

w.Property

An evolution of web property to the form of modern digital asset

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w.Property (Web Property) is a form of digital asset based on an approach to web-resource space as to a property that can be divided and alienated or leased, similar to land plots.

We propose to use Non-Fungible Tokens as a form of ownership representation that can be owned, traded, and transferred. At the same time, proof of NFT ownership solves the problem of granting access to the owned w.Property content management.

Direct content management access leveraged by Proof of ownership concept removes intermediaries and creates conducive conditions to establish Web Property market.

1. Introduction

After the first-ever website made by Tim Berners-Lee went live on August 6, 1991, the World Wide Web went through many dramatic changes, bringing humanity's communication and life to a different level. Many websites went offline during the 30 years of the World Wide Web, but much more has changed the way people get information, communicate, research, build and create, trade, and do new things made possible by the World Wide Web itself. Some websites became the most extensive data libraries, while some others turned into large businesses. Millions of websites are used by billions of people in thousands of industries daily, creating the space where people collaborate and create a new paradigm of relationships, economy, and values.

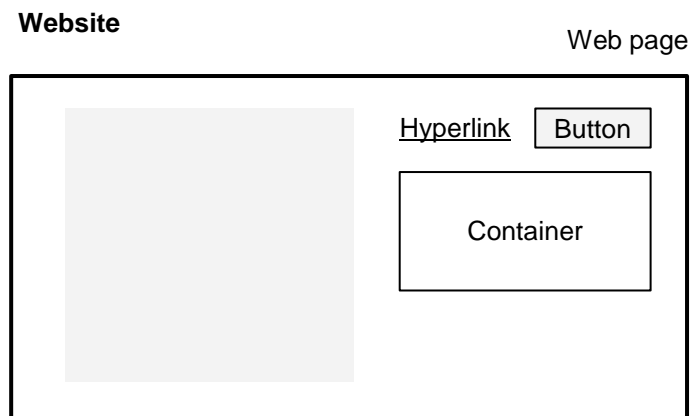
The evolution of Web to Web 2.0 perfectly demonstrates an expansive vista for perception and transformation of the Web, which is now much more than just digital pages and information in a digital form. Following the Web's development, web resources themselves gained much higher value than anybody could have ever imagined. After exponential growth, it has turned from addresses in a web browser to the most visited space globally, where an average person spends over 6.5 hours a day or ¼ of their life.

2. Web property paradigm

Web resources consist of various parts like pages, sections, blocks, and if we dive deeper, even smaller ones like containers, hyperlinks, and buttons. However, from an ownership point of view, the web resource is perceived as single and indivisible. Therefore, we believe that apart from the web resource value, on the whole, every part of a web resource can be allocated to a separate unit and have its value.

For better understanding, let's imagine a multi-story building with separate rooms in each story. The building can be sold or leased as a single unit. However, an owner can sell or rent each room or space down to small areas singly.

The w.Property concept assumes that the owner can detach a separate part of a web resource to a single unit, and its ownership can be transferred to another entity or leased just like real estate. In the most obvious cases, such units can be containers, hyperlinks, web pages, or buttons, although this list can probably be expanded significantly.



The idea of web space ownership transmission is not a new one. Alex Tew perfectly demonstrated it with his "The Million Dollar Homepage" launched on August 26, 2005. It was probably ahead of its time, as the elements required to provide the market with a transparent method for proof of ownership and ownership transmission, including authentication for web property management, did not exist. Such an element in the w.Property is an NFT token that can solve three problems at once:

- proof of ownership;
- ownership transmission;
- web property management authentication.

3. Ownership and rental

By applying an approach of real estate property to the w.Property, it becomes evident that transactions with w.Property can occur for the purpose of sale or leasing when it comes to temporary use.

Based on the possible use cases, we have defined two types of w.Property tokens functions that could cover the mentioned needs:

- O-function (ownership);
- L-function (leasing);

The ownership function solves the most trivial problem of w.Property ownership transmission between addresses. Thus, O-function secures a right to use w.Property by the entity controlling private keys of the address holding NFT. ERC-721¹ token standard can fully cover O-function requirements as it possesses the necessary properties to represent and track ownership of each w.Property object.

