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Better blockchain intelligence.

What does Wash Trading Look Like for Crypto Markets?

A CASE STUDY ON THE FBI'S NEXF TOKEN AND HOW TO DETECT WASH TRADING ON DECENTRALIZED BLOCKCHAIN NETWORKS

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Contents.

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1. Introduction

In this case study, we'll look at what wash trading looks like on the blockchain by studying the NEXF token.

The NEXF token was part of a sting operation conducted by the U.S. Federal Bureau of Investigation (FBI), which ensnared market makers providing wash trading services for a fee.[1]

By combining various measures, including the use of log scales, the number of unique senders of the token, and the sum of transfer amounts, we look at how detecting wash trading on the blockchain is possible.

The NEXF token wash trading case study is an ideal scenario because we know for a fact that almost all the transaction activity was from wash trading.

This enables us to understand which measures are best applied to enable wash trading activity to stand out, and what specific dimensions should be monitored when analyzing blockchain transactions to detect wash trading.

[1] https://www.justice.gov/usao-ma/pr/eighteen-individuals-and-entities-charged-international-operation-targeting-widespread

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2. NEXF - The FBI Token

2.1 What is NEXF?

As part of an investigation into crypto-asset price manipulation, the FBI created a token on the Ethereum blockchain network called NexFundAI or NEXF as part of Operation Token Mirrors.

Ostensibly NexFundAI was a way to invest in early-stage artificial intelligence projects.

Federal agents posing as promoters of the NexFundAI sought out various "market makers" who would facilitate wash trading of the NEXF token for a fee, using bots and algorithms.

While not all "market makers" engage in such manipulative activity, the practice is not uncommon in the crypto-asset space.

Typically, a token promoter will approach such "market makers" to wash trade their tokens for a fee. The token promoter will provide the "market maker" with their tokens and the "market maker" will facilitate trading of the token between its addresses to create the impression that a token is actively traded, thereby luring retail investors to buy the token, while allowing insiders to sell.

2.2 What does wash trading look like in practice?

Although wash trading is common in crypto-asset markets, identifying such patterns is especially challenging in decentralized markets because it is trivial to set up fresh wallet addresses.

New wallet addresses trading an increasing number of tokens can create the mistaken belief in the existence of an organic market for tokens where none exists.

This is why analyzing token volume alone is insufficient to reveal wash trading activity on decentralized blockchain networks and other metrics, such as the number of "Unique From Addresses" is needed.

We know that the NEXF token was wash-traded by the "market makers" the FBI had appointed, and this is clear from the transaction behavior in Figure 1.

