same block height"[1]:glossary[a]

Forks are related to the fact that different parties need to use common rules to maintain the history of the blockchain. When parties are not in agreement, alternative chains may emerge. While most forks are short-lived some are permanent. Short-lived forks are due to the difficulty of reaching fast consensus in a distributed system. Whereas permanent forks (in the sense of protocol changes) have been used to add new features to a blockchain, they can also be used to reverse the effects of hacking such as the case with Ethereum and Ethereum Classic, or avert catastrophic bugs on a blockchain as was the case with the bitcoin fork on 6 August 2010.

Blockchain forks have been widely discussed in the context of the bitcoin scalability problem.[4][5][6]

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Types of forks

Forks can be classified as *accidental* or *intentional*. *Accidental fork* happens when two or more miners find a block at nearly the same time. The fork is resolved when subsequent block(s) are added and one of the chains becomes longer than the alternative(s). The network abandons the blocks that are not in the longest chain (they are called *orphaned* blocks).

Intentional forks that modify the rules of a blockchain can be classified as follows:

Hard fork

A *hard fork* is a rule change such that the software validating according to the old rules will see the blocks produced according to the new rules as invalid. In case of a hard fork, all nodes meant to work in accordance with the new rules need to upgrade their software. If one group of nodes continues to use the old software while the other nodes use the new software, a permanent split can occur.

For example, Ethereum has hard-forked to "make whole" the investors in The DAO, which had been hacked by exploiting a vulnerability in its code. In this case, the fork resulted in a split creating Ethereum and Ethereum Classic chains. In 2014 the Nxt community was asked to consider a hard fork that would have led to a rollback of the blockchain records to mitigate the effects of a theft of 50 million NXT from a major cryptocurrency exchange. The hard fork proposal was rejected, and some of the funds were recovered after negotiations and ransom payment. Alternatively, to prevent a permanent split, a majority of nodes using the new software may return to the old rules, as was the case of bitcoin split on 12 March 2013.[7]

A more recent hard-fork example is of Bitcoin in 2017, which resulted in a split creating Bitcoin Cash.[8] The network split was mainly due to a disagreement in how to increase the transactions per second to accommodate for demand.[9]

Soft fork

A soft fork or a soft-forking change is described as a fork in the blockchain which can occur when old network nodes do not follow a rule followed by the newly upgraded nodes.[1]:glossary This could cause old nodes to accept data that appear invalid to the new nodes, or become out of sync without the user noticing. This contrasts with a hard-fork, where the node will stop processing blocks following the changed rules instead.

Cryptocurrency splits

A *permanent chain split* is described as a case when there are two or more permanent versions of a blockchain sharing the same history up to a certain time, after which the histories start to differ.[10] Permanent chain splits lead to a situation when two or more competing cryptocurrencies exist on their respective blockchains.[10]

Taxation

The taxation of cryptocurrency splits varies substantially from state to state.

Australian Taxation Office (ATO)

The ATO does not classify cryptocurrency splits as taxation events.[10] The ATO classifies the versions of the blockchain coming from the splits as the "original blockchain" and the "new blockchain". In relation to the cost base, the cryptocurrency on the original blockchain should be assigned all the original cost base, while the cryptocurrency on the new blockchain should be assigned cost base zero.[10]

HM Revenue & Customs (HMRC)

The HMRC does not classify cryptocurrency splits as taxation events. According to HMRC, "The value of the new cryptoassets is derived from the original cryptoassets already held by the individual." In relation to the cost base, HMRC says that "Costs must be split on a just and reasonable basis under section 52(4)

Taxation of Capital Gains Act 1992. HMRC does not prescribe any particular apportionment method. HMRC has the power to enquire into an apportionment method that it believes is not just and reasonable."[11]

Internal Revenue Service (IRS)

The IRS classifies cryptocurrency splits as "airdrops" and as taxation events. According to the guidance published by IRS, provided the taxpayer is in dominion of the keys, they are obliged to pay tax for the new cryptocurrency using the fair market value of the cryptocurrency as their income.[12][13]

See also

- List of bitcoin forks

Notes

a. Alternatively, this situation is called a *blockchain split*[2] or a *blockchain divergence*.[3] If permanent, it is also referred to as a *cryptocurrency split*.

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