Measuring DNS Integrations into Blockchain Namespaces

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Agenda

Need for identifiers in blockchain applications

Summary of DNS integrations in blockchain namespaces

Considerations with existing DNS integrations

Measuring DNS integrations

Closing remarks

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Need for Blockchain Identifiers

Easy to Remember	Hard to Remember

example.com → 93.184.216.34

example.eth → 0x51aba267a6e8e1e76b44183a 73e881d73a102f26

DNS Integrations into Blockchain Applications

- A DNS integration enables a DNS domain name to support new use cases in blockchain applications, e.g., blockchain wallet identifiers

- Two examples of blockchain namespaces that provide DNS integrations

DNSSEC-based for SLDs
(introduced in 2018)

DNSSEC Attestations
(introduced in 2022)

Blockchain Namespace and Integration Statistics

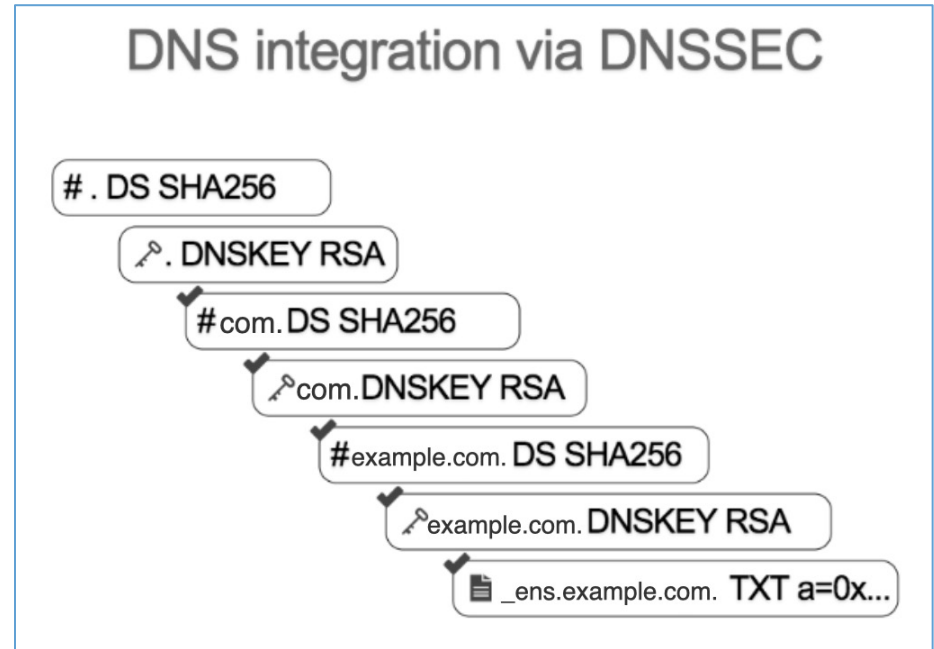| Namespace	Blockchain Identifiers	DNS domain names integrated via. DNSSEC	DNS domain names integrated via. custom solution/s
Ethereum Name Service	2,410,576	863	2,314
Tezos Domains	130,172	5	n/a

Source: https://etherscan.io, https://tzstats.com

- Blockchain identifiers are registered via a blockchain namespace's protocol
- DNS domain names are integrated via a DNS integration using DNS data
  - DNSSEC-based integration is primary integration method for ENS and Tezos
  - ENS also allows registry operators to provide their own custom DNS integration

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How do DNSSEC-based Integrations Function?

- Registrant updates DNS zone

- Registrant pushes the DNSSEC chain of trust to the blockchain namespace

- Blockchain namespace verifies the DNSSEC chain of trust

- No new DNS tooling required

DNS integration via DNSSEC

\# . DS SHA256

🔑 . DNSKEY RSA

\#com.DS SHA256

🔑com.DNSKEY RSA

\#example.com. DS SHA256

🔑example.com. DNSKEY RSA

📄 _ens.example.com. TXT a=0x...