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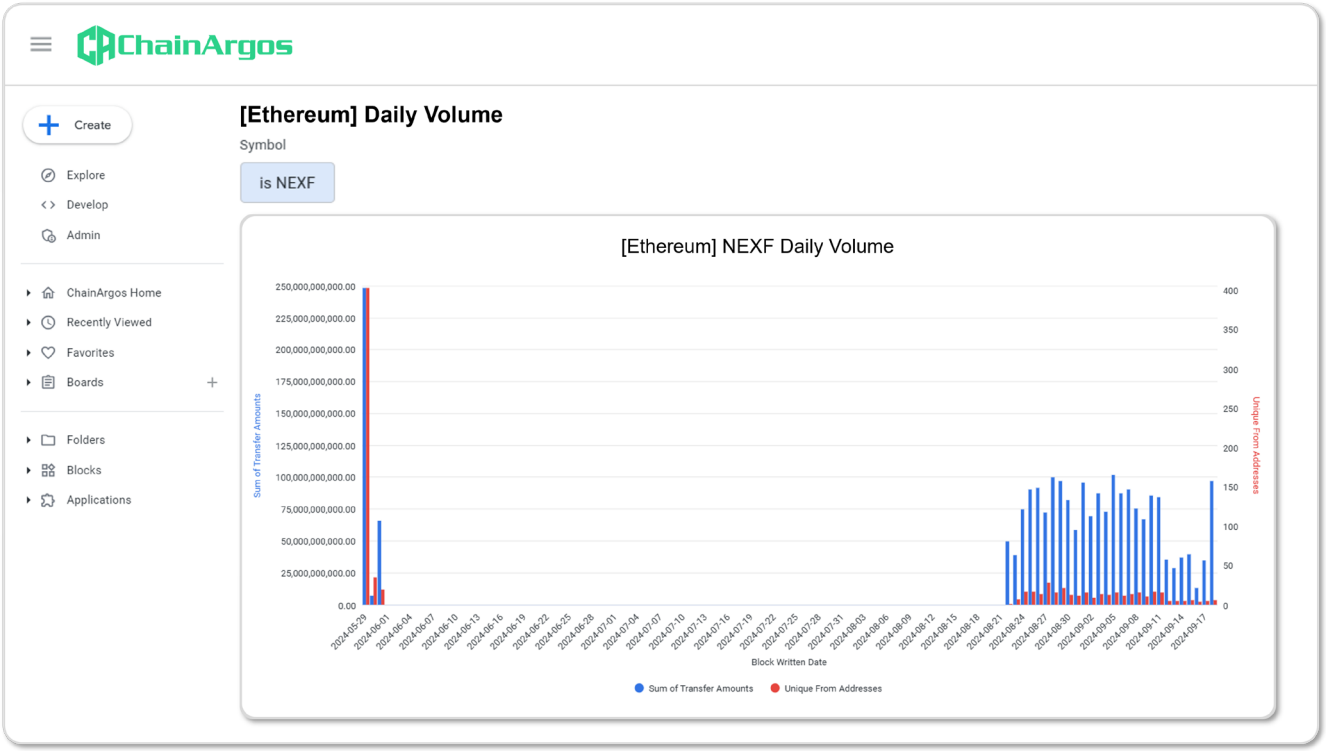

Figure 1. NEXF Daily Volume with Sum of Transfer Amounts (in blue) and the Unique From Addresses (in red).

Figure 1. shows the Sum of Transfer Amounts (the blue bars), which is the number of tokens sent, with their amounts on the left vertical axis.

Unique From Addresses (the red bars) are the number of unique addresses sending the NEXF tokens, with their amounts on the right vertical axis.

As seen from Figure 1., there was an initial flurry of activity on May 29, 2024, which could possibly have been an initial token allocation, or testing of some sort.

This is followed by a period where no activity is observed, presumably as the FBI went looking for “market makers” willing to engage in wash trading activity as part of the FBI’s Operation Token Mirrors.

Transaction activity kicked off again around August 22, 2024 and this is where we observe what wash trading looks like on the blockchain.

Notice that while the Sum of Transfer Amounts varies slightly, it never meaningfully exceeds 100 billion tokens after the “market making” activity begins (the blue bars on the right side of Figure 1.).

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Now look at the Unique From Addresses (the red bars) on the right side of Figure 1. and notice how the number of Unique From Addresses never exceeds 30, with the highest being 28 on August 27, 2024.

This transaction behavior, made obvious when using a combination of the Sum of Transfer Amounts and the number of Unique From Addresses, is consistent with a handful of “fresh” wallet addresses being created every day and wash trading roughly the same number of tokens.

So-called “market making” contracts often stipulate the volume that the “market maker” commits to creating for a customer, and this “commitment” can be seen in Figure 1.

Although an infinite number of “fresh” wallet addresses could in theory be created by a “market maker,” in practice, “market makers” prefer to keep this to a manageable number.

2.3 A Log Scale Makes Wash Trading More Obvious

Wash trading becomes even more obvious when we place the number of addresses sending out the NEXF token on the horizontal axis (From Address) and the Sum of Transfer Amounts on the vertical axis on a log scale as shown in Figure 2.

