

To help our partners better understand the practical value of non-fungible tokens, we have outlined a simplified explanation below. It is our hope that providing this transparency into how to identify “what” makes a quality NFT, will also highlight why working with experts is critical to the longevity and value of your NFTs.

The InterPlanetary File System

Let us just start with a one-line definition of IPFS:

“IPFS is a distributed system for storing and accessing files, websites, applications, and data.”

What does that mean, exactly? Let's say you're doing some research on our portfolio venture: CryptoBlocks. (Just roll with it; we are super cool and super smart!) Did you know we can mint more versions of NFT formats than any online marketplace? Hypothetically speaking, if you wanted to validate that statement, you might start by visiting the sites homepage which would follow a structure of:

<https://www.CryptoBlocks.ventures/>

If you were to put that URL in your browser's address bar, your computer asks one of Wikipedia's computers, which might be somewhere on the other side of the planet, for the CryptoBlocks page (or whichever secure place you choose to host).

However, that is not the only option for meeting your NFT security needs. There is a mirror of Wikipedia stored on IPFS, and you could use that instead. If you use IPFS, your computer asks to get the CryptoBlocks page with a URL structure that looks like this:

```
/ipfs/QmXoypijzW3WknFiJnKLwHCnL72vedxjQkDDP1mXWo6uco/wiki/eNFTPROs.html
```

The easiest way to view the above link is by opening it in your browser through an IPFS Gateway. Simply add <https://ipfs.io> to the start of the above link.

IPFS knows how to find that sweet, sweet CryptoBlocks information by its contents, not its location (more on that, which is called [content addressing](#), below). The IPFS-modified version of the CryptoBlocks info is represented by that string of numbers in the middle of the URL (QmXo...), and instead of asking one of Wikipedia's computers for the page, your computer uses IPFS to ask lots of computers around the world to share the page with you. It can get your CryptoBlocks info from anyone who has it, not just Wikipedia.

When you use IPFS, you do not just download files from someone else, your computer also helps distribute them. When your friend a few blocks away needs the same Wikipedia page, they might be as likely to get it from you as they would from your neighbor or anyone else using IPFS.

IPFS makes this possible for not only web pages but also any kind of file a computer might store, whether it is a document, an email, or even a database record.

Decentralization

Making it possible to download a file from many locations that are not managed by one organization:

- [Supports a resilient internet](#). If someone attacks Wikipedia's web servers or an engineer at Wikipedia makes a big mistake that causes their servers to catch fire, you can still get the same webpages from somewhere else.

- [Makes it harder to censor content](#). Because files on IPFS can come from many places, it is harder for anyone (whether they're states, corporations, or someone else) to block things. We hope IPFS can help provide ways to circumvent actions like these when they happen.
- Can speed up the web when you are far away or disconnected. If you can retrieve a file from someone nearby instead of hundreds or thousands of miles away, you can often get it faster. This is especially valuable if your community is networked locally but does not have a good connection to the wider internet. (Note: well-funded organizations with technical expertise do this today by using multiple data centers or CDNs (content distribution networks) IPFS hopes to make this possible for everyone.)

As your Blockchain NFT experts, the last point we want to make is where IPFS gets its full name:

["The InterPlanetary File System."](#)

Blockchain experts like us are striving to build a system that works across places as disconnected or as far apart as planets. While that is an idealistic goal, it keeps us working and thinking hard, and almost everything we create in pursuit of that goal is also useful here at home.

