

**UNITED STATES PATENT AND TRADEMARK OFFICE**

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**BEFORE THE PATENT TRIAL AND APPEAL BOARD**

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ENS LABS LTD.,

Petitioner

v.

UNSTOPPABLE DOMAINS INC.

Patent Owner

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*Inter Partes* Review No.: IPR2024-00872

U.S. Patent No. 11,558,344

**EXPERT DECLARATION OF JAMES MCDONALD**

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I, James (“Jim”) McDonald, hereby declare as follows:

1. I am making this declaration at the request of Petitioner ENS LABS LTD. (“ENS LABS”) in the matter of *Inter Partes* Review of U.S. Patent No. 11,558,344 (“the ’344 Patent”) (EX1001).

2. I am being compensated for my work in this matter at a rate of \$400/hour. My compensation in no way depends on the outcome of this proceeding.

3. In preparation of this declaration and informing the opinions expressed below, I have considered the references and exhibits cited throughout my declaration, the relevant legal standards, my knowledge and experience based on my work and study in this area, as described below.

## **I. BACKGROUND AND QUALIFICATIONS**

4. I have provided my full background in the curriculum vitae that is attached as EX1021 to this declaration. In the paragraphs that follow, I highlight some of my relevant qualifications and background concerning the technology at issue in this proceeding.

5. I received my Bachelor of Science in Computer Science, with honors, from the University of Edinburgh in 1995. EX1021.

6. As reflected in my curriculum vitae, I have worked for private companies for the last 11 years developing software that interfaces with the Ethereum blockchain and decentralized systems in general, as well as contributing to

specification development for Ethereum protocols and generating open source software. I have also contributed to the development of various features and functions of the Ethereum Name Service (“ENS”) that forms the central technology of the ‘344 Patent, which described in more detail below. EX1021.

7. As further reflected in my curriculum vitae, I have authored more than 50 published papers in the field of blockchain technology, including on the topics of: Ethereum protocols and features, as well as ENS protocols and features. EX1021.

8. I am the chief technology officer and co-founder of Attestant since 2020. Attestant is recognized as the gold standard staking service for Ethereum and frequently participates in the specifications process of the Ethereum protocol. While at Attestant, I write the majority of the company’s articles and much of its marketing copy. I also routinely present at conferences and interface directly with customers in sales calls on behalf of Attestant.

9. I became involved with the ENS in 2017, during which time I wrote the go-ens bindings for ENS along with the primary command line interface to ENS (“ethereal”) and a secondary marketplace (“domainsale”). I have spoken at ENS workshops in 2017 and 2018. My focus eventually shifted to implementing DNS using ENS, which resulted in a number of publications, such as the EIP 1185 proposal, which defines storing DNS records on ENS, the DNS resolver contract for

ENS, and the EthDNS DNS resolver server. All of this work was carried out voluntarily without payment from the ENS Foundation or the Ethereum Foundation,

10. After 2018 my focus shifted elsewhere, although I worked as a paid consultant on a couple of projects related to ENS and DNS for the ENS Foundation. In November 2021, ENS launched a governance token, a portion of which I was granted in recognition of my previous work. I divested my holdings over approximately a 6-month period, and by the end of May 2022, I held no significant ENS tokens. A grant of additional ENS tokens was transferred to me over 2022 and 2023 due to my membership of the Protocol Guild, which I divested in 2024. As of the time of writing, I hold a nominal number of ENS tokens amounting to less than \$1,000 in value.

11. I am also the managing director at Weald Technology since 2012, where I advise technology companies in the enterprise computing space and beyond. I was an early stage investor in companies ranging from regenerative biotechnology to fintech. I'm actively involved in a number of emerging technologies such as cryptocurrencies, and specifically Ethereum. While at Weald, I have consulted in a range of capacities from corporate strategy to expert witness and have advised a number of firms in the cryptocurrency space.

12. I am also a named inventor on multiple two patent applications relating to distributed data storage, which are listed in my curriculum vitae. EX1021.

## II. SUMMARY OF OPINION

13. It is my opinion that:

- a. Claims 1-4, 6-7, 10 and 19-20 of the '344 Patent are obvious over Johnson (EX1003) in view of Millegan (EX1004).
- b. Claim 5 of the '344 Patent is obvious over Johnson (EX1003) in view of Millegan (EX1004), and further in view of Schneider (EX1011).
- c. Claim 9 of the '344 Patent is obvious over Johnson (EX1003) in view of Millegan (EX1004), and further in view of Moore (EX1008).
- d. Claims 8 and 11 of the '344 Patent is obvious over Johnson (EX1003) in view of Millegan (EX1004), and further in view of EIP137 (EX1005).
- e. Claims 12-14 of the '344 Patent is obvious over Johnson (EX1003) in view of Millegan (EX1004), and further in view EIP137 (EX1005), and still further in view of Haynes (EX1010).
- f. Claims 16-18 of the '344 Patent is obvious over Johnson (EX1003) in view of Millegan (EX1004), and further in view Saini (EX1012).

14. My opinions are based on the explanations and reasonings provided in further detail herein. While I believe I have provided such explanations and reasonings sufficient to fully support my opinions, I reserve the right to provide further details to the extent necessary to clarify or otherwise explain my opinions. I further

reserve the right to supplement or otherwise amend my opinions based on future positions taken by Patent Owner or its experts, as well as additional documents, testimony or other information provided by Patent Owner or its witnesses, any orders from the Board, or as otherwise necessary.

### **III. RELEVANT LEGAL STANDARDS**

15. I am not a lawyer, and I am not providing any legal opinions, but I understand from counsel the following legal standards and that those standards are applicable with regard to the validity or patentability of a United States patent. I have applied this law to the facts in this matter in my analysis and in rendering my technical opinions.

#### **A. Person Having Ordinary Skill in the Art**

16. I am informed that the term “person having ordinary skill in the art” (“PHOSITA”) in the context of a patent validity challenge refers to a hypothetical person who is presumed to have knowledge of the relevant prior art at the time of a patented invention. I understand that many factors may influence the level of ordinary skill in the art, including: (1) the educational level of the inventor; (2) the type of problems encountered in the art; (3) prior art solutions to such problems; (4) the rapidity with which innovations are made in the relevant field; (5) the sophistication of the technology to which the patent is directed; and (6) the educational level of active workers in the field. I understand that a PHOSITA is considered to be a person

of ordinary creativity, not an automaton, meaning that a PHOSITA may employ inferences and creative steps in his or her work.

**B. Invalidity by Anticipation (35 U.S.C. § 102)**

17. I understand that a patent claim is “anticipated,” and therefore invalid, if a single prior art reference discloses, either expressly or inherently, each and every element of the claimed invention in a manner sufficient to enable a PHOSITA to practice the invention, thus placing the invention in possession of the public.

18. I understand that an anticipatory reference may “inherently” disclose a claim limitation if the explicitly missing matter is necessarily present in the apparatus or method described in the reference. The disclosure must be sufficient to show that the natural result flowing from the operation of the apparatus or method disclosed in the reference would require the missing matter.

**C. Invalidity by Obviousness (35 U.S.C. § 103)**

19. I understand that even if a prior art reference fails to anticipate a patent claim, the claim may nonetheless be invalid as “obvious” if the differences between the subject matter claimed and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a PHOSITA.

20. I understand that several factual inquiries underlie a determination of obviousness. These inquiries include the scope and content of the prior art, the level

of ordinary skill in the art, and the differences between the claimed invention and the prior art.

21. I understand that a combination of familiar elements according to known methods may be obvious when it does no more than yield predictable results. I further understand that a simple substitution of one known element for another may be obvious to do when it does no more than obtain predictable results, and that the use of a known technique to improve similar devices in the same way may likewise be obvious. I also understand that making choices from a finite number of identified, predictable solutions, with a reasonable expectation of success, may be obvious to do. I also have been advised that common sense and ordinary creativity of one skilled in the art can be relevant to obviousness.

22. I have been additionally informed that certain secondary considerations may be relevant to a determination of whether an invention was obvious. Such secondary considerations may include: (a) whether there was a long-felt and long-unmet need for the invention; (b) whether the invention achieved unexpected results; (c) the commercial success of the invention; and (d) whether the invention was copied or praised within the industry.

**D. Continuity of Disclosure (35 U.S.C. §§ 112(a), 119(e), and 120)**

23. I am informed that, in order for a later filed patent to claim priority to an earlier filed patent application, there must be a continuity of disclosure between the later filed patent and the earlier filed patent application.

24. I am further informed that, in order for there to exist such a continuity of disclosure, the claims of the later filed patent must find adequate written description support in the disclosure of the earlier filed patent application. I understand that adequate written description support exists when a PHOSITA could reasonably conclude from the disclosure of the earlier filed patent application that, as of the filing date of the earlier filed patent application, the inventor had possession of the subject matter claimed in the later filed patent.

**IV. OVERVIEW OF THE TECHNOLOGY**

25. The ‘344 Patent generally relates to resolving a domain name (e.g., *alice.eth*) on a blockchain, which can be thought of as the process for translating the human-friendly domain name into a computer-friendly address where content is stored for retrieval. Neither the concept of resolving a domain name on a blockchain, nor the underlying blockchain and domain name resolution concepts, were new in September 2020.

26. At a high level, domain name resolution is experienced daily by Internet users who enter human-friendly domain names into their web browsers (e.g., Chrome, Firefox, etc.) that then retrieve the contents of the websites associated with those entered domain names.

27. The process of resolving domain names, or domain name resolution, refers to the translation of human-friendly domain names into computer-friendly numeric addresses where retrievable content is stored. EX1030 at 2. Domain name resolution is necessary because computers identify network addresses via numeric or alphanumeric strings (e.g., 192.168.1.1) that are more difficult for humans to remember than human-friendly words typed into browsers. EX1031 at 1.

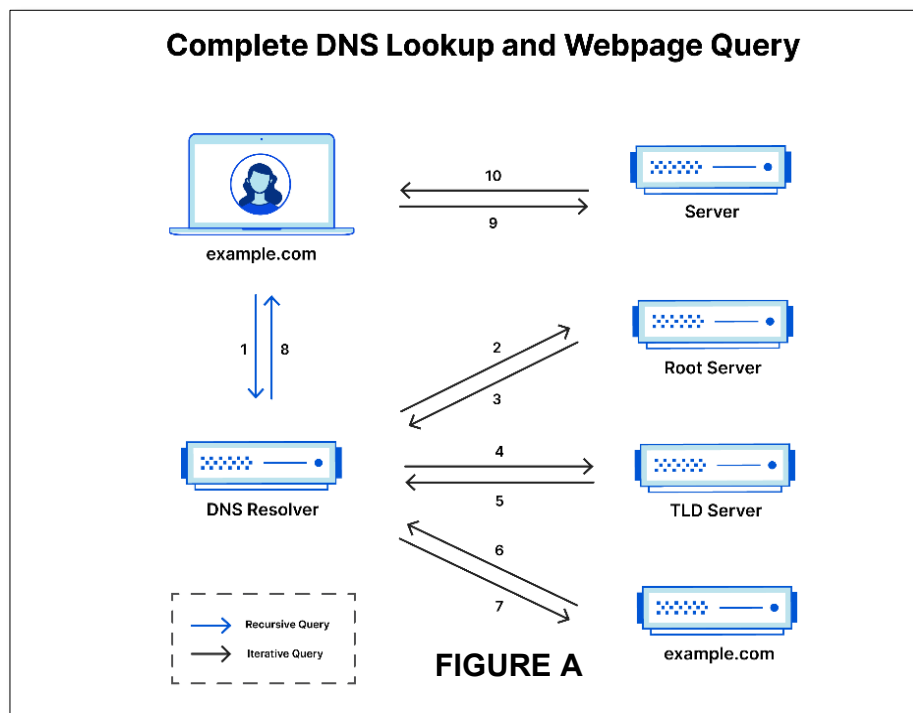
28. Naming services handle domain name resolution by mapping network addresses to human-friendly domain names. This is conceptually no different from how a conventional phonebook maps a person's phone number to that person's name. EX1031 at 1. In the centralized Internet that most users are familiar with (commonly referred to as web 2.0) domain name resolution is handled by the Domain Name Service ("DNS").

**A. Domain Name Service (DNS): The Phone Book of the Internet**

29. DNS has been used since the late 1980's to look-up the Internet Protocol (IP) addresses of computers by their associated website domain name, which is also referred to as a Uniform Resource Locator ("URL"), for example,

‘nytimes.com.’ EX1030 at 1; EX1035 at 3. An IP address is a unique numeric or alphanumeric identifier of a device or network, such as ‘151.101.129.164,’ which is the IP address for www.nytimes.com. EX1032 at 2; EX1033 at 1-2. A URL is a unique identifier for an Internet resource (e.g., a webpage) that includes the domain name of the computer where the website or other content is located. EX1034 at 1. As discussed above, this process of looking-up an IP address by its domain name is called resolving the domain name, or domain name resolution. EX1031 at 2, 7; EX1030 at 1, 2.

30. In the digital world of web 2.0, DNS is commonly referred to as the “phonebook of the Internet.” EX1031 at 1. The basic DNS domain name resolution process is illustrated in Figure A below:



EX1031 at 7.

31. When the user enters a website's domain name or URL, one or more DNS servers look-up the stored records for the domain name, e.g., *nytimes.com*, and return the corresponding IP address—e.g., '151.101.129.164'—for the computer hosting the website content. EX1031 at 6-7. There are often multiple DNS servers that participate in the DNS resolution process to resolve the domain name. EX1031 at 8.

32. Using the example of Figure A to illustrate the general process, the web browser sends a URL query (1) to a DNS resolver. The query requests the IP address associated with the URL (*example.com*). If the IP address is stored locally in the DNS resolver, the DNS resolver will respond to the web browser with the IP address (8) of *example.com*. EX1031 at 7; EX1036 at 2, 5. *Accord* EX1001, Col. 1:13-22. However, if the IP address is not stored locally in the DNS resolver, it will be resolved by querying other DNS servers. Accordingly, the DNS resolver may send sequential queries (2), (4), and (7) to a root server, TLD server, *example.com* name-server and receives responses (3), (5) and (6) from the servers that identify each subsequent server by its respective IP address until finally obtaining the IP address associated with the *example.com* URL. EX1031 at 7; EX1036 at 5.

33. When the resolver receives the IP address from the *example.com* name-server (6), the resolver sends the IP address (8) to the web browser, which uses the

IP address to request (9) the website content from the computer hosting the website, *i.e.* the webserver. The webserver then returns the web content (10) to the web browser, which displays the website content. EX1031 at 7.