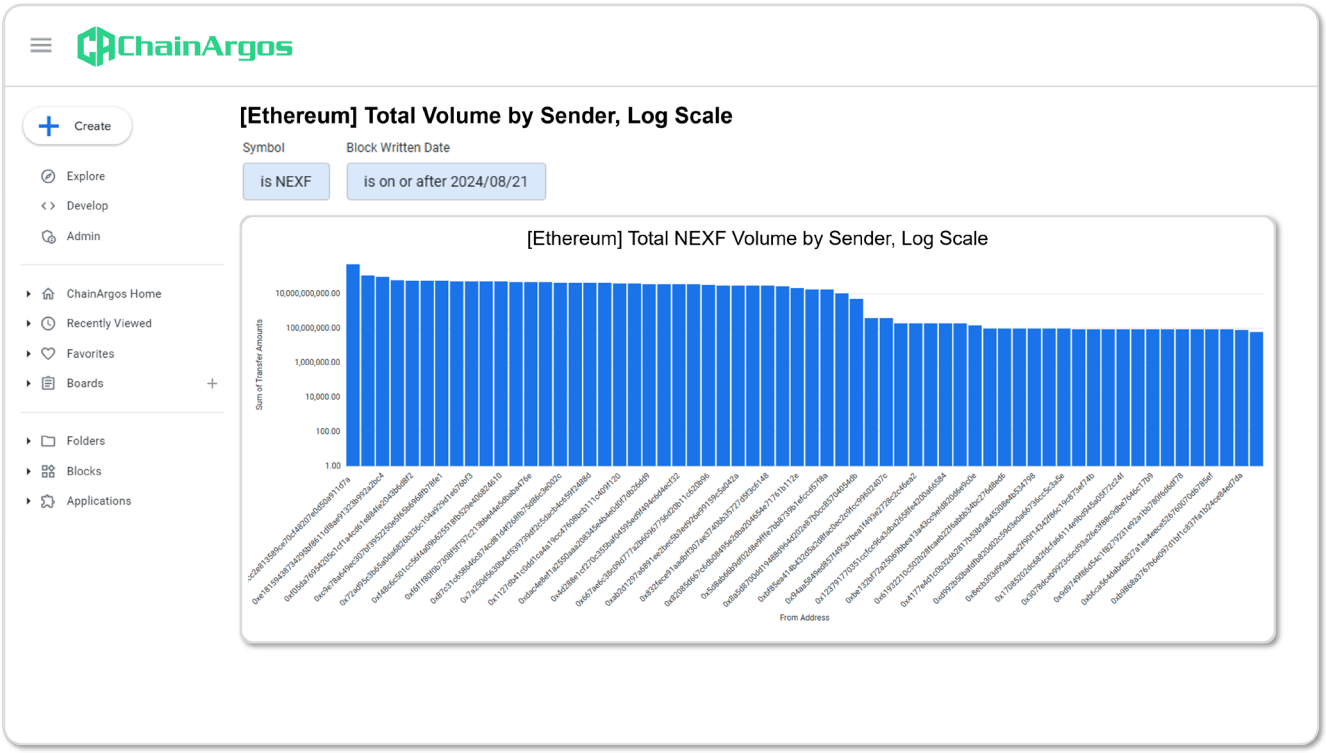

Figure 2. Total Volume by sender addresses (From Address) of the NEXF token on a Log Scale.

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Using a log scale, it's obvious the sender addresses (From Address) were sending approximately the same bucketed amounts of NEXF tokens, consistent with a uniform churn of tokens.

Logs scales are particularly useful because blockchain transaction data tends to cover several orders of magnitude.

In the case of NEXF, this is evident because you have a chunks of wallets sending roughly the same amounts of tokens at various levels, consistent with the "market makers" churning volume.

A log scale compresses the range, making it easier to visualize and compare the various volumes of all the different addresses, if this transaction activity was organic, you would expect to see far more randomness in the chart.

2.4 Looking at Various Time Frames

To round off our analysis, let's look at both the weekly and daily Sum of Transfer Amounts of NEXF tokens by senders.

In Figure 3., we look at the weekly volumes of NEXF tokens by senders and some obvious patterns emerge.

