Decentralized Web Storage Report

What it is and why it matters

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Filecoin
Foundation

Welcome

Introduction

Decentralization

IPFS & Filecoin

NFTs

Highlights

The creators of Filecoin envisioned an independent foundation that would serve as the long-term governance body for the Filecoin ecosystem. Its mandate is to “grow an open ecosystem for decentralized storage” and to “give developers an open and sustainable platform to build, enhance and monetize those services.”

Filecoin Foundation (FF) is an independent organization that facilitates governance of the Filecoin network, funds critical development projects, supports the growth of the Filecoin ecosystem, and advocates for Filecoin and the decentralized web. FF does this by coordinating and supporting the creation and improvement of open-source software and open protocols for decentralized data storage and retrieval networks.

We’re living through an evolution of the internet – technologists often refer to this latest new version of the internet as Web3 or the decentralized web. In 2021, interest in Web3 set records.

- The developer ecosystem hit an all-time high, with over 34,000 new developers committing code to open-source, Web3 projects.
- Media mentions of Web3 skyrocketed – increasing over 200 percent from March 2021 to March 2022.
- It was a record year for venture-capital investment: Business Insider reported nearly $30 billion invested in crypto from $8 billion in 2018.
- And according to CB Insights, the global blockchain unicorn count jumped from 9 to 47.

It’s a space witnessing unprecedented growth – and promise. Web3 holds the promise of a better web: a decentralized version of the internet that takes control away from the central entities and puts it back into the hands of users.

Alongside the rise of Web3, we’ve seen time and again the inadequacies of Web2–from AWS and Facebook outages to government-led internet shutdowns and censorship. Today, the essential internet infrastructure needed for most web applications is controlled by three companies: Amazon, Facebook, or Google. Building a better web–an internet by the people, for the people– requires better infrastructure.

This Dweb Storage Report is part of our ongoing work to unlock the promise of these technologies and support decentralized storage technologies and the broader Filecoin and Web3 communities. We hope you'll learn more about the Filecoin community and be inspired by its potential to transform the web.

Sincerely,

Filecoin Foundation Team

Storage is the backbone of the internet. It’s the technology that allows someone to put a web address, like an HTTP URL, into a browser's address bar and access millions of websites around the world.

Yet, the way that storage works today is fragile. An HTTP address is a link to a single record on a single server, and if that server goes down, the information is no longer accessible. It’s not uncommon to put in an HTTP address and get a 404 return–this is an example of a single point of failure.