## **B. ENS: The Phone Book of the Blockchain**

34. Similar to how DNS can be thought of as the phonebook of the Internet, the Ethereum Name Service (“ENS”) may be thought of as “the phonebook of the blockchain.” EX1035 at 3. However, instead of resolving a URL by querying a series of DNS servers using respective IP addresses via the internet as in DNS, domain name resolution by ENS resolves a URL via a smart contract on the Ethereum blockchain. EX1035 at 5-6.

35. Because of its involvement in domain name resolution, it is helpful to review some aspects of blockchain technology—particularly Ethereum—before discussing how domain name resolution on the blockchain works. However, a detailed explanation of blockchain technology is not necessary for the purposes of my analysis, because the claims of the ‘344 Patent do not claim blockchain technology to that level of detail. Instead, below I provide high-level explanations for various blockchain concepts referenced by the ‘344 Patent as a PHOSITA would have understood those concepts. To the extent necessary, I reserve the right to provide more detailed explanations upon request.

## **1. Blockchain and Ethereum**

36. A blockchain is a type of distributed ledger, which means that the data records are stored in duplicate in multiple locations in a peer-to-peer (P2P) network of computers, or nodes. The multiple nodes store, validate, and update the duplicate blockchain data records simultaneously. This makes data storage on the blockchain more resilient to threats and disruptions due to its redundancy. EX1037 at 1, 3, 4, 9, 10; EX1038 at 3, 5; EX1039 at 1-3.

37. As the name “blockchain” implies, the data records of a blockchain are called “blocks” and are stored in a format that “chains” the blocks in a sequence, where each block refers to the previous block in the chain. EX1037 at 5; EX1038 at 5, 11; EX1039 at 3. Each block also stores various data. EX1037 at 3-5; EX1038 at 5-6. The computers storing the multiple copies of the blockchain execute consensus algorithms (e.g., Proof-of-Stake) that allow the computers to agree upon additional blocks to be added to the chain and authenticate the validity of the data stored in the blockchains.

38. Ethereum is one type of a blockchain that was developed in 2015. EX1040 at 2; EX1039 at 4. In addition to supporting transactions of its cryptocurrency, known as “Ether,” the Ethereum blockchain supports storing computer programs, known as “smart contracts.” EX1040 at 2; EX1039 at 6-7.

## **2. Smart Contracts and Non-Fungible Tokens**

39. A smart contract is a computer program stored on a blockchain. The program automatically executes in response to certain conditions being met. EX1041 at 1-2; EX1037 at 6-7. Among other things, smart contracts are used to create and manage non-fungible tokens (NFTs). EX1042 at 6.

40. An NFT is a type of blockchain-based data structure that establishes ownership of a unique digital asset. EX1043 at 3; EX1041 at 10. Each NFT includes a unique identifier that distinguishes the NFT from other NFTs, as well as an owner identifier that identifies who owns the NFT and the associated unique digital asset. EX1043 at 3; EX1044 at 1; EX1045 at 1. The unique identifier may also be referred to as a token ID that may be computed using a hash function. NFTs may also include an address of where the associated digital asset is stored (the address may be a physical address, IP address, blockchain address, etc.) and other information about the asset. EX1046 at 3.

41. On January 24, 2018, the ERC-721: Non-Fungible Token Standard was issued to standardize a minimum set of requirements for NFTs on the Ethereum blockchain. EX1016 at 1-2; EX1047 at 1-2; EX1048 at 1-2; EX1039 at 7. While the ERC-721 standard has become one of the more popular NFT standards, and was incorporated into ENS in or around May 2019 (EX1019), NFTs existed previously

on Ethereum and other blockchains—known as “deeds” and by other names. EX1047 at 2.

### **3. CryptoWallets: MetaMask for Ethereum**

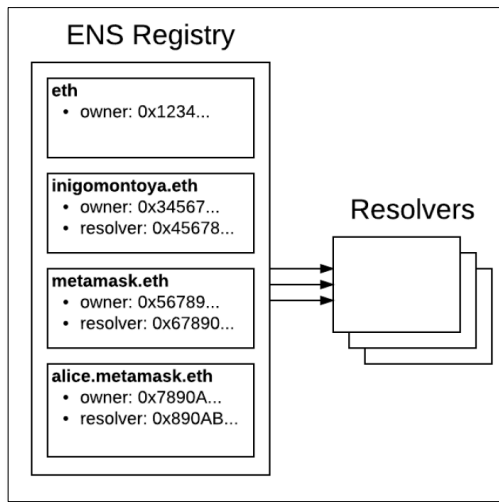
42. Interaction with a blockchain is via hardware and/or software often with a user interface referred to as a cryptocurrency wallet or crypto-wallet. EX1050 at 1; EX1051 at 2. MetaMask is a crypto-wallet that is available as a web browser extension or mobile app. The MetaMask browser extension enables interaction with the Ethereum blockchain via traditional web browsers, such as Chrome, Firefox, Edge, etc. EX1052 at 1-2; EX1039 at 7. Introduced in or around 2016, MetaMask was one of the first crypto-wallets available for interacting with the Ethereum network. EX1052 at 3, 6.

### **4. From DNS to ENS**

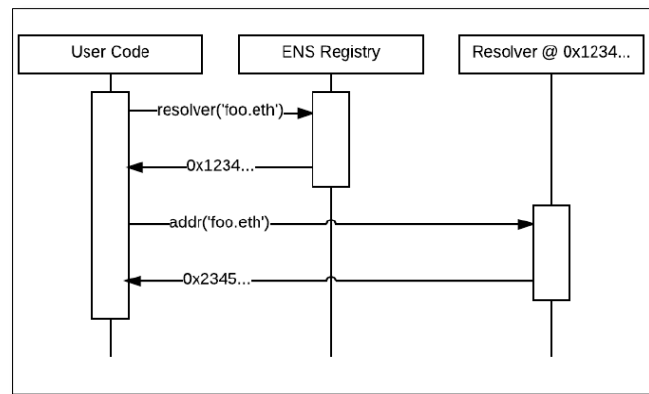
43. Similar to how DNS allows clients to request resolution of names into IP addresses and other results using data local to each DNS server, the Ethereum Name Service (“ENS”) provides the same functionality via a smart contract to store and manage data on the Ethereum blockchain.

44. ENS was developed in 2016 and 2017. ENS is a decentralized naming protocol built on the Ethereum blockchain. EX1003 at 7. ENS performs a similar function to DNS: just as DNS maps a URL to an IP address, ENS maps an ENS name, e.g., ‘alice.eth,’ to a blockchain address where a retrievable resource is stored.

45. ENS relies on two principal components: resolvers and the registry. EX1003 at 5. The resolvers are smart contracts that maintain records of ENS names and the blockchain address of resources, e.g., websites, content, etc., associated with each ENS name. EX1003 at 5-6. The registry is a smart contract that keeps track of which resolver is responsible for which ENS name. EX1003 at 6.



**EX1003 at 6**



**EX1003 at 18.**

46. As shown in the above-right diagram, when a request is received to resolve the ENS name, e.g., *foo.eth*, a request is sent to the ENS registry. EX1003 at 18-19. The registry then looks-up the resolver responsible for the ENS name, e.g., *foo.eth*, and returns the address of the appropriate resolver. EX1003 at 19. A request is subsequently sent to the appropriate resolver, which looks-up and returns the retrievable resource. EX1003 at 19.

47. In sum, much like how DNS resolution takes a human-friendly domain name and translates it into an IP address of a server where stored resources (e.g., website content) can be retrieved, ENS resolution takes a human-friendly ENS name and translates it into an address on the Ethereum blockchain where stored resources can be retrieved.

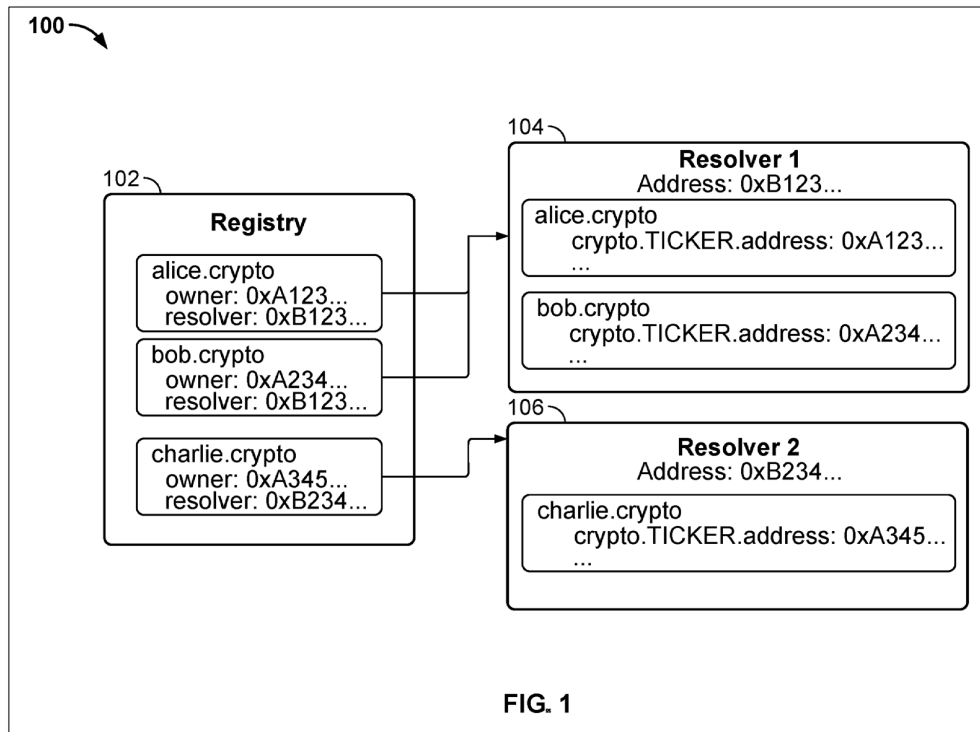
## **V. OVERVIEW OF THE '344 PATENT**

### **A. The Specification**

48. I have reviewed the specification and drawing figures of the '344 Patent. EX 1001. Below, I briefly discuss some of the concepts mentioned in the patent that are referred to in the claims, all of which, as discussed generally above and more specifically with reference to the prior art below, was well known by the critical date.

49. The '344 Patent describes resolving a domain name on a blockchain. The process involves using two types of smart contracts on the blockchain. EX1001, Col. 3:59-61. FIG. 1 of the '344 Patent below depicts these smart contracts. A resolver smart contract maintains a record of domain name identifiers and the locations of resources, e.g., websites, content, etc., associated with each domain name identifier. EX1001, Col. 3:66-4:1. A registry smart contract keeps track of which

resolver smart contract is responsible for which domain name identifier. EX1001, Col. 3:64-66.



50. When a request is received to resolve the domain name identifier, e.g., ‘alice.crypto,’ the request is sent to the registry smart contract using an associated NFT token ID. EX1001, Cols. 11:65-12:1. The registry smart contract looks-up the resolver smart contract responsible for the domain name identifier, e.g., ‘alice.crypto,’ and returns the address of the appropriate resolver smart contract. EX1001, Col. 10:41-55. The request is sent to the appropriate resolver, which looks-up and returns the location of the resource associated with the domain name identifier. EX1001, Col. 10:56-60.

## **B. Prosecution History**

51. It has been explained to me that the file history of the '344 Patent is relevant to understanding the '344 Patent. I have reviewed the file history of the '344 Patent. EX1013.

52. I understand that the '344 Patent issued from U.S. Patent Application No. 17/486,512, filed on September 27, 2021, which claims priority U.S. Provisional Patent No. 63/084,493 (EX1015), filed on September 28, 2020. EX1001 at 1. For purposes of my opinion here, I have been asked to assume that the Patent Owner is entitled to a September 28, 2020 priority date. Accordingly, my evaluation of the patentability of the challenged claims pursuant to all grounds is from the perspective of a PHOSITA prior to the critical date (i.e., September 28, 2020).

53. The original claims were initially rejected as unpatentable in light of the prior art cited by the Examiner. EX1013 at 79. The independent claims were thereafter amended and the Examiner subsequently allowed the claims. EX1013 at 24, 70-73. It is my understanding that none of the prior art forming the basis for the grounds discussed herein was used by the Examiner to reject the claims.

## **VI. CHALLENGED CLAIMS AND CLAIM CONSTRUCTIONS**

54. I have been asked to review Claims 1-20 of the '344 Patent. I discuss the specific limitations of each of those claims in Sections IX to XIV below, where I also discuss my analysis of the claims compared to the prior art.

55. In order to properly evaluate the claims, I understand that the terms of the claims must first be construed. For the purposes of this declaration, I have applied the plain and ordinary meaning of each of the terms in the claims of the '344 Patent as they would have been understood by a PHOSITA as of the critical date (i.e., September 28, 2020). Nevertheless, I reserve my right to offer my opinions under any alternative construction proposed by the Patent Owner or adopted by the Board.

## **VII. QUALIFICATIONS OF A PERSON HAVING ORDINARY SKILL IN THE ART**

56. I have reviewed the '344 Patent, those references cited in the '344 Patent, as well as the prior art documents relied on in this proceeding. Based on this review and my knowledge of ENS and DNS systems, the Ethereum blockchain and related protocols, and decentralized systems from the relevant time period, including my work on such systems, it is my opinion that a PHOSITA would have (a) at least a Bachelor's degree (or international equivalent) in computer science, mathematics,

or related fields, and (b) at least 2 years of experience with software programming, including at least 6 months experience with blockchain technologies.

57. Alternatively, a PHOSITA would not need a Bachelor's degree (or international equivalent) so long as that person had sufficient relevant industry experience, such as an additional 2 years of experience with software programming projects (making the minimum for this person 4 years of such experience). This alternative PHOSITA would still need to have at least six months experience with blockchain technologies.

## **VIII. OVERVIEW OF THE PRIOR ART**

### **A. Johnson—ENS Documentation, Release 0.1**

58. I understand that Johnson, entitled "ENS Documentation, Release 0.1," was published on March 30, 2019. EX1003. I also understand that Johnson was captured and archived by the Internet Archive on December 13, 2019. EX1003; EX1018.