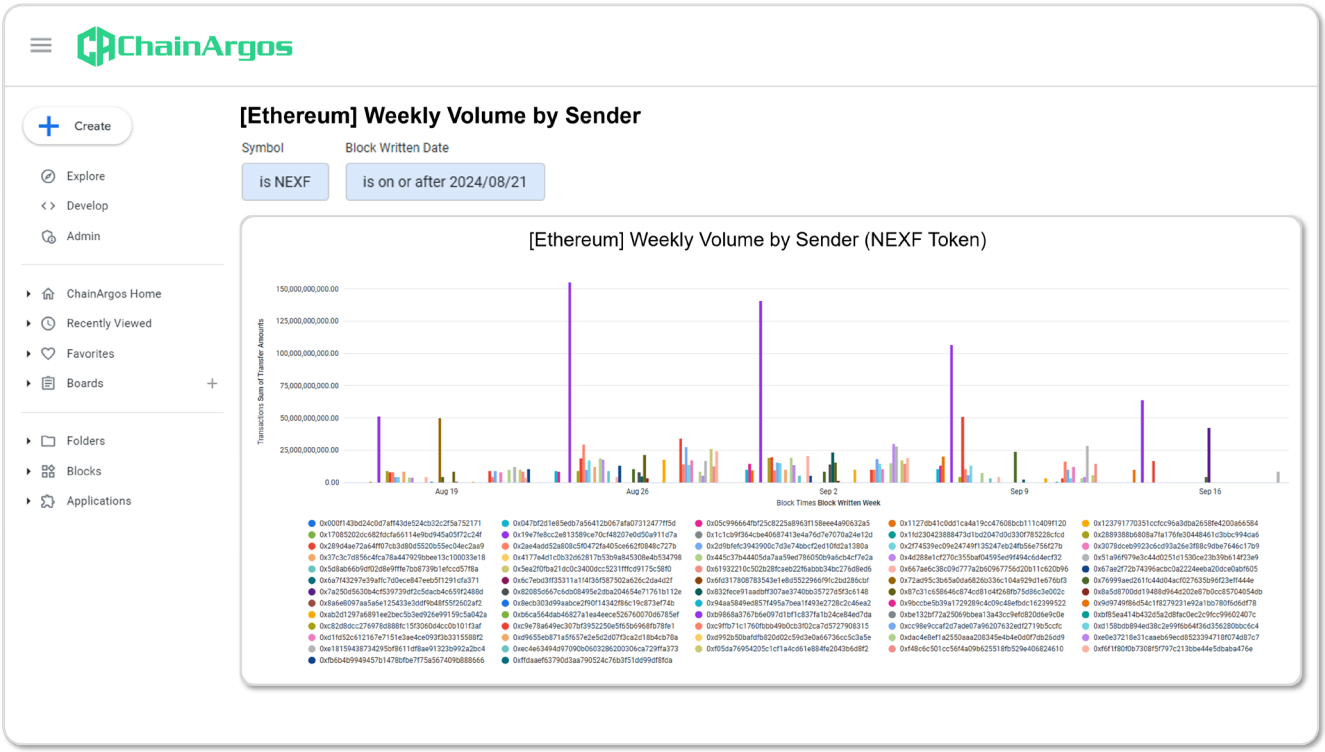

Figure 3. Weekly Volume by Sender of the NEXF token with the addresses in various colors plotted on the horizontal axis and the Sum of Transfer Amounts on the vertical axis.

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The purple bar in Figure 3 is the NEXF Uniswap V2 Pool with contract address 0x19e7Fe8CC2E813589Ce70CF48207e0D50a911d7a (“NEXF Uniswap Pool”).

Notice the other senders of the NEXF token cluster mainly just below the 25 billion transfer mark and only exceed 50 billion tokens twice.

Observe the almost uniform distribution of NEXF tokens sent by the various addresses, consistent with unorganic transaction behavior.

In Figure 4. We look at the same data, only this time we use a daily scale.