The leasing function provides an option to temporarily transfer NFT ownership to another address and withdraw ownership automatically in a trustless manner after the leasing time limit defined during the transaction will be reached. L-function requires an extended token standard, which will provide a solution to secure the described functions. There is the ERC-2615² proposal that can be used as a basis for the required standard extension.

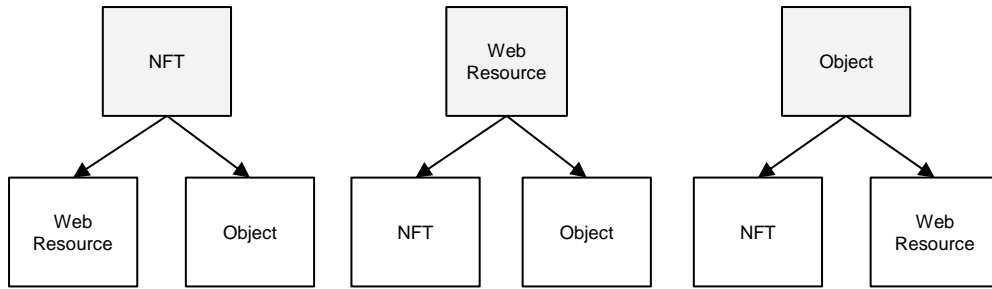
4. Authenticity and validation

NFT, backed by blockchain's decentralized and irreversible nature, is a perfect digital asset to represent w.Property by containing web resource address and unique identifier metadata that links it with the exact w.Property object. However, it is unilateral and does not allow us to verify the fact that NFT was created by the web resource owner. Therefore, a phishing attack is possible when an attacker who does not own the web resource mints a counterfeit NFT token containing original web resource metadata.

Proof of Ownership is required to verify the fact of token minting by the web resource owner and its reference to the exact w.Property object. When looking for a proof method, we assumed that a web resource owner is a party who controls any web resource component, including frontend and backend. In this case, we can perform Proof of Ownership by verifying interconnection between three elements: NFT, web resource, and object.

¹ <https://eips.ethereum.org/EIPS/eip-721>

² <https://eips.ethereum.org/EIPS/eip-2615>

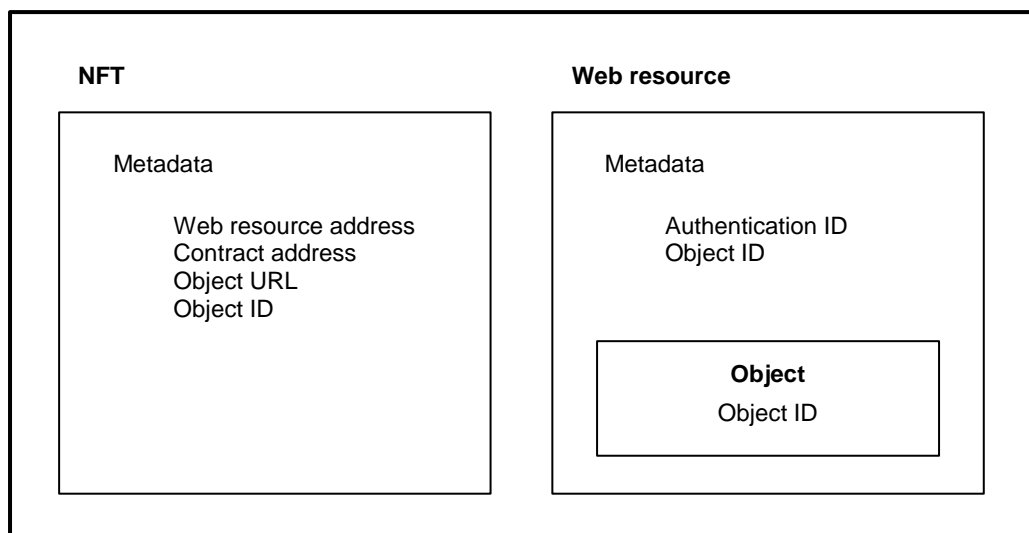


Because blockchain itself can't interact with the external system or data, we found the solution to place validation identifiers in the protected web resource area accessible for web resource owners only (e.g., meta tag record in the <head> section) and inside specific w.Property object. It makes it possible to verify the authenticity of NFT created by a web resource owner through the collation of NFT metadata with web resource metadata and object attributes.