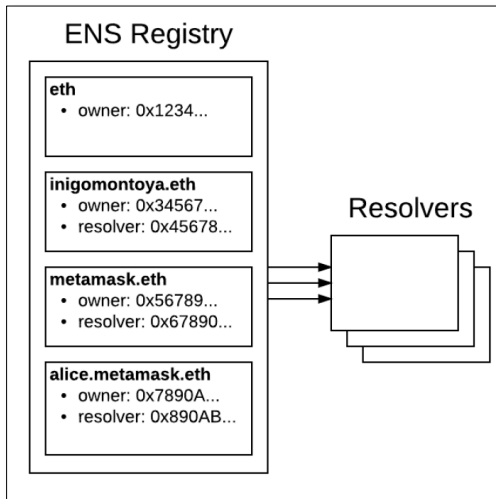
59. In my opinion, Johnson would have been publicly accessible to a PHOSITA as of at least December 13, 2019, if not by March 30, 2019, because Johnson is what is known as a developer's guide, which is intended to guide developers in the use and implementation of the features and protocols described therein. Moreover, Johnson was published by Ethereum Name Service on Read the Docs' website that was widely known to software developers to store and publish their user

documentation. Johnson and the URL address where it was located were also cited in IEEE academic publications. See, e.g., EX1053 at 19, 32, fn192; EX1054 at 271, 278, fn.6. Thus, a PHOSITA would have accessed Johnson in the course of keeping up with latest developments in Ethereum.

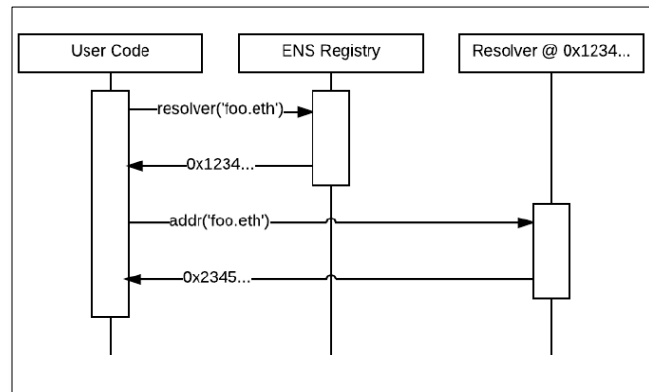
60. It has been explained to me that Johnson is considered prior art, since it was published before the critical date of the ‘344 Patent.

61. Johnson describes the structure and protocols of ENS and the resolution of ENS names using ENS name resolution. Johnson states that ENS “map[s] human-readable names like ‘alice.eth’ to machine-readable identifiers such as Ethereum addresses, content hashes, and metadata.” EX1003 at 5. Johnson explains that ENS is analogous to the well-known DNS, but “has significantly different architecture, due to the capabilities and constraints provided by the Ethereum blockchain.” EX1003 at 5.

62. More particularly, as shown in the below-left diagram, Johnson describes that ENS has two principal components: resolvers and the registry. EX1003 at 5. The resolvers are smart contracts that maintain records of ENS names and the blockchain address of resources, e.g., websites, content, etc., associated with each ENS name. EX1003 at 7, 19-20. The registry is a smart contract that associates the resolver responsible for each ENS name. EX1003 at 6-7.



**EX1003 at 6**



**EX1003 at 18.**

63. As shown in the above-right diagram, when a request is received to resolve the ENS name, e.g., *foo.eth*, a request is sent to the ENS registry. EX1003 at 18. The registry then looks-up the ENS resolver responsible for the ENS name, e.g., *foo.eth*, and returns the address of the corresponding resolver. EX1003 at 19. A request is subsequently sent to the corresponding resolver, which looks-up and returns the resource at the blockchain address associated with the ENS name. EX1003 at 18-19.

64. In sending requests to the registry or the resolver, Johnson describes computing a hash of the domain and computing a hash of the ENS name, which are each a unique identifier stored in an associated NFT. EX1003 at 19.

65. More particularly, Johnson describes the user code querying the ENS registry and the ENS resolver by calling the *resolver(bytes32)* method and passing

it the *namehash* of the ENS name, e.g., *foo.eth*, being queried about. EX1003 at 18-19. The *namehash* of the ENS name refers to a hash resulting from applying the *namehash* function on the ENS name. EX1003 at 22. The output of the *namehash* function, is “used to uniquely identify a name in ENS” corresponding to the domain. EX1003 at 19.

66. Moreover, Johnson also explains that applying the *namehash* function to the ENS name includes applying another hashing function, the *sha3* function, to the domain corresponding to the ENS name—which *sha3* hash corresponds to an identifier of a deed that records ownership of the domain. EX1003 at 14, 16.

**B. Millegan—ENS Now Supports Tor .Onion Address Resolution**

67. I understand that Millegan, entitled “ENS Now Supports Tor. Onion Address Resolution,” published at least as early as August 13, 2019. EX1004 at 1. I also understand that Millegan was captured and archived by the Internet Archive on August 15, 2019. EX1004; EX1018.

68. In my opinion, Millegan would have been publicly accessible to a PHOSITA as of at least August 2019, because Brantly Millegan was known as one of the core team at the ENS Labs at this time, and was also known for authoring several articles describing ENS and its aspects, features and uses. Millegan is one such article published on medium.com, which is an open platform where experts publish articles in their respective areas of expertise, and which was a common

platform for discussion of ENS aspects, features and uses at the time. Millegan was picked up and subsequently re-published on 8/14/2019 and 8/15/2019 on other websites serving news to the crypto community, which are presently accessible. See, e.g., EX1055; EX1056. Thus, a PHOSITA would have accessed Millegan in the course of keeping up with latest developments in ENS.

69. It has been explained to me that Millegan is considered prior art, since it was published before the critical date of the ‘344 Patent.

70. Millegan discloses integrating ENS with a web browser extension that allows domain names to be entered into the browser and resolved with ENS on the Ethereum blockchain to retrieve website content.

71. Millegan describes an example of using ENS to resolve a *.onion* domain name. EX1004 at 1. A *.onion* top level domain is a domain like ‘.com’ or ‘.edu,’ except that it is not recognized by the governing authority, The International Corporation for Assigned Names and Numbers (ICANN), and therefore is not resolvable by DNS.

72. Millegan also describes using a web browser having a MetaMask browser extension installed, which “recognizes that [the inputted domain name] is an ENS name and so prevents the browser from treating it as a search or normal DNS name.” EX1004 at 2.

**C. Schneider—U.S. Patent Publication 2005/0235031**

73. I understand that Schneider, entitled “Hyperlink Generation and Enhanced Spell Check Method, Product, Apparatus, and User Interface System,” was published on October 20, 2005. EX1011. It has been explained to be that Schneider is considered prior art, since it was published before the critical date of the ‘344 Patent.

74. Schneider relates to DNS resolution and describes a technique to determine whether a highest level domain (HLD) name is resolvable. EX1011 at ¶ [0056]. Specifically, Schneider describes comparing a given domain name against a list of resolvable top-level domain names to determine whether the domain name can be resolved. EX1011 at ¶¶ [0023], [0056].

**D. EIP-137—Ethereum Domain Name Service-Specification**

75. I understand that EIP137, entitled “EIP 137: Ethereum Domain Name Service—Specification,” was published on April 4, 2016. EX1005. I also understand that EIP137 was captured and archived by the Internet Archive on March 29, 2018. EX1005; EX1018.

76. In my opinion, EIP137 would have been publicly accessible to a PHOS-ITA as of at least March 29, 2018, if not April 4, 2016, because EIP137 is a published Ethereum improvement proposal that would have been referenced by developers and

implementors at the time. Thus, a PHOSITA would have naturally accessed EIP137 in the course of keeping up with latest Ethereum developments.

77. It has been explained to me that EIP137 is considered prior art, since it was published before the critical date of the ‘344 Patent.

78. EIP137 explains the basics of the ENS service for resolving domain names. More particularly, EIP137 provides a proposal of ENS system, along with sample code snippets for implementing the registry and resolver smart contracts. EX1005 at 7-12.

79. EIP137 explains the type of resources that a resolver may return, including “a contract address, a content hash, or IP address(es) as appropriate. EX1005 at 3.

80. EIP137 also explains that the resolution records included an IP address, a decentralized web content hash identifier, a plurality of target identifiers for different protocols, DApp gateway identifiers, hash values thereof and how it may use a protocol other than a decentralized web protocol. EX1005 at 2, 6, 7.

**E. Moore—EIP-634: Storage of text records in ENS**

81. I understand that Moore, entitled “EIP-634: Storage of text records in ENS,” was published on May 17, 2017. EX1008. I also understand that Moore was captured and archived by the Internet Archive on March 13, 2019. EX1008; EX1017.

82. In my opinion, Moore would have been publicly accessible to a PHOSITA as of at least March 13, 2018, if not May 17, 2019, because Moore is a published Ethereum improvement proposal that would have been referenced by developers and implementors at the time. Thus, a PHOSITA would have naturally accessed Moore in the course of keeping up with latest Ethereum developments.

83. It has been explained to me that Moore is considered prior art, since it was published before the critical date of the ‘344 Patent.

84. Moore describes “a resolver profile for ENS that permits the lookup of arbitrary key-value text data ... allow[ing] ENS name holders to associate e-mail addresses, URLs and other informational data with a[n] ENS name.” EX1008 at 1.

85. Moore highlights the flexibility of the ENS system in its ability to return a wide variety of textual data using custom-defined resolvers. Some examples of the types of data that may be returned by an ENS resolver include, “an e-mail address,” “a URL,” “a URL to an image used as an avatar or logo,” and “[a] description of the name,” among others. EX1008 at 2.

**F. Haynes—U.S. Patent Publication 2013/0114432**

86. I understand that Haynes, entitled “Connecting to an Evolved Packet Data Gateway,” was published on May 9, 2013. EX1010. It has been explained to me that Hayes is considered prior art, since it was published before the critical date of the ‘344 Patent.

87. Haynes is directed to communication between devices via the Internet using IP addresses. EX1010 at ¶ [0036]. Haynes discloses selecting a protocol for communication based on a prioritized protocol list. EX1010 at ¶¶ [0042]-[0044].

**G. Saini—StoragePedia: An Encyclopedia of 5 Blockchain Storage Platforms**

88. I understand that Saini, entitled “StoragePedia: An Encyclopedia of 5 Blockchain Storage Platforms,” was published on August 13, 2018. EX1012. I also understand that Saini was captured and archived by the Internet Archive on August 21, 2018. EX1012; EX1017.

89. In my opinion, Saini would have been publicly accessible to a PHOSITA as of at least August 2018 because it is an article published on hackermoon.com, which is a platform where developers and implementers were known to publish articles discussing computer science trends, and which was a common platform for discussing distributed systems at the time. Thus, a PHOSITA would have naturally accessed Saini in the course of keeping up with latest developments in distributed system technology, such as blockchains and distributed storage.

90. It has been explained to me that Saini is considered prior art, since it was published before the critical date of the ‘344 Patent.

91. Saini provides an overview of five example blockchain-based distributed storage platforms, including Swarm. EX1012 at 1-2. Saini explains that

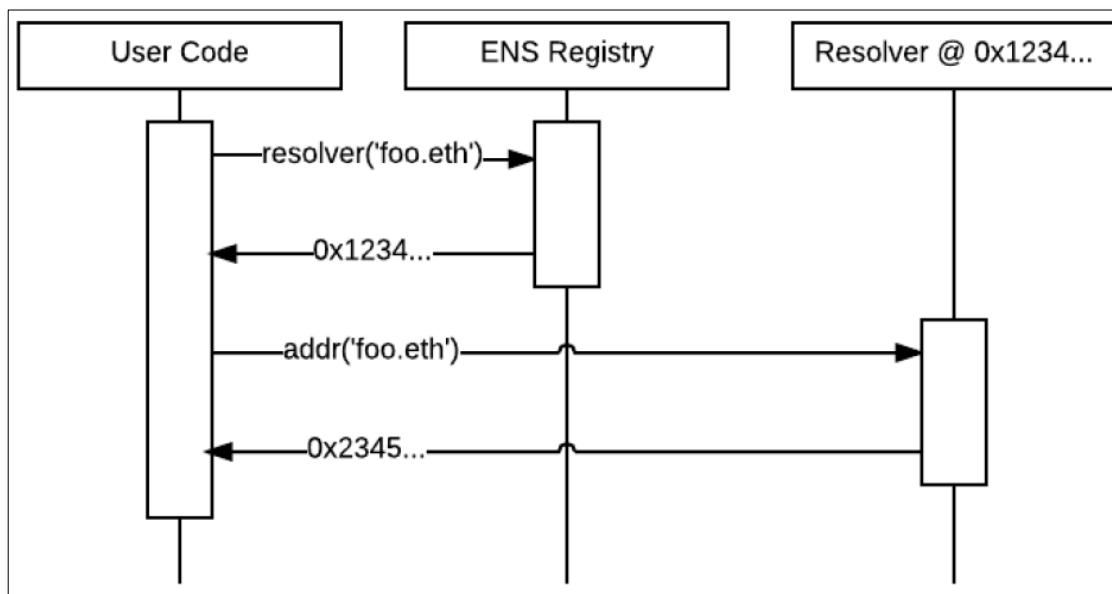
“Swarm is designed to deeply integrate with . . . the Ethereum blockchain for domain name resolution (using ENS). EX1012 at 3. Further confirming the cooperation between Swarm and ENS, Saini states, “ENS is the system that Swarm uses to permit content to be referred to by a human-readable name, such as ‘theswarm.eth.’” EX1012. p. 5.

## **IX. DETAILED EXPLANATION OF GROUNDS OF UNPATENTABILITY**

### **A. GROUND 1: Independent claims 1, 19, and 20, and dependent claims 2-4, 6, 7, 10, and 15 are obvious over Johnson in view of Millegan.**

92. It is my opinion that a PHOSITA considering Johnson would have looked to Millegan to improve the ENS name resolution process of Johnson.

93. More particularly, Johnson and Millegan both relate to resolving ENS names, e.g., ‘foo.eth’ or ‘duckduckgot.eth,’ to return resources that are located at Ethereum addresses associated with those ENS names. EX1003; EX1004. Johnson describes that the ENS name is input to and is used by a “user code” to look-up and return the stored resource (e.g., a website address, etc.) associated with the ENS name (i.e., to “resolve” the ENS name). EX1003 at 18-19, 35. The following figure from Johnson illustrates this process:



EX1003 at 18. Johnson explains, with reference to this figure, that the “user code” queries an ENS registry to resolve the ENS name, e.g., *foo.eth*. EX1003 at 18-19. The ENS registry then returns the Ethereum address of the ENS resolver responsible for returning the stored resource. EX1003 at 18-19. The user code subsequently queries the ENS resolver (at its Ethereum address) for the stored resource. *Id.* The ENS resolver thereafter returns the stored resource to the user code. *Id.*

94. This process would have been well-known to a PHOSITA at the time of the invention, and was generally referred to as ENS resolution, although it was occasionally referred to as an ENS “look-up.” See e.g., EX1004 at 2.