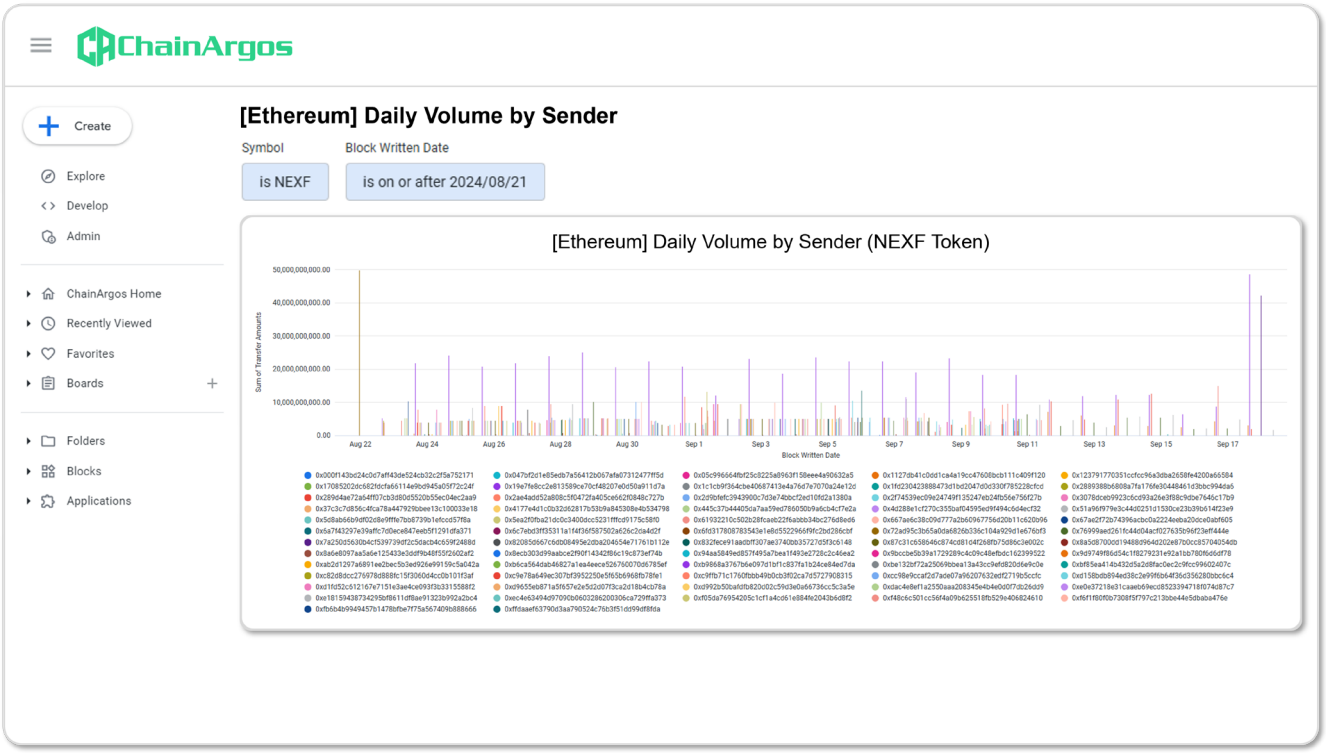

Figure 4. Daily Volume by Sender of the NEXF token with the addresses in various colors plotted on the horizontal axis and the Sum of Transfer Amounts on the vertical axis.

Again, notice how a clear pattern emerges for senders. Outside of the outliers, which are liquidity pools, the vast majority of senders of NEXF tokens cluster below what appear to be preset levels.

On average, almost all the other NEXF token-sending wallets hover around the 5 billion mark daily.

The “rhythm” of NEXF tokens being sent is also clear from the daily chart in Figure 4.

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3. Lessons Learned

The NEXF token is an interesting case study in wash trading on decentralized crypto-asset markets because there is no ambiguity as to the purpose of this transaction behavior.

In one sense, this is an idealized version of wash trading that is made even more obvious when examined using measures and dimensions combining both information about senders and the number of tokens sent.

While some of NEXF's transactions could have been organic trading, what little of that genuine activity existed was drowned out by the overwhelming wash trading activity.

This is not to say that wash trading exists with certainty whenever such transaction activity is observed, rather it raises red flags that if such transaction activity is noted, further investigation is warranted.

In practice, most "market makers" deploy slightly more sophisticated wash trading bots and algorithms, but by using a combination of measures, it is possible to gain better insight into the possible presence of such market manipulation.

Using measures such as:

- Number of Unique Transactions
- Number of Unique Senders
- Number of Unique Receivers
- Sum of Transfer Amounts
- Log Scale

combined, provides for better and more resilient analysis of transaction activity and provides the necessary insight to make better trading or enforcement decisions.