The requirement to prove NFT authenticity defines w.Property elements creation order. NFT must be minted in the first instance so that its unique ID could be allocated in a web resource metadata and object attributes subsequently. The minimal NFT metadata set should include the data pointing to the w.Property object unambiguously and the necessary data to validate NFT authenticity:

| | |
|---------------------|--|
| <i>resAddress</i> | web resource address; |
| <i>contrAddress</i> | NFT smart contract address; |
| <i>objectURL</i> | w.Property object address URL; |
| <i>objectID</i> | ID объекта, уникальный в рамках web-ресурса; |

w.Property structure



A single web resource may contain a bunch of w.Property objects. To eliminate the need to add many metadata records in a <head> area, we can optimize it to a single meta tag containing a link to the list with all w.Property objects existing and authorized on the web resource. We propose to use a JSON file containing an array of smart contracts and NFT identifiers matches:

```
[
    {...},
    {...},
    // ...
]
```

JSON file example:

```
[
  {
    "contract": "9225ca5edde407d9e8cd66bd95949971520e6ccf377003ef6c3bf711f2676e8b",
    "objects": [
      "8f95fee62c05715764a2ff7b2533283a",
      "8f95fee62c05715764a2ff7b2533283a"
    ]
  }
]
```

Metadata examples:

Token metadata

```
{
  "resAddress": "domain.com",
  "authID": "9225ca5edde407d9e8cd66bd95949971520e6ccf377003ef6c3bf711f2676e8b",
  "objectURL": "https://domain.com/pageaddress/",
  "objectID": "8f95fee62c05715764a2ff7b2533283a",
}
```

Resource metadata (domain.com)

```
<meta name="w.Property-objects-auth" content="https://domain.com/w.Propertyauth.json" />
```

Object attribute

```
<div data-w.Propertyid="8f95fee62c05715764a2ff7b2533283a">
  w.Property
</div>
```

5. NFT standard requirements

To endow w.Property with the features defined by the idea, NFT as an element ensuring ownership and authentication should support the following functions:

1. Containing metadata pointing to the exact w.Property object;
2. Securing ownership transmission;
3. Securing temporary usage rights transmission within defined terms in a trustless manner.

An option to select between ERC-721 or the extended token standard mentioned in Section 3 will allow web resource owners to predefine if the w.Property object owner can use it for leasing, or the object usage rights transmission can be fulfilled strictly within full ownership.

NFT metadata makes it possible to define specific properties of w.Property, such as dimension, permissible content type, maximum media file size, restricted or permitted content, and others.

6. Direct interaction

Signing a message with a private key provides a simple and reliable way to authorize an entity controlling the private key that holds NFT as an NFT owner. Furthermore, in case authorization by a signed message is integrated on a web resource (e.g., with Metamask browser plugin), it provides the w.Property owner with a tool to manage w.Property content directly on a web resource. Thereby, web resource owner and w.Property owner relationships can be secured in a decentralized manner without intermediaries.

The decentralized authorization ensures the circumstances required to establish a distributed market, where platforms can perform the role of interface for w.Property NFT minting, content storage, and trading.

7. Content problem

Posting content in a w.Property object is related to a problem of correspondence with a policy of eligible content, which is various for every specific web resource. We assume that w.Property object owners are compelled to agree and accept the rules defined by web resources owners and allocate only the eligible content following specific web resource content policies.

Considering that w.Property content has to be approved by the web resource owner before it appears in the w.Property object, such a mechanism together with approval term should be defined by the web resource owner. Web

resource owners also need to ensure that the content display is limited until approval when the property owner updates or changes it.

Instead of creating an ocean of individual content policies for every web resource, content policies standards may be developed. For example, the web resource owner may specify the standard's ID in the w.Property NFT metadata, web resource metadata, or object attributes.

8. Conclusion

The emergence of blockchain technology, smart contracts, and NFT paved the way for transforming an approach to secure art and digital property ownership. But, at the same time, the most prominent asset in many ways created a premise for the phenomena mentioned above, left without attention.

We have proposed to use a combination of cutting-edge technologies to transform enormous volumes of existing and future web resources and web property into an asset endowed with exact features and defined value. An asset that can be traded and transferred between market participants directly, bypassing intermediaries.

Any entity that owns a web resource de facto can create w.Property. The market defines its value.