DTCC

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BUILDING THE SETTLEMENT SYSTEM OF THE FUTURE

A WHITE PAPER TO THE INDUSTRY

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OUR VISION FOR THE SETTLEMENT SYSTEM OF THE FUTURE

Dear Clients -

As the backbone of the U.S. financial industry, DTCC operates the most reliable, cost-effective, and efficient settlement system in the world.

Every business day – across multiple counterparties and markets – DTCC's subsidiaries, National Securities Clearing Corporation (NSCC) and The Depository Trust Company (DTC), clear and settle hundreds of billions of dollars in equities transactions on a next day (T+1) and same-day (T+0) basis.[1] However, this volume of T+1 and T+0 transactions represent only a small fraction of what DTCC processes for the industry every day. The majority of what DTCC processes is on a standard T+2 settlement cycle, occurring two days after the trade. One of the challenges the industry is solving for is how to shorten the standard settlement cycle to T+1 or T+0 for all equity trades.

While shortening a settlement cycle sounds simple enough – if everyone in the industry agrees to move their transaction activity and processing clocks ahead by one day – the execution is complex. Equity clearance and settlement is part of a large ecosystem of global financial markets, interconnected processes, and linked systems. Accelerating the U.S. cash market settlement cycle to shorter than T+2 will have both upstream and downstream impacts on other parts of the market structure, such as derivatives, securities lending, financing, foreign clients and foreign exchange, and collateral management.

DTCC and our industry partners are actively working towards a path to T+1. Working with SIFMA and ICI and engaging with regulators,[2] DTCC continues building consensus across the industry. We have actively involved our membership with a series of workshops and formed working groups to consider issues, such as risk mitigation, investor benefit and costs, and operational resiliency. One of the key takeaways from these workshops is that the current T+2 settlement cycle is very much a convention of generations of layered and complex market practice – and shortening that cycle for all market participants will require new approaches, an evolution of business capabilities across the industry, and, most importantly, industry coordination.

Settlement is one of DTCC's most powerful and critical processes. In this paper, we lay out our vision for the most robust and efficient settlement system of the future, including our support for the efficiency offered by central counterparty clearing. We also provide an update on DTCC's DLT offering, Project Ion, which holds the promise of new settlement functionality supported by next-generation technical capabilities.

Murray Pozmanter
Head of Clearing Agency Services and Global Business Operations

1 DTCC Settlement by the Numbers
2 DTCC Press Release: SIFMA, ICI & DTCC Comment on Progress Around T+1 Effort in Letter to Chair Gensler (Aug 17, 2021)

BUILDING THE SETTLEMENT SYSTEM OF THE FUTURE

One of the areas of exposure remaining in the settlement system today is the risk of a sudden event that could affect the transfer of cash or ownership of securities from trade execution through trade settlement.

In a settlement cycle, one of the greatest risks affecting market forces is a product of time. As a shortened settlement cycle decreases the amount of time between trade execution and settlement, the degree of counterparty, credit and default risks is lowered. Accelerating settlement for all "regular way" trades to just one day after the trade, T+1 will decrease the amount of capital and margin required to be deposited at NSCC, the U.S. equities cash market central counterparty (CCP), for risk management purposes, while still preserving the efficiencies of guaranteed settlement and multilateral trade netting. A move to T+1 will also make the proceeds of securities transactions available to end investors faster.

The current T+2 settlement cycle is a convention of market practice, which means the biggest challenge of moving to a shortened settlement timeline will be process and procedure.

The Role of the CCP: Protecting the Capital Markets and Investors

One of the primary benefits that NSCC provides to the industry is **multilateral netting and guaranteed settlement**, where NSCC becomes the CCP to, and guarantees the settlement of, trades. This allows brokers to offset buy and sell positions executed against multiple counterparties into a single counterparty and reduces payment/security obligations and provides a guaranty of settlement for those obligations – thus also reducing credit and financial exposure.

- **Netting:** Throughout each day, NSCC automatically and efficiently nets trades in each participant's portfolio and calculates and assesses margin requirements to manage counterparty default risk in the system. Netting through NSCC greatly reduces clients' margin requirements, creating significant capital efficiencies.