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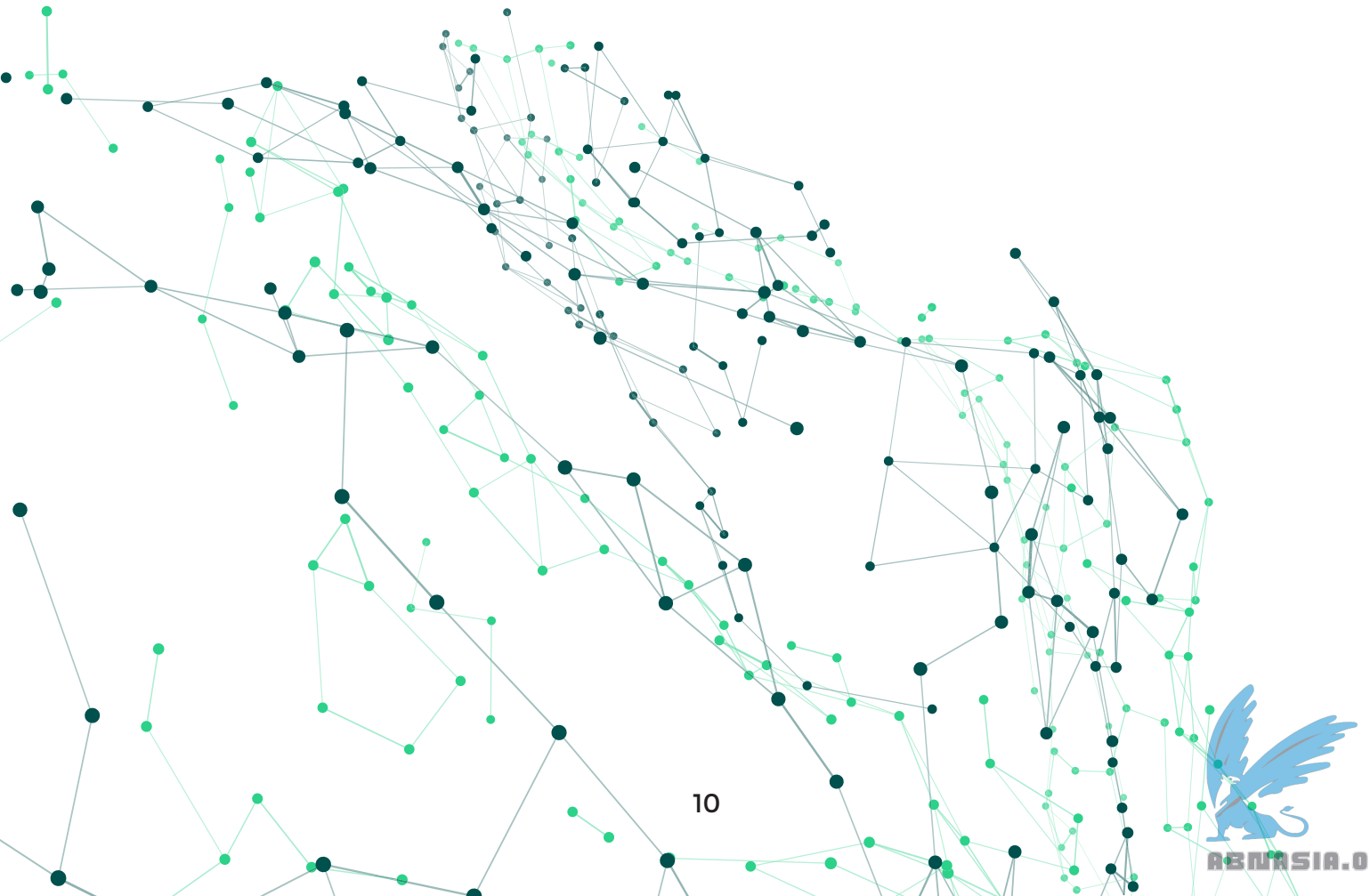
Who are we?

ChainArgos is the blockchain intelligence firm best known for uncovering crypto-asset exchange Binance's $1.4bn BUSD stablecoin undercollateralization, forcing the New York Department of Financial Services to take action.

We provide unparalleled blockchain intelligence by focusing on the financial drivers of transactions, facilitate investigations and analysis centered on the economic value of transfers, and provide insight into the motivation behind specific flows.