95. Millegan refers to using this very same process to resolve ENS names and return an associated website address—except where Johnson relies on a generic user code and returns a generic resource, Millegan expressly describes (1) a modified

web browser requesting the ENS resolution, and (2) a website address as the returned resource. EX1004 at 2. More particularly, Millegan explains that the ENS name (i.e., *duckduckgotor.eth*) is entered into the modified web browser, which does an ENS “look-up” to retrieve a website address (e.g., a *.onion* address) associated with the ENS name. EX1004 at 2-3.

96. A PHOSITA would have found it obvious to combine Johnson and Millegan so that the modified web browser of Millegan queries the ENS registry and ENS resolver of Johnson so as to resolve ENS names into website addresses for the web browser. This is precisely what Millegan has done, and thus the combination is no more than a simple combination of known elements that yields predictable results.

97. A PHOSITA would have been further encouraged by Johnson to make this combination. Johnson indeed explains that the user code can be any software that accepts ENS names, as is illustrated by the user code of the above-figure accepting the ENS name for ENS resolution. EX1003 at 17. Millegan provides such software in the form of its modified web browser that accepts ENS names for ENS resolution. EX1004 at 2-3.

98. Johnson further refers to MetaMask as an example of software that accepts ENS names. EX1003 at 34. MetaMask is the same software that provides the browser extension to the web browser of Millegan, which enables the web browser

to accept ENS names for ENS resolution. EX1004 at 2-3. A PHOSITA would have therefore been encouraged by the express disclosure of Johnson to use the MetaMask enabled web browser of Millegan as the user code of Johnson.

99. A PHOSITA would also have been encouraged by Johnson to return to the web browser, as the result of ENS resolution, a website address. Johnson indeed explains that the retrieved resource can be any resource, and Millegan describes the returned resource as a website address. EX1003 at 19, 37; EX1004 at 2. Additionally, returning a website address is a natural result of resolving ENS names entered into a web browser, because web browsers are typically and naturally used to navigate to websites. A PHOSITA would have therefore been motivated to return a website address as the resource retrieved via ENS resolution of the ENS name entered into the modified web browser of Millegan.

100. A PHOSITA would also have a reasonable expectation of success in combining Johnson with Millegan; it is what Millegan expressly suggests. While Millegan does not describe the ENS resolution process in detail, it refers to and builds on the ENS resolution process described in Johnson by explaining that its modified web browser “does a look-up on ENS on Ethereum, grabbing the *.onion* address for [the ENS name entered into the web browser] in the ENS record for [the ENS name] and returning it to the address bar.” EX1004 at 2. Thus, Millegan illustrates that a PHOSITA would have a reasonable expectation of success using its

teachings with the ENS resolution of Johnson, because a PHOSITA would have understood that Millegan is itself the successful result of that same combination.

**B. Claim 1:**

***[1-Pre] – A method, comprising:***

101. I understand that the preamble of a claim may or may not be considered a limitation of the claim. Regardless of whether the preamble is determined to be a limitation of this claim, it is my opinion that both Johnson and Millegan describe to a PHOSITA the subject matter of the preamble.

102. In particular, Johnson describes a method for resolving an ENS name using ENS resolution. EX1003 at 7, 18. Millegan describes a method for resolving ENS names entered into a web browser to return website address associated with the ENS name. EX1004 at 2.

103. I provide further details concerning the method introduced by the preamble in the sections that follow.

***[1a] – receiving a request to resolve a name of a domain of an identifier of web content***

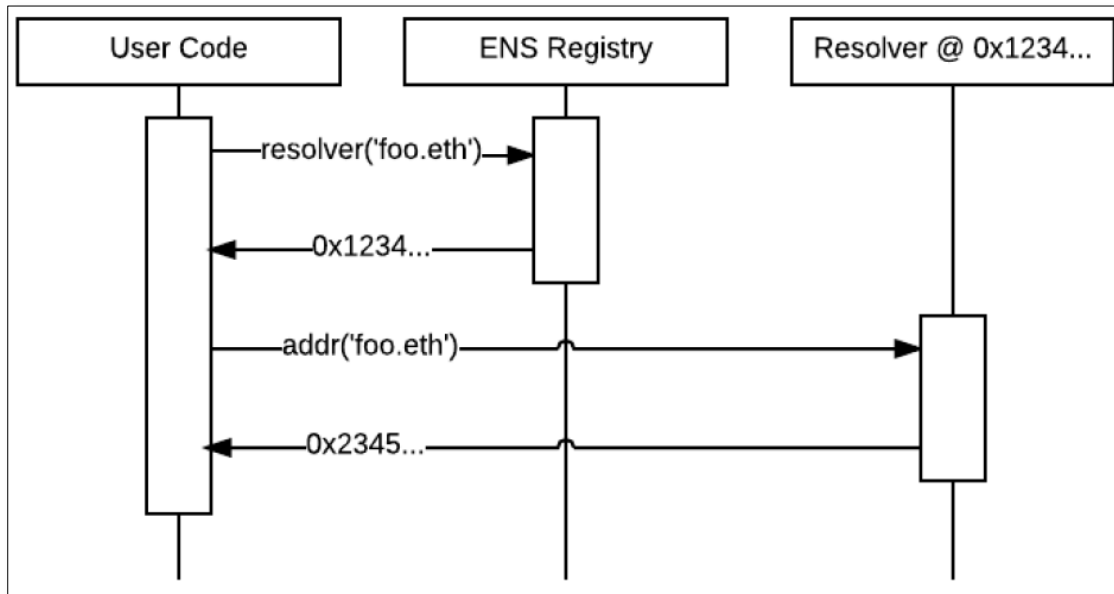
104. Millegan discloses “receiving a request to resolve a name of a domain of an identifier of web content” in the form of receiving an ENS name by a web browser for resolution to a website address associated with the ENS name. EX1004 at 1-2.

105. More particularly, Millegan describes a Tor web browser with a MetaMask extension that allows the Tor web browser to interact with the Ethereum blockchain. EX1004 at 2. Millegan describes entering an ENS name into the Tor web browser, and provides the example ENS name of *duckduckgotor.eth*. EX1004 at 2. The MetaMask extension recognizes the ENS name as an ENS name to be resolved by ENS resolution, and prevents the web browser from treating the ENS name as a search for a DNS name. EX1004 at 2. Instead, the MetaMask extensions accesses the Ethereum blockchain to request ENS resolution to “look-up” the website address associated with the ENS name. EX1004 at 2. Millegan provides the example website addresses as a *.onion* address in the form of: *onion://[insert .onion address without the .onion ending]*. EX1004 at 3.

106. Johnson describes specific steps for resolving an ENS name using the Ethereum blockchain—i.e., the steps for ENS resolution. EX1003 at 18-19. More particularly, as explained in Sec. IX.A above and illustrated in the below Figure, Johnson describes user code querying the ENS registry by calling the *resolver(bytes32)* method on the ENS registry and passing it the *namehash*<sup>1</sup> of the ENS name, e.g., *foo.eth*, being queried about:

---

<sup>1</sup> As explained further herein, the *namehash* of the ENS name refers to the 32-byte hash identifier resulting from applying the *namehash* function to the ENS name.



EX1003 at 18-19. The ENS registry then returns the address, e.g. “0x1234...,” of the ENS resolver responsible for returning the resource associated with the ENS name. EX1003 at 18-19. The user code then queries the ENS resolver by calling the *addr(bytes32)* method on the ENS resolver and passing it the *namehash* of the ENS name. EX1003 at 18-19. The ENS resolver then returns the resource associated with the ENS name. EX1003 at 18-19.

107. Millegan describes that the *.onion* address is the stored content record of the ENS resolver for the ENS name. EX1004 at 3. Thus, Millegan’s description of using ENS to “look-up” the *.onion* address would be understood by a PHOSITA as performing ENS resolution and returning the *.onion* address as corresponding to the returned resource described in Sec. IX.A. with respect to Johnson’s ENS resolution process.

108. A PHOSITA would have understood that both the ENS name and the returned website address are each identifiers of web content at least because either the ENS name or the returned website address (e.g., IP address) could be used by a web browser to retrieve the equivalent web content.

109. A PHOSITA would have found it obvious to combine Millegan with Johnson for the reasons discussed in Sec. IX.A above.

110. More particularly, a PHOSITA would have found it obvious to use the modified web browser of Millegan in combination with the ENS name resolution of Johnson to resolve ENS names entered in web browsers and thereby return website addresses associated with those ENS names. This natural combination would utilize Millegan's MetaMask-enabled web browser as the user code of Johnson, and utilize the returned website address of Millegan as the returned resource of Johnson. A PHOSITA would recognize that this is a simple combination of known elements with predictable results.

111. A PHOSITA would further recognize that this is little more than using the ENS resolution process of Johnson precisely where Millegan instructs that ENS resolution is to be used to "look-up" the website address associated with the ENS name. As such, the combination merely relies on Johnson's ENS resolution process to fill in details that Millegan omits in the way those details would naturally be applied.

112. It is therefore my opinion that a PHOSITA would have found the limitations of *[1a]* obvious based on the combined teachings of Johnson and Millegan.

***[1b] – automatically determining that the name of the domain is to be resolved using a blockchain***

113. Millegan discloses this limitation in the form of its web browser automatically determining that the entered ENS name is an ENS name for ENS resolution.

114. Millegan explains that “[a]fter you enter duckduckgotor.eth in the address bar of the Tor Browser, MetaMask recognizes that duckduckgotor.eth is an ENS name.” EX1004 at 2. The MetaMask extension then accesses the Ethereum blockchain and “does a look-up on ENS” to “grab[]” the website address. EX1004 at 2.

115. A PHOSITA would have found it obvious to combine Millegan with Johnson for the reasons discussed in Sec. IX.A above, as well as for the reasons discussed for *[1a]*.

116. More particularly, a PHOSITA would have found it obvious to use the modified web browser of Millegan in combination with the ENS name resolution of Johnson to resolve ENS names entered in web browsers and thereby return website addresses associated with those ENS names. A PHOSITA would recognize that this is a simple combination of known elements with predictable results.

117. A PHOSITA would further recognize that this is little more than using the ENS resolution process of Johnson precisely where Millegan instructs that ENS resolution is to be used to “look-up” the website address associated with the ENS name.

118. It is therefore my opinion that a PHOSITA would have found the limitations of [1b] obvious based on the combined teachings of Johnson and Millegan.

***[1c] – determining an identifier of a non-fungible token corresponding to the domain of the identifier of the web content***

119. Johnson discloses “determining an identifier of a non-fungible token” in the form of determining an identifier of a deed for a domain corresponding to the ENS name.

120. More particularly, Johnson describes that a deed records ownership of the domain<sup>2</sup> of an ENS name. EX1003 at 14. Johnson explains that deed ownership allows the deed owner to transfer administration of the ENS name to another account, as well as irrevocably transfer deed ownership to another account. EX1003 at 14. The code that Johnson describes as used to irrevocably transfer deed ownership cross-references the domain of the ENS name in the form of the *sha3()* hash of the domain of the ENS name. EX1003 at 14.

---

<sup>2</sup> As used herein for simplicity sake, the domain of the ENS name is the ENS name without the *.eth* at the end.

121. Johnson indeed discloses that *sha3()* is a hashing algorithm<sup>3</sup> that is applied to the domain to which the deed pertains and constitutes its identifier. EX1003 at 14. For example, Johnson explains that the identifier of the deed for the domain “foo” is “*sha3(foo)*.” EX1003 at 16.

122. A PHOSITA would have understood from this description in Johnson that the deed contains all the necessary characteristics of an NFT for the ENS name, because the deed is a unique token that records ownership of the domain corresponding to the ENS name. This understanding is reinforced by the ERC721 standard for NFTs on the Ethereum blockchain, which explains that the “standard interface for non-fungible tokens [are] also known as deeds.” EX1016 at 1.

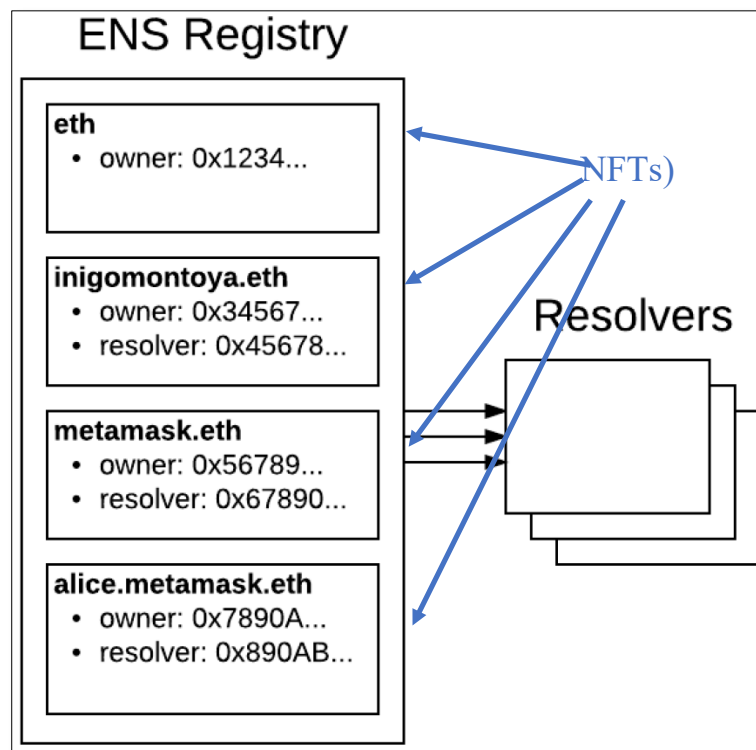
123. It is therefore my opinion that Johnson thus describes “determining an identifier of a non-fungible token corresponding to the domain.”

124. In addition, as discussed for *[1a]*, Millegan describes associating a domain with “an identifier of web content” in the form of a website address stored in the ENS record for the ENS name. A PHOSITA would have found it obvious to combine Millegan with Johnson for the reasons discussed in Sec. IX.A above, as well as for the reasons discussed for *[1a]*.

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<sup>3</sup> A hashing function is a cryptographic function that translates an input into a fixed-length hexadecimal value.

125. Johnson additionally discloses "determining an identifier of a non-fungible token corresponding to the domain," by determining a hash of the requested ENS name, e.g., *foo.eth*. EX1003 at 18-19. More particularly, Johnson explains that a hashing algorithm called *namehash* is applied to translate the domain name into a hash value that is used to identify a data record stored in the ENS registry. EX1003 at 22. Johnson indeed notes that "the output of the *namehash* function, [is] used to uniquely identify a name in ENS." *Id.*



EX1003 at 6 (annotated).

