

# NONFUNGIBLE TOKENS: APPLICATIONS, TECHNOLOGY, AND OUTLOOK



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In the cryptocurrency world, a token is the denomination of currency, in the same way as the dollar is the denomination of the US national currency. It represents a tradable asset that has value. All fiat currencies<sup>1</sup> and almost all tokens are fungible – i.e., each unit has the same value and is interchangeable. One US Dollar is worth the same as another US Dollar. One Bitcoin is worth the same as another Bitcoin, and they are interchangeable. Because of their fungible nature, cryptocurrency tokens can be used to purchase goods and services. In the broader use of blockchains, tokens can represent more than currency. There are security tokens (i.e., units of ownership in a business), reward tokens, and utility tokens. In most cases, these tokens are also fungible. However, a nonfungible token ("NFT") has a unique value and is not interchangeable with another NFT.

NFTs are growing in popularity, partly due to the global rise in the legitimacy of cryptocurrencies and because NFTs are a viable way to ensure trusted and authenticated ownership using blockchain technology.

## APPLICATIONS – ART

In the world of art, the NFT is proof of authenticity and ownership of a piece of digital art. It is the equivalent of a certificate of authenticity in the physical art world. The artist still retains the copyright and reproduction rights, as it is with physical artwork. Artists who want to sell their work as NFTs must mint digital tokens by uploading and validating their information on a blockchain. Doing so usually costs anywhere from \$40 to \$200. They can then list their piece for auction on an NFT marketplace.

The most expensive NFT to date is "Everydays: The First 5,000 Days" by Beeple, which was sold by Christies, a traditional art auctioneer, for \$69 million. It was a compilation of 5,000 pieces of Beeple's work. His work, "CROSSROAD," was bought on the online Nifty Gateway marketplace for \$6.66 million. Beeple is the pseudonym of digital artist Mike Winkelmann.

**Many contemporary artists are attracted to NFTs for three reasons:**

1. Greater accessibility to the market
2. Proof of ownership
3. Unique forms of monetization

While traditional art sales require gaining access to a legacy network of art dealers and auction houses, digital sales driven by NFTs, give lesser-known digital creators access to a wider market than previously possible. The blockchain infrastructure underpinning NFTs allows for a recognized and secure pathway to legitimately "own" a digital asset, enabling buyers to feel more comfortable participating in the digital art market. Another advantage of NFTs is that they can incorporate smart contracts, which allow creators to earn royalties on future transactions involving their work.

**APPLICATIONS – COLLECTIBLES**

Much of the foundation for the current NFT collectibles craze began in 2017 with the launch of the blockchain game CryptoKitties. This game allowed users to buy and sell the rights to digital cats, each with its unique appearance, personality, and family history. In the years since, numerous NFT marketplaces have sprung up—most notably the launch of NBA Top Shot in October 2020, which has already secured \$390 million in sales of NBA moments such as dunks, blocks, and famous highlights. NBA Top Shot is managed by Dapper Labs, a developer of an online platform intended to offer games built upon blockchain technology.

Many of these marketplaces deal in niche areas of interest. However, those with wider brand recognition, such as the NBA, are betting that the mass appeal of their brands will boost the legitimacy and value of their marketplace and related assets.

The most valuable NFT collectible to date was the sale of Twitter founder Jack Dorsey's first-ever tweet, which was sold on the online Valuable platform for \$2.9 million to a Malaysia-based businessman. Mr. Dorsey donated the money to charity. The tweet, which said "just setting up my twttr," was first published on March 21, 2006.

Will NFTs replace physical collectibles such as baseball cards? The digital ecosystem's maturity—along with cryptocurrencies' explosive growth—suggests that this will, indeed, be the trend.

**TECHNOLOGY**

NFTs can easily be minted, a process whereby the creator of a digital asset attaches a blockchain-backed token to the asset. During an NFT purchase, information pertaining to the transaction—such as sale date, purchase amount, and participants—is securely stored on a digital blockchain ledger. The purchased token then acts as a virtual deed of ownership, giving the individual the rights to resell the NFT but not the rights to the underlying content. For example, an owner of an NFT cannot resell the content in other forms, such as by printing digital artwork on a T-shirt. Furthermore, the original content creator has the right to remove, alter, or otherwise destroy the digital existence of the original work.



**EVERYDAYS: THE FIRST 5,000 DAYS**

The Ethereum blockchain mints the majority of NFTs primarily due to its superior infrastructure for handling these types of assets. It uses a standard called ERC-721. Creators gravitate to Ethereum for a variety of reasons: the simplicity and security of proving ownership history, the difficulty of stealing ownership, the ability to trade NFTs peer-to-peer, and the portability of Ethereum products. Portability allows NFT owners to easily sell their assets on a variety of Ethereum-backed platforms. Even so, prohibitive transaction fees and the high energy use of Ethereum have sent some creators looking for alternatives, such as the recently created Flow blockchain. However, it is quite difficult to transfer NFTs across competing blockchains, making the portability of ownership an issue that needs a long-term solution.

## OUTLOOK

Given that Ethereum is the primary blockchain standard backing these tokens, the recent explosion of NFT-related interest and transactions has increased Ethereum usage. As a result, energy consumption associated with verifying blockchain transactions on Ethereum has climbed sharply. The total energy utilization of the Ethereum network is comparable to the annualized energy usage of Slovakia.<sup>2</sup> This has raised legitimate concerns about increasing carbon emissions, even though some of this energy consumption comes from renewable, clean energy.

Other blockchain standards, such as Flow, claim to use less energy to verify transactions. Ethereum's developers are developing a proof-of-stake framework that should be less carbon-intensive, but there is no clear adoption timeline. Given the ever-increasing international focus on decarbonization, the voracious energy appetite of NFTs could prove to be a costly impediment toward widespread adoption.

Economists, analysts, and day traders alike are vexed with the perceived high value of NFTs and cryptocurrency, as many question speculative value versus true fair market value. Undoubtedly, news of tougher regulatory oversight, climate concerns, and overheating economies will make them a volatile asset. NFTs enable a unique form of digital ownership with a broad variety of uses and opportunity for owners from initial sale to future royalties. ■

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<sup>1</sup> Fiat currency is government-issued currency that is not backed by a physical commodity, such as gold or silver, but rather by the government that issued it.

<sup>2</sup> "Ethereum Energy Consumption Index," Digiconomist, March 24, 2021.

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