ChainArgos is recognized globally as a leader in blockchain intelligence.

We've tracked illicit flows funding terrorism and sanctions evasion, analyzed transaction patterns connecting global scams, and uncovered crypto-asset trading opportunities before the market.



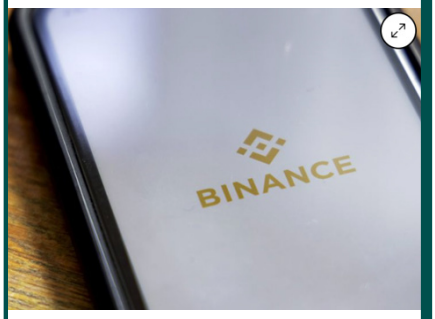
Where else have you seen us?

ChainArgos works with the United Nations, governments, central banks, financial institutions, hedge funds, proprietary trading firms, regulators, law enforcement and intelligence agencies, research institutes, universities, and crypto-asset service providers globally.

We're trusted by top news outlets including the Wall Street Journal, Bloomberg, Forbes, Fortune, Thomson Reuters, and the South China Morning Post, for unimpeachable blockchain intelligence.

Here's just a selection of our blockchain intelligence that created news:

Bloomberg



Binance Acknowledges Past Flaws in Maintaining Stablecoin Backing

- Blockchain analyst Reiter had flagged gaps in Binance-peg BUSD
- Binance says earlier 'operational delays' have now been fixed

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Did Digital Currency Group Profit From $60 million In North Korea Crypto Money Laundering?

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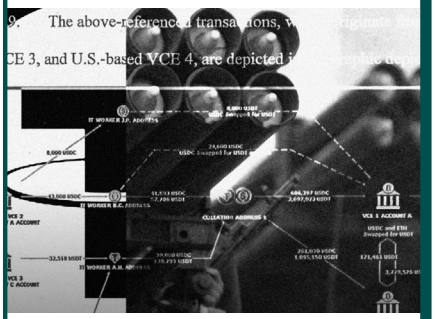

From Hamas to North Korean Nukes, Cryptocurrency Tether Keeps Showing Up

Tether has allegedly been used by Hamas, drug dealers, North Korea and sanctioned Russians

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The Shadow Dollar That's Fueling the Financial Underworld

Cryptocurrency Tether enables a parallel economy that operates beyond the reach of U.S. law enforcement

Bloomberg

Stablecoin Operator Moves $1 Billion in Reserves to Bahamas

- Move reflects worsening US banking conditions for crypto firms
- TrueUSD's circulation has more than doubled in the last month

South China Morning Post

How crypto investigators uncover scammers' blockchain billions, scale of money laundering in Asia

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Who uses blockchain intelligence?

Finance and Banking

Assess the risks and opportunities in crypto-assets, stablecoins, and decentralized finance. Develop innovative products, explore tokenization opportunities, and generate new revenue streams.

Compliance

Fight money laundering, expand know-your-customer tools, and combat the financing of terrorism while expanding your customer base. Manage risk from customer crypto-assets and confidently verify sources of crypto-asset wealth.

Law Enforcement

Terrorists and criminals are using blockchain technology to avoid the banking system, launder money, and fund operations. Blockchain wallet analysis and transaction tracing fights crime, prosecutes criminals, and tracks illicit fund flows.

Regulators and Policymakers

Develop and implement effective crypto-asset and stablecoin supervisory, licensing tax, compliance, and regulatory frameworks to foster innovation, while managing threats to national security and the financial system.

How are we different?

We deliver actionable blockchain intelligence.

Say “no” to pseudo-science and “yes” to blockchain intelligence you can count on for commerce, compliance, and crime-fighting.

ChainArgos is built by finance, legal, and technology professionals to deliver actionable blockchain intelligence focused on financially-relevant analysis.

Whether you’re looking to on-board a customer, determine source of wealth, or ensure your evidence isn’t rejected on appeal, our blockchain intelligence is based on established principles of statistics, math, and forensic science.

Extreme Versatility

Create compliance and commercially-driven analysis in a single place and arrive at better business decisions faster.

No-Code Customization

Build any query or analysis without programming skills or coding.

Financially-Relevant

Standard financial measures combined with blockchain intelligence for actionable insight.

