



## **Bridging the Data Divide: New York State Department of Financial Services (NYDFS) Mandate for Integrated On-Chain and Off-Chain Compliance in Virtual Currency Operations**

This whitepaper from Glacier21 examines how the regulatory landscape for virtual currency (VC) businesses and financial institutions must rapidly evolve to address financial crime risks in the digital asset ecosystem. Recent issuances from regulatory bodies, including the recent September 17, 2025, Notice on Use of Blockchain Analytics from the New York State Department of Financial Services (NYDFS) underscores a critical shift: New York banking organizations must now leverage robust compliance programs that integrate both on-chain blockchain data and complementary off-chain intelligence. Other national and international financial institutions are certain to follow suit.

Glacier21's platform, focused on off chain analysis to enhance on chain analytics, is uniquely positioned to address this mandate. We recognize that on-chain data alone is insufficient to meet escalating regulatory standards for Know Your Customer (KYC), Transaction Monitoring, and Sanctions Screening. Our deep, unique, and multi-faceted analysis details the limitations of pseudonymous on-chain data and outlines the architectural necessity of a holistic solution—Glacier21's Integrated Risk Intelligence Platform—which seamlessly bridges wallet addresses with real-world identities and risk data. This capability is the fundamental requirement for Covered Institutions and VC Entities to effectively comply with the enhanced NYDFS expectations and proactively mitigate financial crime risk.

### **The Regulatory Imperative: NYDFS Guidance on Virtual Currency Compliance**

Recognizing that as institutional engagement with digital assets grows, the NYDFS has responded by extending its supervisory expectations. The September 17, 2025, guidance explicitly advises Covered Institutions (New York banking organizations and branches/agencies of foreign banking organizations) engaged in, or contemplating, Virtual Currency-Related Activity (VCRA) to reference and consider leveraging the blockchain analytics tools previously recommended for VC Entities. This solidifies the requirement for robust, technology-driven compliance controls that accommodate each institution's unique risk appetite and makes off chain analytics an imperative.

The Department suggests that Covered Institutions consider blockchain analytics for specific, high-priority use cases, all of which demand the enriched context provided by integrated data:

NYDFS Suggested Use Case	Glacier21 Integrated Solution
<p><b>Screening wallets</b> of customers who have disclosed or exhibited crypto-related transactions, to assess risk exposure.</p>	<p><b>Advanced Wallet &amp; Entity Screening:</b> Connects customer-associated wallets to Glacier21's vast database of on-chain labels and attributable off-chain entity data for granular risk scoring.</p>
<p><b>Verifying the source of incoming funds</b> originating from Virtual Asset Service Providers (VASPs).</p>	<p><b>Enhanced Provenance Tracing:</b> Combines on-chain flow analysis with real-world VASP identity and licensing status (off-chain) to verify fund origin and risk exposure.</p>
<p><b>Monitoring the crypto ecosystem holistically</b>, to assess customer (e.g., VASP) exposure to money laundering, sanctions violations, or other predicate crimes.</p>	<p><b>Holistic Ecosystem Monitoring:</b> Integrates deep on-chain risk typologies (mixers, darknet) with off-chain VASP/counterparty risk intelligence and behavioral analytics for a complete, attributable risk picture.</p>
<p><b>Identifying and gauging the risk of third parties</b> (e.g., VASP counterparties) with which a customer has engaged.</p>	<p><b>Counterparty Risk Attribution:</b> Utilizes Glacier21's core Attribute Linkage capability to transition from a pseudonymous address to a verifiable, risk-rated third-party entity or individual.</p>
<p><b>Evaluating expected versus actual activity</b> (e.g., dollar thresholds) of customers engaging in virtual currency activity.</p>	<p><b>AI-Driven Anomaly Detection:</b> Leverages Graph Neural Networks (GNNs) on the combined dataset to proactively detect deviations from established off-chain profile and on-chain behavior, flagging complex, evasive patterns.</p>

Through this recommendation, NYDFS is sending a strong and clear regulatory message that traditional financial institutions must upgrade their risk-management frameworks to employ new tools, such as blockchain analytics, with enhanced capabilities to mitigate, meet and diminish the evolving threats of illicit finance.