Considerations with Existing DNS Integrations

Control

Domain Lifecycle

Alignment

Utility

Measuring Synchronization in DNS Integrations

- A DNS domain name is synchronized if its state matches in DNS and the blockchain namespace + other users can verify that this is true

- ENS' and Tezos Domains' DNSSEC-based integration links a DNS domain name into a blockchain namespace at a particular point in time

- Important to measure ongoing synchronization in DNS integrations
  - We measured synchronization in ENS
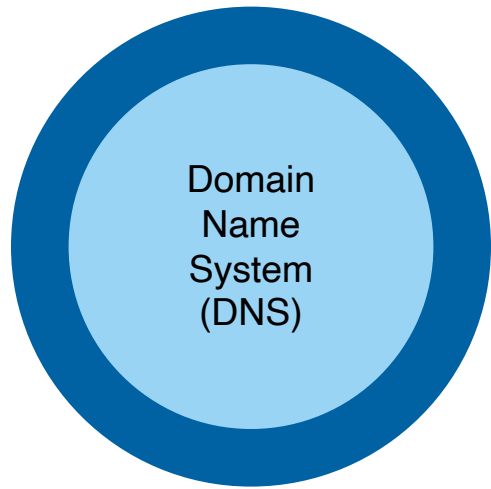
ENS DNSSEC Integration Analysis

	Synchronization Status	Count (Percentage)
✅	$ENS_{registrant} = DNS_{TXT}$	663 (76.83%)
⚠️	SLD DS Missing	75 (8.69%)
⚠️	SLD NXDOMAIN	53 (6.14%)
❌	SLD SERVFAIL	31 (3.59%)
⚠️	$ENS_{registrant} \neq DNS_{TXT}$	23 (2.67%)
⚠️	TXT NXDOMAIN	11 (1.27%)
⚠️	Cloudflare Black Lie	7 (0.81%)

Source: https://etherscan.io

Results show that synchronization issues are real:
- ⚠️ → Out of sync but **can** bring back into sync by submitting the latest DNSSEC data
- ❌ → Out of sync but **cannot** bring back into sync because does not generate DNSSEC data
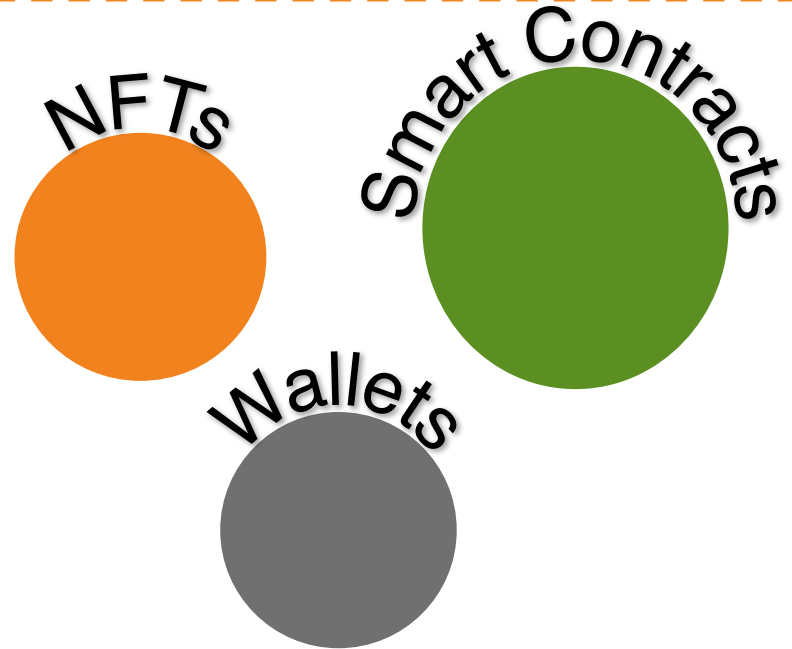
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