Data Integrity

ChainArgos runs its own blockchain nodes, and we never enrich our data with yours, so you can be sure of data integrity.

API Ready

Robust and resilient APIs with 99.99% uptime. Minimal code required for easy integration.

Automated Alerts

Schedule automated alerts and reports via Email, Webhook, Amazon S3 and SFTP so you’re always in the know when something happens.

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How do we do it?

Blockchain intelligence is a relatively new industry, and it's not uncommon to hear of methods which have little basis in finance, let alone forensic science.

Let's look at one example to understand the limitations of blockchain tracing.

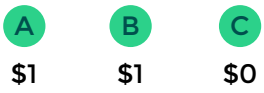


Fig. 1

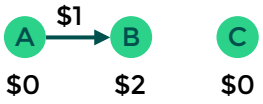


Fig. 2

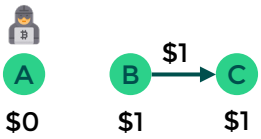


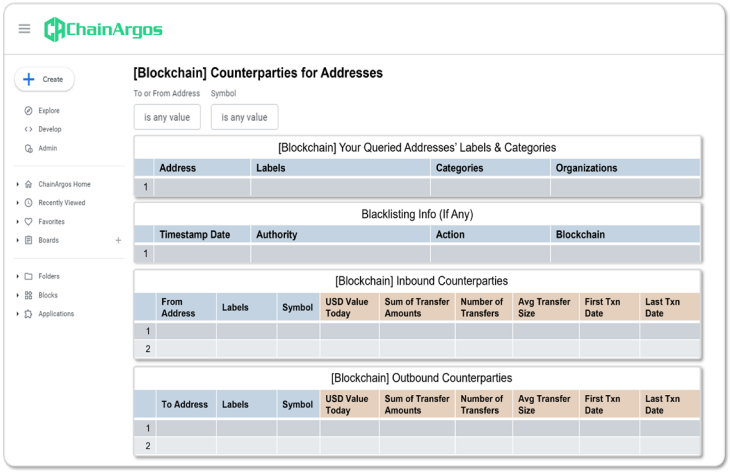
Fig. 3

In Fig. 1, A and B start with $1, while C starts with $0. In Fig. 2, A transfers their $1 to B who now has $2. Finally, in Fig. 3, B transfers $1 to C, who now has $1.

If it turns out A is an illicit actor, with what degree of confidence can we say that C has received $1 from illicit sources? 50-50?

Would you accept a "risk score" of 50%?

Follow the money.



Instead of passing off "risk scores" as "risk management" ChainArgos helps you follow the money.

Most blockchain transactions don't derive from a single source, and believing they do is what leads to poor outcomes.

Make better decisions by focusing on what matters - where the money went, where it came from, and where does it look like it's headed to?

How much does one address deal with another? What's the average transaction size? What's the frequency? What's the crypto-asset or stablecoin of choice? What's the transaction behavior? When did the transaction size change?

And so much more.

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Better attribution.

Don’t risk critical legal, trading, and compliance decisions to questionable or subjective attribution methods. Trust math and science.

ChainArgos is the only blockchain intelligence firm that delivers programmatic address labels and wallet tags that are unassailable whether you’re making business decisions or preparing to sue someone.

Blockchain addresses are automatically ranked and labeled based on a variety of factors including:

- **Transaction Count**: the number of transactions by an address. Sending $100,000 in one transaction may have very different implications from sending 10 transactions of $10,000 each. Either way, you’ll know the difference.
- **Lifetime Sent/Received**: lists the biggest sender and/or receiver of any given crypto-asset or stablecoin currently. Markets are extremely dynamic. The biggest movers today may not be the same tomorrow.
- **Max. Historical / Current Balances**: helps you decide whether an address is participating in affiliated crypto-assets and/or stablecoins based on their maximum historical balance and who’s stocking the highest current balances.
- **Recipient Number**: gives you a sense of whether they were an early adopter, or even possibly an insider of a crypto-asset or stablecoin. Recipients are ranked according to the date and time they received a crypto-asset or stablecoin.

Say “no” to dodgy wallet tagging and “yes” to attribution you can trust.

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