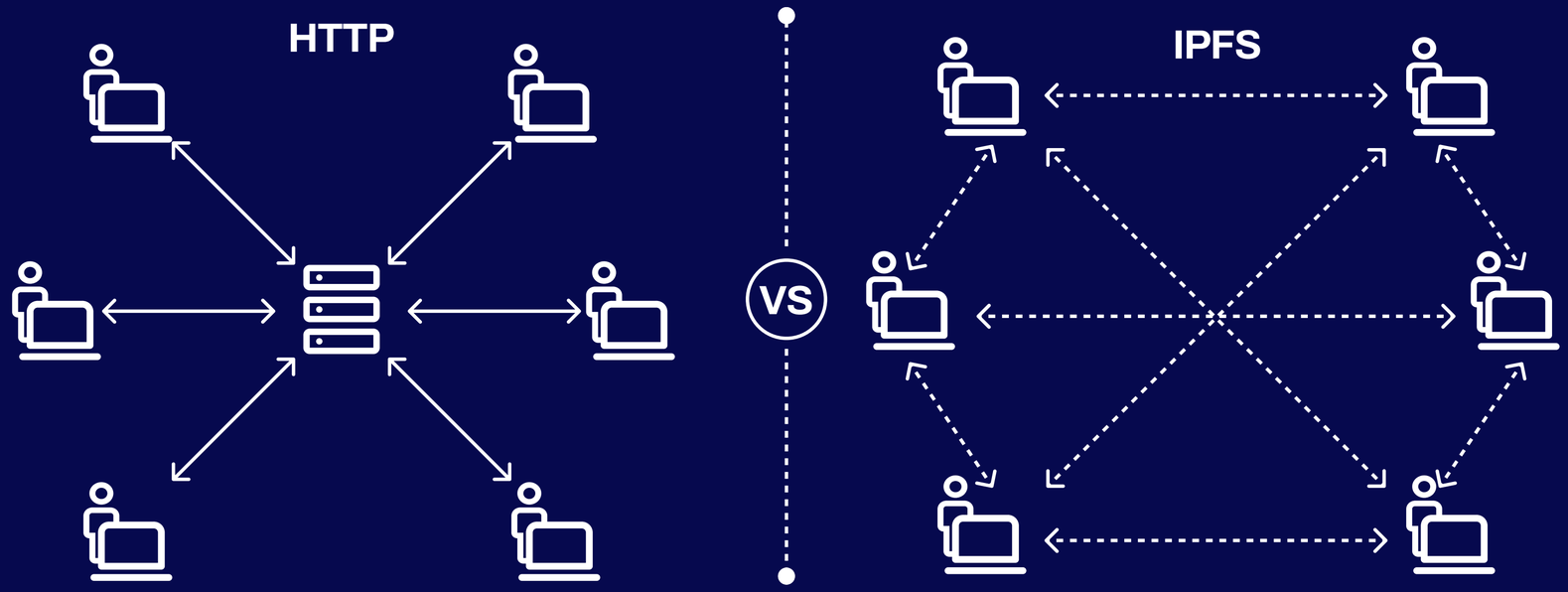
This centralized infrastructure is why when Amazon or Facebook go down, vast swaths of the web go down with it.

However, as our digital and physical lives become increasingly intertwined, our livelihoods increasingly depend on those servers–and their security. We've seen countless examples.

- For many small business owners, Facebook, Instagram, and WhatsApp have become an essential part of their business: the impact of the Instagram outage was estimated to be $100 million.
- In 2018, changes to YouTube's monetization policies suddenly upended the businesses of many people who relied on the income from their YouTube channel.
- In 2009, Amazon staff panicked when they came to believe that they'd allowed copies of George Orwell's classic 1984 to be sold through the Kindle store without properly clearing copyright permissions. They reacted by eliminating copies of 1984 not only from the Kindle Store but from the Kindles of individual purchasers.

Decentralized storage offers technical robustness that simply is not possible with centralized storage. The crux of decentralized storage is a peer-to-peer network, meaning that information can be stored across multiple places by multiple people–building in redundancy and resiliency by design.

- It means that even if some nodes fail websites will stay up because the availability of information is not dependent on one company or one server.
- It means that your data is not controlled by Amazon, Facebook, or Google–instead you can retain control over your data and how it's used–which creates completely new ways of thinking about how we manage and interpret data.
- It means that data can outlive a service. For instance, if Facebook were to shut down, millions of people would lose access to their data. And it's not just personal data like conversations and photos – millions of small businesses would lose access to platforms, and businesses would lose contacts for customers.