126. A PHOSITA would have understood that the data record of the ENS name that is stored in the registry is also a non-fungible token, as identified in the

above annotated figure. The data record of the ENS name is a non-fungible token because it: (1) has a unique identifier in the form of a unique hash of the ENS Name (e.g., the *namehash* of the *.eth* domain name), (2) records an associated owner, and (3) is stored on the Ethereum blockchain. EX1003 at 5-6, 18, 22.

127. A PHOSITA would have understood that there is no difference between this and what is described and illustrated in the '344 Patent. EX1001 at Col. 4:11-15, 43-55. The figure of Johnson, and Fig. 1 of the '344, are depicted below top-bottom to show the virtually identical architecture in the storage of NFTs in the registry.

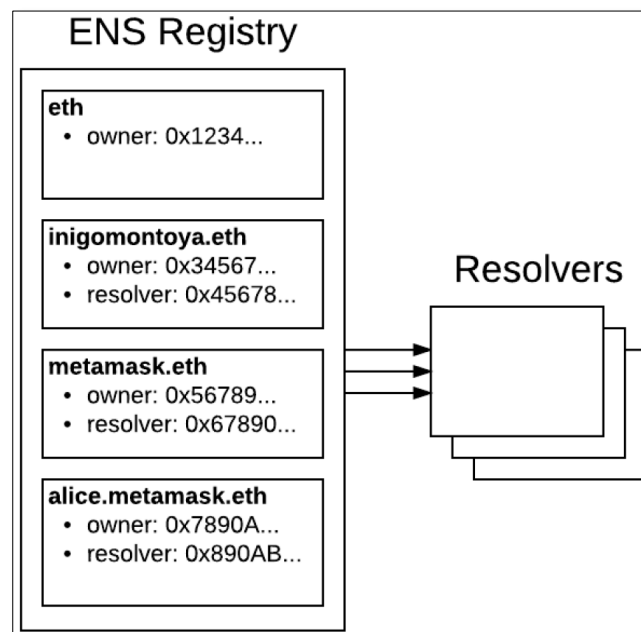


Figure from Johnson (above)

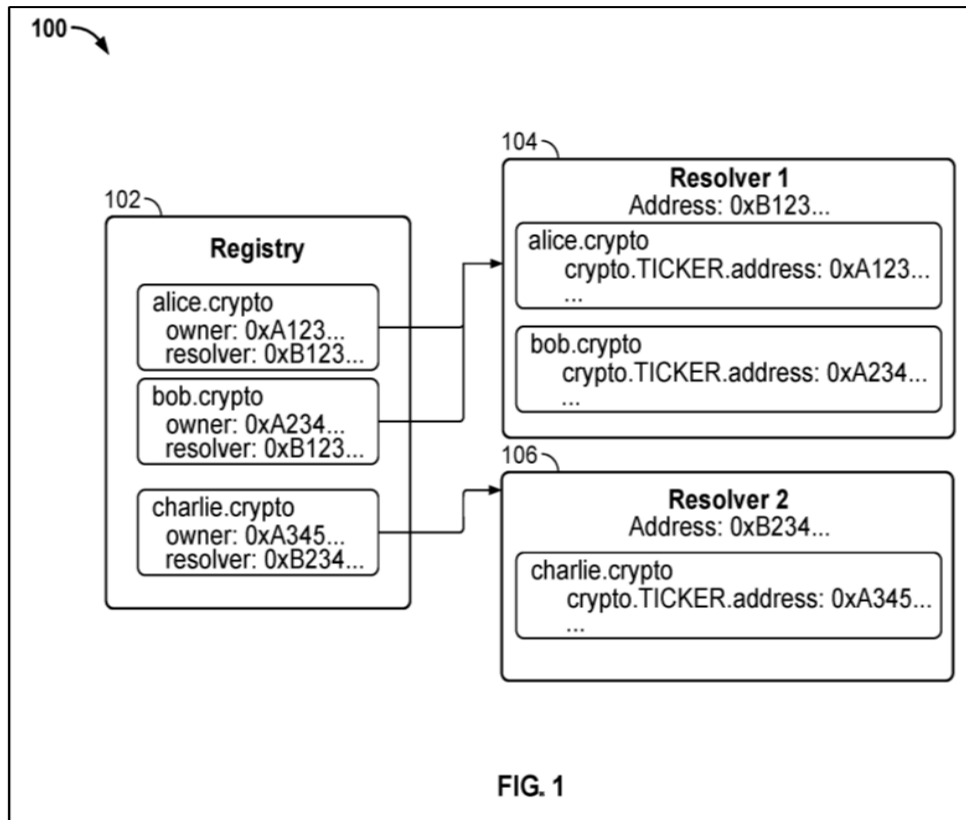


FIG. 1 of '344 Patent (immediately above)

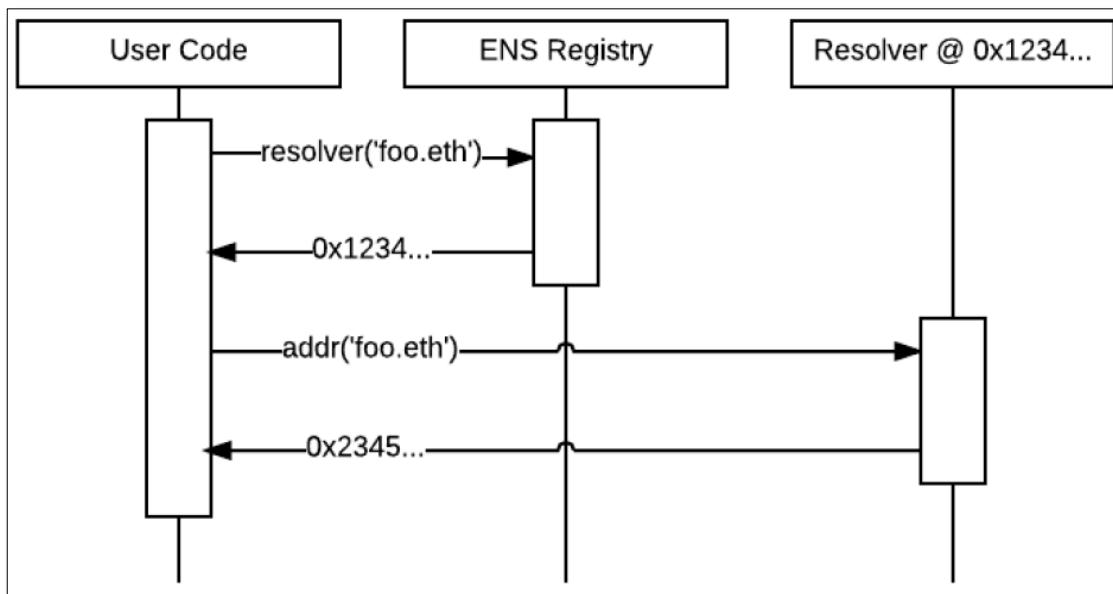
128. Accordingly, a PHOSITA would have understood that Johnson discloses the above-limitation by both (1) determining the *sha3* hash of the domain *foo* as the identifier of the deed corresponding to *foo.eth*, and (2) determining the *name-hash* of the ENS name *foo.eth* as the identifier of the data record of the ENS registry.

129. It is therefore my opinion that Johnson discloses the limitations of [1c].

***[1d] – using the identifier of the non-fungible token to send a request to a smart contract of the blockchain to obtain one or more resolution records for the domain, wherein the blockchain stores the non-fungible token associating the domain to an account address of an owner of the domain***

130. Johnson discloses “send[ing] a request to a smart contract of the blockchain to obtain one or more resolution records for the domain,” by querying the registry using the *namehash* of the ENS name. EX1003 at 19.

131. More particularly, as shown in the below figure, Johnson describes the user code querying the ENS registry by calling the *resolver(bytes32)* method on the ENS registry and passing it the *namehash* of the ENS name, e.g., *foo.eth*, being queried about:



EX1003 at 18-19. The *namehash* of the ENS name refers to a hash resulting from applying the *namehash* function on the ENS name. EX1003 at 22. The *namehash* of the ENS name is thus used to query the ENS registry. EX1003 at 19.

132. The ENS registry then returns the address, e.g. “0x1234...,” of the ENS resolver responsible for returning the resource associated with the ENS name.

EX1003 at 18-19. The user code then queries the ENS resolver by calling the *addr(bytes32)* method on the ENS resolver and passing it the *namehash* of the ENS name. EX1003 at 18-19. The ENS resolver then returns the resource associated with the ENS name—which corresponds to the “resolution record.” EX1003 at 18-19.

133. Johnson explains that both the ENS registry and the ENS resolver are smart contracts. EX1003 at 5-6, 18-19. Moreover, as discussed for [1c], the *namehash* of the ENS name, e.g., *foo.eth*, corresponds to “the identifier of the non-fungible token.”

134. Thus, a PHOSTIA would have understood that Johnson discloses “using the identifier of the non-fungible token to send a request to a smart contract of the blockchain to obtain one or more resolution records for the domain” in the form of the user code using the *namehash* of the ENS name to query the ENS registry to resolve the ENS name so as to obtain the resource associated with the ENS name.

135. Additionally, as discussed for [1c], the *sha3()* hash of the domain, e.g., *foo*, also corresponds to “the identifier of the non-fungible token” in that it is the identifier of the deed corresponding to the ENS name, e.g., *foo.eth*.

136. Johnson further explains that the *sha3* function is used by the *namehash* function to query the ENS registry. EX1003 at 22. More particularly, Johnson describes the below Python code illustrating that the *namehash* function partitions the

inputted ENS name (e.g., *foo.eth*) into labels, and each label (e.g., *foo* and *eth*) is hashed using the *sha3* function:

```
def namehash(name):  
    if name == '':  
        return '\0' * 32  
    else:  
        label, _, remainder = name.partition('.')  
        return sha3(namehash(remainder) + sha3(label))
```

EX1003 at 22. See also, EX1005 at 18.

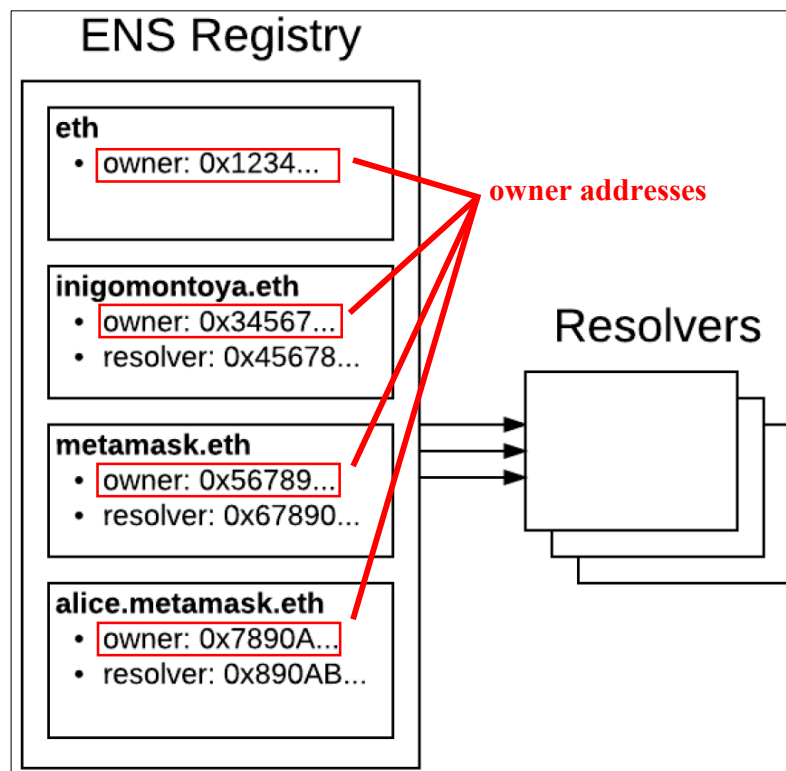
137. Because the *sha3(foo)* portion of *namehash(foo.eth)* corresponds to the identifier of the deed for the *foo* domain, the user code of Johnson using *namehash(foo.eth)* to query the ENS registry and the ENS resolver also necessarily uses the identifier of the deed, i.e., *sha3(foo)*, to request resolution of the *foo.eth* ENS name.

138. Thus, a PHOSITA would have understood that Johnson’s use of the *namehash* of the ENS name (e.g., *namehash(foo.eth)*) to query the ENS registry is “using the identifier of the non-fungible token to send a request to a smart contract of the blockchain to obtain one or more resolution records for the domain” in the form of the *sha3()* of the domain (e.g., *sha3(foo)*) that is used within the *namehash* of the ENS name (e.g., *namehash(foo.eth)*).

139. In addition, Johnson discloses “wherein the blockchain stores the non-fungible token associating the domain to an account address of an owner of the

domain,” in that both of the deed and the registry record associates the domain to an account address of an owner of the domain.

140. More particularly, as discussed for [1c], Johnson discloses that the blockchain stores the deed, which associates the domain to an owner account address. EX1003 at 14. This is shown in at least the annotated figure below, which identifies the owner by a hexadecimal address, e.g., 0x1234..., 0x34567..., etc., that corresponds to an Ethereum wallet of the owner.



EX1003 at 6 (annotated).

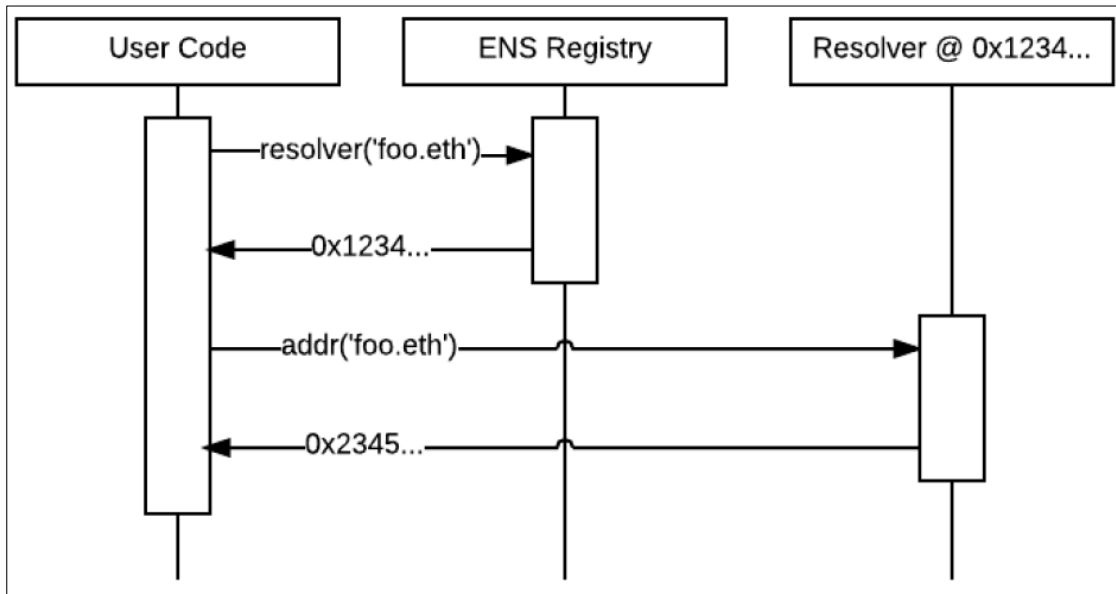
141. Additionally, as discussed for [1c], Johnson discloses that the ENS registry stores hashed ENS names mapped to the respective ENS resolvers responsible for them, as well as to the owners of the ENS names. EX1003 at 14.