**The Glacier21 Unique and Important Offering: Bridging the Data Gap**

While public blockchain ledgers provide immutable transaction records (On-Chain Data), their inherent pseudonymity creates a fundamental compliance challenge. On-chain data alone cannot reliably provide the real-world identity of the beneficial owner or the full context (e.g., purpose) of a transaction. This is where Glacier21 comes in.



Data Source	Strengths	Limitations for Compliance
<b>On-Chain Data</b>	Immutable ledger, auditable transaction history, fund flow tracing.	<i>Pseudonymous wallet addresses, lack of real-world identity, limited context (e.g., purpose of transaction).</i>
<b>Off-Chain Data</b>	Real-world entity identification, risk alerts, sanctions watchlists, behavioral analytics.	<i>Disconnected from the on-chain activity, requires specialized processes for association.</i>

Glacier21 solves this compliance challenge by providing the critical link—an integrated platform where on-chain activity is instantly and reliably cross-referenced with curated off-chain intelligence. This unified approach transforms raw blockchain transactions into actionable, attributable risk intelligence.

### Glacier21's Core Capabilities: The Integrated Risk Intelligence Platform

Glacier21 is specifically engineered and its design is the perfect complement to meet and exceed the NYDFS's enhanced requirements through a foundation built on non-negotiable integrated capabilities:

#### 1. Robust Data Foundation and Comprehensive Labeling:

- **Deep On-Chain Labeling:** Industry-leading coverage of wallets associated with known typologies (sanctioned entities, darknet, scams) for immediate, effective risk profiling.
- **Vast Off-Chain Tagging:** The proprietary ability to gather, validate, and associate real-world identity markers (corporate names, ownership data, social profiles, email addresses) from diverse, vetted sources (Web3 social platforms, dark web intelligence, proprietary research) to pseudonymous wallet addresses.

#### 2. Advanced Attribute Linkage and Analysis:

- **Core Attribute Linkage Engine:** This is the single most critical feature. Glacier21's proprietary algorithms automatically link raw wallet addresses to their associated off-chain identifiers, instantly transforming a pseudonymous address into a verifiable, attributable entity necessary for KYC/AML/Sanctions compliance.

- **AI-Driven Anomaly Detection (GNNs):** Leveraging sophisticated machine learning, including Graph Neural Networks (GNNs), to analyze the combined on-chain and off-chain data graph. This detects complex, multi-hop, and evasive financial crime patterns—such as the layering techniques used in money laundering—that rules-based systems cannot identify.

### 3. Enhanced Provenance Tracing with Context:

- Glacier21 goes beyond simple coin-flow charting. It overlays on-chain transaction history with the real-world context provided by off-chain data, delivering a complete, defensible picture of fund lineage and identifying high-risk activities like the structured use of mixers and tumblers.

## Application of Integrated Intelligence to NYDFS Compliance

Glacier21's architecture directly addresses the critical risk mitigation areas highlighted by the NYDFS, providing Covered Institutions with the necessary tools for a resilient compliance program, including by providing critical information on the identification of ultimate beneficial owners, third party risk assessments, and an enhanced ability to trace funds and provide effective transaction monitoring capabilities:

Compliance Area	Glacier21 Integrated Solution Impact	NYDFS Compliance Goal Fulfilled
<b>Augmenting KYC and CDD</b>	Connects on-chain wallet addresses to off-chain beneficial owner/entity data, extending due diligence to assess counterparty exposure by analyzing combined on-chain activity and organizational risk data.	<i>Reliable identification of ultimate beneficial owners of funds and assessment of third-party risk.</i>
<b>Effective Transaction Monitoring</b>	Seamless data integration enables Enhanced Provenance Tracing, utilizing AI on the combined dataset to identify complex, high-risk typologies with greater accuracy.	<i>Ability to trace fund provenance and detect complex, high-risk typologies using all available data.</i>
<b>Robust Sanctions Screening</b>	Provides a crucial dual-layered defense by automatically screening both the on-chain addresses and the associated off-chain identifiers against global sanctions lists.	<i>Comprehensive screening against watchlists by connecting on-chain identifiers to off-chain, real-world entities.</i>

## Conclusion

The NYDFS Notice of September 17, 2025, is a clear regulatory message: comprehensive Virtual Currency compliance for financial institutions hinges on moving beyond siloed, pseudonymous on-chain data and such capabilities are an imperative. Covered Institutions must adopt a holistic risk intelligence framework.

Glacier21's Integrated Risk Intelligence Platform is the essential tool for this new regulatory era and to meet the demands and requirements of these emerging regulatory mandates. Our ability to seamlessly and accurately connect the pseudonymous nature of digital assets to verifiable, risk-rated real-world entities is the single most critical factor in establishing a compliant, robust, and proactive financial crime mitigation program in the digital asset space, ensuring Covered Institutions can confidently meet the NYDFS's supervisory expectations.

### **Glacier21 Overview & Authors**

Glacier21, founded by former FBI and Department of Justice leaders along with expert developers, provides a government-grade risk intelligence solution to combat illicit cryptocurrency activities. Our platform uniquely integrates both on-chain and off-chain data from sources like social media, data leaks, and the deep/dark web to uncover complex connections between crypto wallets, businesses, and individuals. By using AI-driven analysis, Glacier21 helps clients efficiently detect and mitigate risks associated with activities such as terrorism financing, money laundering, and fraud. For more information visit [www.glacier21.com](http://www.glacier21.com) or email us at [info@glacier21.com](mailto:info@glacier21.com).

**George “Ren” McEachern, CEO:** Ren is a highly accomplished executive with over 20 years of experience driving innovation and growth in both the public and private sectors. As a former FBI Supervisory Agent, Ren was known for implementing a global strategy against complex financial crime, money laundering, and asset recovery. In 2023, he co-founded Glacier21 to solve the crucial off-chain data gap in blockchain risk and compliance intelligence. A respected authority on financial crime and cryptocurrency, Ren frequently appears on cable news networks, has published on Bloomberg Law and featured on prominent podcasts including Thinking Crypto and The Bitcoin Frontier. Contact Ren at [ren@glacier21.com](mailto:ren@glacier21.com).

**Robert Appleton, COO / GC:** Robert specializes in representing both foreign and U.S. companies and individuals in cross-border matters, including cryptocurrency fraud, asset recovery, whistleblower claims, and defending clients before U.S. regulatory agencies. With over 14 years at the DOJ as a senior and later supervisory federal prosecutor, Robert led

numerous high-profile international fraud and corruption cases, as well as money laundering and international trade prosecutions. He has also been featured in the New York Law Journal with his article “[Cryptocurrency Fraud: Trends, Challenges and Recovery](#)” demonstrating his deep expertise in the field of cryptocurrency fraud and recovery. Robert co-founded Glacier21 in 2023 and can be contact at [robert@glacier21.com](mailto:robert@glacier21.com).

**Michael Borowski, Head of Product:** Michael has over 9 years of experience in blockchain, data analytics, building data retrieval and data display tools. In 2019, he co-founded a web3 enabled platform that aggregated thousands of sources from around the web using AI topical tagging, scoring, and summaries. The platform gathered data from a variety of sources including news outlets, media streams, publications, patents, and SEC filings to provide AI generated summaries and curated feeds. This platform was acquired by a private company in 2022. In 2023, Michael co-founded Glacier21 and can be contacted at [mike@glacier21.com](mailto:mike@glacier21.com).