  In 2020, NSCC cleared an average of $1.7 trillion daily in broker-to-broker transactions for 50+ exchanges and trading venues, an average of over 173 million equities transactions every day, netting to a factor of 98%.[3]

- **Trade Guaranty:** As the CCP that provides multilateral netting for all cash trading activity, NSCC creates significant capital efficiencies. As a CCP, NSCC also guarantees the settlement of the remaining obligations. Unlike bilateral settlement, NSCC's CCP model guarantees the settlement of the trade, so sellers will get paid and buyers will receive their securities irrespective of the solvency of a trading counterparty. While participant defaults do occur from time to time, the industry has never experienced a financial loss following the liquidation of a defaulting participant for trading activity that occurs within NSCC's CCP protection, and non-defaulting participants have always been made whole versus their trading activity with the defaulted participant.

  The trade guaranty enables blind trading, which ensures anonymity to both the buyer and the seller in a transaction, and facilitates the growth of the U.S. capital markets. It effectively absorbs counterparty risk – something non-guaranteed bilateral trading cannot do.

- **Risk Management:** Risk management is the primary function of DTCC – and has been since the organization's inception almost 50 years ago. DTCC's risk management role entails effective and efficient identification,

3 DTCC 2020 Annual Report

measurement, monitoring and robust control of credit, market, liquidity, systemic, operational and other risks for the DTCC enterprise, its users and the marketplace. DTCC continuously works to develop and maintain risk requirements to help reinforce risk management practices and standards, adhering to rigorous international regulatory standards to maintain model coverage of no less than 99% coverage. DTCC protects the U.S. cash markets – the most liquid markets in the world.

- **Margin:** NSCC calculates margin overnight and intraday. Client trading activity, especially during periods of high volatility, may trigger a need to collect additional margin. The additional margin calls are designed to support settlement and to protect the industry and the clearing agency from possible losses in the event of a counterparty default.

Benefits of a Shortened Settlement Cycle

Shortened settlement times reduce market risk and margin requirements, which will allow firms to use those resources in other ways.

- **Margin Reduction:** For broker/dealers, a move to T+1 would lead to a significant reduction in margin and collateral requirements. Today an average of over $13.4 billion is held in margin every day to manage counterparty default risk in the system. Shortening the settlement cycle would help strike an improved balance between risk-based margining and procyclical impacts. Last year, DTCC's risk analysis and risk model simulations showed that the Volatility component of NSCC's margin could potentially be reduced by approximately 41% by moving to T+1, assuming current processing and without any other changes in client behavior. Over the last year, the Volatility component has accounted for approximately 60% of NSCC's total margin. Notably, in times of market volatility, this amount is significantly greater.[4]

- **Risk Reduction:** While a shorter settlement cycle would deliver reduced margin requirements to the industry and lower costs for investors, the systemic and process improvements needed to achieve T+1 would also enhance market resilience. The move to T+1 would have many benefits, such as reducing systemic risk, operational risk, liquidity needs, buy-side counterparty exposure, and broker-to-broker counterparty risk.

Modernizing DTCC's Post-Trade Platform

DTCC serves a community of institutional and retail broker/dealers, custodians, regional banks, buyside and service providers. Foundational to our core and our way of operating is considering the collective impact of changes.

DTCC has been building industry support for the move to T+1 for several years, and market participants are active and engaged in these projects. Like the move to T+2 in 2017, this industry-wide, multi-year initiative to further shorten the standard settlement cycle is not driven by regulatory mandate but rather led and coordinated by market participants, demonstrating the industry's ongoing commitment to continual improvements in the shared operation of our capital markets.

Continuing where the industry left off in 2017 and leveraging the work from modernization efforts in 2018 and 2019, DTCC has extensively explored the impact and benefits of accelerated and optimized settlement to T+1 for the entire U.S. equities market. The drivers identified as critical to the success of reimagining the evolution of the

4 DTCC White Paper: Advancing Together: Leading the Industry to Accelerated Settlement (Feb 2021)

financial services industry by the industry working group included delivering capital, liquidity and operational efficiency in service of providing overall business resiliency to the market. Effective use of technology will help us meet those business goals.

As a precursor to the accelerated settlement discussion, DTCC has examined all aspects of our equity clearance and settlement systems and identified opportunities to modernize operations, workflows, and core systems to deliver an optimal post-trade platform of the future. Our integrated strategic roadmap represents both our target-state vision and the associated initiatives that will drive DTCC's transformation over the next several years, all to deliver the greatest impact to the industry.

A COMPARISON OF SETTLEMENT MODELS

During the events of early 2021, the topic of same day settlement was very much in focus, with many calls for instantaneous, real-time gross settlement to replace the current settlement cycle.