142. It is therefore my opinion that Johnson discloses the limitations of [1d].

***[1e] – receiving the one or more resolution records  
of the domain***

143. Johnson discloses this limitation in the form of the user code receiving from the resolver the resource associated with the queried ENS name. EX1003 at 18-19.

144. More particularly, as explained in Sec. IX.A above and illustrated in the below Figure, Johnson describes the user code querying the ENS resolver by calling the *addr(bytes32)* method on the ENS resolver and passing it the *namehash* of the ENS name, in response to which the ENS resolver then returns the resource associated with the ENS name:



EX1003 at 18-19.

145. A PHOSITA would have understood that the returned resource corresponds to the “resolution record,” because there is no difference between this and what is described in the ‘344 Patent. More particularly, the ‘344 Patent describes the resolution record as what is returned from the resolver. EX1001 at 12:15-18. Similarly, the resource of Johnson is what is returned from the ENS resolver. EX1003 at 18-19.

146. It is therefore my opinion that Johnson discloses the limitations of [1e].

147. In addition, as discussed for [1a], Millegan also discloses receiving a website address (e.g., a *.onion* address) as a result of the ENS resolution of an ENS name entered into its web browser. EX 1004 at 2-3.

148. As discussed in Sec. IX.A, a PHOSITA would have found it obvious to modify Johnson to use the modified web browser of Millegan to receive, as a result

of ENS resolution, website addresses associated with ENS names entered into the web browser, with the website address being the returned resource. A PHOSITA would recognize that this is a simple combination of known elements with predictable results.

149. It is therefore my opinion that a PHOSITA would have also found the limitations of [1e] obvious based on the combined teachings of Johnson and Millegan.

***[1f] – utilizing the received one or more resolution records to resolve the name of the domain***

150. Millegan discloses “utilizing the received one or more resolution records to resolve the name of the domain,” in the form of utilizing the retrieved website address, e.g., a .onion address, to access the website address in lieu of the ENS name entered into the browser, which is discussed in [1a] and [1e]. The website address retrieved and returned to the browser via ENS resolution corresponds to “resolv[ing] the name of the domain.”

151. As discussed in Sec. IX.A and also in [1a], a PHOSITA would have found it obvious to modify Johnson to use the modified web browser of Millegan to receive ENS names for ENS resolution into website addresses. A PHOSITA would recognize that this is a simple combination of known elements with predictable results.

152. It is therefore my opinion that a PHOSITA would have also found the limitations of [1e] obvious based on the combined teachings of Johnson and Millegan.

### C. Claim 2

***The method of claim 1, wherein the identifier of the web content includes a Uniform Resource Locator (URL).***

153. I understand that Claim 2 depends from Claim 1, which means that it contains all of the limitations of that claim. I have analyzed those limitations in view of the prior art above.

154. As discussed in [1a] and [1f], Millegan discloses the “identifier of the web content” in the form of the ENS name and the returned website address.

155. Millegan further describes an example ENS name as *duckduck-gotor.eth*. EX1004 at 2. A PHOSITA would have understood *duckduckgotor.eth* as a URL.

156. Millegan also describes the returned website address takes the following form: *onion://[insert .onion address without the .onion ending]*. EX1004 at 3. A PHOSITA would have understood that this is the form of a URL for website on the Tor network, which is an Internet overlay network. Thus, a PHOSITA would have understood that the website address returned to the web browser is also a URL.

157. As discussed in Sec. IX.A., a PHOSITA would have found it obvious to modify Johnson to use the modified web browser of Millegan to receive ENS names for resolution into website addresses, which are URLs. A PHOSITA would recognize that this is a simple combination of known elements with predictable results.

158. It is therefore my opinion that a PHOSITA would have also found the limitations of Claim 2 obvious based on the combined teachings of Johnson and Millegan.

**D. Claim 3**

*The method of claim 1, wherein the request is received at a web browser.*

159. I understand that Claim 3 depends from Claim 1, which means that it contains all of the limitations of that claim. I have analyzed those limitations in view of the prior art above.

160. As discussed in [1a], Millegan describes a Tor web browser with a MetaMask extension that allows the Tor web browser to interact with the Ethereum blockchain. EX1004 at 1-3. Millegan describes entering an ENS name into the Tor web browser, and provides the example ENS name of *duckduckgotor.eth*. EX1004 at 1-2. An associated website address is then looked-up via ENS resolution. EX1004 at 2.

161. As discussed in Sec. IX.A, a PHOSITA would have found it obvious to modify Johnson to use the modified web browser of Millegan to receive ENS names for ENS resolution into website addresses. A PHOSITA would recognize that this is a simple combination of known elements with predictable results.

162. It is therefore my opinion that a PHOSITA would have also found the limitations of Claim 3 obvious based on the combined teachings of Johnson and Millegan.

**E. Claim 4**

*The method of claim 1, wherein the request is received at a Domain Name System (DNS) gateway configured to handle resolution of domains of a blockchain-based name service.*

163. I understand that Claim 4 depends from Claim 1, which means that it contains all of the limitations of that claim. I have analyzed those limitations in view of the prior art above.

164. As discussed in [1a]-[1f], the combination of Johnson and Millegan account for resolving ENS names, which are domains of the Ethereum blockchain-based ENS (i.e., Ethereum Name Service).

165. Johnson further discloses that ENS supports “hosting DNS domains on the Ethereum blockchain via ENS.” EX1003 at 31. More particularly, the “domain’s nameserver records [are configured] to point to gateway DNS servers . . . [which] consult[] an ENS registry which points to resolvers . . . for the relevant

domain.” EX1003 at 31. In 2018, I published an article further describing and illustrating this concept, which I termed the “EthDNS” system. EX1006. FIG. 5 from my article illustrates how a domain’s nameserver records could be “configured to fetch information not from a local store but from the Ethereum blockchain.” EX1006 at 4.

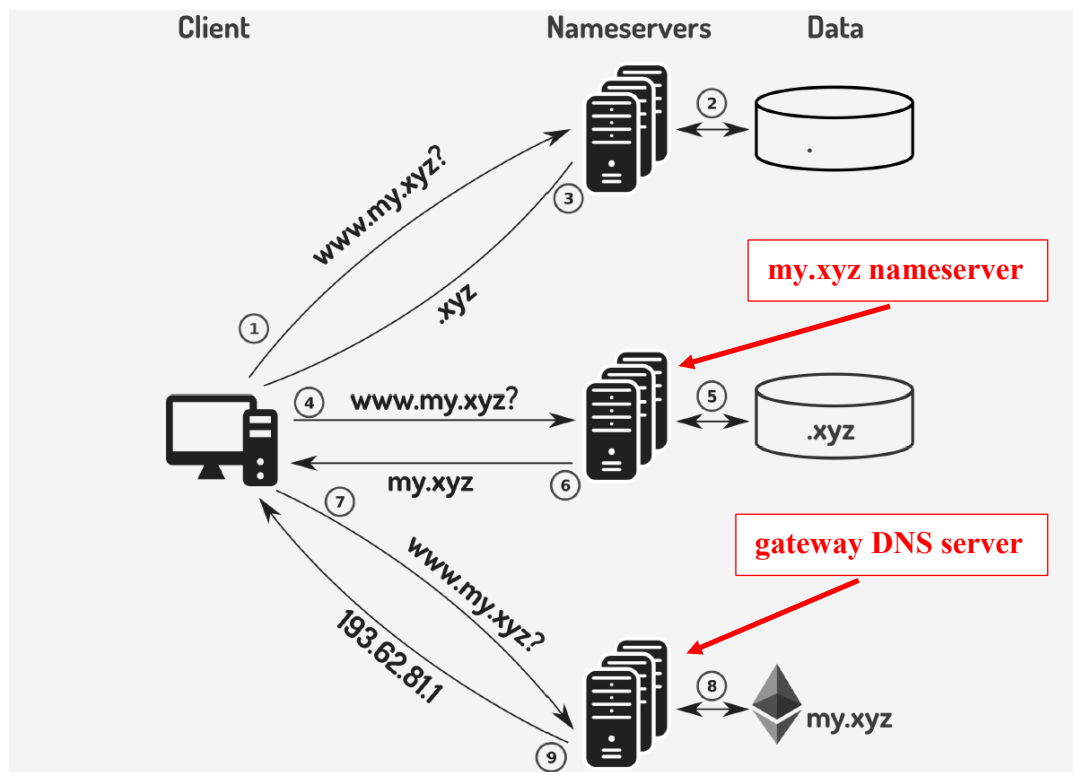


Figure 5: DNS nameserver infrastructure with EthDNS serving my.xyz

166. As shown in annotated FIG. 5 above, the records of the “my.xyz nameserver” are configured to point to the “gateway DNS server,” which is configured to interact with the Ethereum blockchain as indicated by reference numeral “8.” The “gateway DNS server” shown above would then proceed to interact with the ENS

registry and resolver to resolve the domain (e.g., my.xyz) in the same fashion as the “user code” shown and described in Johnson. EX1003 at 18. The steps of FIG. 5 for resolving a domain using the EthDNS system are nearly identical to the steps for resolving conventional DNS domains except for the substitution of the Ethereum blockchain for the local storage of the gateway server, as further illustrated with reference to FIG. 4 below.

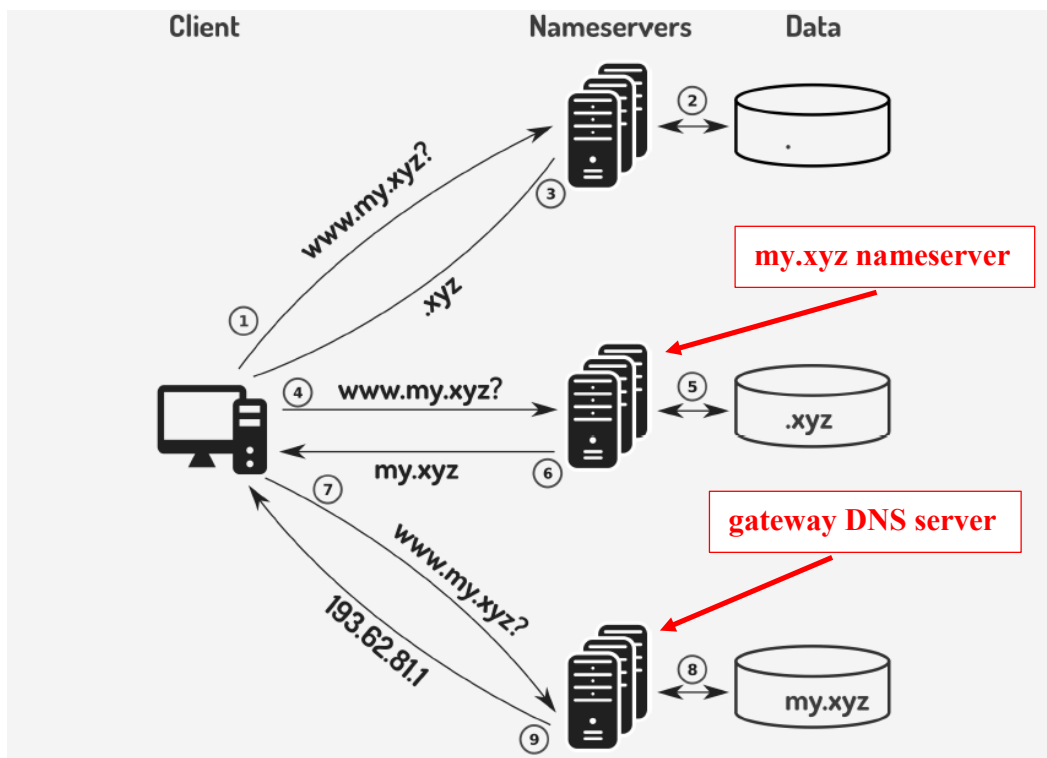


Figure 4: Resolving the address of [www.my.xyz](http://www.my.xyz)

167. A PHOSITA, who would have understood how conventional DNS operates (i.e., FIG. 4 above), would have thus understood that Johnson discloses the remainder of the limitation in the by suggesting modifying the conventional domain

nameserver records to point to a gateway DNS server, which is configured to resolve the ENS name by consulting the ENS registry which points to the ENS resolvers for the relevant domain. EX1003 at 31.

168. It is therefore my opinion that a PHOSITA would have also found the limitations of Claim 4 obvious based on the combined teachings of Johnson and Millegan.

**F. Claim 6**

*The method of claim 1, wherein the determination that the name of the domain is to be resolved using the blockchain is performed using an extension of a web browser*

169. I understand that Claim 6 depends from Claim 1, which means that it contains all of the limitations of that claim. I have analyzed those limitations in view of the prior art above.

170. As discussed for [1b], Millegan discloses that the web browser automatically determines that the entered ENS name is an ENS name for ENS resolution.

171. More particularly, Millegan explains that “[a]fter you enter duckduckgotor.eth in the address bar of the Tor Browser, MetaMask recognizes that duckduckgotor.eth is an ENS name.” EX1004 at 2. The MetaMask extension then accesses the Ethereum blockchain and “does a look-up on ENS” to “grab[]” the website address. EX1004 at 2. Thus, Millegan discloses “the determination that the

name of the domain is to be resolved using the blockchain is performed using an extension of a web browser.”

172. As discussed in Sec. IX.A, a PHOSITA would have found it obvious to modify Johnson to use the MetaMask extension modified web browser of Millegan to receive ENS names for ENS resolution into website addresses. A PHOSITA would recognize that this is a simple combination of known elements with predictable results.

173. It is therefore my opinion that a PHOSITA would have also found the limitations of Claim 6 obvious based on the combined teachings of Johnson and Millegan.

