

Hashtag:

A content tagging protocol for the decentralized internet

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Abstract

In this paper I introduce a new, simple decentralized protocol that establishes an incentive market emerging from the tokenization of hashtags, the linking of these tokens to online media and the surfacing of this data for use in networks, platforms and applications.

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1 Introduction

"I had no interest in making money (directly) off hashtags. They are born of the Internet, and should be owned by no one. The value and satisfaction I derive from seeing my funny little hack used as widely as it is today is valuable enough for me to be relieved that I had the foresight not to try to lock down this stupidly simple but effective idea."
From Quora, attributed to Chris Messina, inventor of hashtags, explaining why he didn't patent the hashtag

It's understandable that Chris Messina, the inventor of hashtags, might have such unsuspecting hopes for hashtags. In 2007, the year he "invented" them, the socio-technical forces driving today's decentralized internet movement had yet to materialize. Indeed, Twitter, Facebook and LinkedIn were fledgling startups; Instagram and WeChat were yet to be thought up.

Fast forward to today. It's arguable that the vast social, informational and financial equity of hashtags is siloed and hoarded by the world's largest corporations. This over-centralization leads to several problematic scenarios:

1. Hashtags, as well as the content they are applied to, are manipulated, promoted or censored for political or economic reasons.
2. Analyzing and interpreting global hashtag data requires significant, complex resources.
3. Small publishers and applications derive limited exposure and utility (and hence revenue) from using hashtags in their own systems.
4. Hashtag data is centralized among a few large enterprises.

In this paper, we introduce The Hashtag Protocol, a simple protocol for decentralizing hashtags and content tagging. By tokenizing hashtags and providing a standard mechanism for linking them to other online assets, we seek to bring Messina's "*stupidly simple but effective idea*" to the decentralized internet. If effective, this system will mitigate the flaws of the current system and distribute ownership and financial incentive back to the individuals and applications (dApps) doing the work of creating and applying hashtags.

2 The Hashtag Protocol

Hashtag is a protocol on the Ethereum blockchain that aims to create a virtuous, financially incentivized system centered around the creation and use of hashtags.

The system revolves around four market participants: Creator, Owner, Publisher and Tagger. These key market participants interact directly with the protocol, paying to use and earning from the system without having to negotiate terms of use. The data generated by the protocol is immutable (impervious to censorship) and globally accessible.

The Protocol also provides users and applications an interface to query, consume and display hashtag data.

2.1 Hashtag Creator

Unlike today's social networks that utilize free tagging to capture and store hashtag strings within their own systems, the Hashtag Protocol stores hashtags (and tagging data) in a global, decentralized database. Hashtags are added to this database by users and systems ("Creators") interacting with the Protocol.

Hashtags in the system are represented by ERC-721 non-fungible tokens. Non-fungible tokens (or NFTs) are unique, one-of-a-kind cryptographic tokens on the Ethereum blockchain that can be owned and traded by anyone. Each NFT is unique and immutable; and, in the case of the Hashtag Protocol, each and every Hashtag Token references and represents a unique hashtag string.

Adding a new hashtag to the system comes with a fee that is a combination of the standard gas fee (required to interact with the Ethereum blockchain) and an *initial hashtag value* set by the Protocol. There are a number of potential mechanisms to determine *initial hashtag value*; for the purposes of this whitepaper, it will be a fixed, flat fee provided by the Protocol.

2.1.1 Creator Incentives

There are three immediate benefits to incentivize the Creator to mint a hashtag :

1. Sole ownership of the NFT token representing the hashtag.
2. Dividends received from the protocol when a Tagger tags content with their hashtag (discussed in section 2.3).
3. Ability to sell or auction their token either peer-to-peer or on a standard public NFT marketplace such as OpenSea.

2.2 Hashtag Owner

Once a hCreator mints a hashtag, unless they transfer it Anytime after the Creator creates

2.3 Hashtag Publisher

Publishers are websites, dApps, applications or other entities that utilize the Hashtag Protocol to provide their system with a rich, robust content tagging framework. Publishers can utilize a tagging widget provided by the Protocol, develop a custom widget or other implementation of the protocol.

2.3.1 Publisher Incentives

Publishers are incentivized both financially and functionally to use the Protocol. Financially, the publisher receives a portion of the fee paid by the Creator to mint the token if it takes place on their application. Additionally, when a tagger pays the small fee to tag content (explained in the next section), the protocol splits a portion of the proceeds between the Owner and Publisher.

The functional benefits to the publisher and their customers are significant as well. Potentially slick functionality and interface for their users; cleanly structured and tagged content; and a standard interface to query their data all in a decentralized system. Additionally, being a global content tagging network, the Protocol immediately exposes their structured content to other dApps, applications and systems providing benefits to one or both parties.

2.4 Content Tagger

The Hashtag Protocol supports “tagging” of other online content linking of Hashtag tokens to online content. This is achieved via a Ethereum smart contract implemented by Publishers within their dApps and applications. This token-to-content linkage, akin to the many-to-many design pattern found in relational databases, is a core feature provided by the Protocol.