Although the majority of what is processed through DTC originated from T+2 activity, DTC has always been a T+0 settlement platform and settles billions of dollars' worth of T+0 activity every day. Likewise, NSCC already accepts and nets thousands of T+0 trades received prior to the industry-established 11:30 AM ET cutoff, and delivers netted T+0 activity to DTC for same day settlement.[5]

The concept of real-time gross settlement should not be confused with a netted T+0 settlement. With netted T+0, trades are netted and settled at the end of the same trading day, which maintains some of the most significant benefits of netting by providing periodic netting cycles throughout the day. Settlement can be achieved as close to the time of the trade as possible without creating capital inefficiencies and introducing new, unintended market risks. DTCC supports and is committed to considering with our clients and industry partners what measures will be needed to deliver netted T+0 after the industry solidifies the plan for T+1.

While real-time gross settlement does provide certain benefits and may be appropriate in certain cases, it also presents substantial challenges for the industry and potentially tremendous inefficiencies. Real-time gross settlement eliminates important netting and financing opportunities because it requires that all transactions be funded on a transaction-by-transaction basis, requiring clients to have funds and securities available before the settlement of every transaction. This means the entire industry – clients, brokers, investors – loses the liquidity and risk-mitigating benefit of netting, which is particularly critical during times of heightened volatility and volume.

The industry's primary goal must be to create efficiencies without introducing additional risk to markets.

DTCC supports and is committed to considering with our clients and industry partners what measures will be needed to deliver netted T+0 after the industry solidifies the plan for T+1.

Real-time gross settlement isn't a simple technical solution, it imposes a very complicated structural change to the markets, and the enormous benefits of multilateral netting may be lost, or at the very least, seriously compromised. Additionally, areas such as financing, securities lending, processing schedules, institutional trade processing and non-U.S. transactions would also require restructuring, and industry participants would likely need to completely abandon any remaining batch processes. Redesigning these business processes to be real-time could introduce even more risk into the processing environment and should remain the exception rather than the industry norm.

The industry's primary goal must be to create efficiencies without introducing additional risk to markets. DTCC believes that central clearing and netting continues to be the most efficient and beneficial way of settling trades, irrespective of the technology or the settlement cycle, and is critical to the safe and efficient functioning of the U.S. capital markets, regardless of settlement date.

5 DTCC Settlement by the Numbers

	NSCC CCP Clearing	NSCC Non-CCP Multilateral Netting	NSCC Bilateral Clearing	RTGS
Netting	>98% netting benefit realized Netting supported for T+2, T+1 and T+0 trades Fails are marked-to- market and re-netted daily	Approximately 73% netting benefit realized; significant variability across asset classes[6] Fails are marked-to-market twice per month	Approximately 27% bilateral netting Fails are marked-to-market twice per month	No netting available
Guarantee of Settlement	Guaranteed through actual obligation settlement	Guaranteed through contractual settlement at NSCC	No guarantee	Pre-positioning of securities and cash likely required in lieu of guarantee
Risk Management	• Liquidation with degree of confidence • Back-testing • Stress-testing		Varies by counterparty	Pre-positioning of securities and cash likely required in lieu of risk management
Supported Settlement Cycles	Flexible settlement cycles supported to match trading needs: T+0, T+1, T+2, Extended settlement			Real-time gross only
Capital Treatment	RWA calculated at CCP 2%	RWA calculated at 20-100% depending on settlement counterparty		TBD – these areas have not been explored in detail
Balance Sheet	Failed activity is recorded on a net basis vs. CCP	Failed activity is recorded per settlement counterparty basis		
Integrated NSCC/ DTC Services	Integration into broader NSCC/DTC ecosystem • ACATS • ETF Create / Redeem and collateral services • Obligation Warehouse • Prime Broker processing • ID Net • Asset Services processing • ITP Settlement • Securities Financing Transactions[7] • Tax • Option exercise and assignment settlement • Fully-Paid-For Account processing • DTC settlement	NSCC's multilateral and bilateral nettings are integrated into broader NSCC/DTC ecosystem • ACATS • ETF Create / Redeem and collateral services • Obligation Warehouse • Asset Services processing • ITP Settlement • Securities Financing Transactions* • Tax • Option exercise and assignment settlement • DTC settlement		

6 Based on DTCC's August 2021 data.

7 NSCC's proposed SFT Clearing service is pending regulatory approval.

PROJECT ION: AN ALTERNATIVE SETTLEMENT PROCESS

Cryptocurrency, digitized assets, distributed ledger technology (DLT) and other innovations increasingly are integral parts of our discussions about the evolving financial services industry, as firms, stakeholders and policymakers assess the challenges of implementation and regulation. **DTCC's Project Ion[8] has demonstrated that settlement in a T+1 or T+0 environment are effective use cases for DLT.**

DTCC tested a Project Ion proof-of-concept as a DLT use case in mid-2020 and expanded the functionality into a fully-fledged prototype in early 2021. The prototype provided pilot users with multiple interfaces including adoption of a DLT Node, an API interface, and a fully developed User Interface, specifically designed to help visualize and quickly get "hands-on" with the platform.