#### **G. Claim 7**

***The method of claim 1, wherein the identifier of the non-fungible token is calculated using a hash function***

174. I understand that Claim 7 depends from Claim 1, which means that it contains all of the limitations of that claim. I have analyzed those limitations in view of the prior art above.

175. As discussed for [1c], Johnson discloses the non-fungible token as both the deed and as the data record of the ENS registry.

176. Moreover, Johnson discloses that the identifier of the deed is the *sha3* hash of the domain (e.g., *foo*) corresponding to the ENS name (e.g., *foo.eth*).

EX1003 at 14. Johnson also discloses that the identifier of the data record is described the *namehash* of the ENS name (e.g., *foo.eth*). EX1003 at 18-19, 22. Thus, in each instance, Johnson discloses that “the identifier of the non-fungible token is calculated using a hash function.”

177. It is therefore my opinion that Johnson discloses the additional limitations of Claim 7.

#### **H. Claim 10**

***“The method of claim 1, wherein the one or more resolution records include a decentralized web content hash identifier.”***

178. I understand that Claim 10 depends from Claim 1, which means that it contains all of the limitations of that claim. I have analyzed those limitations in view of the prior art above.

179. Johnson discloses that “the one or more resolution records include a decentralized web content hash identifier,” by describing that the resource returned by the ENS resolver can include a “Swarm content hash.” EX1003 at 7.

180. A PHOSITA would have understood that a Swarm content hash is a hash identifier of the decentralized web content storage system known as Swarm.

181. It is therefore my opinion that Johnson discloses the additional limitations of Claim 10.

## I. Claim 15

*The method of claim 1, wherein utilizing the received one or more resolution records to resolve the name of the domain includes providing a response including at least a portion of the one or more resolution records to a web browser.*

182. I understand that Claim 15 depends from Claim 1, which means that it contains all of the limitations of that claim. I have analyzed those limitations in view of the prior art above.

183. As discussed for [1f], Millegan discloses “utilizing the received one or more resolution records to resolve the name of the domain,” in the form of utilizing the retrieved website address, e.g., a .onion address, to access the website address in lieu of the ENS name entered into the browser.

184. As discussed in Sec. IX.A, a PHOSITA would have found it obvious to modify Johnson to use the modified web browser of Millegan to receive ENS names for ENS resolution into website addresses. A PHOSITA would recognize that this is a simple combination of known elements with predictable results.

185. In addition, as discussed for [1e] and [1f], a PHOSITA would have further understood that the website address returned to the web browser of Millegan corresponds the returned resource of Johnson and that it is associated with the ENS name entered into the web browser. Thus, in the combination of Johnson and

Millegan, the returned resource of the website address corresponds to the “resolution record” that is provided to the web browser.

186. It is therefore my opinion that a PHOSITA would have also found the limitations of Claim 15 obvious based on the combined teachings of Johnson and Millegan.

**J. Claim 19**

***[19-Pre] – A system, comprising:***

187. I understand that the preamble of a claim may or may not be considered a limitation of the claim. Regardless of whether the preamble is determined to be a limitation of this claim, it is my opinion that both Johnson and Millegan describe to a PHOSITA the subject matter of the preamble.

188. In particular, Johnson describes a system for resolving an ENS name using ENS resolution. EX1003 at 7, 18. Millegan describes a system for resolving ENS names entered into a web browser to return website address associated with the ENS name. EX1004 at 2-3.

189. I provide further details concerning the system introduced by the preamble in the sections that follow.

***[19a] – a processor configured to:***

190. As described in *[1-Pre]* and *[1b]*, Millegan describes resolving ENS names entered into a MetaMask enabled web browser to return website address

associated with the ENS name. EX1004 at 2-3. The web browser has a MetaMask extension that allows the web browser to perform a “look-up on ENS” so as to retrieve the website address.

191. A PHOSITA would have understood that the functions of the web browser—and of the MetaMask extension—are necessarily executed by the processor of a computer. This is because web browsers are processor-executed software applications.

192. As also described in *[1-Pre]* and *[1b]*, Johnson describes resolving an ENS name using ENS resolution. EX1003 at 7, 18. The ENS resolution process includes user code interacting with the ENS registry and the ENS resolvers. EX1003 at 18.

193. A PHOSITA would have understood that the user code is processor-executable software, because that is generally what is understood by the term user code. Indeed, code is written to be executed.

194. Johnson further discloses a variety of software-based computer operations for executing ENS resolution. EX1003 at 9-11, 20-22, and 25.

195. As discussed in Sec. IX.A, a PHOSITA would have found it obvious to modify Johnson to use the modified web browser of Millegan to receive ENS names for ENS resolution into website addresses. Such modification would have inherently utilized a processor to execute the software-based operations of both

Johnson and Millegan. A PHOSITA would recognize that this is a simple combination of known elements with predictable results.

196. It is therefore my opinion that a PHOSITA would have also found the limitations of [19-Pre] obvious based on the combined teachings of Johnson and Millegan.

***[19b] – receive a request to resolve a name of a domain of an identifier of web content***

***[19c] – automatically determine that the name of the domain is to be resolved using a blockchain***

***[19d] – determine an identifier of a non-fungible token corresponding to the domain of the identifier of the web content***

***[19e] – use the identifier of the non-fungible token to send a request to a smart contract of the blockchain to obtain one or more resolution records for the domain, wherein the blockchain stores the non-fungible token associating the domain to an account address of an owner of the domain***

***[19f] – receive the one or more resolution records of the domain***

***[19g] – utilize the received one or more resolution records to resolve the name of the domain***

197. The majority of claim 19 tracks the limitations of [1a]-[1f], and its limitations are satisfied by the combination of Johnson and Millegan for the same reasons as explained above.

***[19h] – a memory coupled to the processor and configured to provide the processor with instructions.***

198. As discussed in [19-a], Johnson and Millegan both describe software-based computer operations for resolving ENS names using ENS resolution. Johnson discloses a variety of software-based computer operations, including executable code provided in Javascript and Python. EX1003 at 9-11, 20-22, and 25. A PHOSITA would have understood that computer executable software is necessarily stored in a memory as a set of instructions provided to the processor for execution.

199. It is therefore my opinion that a PHOSITA would have also found the limitations of [19-h] inherent to the combined teachings of Johnson and Millegan.

200. Moreover, as discussed in Sec. IX.A, a PHOSITA would have found it obvious to modify Johnson to use the modified web browser of Millegan to receive ENS names for ENS resolution into website addresses. Such modification would have inherently utilized a processor to execute the software-based operations of both Johnson and Millegan. A PHOSITA would recognize that this is a simple combination of known elements with predictable results.

**K. Claim 20**

***[20-Pre] A computer program product embodied in a non-transitory computer readable medium and comprising computer instructions for***

201. As described in *[1-Pre]*, *[1b]* and *[19-Pre]*, Millegan describes resolving ENS names entered into a MetaMask enabled web browser to return website address associated with the ENS name. EX1004 at 2-3. The web browser has a MetaMask extension that allows the web browser to perform a “look-up on ENS” so as to retrieve the website address.

202. As described in *[19-pre]*, a PHOSITA would have understood that the web browser—and the MetaMask extension—are software applications necessarily executed by the processor of a computer. Moreover, as described in *[19h]*, a PHOSITA would have understood that computer executable software (i.e., a computer program) is necessarily stored in a memory (i.e., a non-transitory computer readable medium) as a set of instructions provided to the processor for execution.

203. Moreover, as also described in *[1-Pre]*, *[1b]* and *[19-Pre]*, Johnson describes resolving an ENS name using ENS resolution. EX1003 at 7, 18. The ENS resolution process includes user code interacting with the ENS registry and the ENS resolvers. EX1003 at 18-19.

204. As described in *[19-Pre]*, a PHOSITA would have understood that the user code is processor executable software, because that is generally what is understood by the term user code. Indeed, code is written to be executed. Moreover, as described in *[19h]*, a PHOSITA would have understood that computer executable software (i.e., a computer program) is necessarily stored in a memory (i.e., a non-

transitory computer readable medium) as a set of instructions provided to the processor for execution.

205. Johnson further discloses a variety of software-based computer operations for executing ENS resolution. EX1003 at 9-11, 20-22, and 25.

206. As discussed at Sec. IX.A above, a PHOSITA would have found it obvious to modify Johnson to use the modified web browser of Millegan to receive ENS names for ENS resolution into website addresses. Such modification would have inherently utilized a processor to execute the software-based operations of both Johnson and Millegan, which would be stored in a memory. A PHOSITA would recognize that this is a simple combination of known elements with predictable results.

207. It is therefore my opinion that a PHOSITA would have thus found the limitations of claim [20-Pre] obvious based on the combined teachings of Johnson and Millegan.

***[20a] – receiving a request to resolve a name of a domain of an identifier of web content***

***[20b] – automatically determining that the name of the domain is to be resolved using a blockchain***

***[20c] – determining an identifier of a non-fungible token corresponding to the domain of the identifier of the web content***

***[20d] – using the identifier of the non-fungible token to send a request to a smart contract of the***

*blockchain to obtain one or more resolution records for the domain, wherein the blockchain stores the non-fungible token associating the domain to an account address of an owner of the domain*

*[20e] – receiving the one or more resolution records of the domain*

*[20f] – utilizing the received one or more resolution records to resolve the name of the domain*

208. The limitations of claim [20a]-[20f] track the limitations of [1a]-[1f], as well as [19a]-[19-g], and its limitations are satisfied by the combination of Johnson and Millegan for the same reasons as explained above.

**X. GROUND 2: Claim 5 is obvious under 35 U.S.C. §103 over Johnson in view of Millegan and further in view of Schneider.**

**A. Claim 5**

*The method of claim 1, wherein determining that the name of the domain is to be resolved using the blockchain includes determining that a top-level domain included in the name of the domain matches an entry in a list of domains to be resolved using the blockchain.*

209. I understand that Claim 5 depends from Claim 1, which means that it contains all of the limitations of that claim. I have analyzed those limitations in view of the prior art above.

210. As discussed in [1b], Millegan discloses that the web browser automatically determines that the entered ENS name is an ENS name (e.g., .eth) for ENS resolution. EX1004 at 2.

211. Schneider discloses determining whether a domain name is resolvable by comparing it against a list of resolvable top-level domains. EX1011 at ¶ [0056].

212. A PHOSITA would have understood that comparing a domain name against a list of resolvable top-level domains allows a DNS server or gateway to quickly determine whether the request to resolve the domain name is resolvable via DNS or requires alternative processes to resolve.

213. A PHOSITA would have therefore found it obvious to implement this same technique of Schneider to an ENS name resolving system using the blockchain as described by Johnson and Millegan.

214. A PHOSITA would have been motivated to do so at least because an ENS name is a domain name, like traditional domain names on DNS servers, except on the Ethereum blockchain. In other words, the ENS resolution described by Johnson and Millegan is analogous to the DNS resolution of Schneider. Thus, the added benefits of Schneider would be similarly desirable in the combination of Johnson and Millegan.

215. Accordingly, combining the teachings of Schneider with Johnson and Millegan would merely apply a known technique (comparing a candidate domain

name with a list) to improve similar systems (blockchain-based and DNS-based name resolution services) in the same predictable way.

216. It is therefore my opinion that a PHOSITA would have thus found the limitations of Claim 5 obvious based on the combined teachings of Johnson, Millegan and Schneider.

**XI. GROUND 3: Claim 9 is obvious under 35 U.S.C. §103 over Johnson in view of Millegan and further in view of Moore, and as evidenced by Amini.**

**A. Claim 9**

*The method of claim 1, wherein the one or more resolution records include a redirect address.*

217. I understand that Claim 9 depends from Claim 1, which means that it contains all of the limitations of that claim. I have analyzed those limitations in view of the prior art above.

218. As discussed in [1d]-[1f], Johnson and Millegan disclose receiving from the resolver the resource associated with the queried ENS name. EX1004 at 2-3.

219. Moore discloses that ENS records can store “arbitrary key-value text data,” such as “a website URL.” EX1008 at 2. A PHOSITA would have understood that, in the context of ENS resolution, the website URL is a “redirect address”

because it, when it is returned to the web browser, the web browser is redirected to resolve the URL, for example, via DNS resolution.

220. More particularly, in the conventional DNS resolution, the returned web resource can be set as another website address, so that the web browser is “re-directed” to the other website address. Amini provides an explanation of this process and notes that “DNS can provide redirection when the client device attempts to resolve an IP domain name into an IP address” and that “the DNS server can resolve this name to an alternate, or alias, IP domain name. . . [which] is often referred to as DNS CNAME (canonical Name) redirection.” EX1009 at ¶¶ [0004], [0005]. The concept of redirection was well-known as of the critical date—and a PHOSTIA would have recognized that Moore’s discussion of ENS records storing website URLs is no more than this same redirection done via ENS.

221. A PHOSITA would have thus found it obvious to combine the teachings of Moore to those of Johnson and Millegan so as to achieve the same redirection that was commonplace in DNS systems as of the critical date. A PHOSITA would have been motivated to make this combination at least because Moore expressly instructs “defin[ing] a resolver profile for ENS that permits the lookup of arbitrary key-value text data.” EX1008 at 1. A PHOSTIA would have further been motivated to make this combination because it is no more than applying a known technique

(redirection) to improve similar systems (blockchain-based and DNS-based name resolution services) in the same predictable way.

222. It is therefore my opinion that a PHOSITA would have thus found the limitations of Claim 9 obvious based on the combined teachings of Johnson, Millegan and Moore.

**XII. GROUND 4: Claims 8 and 11 are obvious under 35 U.S.C. §103 over Johnson in view of Millegan and further in view of EIP137.**

**A. Claim 8**

*The method of claim 1, wherein the one or more resolution records include an Internet Protocol (IP) address.*

223. I understand that Claim 8 depends from Claim 1, which means that it contains all of the limitations of that claim. I have analyzed those limitations in view of the prior art above.

224. As discussed in [1d]-[1f], Johnson and Millegan disclose receiving from the resolver the resource associated with the queried ENS name. Moreover, as discussed in [1a] and [1f], Millegan describes the returned resource as a website address (e.g., a .onion address). EX1004 at 2-3.

225. EIP137 describes ENS resolvers that “are responsible for performing resource lookups for a name – for instance, returning a[n] . . . IP address(es) as appropriate.” EX1005 at 1, 3.

226. A PHOSITA would have found it obvious to return, as the resource of Johnson and Millegan, the website address in the form of an IP address—at least because a website address may be represented by its IP address.