Content Addressing

For a beginner-friendly primer on why cryptographic hashing and content addressing matter, look at ProtoSchool's tutorial, [Content Addressing on the Decentralized Web](#). ([link here](#))

What about that link to the CryptoBlocks page above? It looked a little unusual:

```
/ipfs/QmXoypizjW3WknFiJnKLwHCnL72vedxjQkDDP1mXWo6uco/wiki/eNFTPROs.html
```

That jumble of letters after /ipfs/ is called a [content identifier](#) and it is how IPFS can get content from multiple places. This is done today using traditional URLs and file paths such as:

- <https://en.wikipedia.org/wiki/CryptoBlocks>
- /Users/MatTHEmastermind/Documents/term_paper.doc
- C:\Users\Cryptoblocks\My Documents\project_sprint_presentation.ppt

All the above identify a file by where it is located, what computer it is on, and where on that computer's hard drive it is. That does not work if the file is in many places, though, like your neighbor's computer and your friends across town or a web-based file system you forgot your password to.

Instead of being location-based, IPFS addresses a file by what is in it, or by its content. The content identifier above is a cryptographic hash of the content at that address. The hash is unique to the content that it came from, even though it may look short compared to the original content. It also allows you to verify that you got what you asked for and [bad actors cannot just hand you content that does not match](#).

NFT PROS NOTE

Why do we say "content" instead of "files" or "web pages" here? Because a content identifier can point to many different types of data, such as a single small file, a piece of a larger file, or metadata. (In case you do not know, metadata is "data about the data." You use metadata when you access the date, location, or file size of your digital pictures, for example.) So, an individual IPFS address can refer to the metadata of just a single piece of a file, a whole file, a directory, a whole website, or any other kind of content. For more on this, check out our guide to how IPFS works.

- Because the address of a file in IPFS is created from the content itself, links in IPFS cannot be changed. For example, if the text on a web page is changed, the new version gets a new, different address.
- Content cannot be moved to a different address. On today's internet, a company could reorganize content on their website and move a page at http://mycompany.com/what_we_do to <http://mycompany.com/services>. In IPFS, the old link you have would still point to the same old content.

It is understood people want to update and change content all the time and do not want to send new links every time they do it. This is entirely possible in an IPFS world, but explaining it requires an advanced lesson with one of our experts, or you can Google "Mutable File System (MFS), and DNSLinking" to learn more about how changing content can work in a content-addressed, distributed system.

It is important to remember in all these situations, using IPFS is participatory and collaborative. If nobody using IPFS has the content identified by a given address available for others to access, you will not be able to get it. On the other hand, content cannot be removed from IPFS if someone is interested enough to make it available, whether that person is the original author or not. Note that this is like the current web, where it is also impossible to remove content that has been copied across an unknowable number of websites; the difference with [IPFS is that you are always able to find those copies](#).

Participation

While there is lots of complex technology in IPFS, the fundamental ideas are about changing how networks of people and computers communicate. Today's World Wide Web is structured on ownership and access, meaning that you get files from whoever owns them, if they choose to grant you access.

IPFS is based on the ideas of possession and participation, where many people possess each other's files and participate in making them available.

That means IPFS only works well when people are [actively participating](#). If you use your computer to share files using IPFS, but then you turn your computer off, other people will not be able to get those files from you anymore. If you or others make sure that copies of those files are stored on more than one computer that is powered on and running IPFS, those files will be more reliably available to other IPFS users who want them.

This happens to some extent automatically: by default, your computer shares a file with others for a limited time after you have downloaded it using IPFS. You can also make content available more permanently by pinning it, which saves it to your computer and makes it available on the IPFS network until you decide to unpin it.

If you want to make sure one of your own files is permanently shared on the internet today, you might use a for-pay file-sharing service like Dropbox or GoogleDocs. We [provide our customers](#) with similar services based on IPFS called pinning services. Since IPFS makes this kind of sharing a built-in feature, you can also collaborate with friends or partner with institutions (for example, museums and libraries might work together) to share each other's files.

We make sure every customer understands how IPFS can be the low-level tool that allows a rich fabric of communities, business, and cooperative organizations to all form a distributed web that is much more reliable, robust, and equitable than the one we have today. If you have any additional questions, send us a DM or reach us on Discord.

[We look forward to helping your organization take on giant leap into the world of tomorrow.](#)