The proposed design was inspired by key concepts from our strategic roadmap work, including the Settlement Optimization and Accelerated Settlement initiatives, and was specifically modeled around a T+0 settlement cycle — though capable of supporting any settlement cycle.

Multiple DTCC clients participated in the prototype and provided feedback to help shape DTCC's view of possible enhancements to DTCC core clearance and settlement processes and workflows. With six months of successful testing now complete, DTCC has gathered enough quantitative data and qualitative feedback from clients to guide the next steps: to build out a production ready workflow and a roadmap for full industry integration and adoption.

WHAT IS PROJECT ION?

Project Ion introduces new clearance and settlement functionality, leveraging distributed ledger technology (DLT) as a pivotal piece of technology to help bring about new efficiencies in clearance and settlement. Project Ion is aligned with DTCC's innovation agenda to address key challenges and opportunities in market infrastructure services.

With DTCC's years of experience, Project Ion holds the promise of new settlement functionality supported by robust technical capabilities.

Project Ion's Functionality

While the Project Ion prototype provided a forward-looking example of the transformation of clearance and settlement onto DLT, the full integration of DLT into the U.S. clearance and settlement processes will require careful planning, including time for the industry and DTCC to build confidence that the technology satisfies requirements for scalability, resiliency, governance, and security and is sufficiently robust to support the volumes and speeds required by the U.S. cash equities markets. This will also include time for the industry and DTCC to build out the supporting governance framework to support a critical industry infrastructure on top of DLT. DTCC's delivery roadmap offers advancements in functionality and adoption by clients to be driven by the industry's readiness to advance.

DTCC has been careful to plan for early and later adoption of the functionality and technology offered by Project Ion, to be responsive to clients' own development agendas. For clients, this means that while the general industry can move ahead to achieve T+1 accelerated settlement on DTCC's current classic systems, those clients ready to integrate onto the ledger can consider taking their development efforts in a different direction where applicable and begin to ready their firms for the future operating model without waiting for full-market adoption.

8 DTCC's Project Ion Case Study (May 2020)

Project Ion commits to successfully:

- Offering a clearance and settlement option for the industry that will never compromise on DTCC's core benefits of risk management and volume capacity, including netting and the trade guarantee of the CCP.

- Supporting new features, with seamless interoperability between the Project Ion platform and classic settlement platforms.

- Building and implementing a platform that ensures adherence to DTCC rigorous regulatory standards across resiliency, stability, security, risk, and controls.

- Providing for optional adoption of the technology, the Project Ion platform will interoperate with DTCC's existing technology while the industry advances to full adoption.

The Path to Production

The Project Ion prototype was built outside of DTCC's core systems as a functional model, utilizing test data for pilot users. The Project Ion minimal viable product (MVP) model will be piloted within DTCC with live, production data. The production journey will begin with the Project Ion MVP, which will allow clients to directly integrate into the ledger for DTC Deliver Order transactions processed on the classic DTC system. Classic DTC settlement will remain the authoritative record.

The MVP, scheduled for pilot release in 1Q 2022[9], will support bilateral deliver order transactions that will be initiated by pilot participants through client nodes hosted by DTCC.

- A Project Ion-submitted transaction will be processed through the Project Ion platform and then passed on to classic DTC systems for settlement processing.

- As the Project Ion-submitted transaction is processed by the classic DTC systems, status change messages will be sent back to the Project Ion platform and posted on the Project Ion ledger.

- The MVP will allow participants to access a parallel infrastructure and records for limited bilateral transactions.

- The classic DTC systems will remain the authoritative source for all transactions, including Project Ion-submitted transactions.

Subsequent phases will extend the functionality of the infrastructure and recordkeeping. Later phases are expected to extend functionality over time to realize the reconciliation efficiencies offered by DLT. Expansion phases are likely to include provision of access through a client-hosted node, expand the transaction types processed by the Project Ion platform and see increased adoption of the functionality by clients.

DTCC is committed to evolving the discussion around shortening the settlement cycle and the development of Project Ion settlement process, and we will continue to share our plans with our entire membership. Client participation and feedback at every iterative step of this journey will be pivotal to the success of the new Project Ion platform.

9 Pending regulatory approval

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