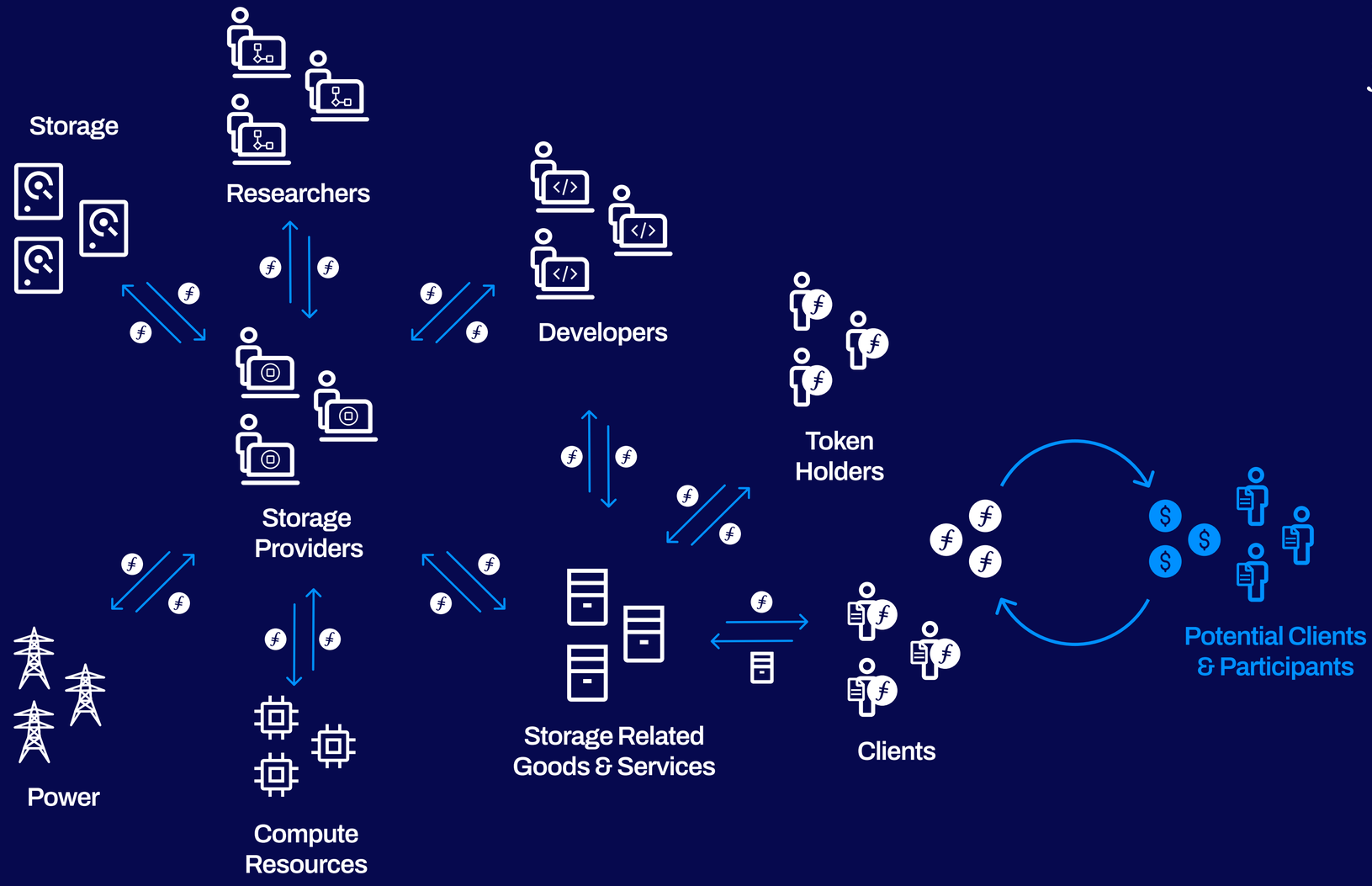
Filecoin and IPFS are complementary protocols. IPFS allows peers to store, request, and transfer verifiable data with each other while Filecoin is designed to provide a system of persistent data storage.

HTTP vs IPFS

IPFS: Changing How Content is Referenced

IPFS (the InterPlanetary File System) is a peer-to-peer network and protocol designed to make the web faster, safer, and more open.

On the centralized web, the majority of web addresses are HTTP links. These URLs are location addressed, meaning the URL itself is routing people to a specific location on the internet. IPFS is a peer-to-peer network, addressing data by what it is instead of where it’s located on the network, or who is hosting it. This is the beauty of IPFS: it doesn't require users to specify where data is–this is how an HTTP URL works–but rather what data they’re looking for.