227. Moreover, a PHOSITA would refer to the teachings of EIP137 that discloses features proposed for the ENS system as disclosed by Johnson and Millegan at least because Johnson expressly refers to the EIP137 document. For example, Johnson references EIP137 as a source of information for “a list of currently recognised [sic] resource types” and as a “Resource” for further reading. EX1003 at 19 and 4.

228. Accordingly, a PHOSITA would have combined Johnson and Millegan with the teachings of EIP137 as directed by Johnson to understand and incorporate additional improved functionality of the ENS system described by Johnson, such as adding the return of IP addresses as disclosed by EIP137.

229. It is therefore my opinion that a PHOSITA would have thus found the limitations of Claim 8 obvious based on the combined teachings of Johnson, Millegan and EIP137.

## **B. Claim 11**

*The method of claim 1, wherein the one or more resolution records include a plurality of target identifiers for different protocols.*

230. I understand that Claim 11 depends from Claim 1, which means that it contains all of the limitations of that claim. I have analyzed those limitations in view of the prior art above.

231. As discussed in [1d]-[1f], Johnson and Millegan disclose receiving from the resolver the “resolution record” as the resource associated with the queried ENS name. EX1004 at 2-3.

232. EIP137 discloses that the resolution records of the resolver may include a plurality of target identifiers for different protocols, including “a DApp hosted in Swarm, a Whisper address, and a mail server.” EX1005 at 2. Additional example target identifiers are provided in the table for returning a contract address, reverse ENS name lookup, contract application binary interface (ABI), and SECP256k1 public keys lookup. EX1005 at 6-7.

233. A PHOSITA would have found it obvious to combine the teachings of EIP137 with Johnson and Millegan such that the one or more resolution records include a plurality of target identifiers for different protocols, as described by EIP137.

234. A PHOSITA would have been motivated to make this combination at least because Johnson expressly refers to EIP137. For example, Johnson references EIP137 as a source of information for “a list of currently recognised [sic] resource types” and as a “Resource” for further reading. EX1003 at 19 and 7. A PHOSITA would have also appreciated that including a plurality of target identifiers for

different protocols “allow the same domain [name] to reference different resources. . . . [such as resolving] ‘mysite.swarm’ to the IP address of its server . . . [or] resolv[ing] the same address to a mail server.” EX1005 at 1.

235. Accordingly, a PHOSITA would have combined Johnson and Millegan with the teachings of EIP137 as directed by Johnson to improve the functionality of the ENS system, such as by using a plurality of target identifiers for different protocols and services as described by EIP137.

236. It is therefore my opinion that a PHOSITA would have thus found the limitations of Claim 11 obvious based on the combined teachings of Johnson, Millegan and EIP137.

**XIII. GROUND 5: Claims 12-14 are obvious under 35 U.S.C. §103 over Johnson in view of Millegan, EIP137, and further in view of Haynes.**

**A. Claim 12**

*The method of claim 11, wherein utilizing the received one or more resolution records to resolve the name of the domain includes selecting one of the plurality of target identifiers based on an ordered list of protocol preferences.*

237. I understand that Claim 12 depends from Claim 11, which means that it contains all of the limitations of that claim. I have analyzed those limitations in view of the prior art above.

238. As discussed in [1a] and [1f], the combination of Johnson and Millegan discloses utilizing the retrieved website address (e.g., a .onion address) to access the

website address in lieu of the ENS name entered into the browser. Moreover, as discussed with respect to Claim 11, EIP137 discloses that the resolution records of the resolver may include a plurality of target identifiers for different protocols and services. EX1005 at 2, 6, and 7.

239. Haynes discloses selecting a protocol from an ordered list of protocol preferences. More particularly, Haynes describes “select[ing] a tunneling protocol from the list of tunneling protocols based on the prioritized list.” EX1010 at ¶ [0044]. Haynes explains that the list “specifies an order in which user device 110 should use [one of several] IPsec tunneling protocol components.” EX1010 at ¶ [0033].

240. In this way, the user device may improve the likelihood of successfully establishing a connection with the evolved packet data gateway (ePDG) device using an IPsec protocol that is supported by the ePDG device to retrieve applications from an IP address. EX1010 at ¶¶ [0036] and [0044].

241. A PHOSITA would have found it obvious to resolve the ENS name, in accordance with the combination of Johnson, Millegan and EIP137, into a selected target identifier based on an ordered list of protocol preferences for the purpose of providing fallback resources to return via ENS resolution.

242. Prioritizing the list target identifiers has the advantage to increase the likelihood of successfully connecting with a target device using a protocol that is known to be supported and/or compatible.

243. Such a modification amounts to applying a known technique (the prioritized protocol list of Haynes) to improve similar devices (computer devices that communicate via IP addresses) in the same way (by selecting a protocol from the prioritized list to improve the likelihood of a successful connection with another device).

244. It is therefore my opinion that a PHOSITA would have thus found the limitations of Claim 12 obvious based on the combined teachings of Johnson, Millegan, EIP137 and Haynes.

## **B. Claim 13**

*The method of claim 12, wherein the ordered list of protocol preferences is at least in part specified in the one or more resolution records received using the blockchain.*

245. I understand that Claim 13 depends from Claim 12, which means that it contains all of the limitations of that claim. I have analyzed those limitations in view of the prior art above.

246. As discussed in [1e], the combination of Johnson and Millegan disclose receiving from the resolver, via ENS resolution on the Ethereum blockchain, the

resource associated with the queried ENS name—which corresponds to the “resolution record.”

247. Moreover, as discussed above with reference to Claim 12, the combination of Johnson, Millegan, EIP137, and Haynes provides for the use of an ordered list of protocols in the one or more resolution records of the resolver.

248. In addition, as discussed in with reference to Claim 11, EIP137 teaches that the target identifiers are in the resolution records of the ENS resolver. EX1005 at 6-7.

249. A PHOSITA would have been motivated by the suggestion in Johnson to maintain efficient data storage and quick data retrieval by having the ordered list of protocols as taught by Haynes in the same data records where the target identifiers are stored, as EIP137 teaches the target identifiers are in the resolution records. This combination applies a known technique to a known method for improvement to yield predictable results.

250. Additionally, only a finite number of locations exist within the ENS system where the ordered list of protocol preferences could be stored, including within the resolution records of the resolver, within the registry, or within the user code (e.g., web browser). A PHOSITA could choose from any one of these identified, predictable storage locations with a reasonable expectation of success, which also supports a conclusion of obviousness.

251. It is therefore my opinion that a PHOSITA would have thus found the limitations of Claim 12 obvious based on the combined teachings of Johnson, Millegan, EIP137 and Haynes.

**C. Claim 14**

*The method of claim 12, wherein selecting the one of the plurality of target identifiers based on the ordered list of protocol preferences includes evaluating each protocol specified in an order of the ordered list to determine whether there exists a specific target record for the protocol.*

252. I understand that Claim 14 depends from Claim 12, which means that it contains all of the limitations of that claim. I have analyzed those limitations in view of the prior art above.

253. As discussed above with reference to Claim 12, the combination of Johnson, Millegan, EIP137, and Haynes provides for the use of an ordered list of protocols.

254. Haynes discloses the remaining limitations in the form of evaluating whether the protocol “listed first in the prioritized list of tunneling protocols . . . [provided that the protocol] has not been already unsuccessfully used by user device 110 to attempt to establish the connection.” EX1010 at ¶¶ [0044] and [0045].

255. A PHOSITA would have found it obvious to include evaluating the target identifiers in the resolution records of EIP137 in a specified order to determine whether a target record exists for the protocol as taught by Haynes.

256. A PHOSITA would have been motivated to evaluate the target identifiers of EIP137 in a prioritized way as taught by Haynes to minimize processing of target records that do not exist.

257. This combination applies a known technique to a known method for improvement to yield predictable results.

258. It is therefore my opinion that a PHOSITA would have thus found the limitations of Claim 14 obvious based on the combined teachings of Johnson, Millegan, EIP137 and Haynes.

**XIV. GROUND 6: Claims 16-18 are obvious under 35 U.S.C. §103 in view of Johnson in view of Millegan and Saini.**

**A. Claim 16**

*The method of claim 1, wherein utilizing the received one or more resolution records to resolve the name of the domain includes providing an identifier of a decentralized web gateway.*

259. I understand that Claim 16 depends from Claim 1, which means that it contains all of the limitations of that claim. I have analyzed those limitations in view of the prior art above.

260. As discussed in [1e], the combination of Johnson and Millegan discloses receiving from the resolver the resource associated with the queried ENS name. EX1003 at 18-19.

261. Saini discloses the remaining limitations in the form of describing that Swarm is “designed to deeply integrate with . . . the Ethereum blockchain for domain name resolution (using ENS).” EX1012 at 3. Saini further explains that “ENS is the system that Swarm uses to permit content to be referred to by a human-readable name, such as ‘theswarm.eth.’” EX1012 at 5. Saini also explains that Swarm provides a “public gateway [that] can be found at <https://swarm-gateways.net>,” which would have been understood by a PHOSITA to correspond to an identifier of a decentralized web gateway. EX1012 at 5. Saini discloses that Swarm content referred to by the example name “theswarm.eth,” may be accessed through “major browsers such as Chrome, Firefox or Safari” using ENS. EX1012 at 5. To do so, the Swarm public gateway can be provided in conjunction with the ENS name, e.g., “<https://swarm-gateways.net/bzz://theswarm.eth/>”. EX1012 at 5.

262. A PHOSITA would have combined the teachings of Saini with Johnson and Millegan such that resolving the ENS name includes providing an identifier of a Swarm gateway.

263. There is express motivation for this combination in both Johnson and Saini. As previously explained with reference to Claim 10, Johnson describes that the resolution records of ENS can include a “Swarm content hash.” EX1003 at 7. Saini expressly describes using ENS with Swarm for the advantage of using a web browser to access Swarm using decentralized web gateway. EX1012 at 3, 5, and 6.

264. Accordingly, a PHOSITA would have found it obvious to utilize a decentralized gateway to access the Swarm content, as taught by Saini, as the received resource.

265. It is therefore my opinion that a PHOSITA would have thus found the limitations of Claim 16 obvious based on the combined teachings of Johnson, Millegan and Saini.

#### **B. Claim 17**

*The method of claim 16, wherein in response to a request made to the decentralized web gateway using the provided identifier of the decentralized web gateway, the decentralized web gateway obtains from a decentralized content network, decentralized web content referenced by a decentralized web content hash value included in the one or more resolution records of the domain, and stores and provides the obtained decentralized web content.*

266. I understand that Claim 17 depends from Claim 16, which means that it contains all of the limitations of that claim. I have analyzed those limitations in view of the prior art above.

267. Saini discloses the remaining limitations in the form of a request made to the public Swarm gateway using the ENS identifier that corresponds to the Swarm content hash. EX1012 at 5. In response, the Swarm public gateway obtains decentralized web content from the Swarm network as “chunks of data” that are reassembled locally. EX1012 at 5. Saini further teaches that the decentralized web content

is referenced by the “Swarm hash [value] of the content,” (i.e., a decentralized web content hash value) which is “content to be referred to by a human-readable name, such as ‘theswarm.eth’” using ENS resolution. EX1012 at 5.

268. As discussed with respect to Claim 10, Johnson further teaches that ENS can be configured to return, via the resolver, a Swarm content hash value of the human-readable domain name within one or more resolution records. EX1003 at 7, 18. Thereby, the decentralized web content is retrieved and may then be stored and provided to the browser using the Swarm public gateway. EX1012 at 5.

269. Accordingly, a PHOSITA would have found it obvious to combine these further teachings of Saini with Johnson and Millegan so as to retrieve data from a Swarm site using a decentralized web content hash value included in the resolution records of the domain.

270. A PHOSITA would have been motivated to make this combination because Saini expressly teaches resolving Swarm content hashes from human-readable ENS names. EX1012 at 4-5. Thus, the combination is merely a combination of known elements according to known methods with predictable results.

271. It is therefore my opinion that a PHOSITA would have thus found the limitations of Claim 17 obvious based on the combined teachings of Johnson, Millegan and Saini.

### C. Claim 18

*The method of claim 17, wherein the decentralized web gateway obtains the content referenced by the decentralized web content hash value using a decentralized web protocol but provides the obtained decentralized web content using a protocol that is not the decentralized web protocol.*

272. I understand that Claim 18 depends from Claim 17, which means that it contains all of the limitations of that claim. I have analyzed those limitations in view of the prior art above.

273. Saini discloses the remaining limitations in the form of using the Swarm public gateway on a web browser to retrieve, via the bzz protocol, content referenced by the Swarm content hash value (the decentralized web content hash value). EX1012 at 4. The browser then communicates with the Swarm public gateway and provides the decentralized content using the HTTP protocol, which is not the Swarm-native bzz protocol. EX1012 at 5.

274. A PHOSITA would have found it obvious to combine these further teachings of Saini with Johnson and Millegan so as to retrieve data from a Swarm site using a decentralized web protocol and providing the content using a different protocol.

275. A PHOSITA would have been motivated to make this combination because Johnson, Millegan and Saini each suggest using ENS resolution to resolve ENS names and to retrieve content from decentralized databases. In particular,

Johnson describes using the ENS system to resolve an ENS name (e.g., “theswarm.eth”) to a Swarm content hash. EX1003 at 7, 18-19. Millegan describes the use of a web browser to retrieve content by inputting an ENS name into the address bar. EX1004 at 2-3. Saini describes retrieving Swarm content referenced by the ENS name, also using a web browser. EX1012 at 4-5. Thus, the combination is merely a combination of known elements according to known methods with predictable results. A PHOSITA would have been motivated to combine the teachings of each of Johnson, Millegan, and Saini at least because each of Johnson, Millegan, and Saini pertain to and expressly reference using the ENS system

276. It is therefore my opinion that a PHOSITA would have thus found the limitations of Claim 18 obvious based on the combined teachings of Johnson, Millegan and Saini.

## **XV. OBJECTIVE EVIDENCE OF NONOBVIOUSNESS**

277. I understand that objective non-obviousness factors are to be considered in the obviousness analysis.

278. I am unaware of any secondary considerations relied on by Patent Owner during the prosecution of the '344 Patent.

279. Accordingly, having considered all of the relevant factors for obviousness, it is my opinion that the challenged claims are unpatentable.

## **XVI. CONCLUSIONS**

280. For the reasons described above, it is my opinion that all claims of the '344 Patent are unpatentable in view of the prior art references discussed above.

281. I reserve the right to supplement my opinions to address any information obtained, or positions taken, based on any new information that comes to light throughout this or any other proceeding.

282. I declare under the penalty of perjury that the foregoing is true and accurate to the best of my ability.

Executed on:

May 1, 2024, in Rota, Spain.



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James McDonald