2.4.1 Tagging Fees

Tagging content (by implementing the smart contract) comes with a fee made up of the standard Ethereum transaction gas fee and a Tagging Fee added by the Protocol. The Tagging Fee component is small and identical for all transactions. Fees generated by a successful tagging event are automatically distributed among the Owner, the Publisher and the Protocol at proportions defined within the Protocol.

2.4.2 Benefits to Taggers

The Protocol Tagging fee and the dividend to ecosystem participants carries a natural incentive to minting and/or acquiring Hashtag tokens. But paying a fee to tag content represents a *fundamental difference* from the open, free-tagging methodology employed by centralized social networks. What incentivizes a Tagger to pay to tag their content?

On centralized social networks that utilize hashtagging (eg. Twitter) users and machines tag content for two reasons: to classify content with semantic, human (and machine) interpretable metadata and to expose or promote their content to a broader audience. The Hashtag Protocol aims to provide Taggers and Publishers with these same benefits as well as the following added benefits and emergent properties unique to the Protocol.

1. Tagging data is stored in a global, decentralized database. This makes it immutable and uncensorable: The linked hashtag and content can never be broken, censored, edited, or removed (except by the tagger).

2. Tagging data is freely and easily accessible through a standardized API, a unique characteristic that opens the possibility of tagged content being visible to more agents and a broader audience.
3. The act of tagging communicates valueTags carry value;

The success of the Protocol will hinge on Taggers and/or Publishers willingly accepting a tagging fee. General acceptance can be achieved by making the emergent benefits derived making the immediately obvious and intrinsically linked.

3. Implementation & Architecture

At its core, the Hashtag Protocol is conceptually simple: it's a set of smart contracts that permits the generation on ERC-721 non-functional tokens that can be linked to other digital artifacts.

3.1 The Hashtag Token

The centerpiece of the Protocol is the Hashtag Token, an implementation of the ERC-721 specification. ERC-721 tokens differ from the more common ERC-20 tokens with the key difference being that ERC-721 tokens are “non-fungible”. This means that each token is unique and as a result, not interchangeable. This property makes them ideally suited to represent hashtags. In addition, each ERC-721 has one owner and can be bought or sold.

3.1.1 Creating Hashtag Tokens

Hashtag tokens are created by (human or machine) implementing the `mint()` method in the ERC-721 smart contract provided by Protocol. Minting a Hashtag Token via the contract requires the following parameters:

ID

Unique ID for the Hashtag

Hashtag String

This is the hashtag string being stored in the token. Name must be unique among the entire universe of Hashtag Tokens. If not, the Protocol will reject the process during minting. Strings are not case sensitive and all hashtags are reduced to lowercase. Other string dynamics (length, special characters, etc) are TBD.

Creator

Wallet address of the person or process creating the hashtag. After successful hashtag token creation, this address becomes the Owner of the Hashtag.

Publisher

Wallet address for the dApp or application that provides an interface to interacting with the hashtag protocol. The interface could be a widget provided by the Protocol, or an implementation of their own. The Creator and Publisher can be the same wallet address. The publisher receives a portion of the price paid by the Creator to mint the token.

Publisher addresses should be whitelisted by the Protocol, and verified for the contract to successfully complete.

Dev questions:

1. Is it possible to securely identify the publisher id from the client in a decentralized way?
2. Is it possible for publisher to pay entire fee for generating a token, and have this be transparent to the end user?

Price

The cost, set by the Protocol, for the creator to mint a new hashtag token. The funds received are distributed between the Publisher and the Protocol at fixed proportions (TBD) that are set by the Protocol.

URI

When a token is minted (smart contract successfully implemented) the Protocol will dynamically create an image representing the Token and upload it to IPFS.

Depending on how

3.2 Applying Hashtags

In addition to minting unique, non-fungible tokens that represent/contain a single, natural language hashtag, the Protocol also provides a facility for linking a token to any online digital artifact, effectively tagging that content with the hashtag.

This functionality is supported by the Protocol Tagging smart contract.

For the purposes of a minimum viable product (MVP) the Protocol will only allow for tagging of other ERC-721 non-fungible tokens. To extend tagging to a wider array of digital artifacts, a couple key technical hurdles must be addressed:

1. The ephemeral nature of much of the centralized internet. Websites and web pages are removed. Digital assets like PDFs and images are removed.
2. Digital artifact classification. There is an incredible variety of online digital media. *What* the hashtag is linking to should be implied and contained in the tagging metadata stored to the blockchain.

Applying a hashtag to a digital artifact implements the Hashtag Protocol tagging smart contract. The contract has the following methods and stores the following metadata:

Executing the tagging smart contract comes with a fee composed of the standard ethereum transaction fee (gas fee) and a small fee provided by the Protocol.

When the contract is successfully executed, the proceeds from the Protocol portion of the fee are distributed between the Hashtag Token owner, the publisher and the Protocol in fixed proportions (TBD) determined by the Protocol.

The Protocol should support a method that permits publishers to cover all tagging fees, thereby supporting free tagging functionality for it's users.

3.3 Hashtag Data APIs