Filecoin Market Structure

Filecoin: Changing How Content is Stored

While interacting with IPFS does not require using Filecoin, all Filecoin nodes are IPFS nodes under the hood. It's a network that stores files, with built-in economic incentives to ensure files are stored reliably over time. Storage "deals" are facilitated by the open markets in which anyone can participate. Users pay to store their files with storage providers on the network, and storage providers earn FIL for storing files.

The incentive structure and competitive nature of the Filecoin storage market mean that providers offer deals at far lower prices than their centralized counterparts: approximately 0.01% of the equivalent Amazon S3 offering.

This rise of decentralized technology is bringing completely new markets to life – NFTs are the perfect example. The first NFT emerged in 2014 – today it's a $22 billion market. NFTs put power in the hands of content creators – giving them monetizable, verifiable ownership in the digital world. This is just one example of how Web3 is revolutionizing the web we know today.

NFTs on nft.storage

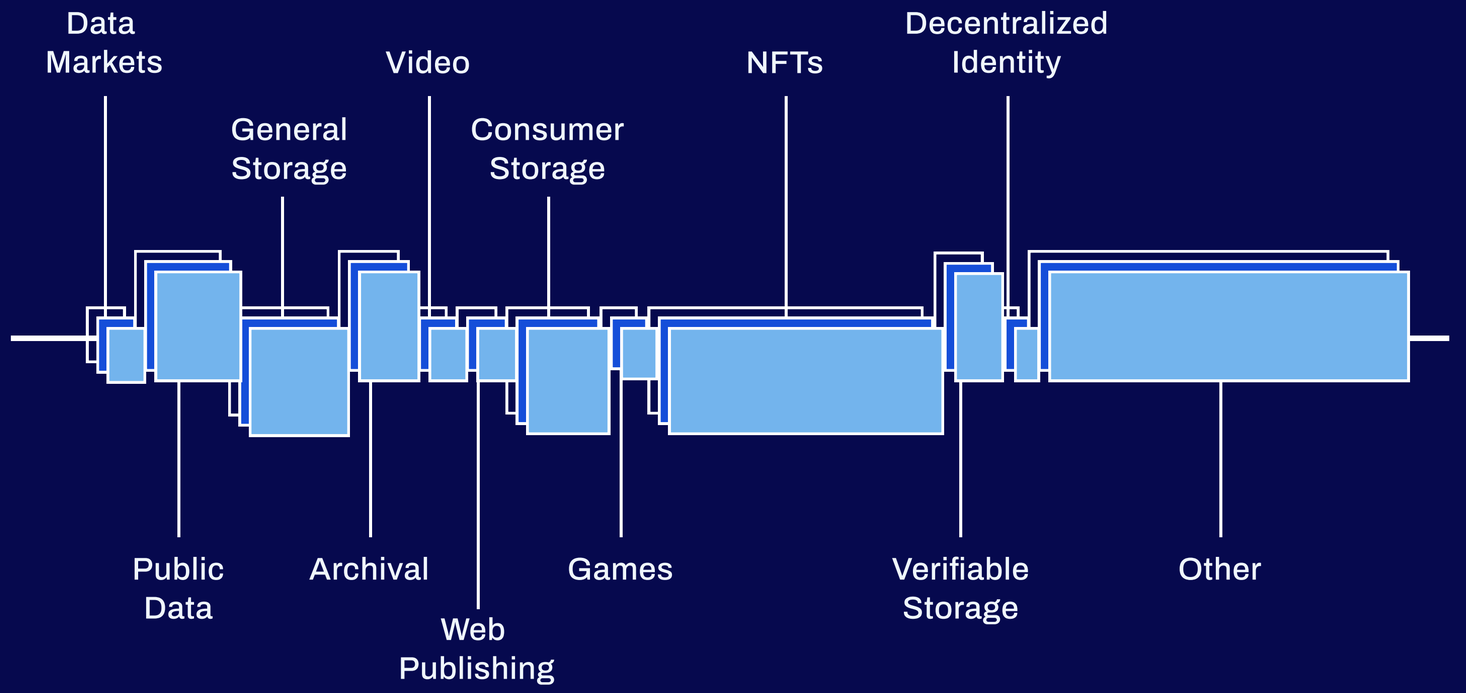
NFT.Storage

NFT.Storage is a free, simple service that provides off-chain storage of NFT metadata with the ultimate goal of persisting NFT data in a decentralized manner as a public good. Data uploaded to NFT.Storage's HTTP endpoint is stored on Filecoin and made available to the public IPFS network.

The service also provides users with properly formatted IPFS URLs to reference their metadata in their smart contracts. It guarantees the use of "ipfs://" URLs rather than "http://" URLs, which are centralized and can break if the server goes away, DNS is down, or the data's location changes. This is a critical step to ensure NFTs are truly making a permanent reference to the intended data.

NFTs on the platform include those minted by some of the largest marketplaces and minting services in the space, including OpenSea, OneOf, NFTPort, Makersplace, Jigstack, Curio, and more.

Welcome
Introduction
Decentralization
IPFS & Filecoin
NFTs
Highlights



The following pages highlight different parts of the Filecoin ecosystem – including applications, builders, storage providers, and more. With over 320 organizations building on the network, this is a very high-level overview of contributors and projects that are helping drive the Filecoin network forward.

Filecoin Ecosystem Projects

Filecoin Green

Launched in 2021, Filecoin Green is making great strides in turning Filecoin into the world's most verifiably sustainable blockchain!

Working with Storage Providers (SPs) to better understand energy use on the network, the Filecoin Green team developed an open-source energy use model and launched the filecoin.energy dashboard. These tools make it easy for anyone to estimate the energy use both for the network as a whole and for specific SPs.

The team also developed the ability to match SP energy use with renewables like wind and solar. This makes it possible for storage clients to see not only how much energy is being used by their chosen SP, but also verify what type of renewable energy is being purchased to store their files down to the level of an individual solar or wind farm!

Estuary

Estuary is a reliable, scalable solution for participating in the Filecoin network. Estuary nodes have their own libp2p stack with full IPFS and Filecoin features to help anyone make Filecoin storage deals in a multitude of ways.

Estuary has made over 86,700 successful storage deals, has over half-a-billion objects registered, stored over 784 TiB of files, collaborates with many companies and groups within the Filecoin ecosystem, and works with over 140 storage providers around the world.

Those interested can run their own Estuary nodes in the cloud. Web developers can clone or fork the web client and provide a similar experience for their own users, or they can use the hosted API to make storage deals with any public data they have.

Starling Lab

The Starling Lab is a new research center tackling the technical and ethical challenges of establishing trust in the most sensitive digital records of our human history using the latest advances in cryptography and decentralized web protocols. The Lab uses the Starling Framework, a host of open-source tools, best practices, and case studies across three key modules: capture, store, and verify. The Filecoin network is a key component for storage.

In its first case study, The Starling Lab and Reuters worked together to document the 2020 U.S. presidential transition with an array of new image authentication tools and decentralized web protocols. Additionally, the teams at Starling Lab and Reuters worked together to create and embed digital cryptographic signatures on photos taken by Reuters journalists to create a location, time, and date metadata that cannot be altered when shared on newswires and other sources.

PiKNik

PiKNiK, established by founding members of the Filecoin Storage Provider Working Group and Protocol Labs MinerX Fellows, joined the Filecoin community as a bootstrapped Web3 storage provider in 2020. It was one of the first U.S. startups to onboard 1PB — or roughly 1,000,000GB — of storage capacity to the Filecoin network.

The team is enabling other Web3 storage providers to serve end-users atop the Filecoin network. Driven by core values that “Data is the most valuable asset in the world” and “Decentralization of the internet is inevitable,” PiKNiK has been proud to support the onboarding of pioneering customers such as the USC Shoah Foundation, Internet Archive, and Fleek.

Filecoin Foundation

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