

REVISION HISTORY

T+2 Test Approach: Detailed Testing Framework

| Version | Date | Other |
|-----------|--------------|---|
| VERSION 1 | July 2016 | http://www.ust2.com/pdfs/UST2-Testing-WhitePaper.pdf |
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Change Log: Version 2

| Type | Description | Page No. |
|----------------------|---|-------------|
| Updated Information | DTCC Security Master File (SMF) refresh schedule in the PSE U | Page 4 |
| Updated Information | Purging of test transactions during the PSE U environment reset | Page 5 |
| New Information | Modification to the Obligation Warehouse (OW) refresh schedule in the PSE U environment | Page 6 |
| New Information | New test scenario -“Bank Holiday -Double Settlement Day scenario” added to the Test Calendar (Test Cycle 6) | Page 7 |
| New Testing Scenario | Testing for Interoperability with Bloomberg, SS&C and Omgeo | Page 29 |
| New Testing Scenario | Bank Holiday- Double Settlement Day scenario | Page 44, 42 |

Change Log: Version 3

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| Updated Information | Revised dates for the conversion day test in Testing Cycle 8 | Page 7 |

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1. INTRODUCTION

The financial services industry, in coordination with applicable regulators, is planning to shorten the settlement cycle for U.S. equities, corporate bonds, municipal bonds, unit investment trusts (UITs), and financial instruments comprised of these security types (e.g. ADRs and ETFs) from the current trade date plus three business days (T+3) to trade date plus two business days (T+2) on September 5, 2017.

The move to a T+2 settlement cycle has broad industry and regulatory support, and has been an ongoing industry effort for well over two years. The move to T+2 will generate significant risk reductions for all market participants, and will require organizations across the financial services industry to assess and potentially modify aspects of their trade processing lifecycle.

The number of changes being made to support the move to T+2 – and the magnitude of the firms making the changes – results in the need for a comprehensive and well-coordinated industry test to confirm industry readiness, and ensure a successful industry implementation.

The purpose of this paper is to provide DTCC Members with a detailed plan for testing T+2 changes with DTCC and other industry infrastructures.

The paper includes detailed information on:

- The structure of the T+2 industry test, including information on other industry infrastructures participating in the industry test, testing cycles and testing schedules
- DTCC's T+2 and T+3 test environments, including information on the role of the different environments, how to connect to the different environments and how to get all the required access in both environments to support testing
- Suggested test scenarios which Members can use to begin preparing their own T+2 test plans

Testing between Member firms and their customers, and Member firms and their service providers is out of the scope of this paper. However, Members are encouraged to work with all applicable stakeholders to develop and execute robust and comprehensive T+2 test plans.

This paper reflects the work done by the T+2 Industry Testing Working Group and incorporates input from all impacted market segments, including issuers, asset managers ('40Act and non-'40Act funds), broker-dealers (retail and institutional), custodians, service bureaus, transfer agents, exchanges, clearing firms and market infrastructures.

2. BACKGROUND

Testing for T+2 has been recognized as a critical success factor by the industry from the start of the T+2 initiative.

In late 2015, DTCC assembled a testing working group, comprised of representatives from all impacted market segments, to begin developing a T+2 test approach. The output of this effort was captured in a [high-level test approach document](#), published in February of 2016. The purpose of the high-level test document was to help Member firms understand how the T+2 test would be constructed, to allow them to begin configuring their own test plans and test environments. While the high-level document may help Members construct test plans and test environments, DTCC recognized the need to develop more detailed information to help with the execution of the T+2 test.

Following the release of the high-level test approach document, the T+2 Industry Testing Working Group was reconvened and began working on a detailed T+2 test document.

Although the bulk of this paper addresses testing with the DTCC subsidiaries impacted by the move to T+2 (Omgeo, NSCC and DTC), there was a desire at the industry-level to expand the test to include other industry infrastructures. As such, the test has been expanded to include exchanges (Nasdaq and Bats) as well as the Options Clearing Corporation (OCC).

Although the hope is to make this paper as comprehensive as possible, DTCC recognizes that some aspects of the T+2 test are still evolving, and that there remains a significant amount of time between now and when testing is scheduled to begin. Furthermore, DTCC recognizes the complexity of a test of this magnitude and the coordination required to ensure the test is successful. As a result, this paper includes information on the testing management provided by DTCC, as well as a process for communicating any testing-related updates, should updates be required.

Any update to this paper will be communicated to members and published to the [UST2 Website](#). Members can also access updated versions of this document through the [T+2 page](#) on the DTCC Learning Center website.

3. TEST STRUCTURE

This section outlines the framework for T+2 testing with DTCC's subsidiaries – Omgeo, NSCC and DTC. This section also outlines the involvement of other industry infrastructures participating in the industry T+2 test, testing timelines, reset schedules and testing involvement requirements.

Participating Infrastructures

The industry infrastructures participating in the industry test will include DTCC's subsidiaries Omgeo, NSCC and DTC as well as exchanges Bats and Nasdaq, and the OCC.

Bats and Nasdaq will provide Members an opportunity to perform end-to-end testing from trade execution to trade settlement. The OCC will provide Members an opportunity to test option Exercise and Assignment (E&A) activity. Test connections between the industry infrastructures will be established to allow for robust end-to-end testing. Members will need to review their connections to the various infrastructures to ensure they have all the test access they need to support the T+2 test (connectivity instructions to each of the participating infrastructures are contained later in the paper).

Industry Test Scope

As previously mentioned, the industry T+2 test is designed to support full end-to-end testing. For exchange activity, Members will be able to submit test trades to Nasdaq or Bats for execution. Executed trades will be submitted to NSCC for clearance and ultimately to DTC for settlement. For institutional activity, Members will be able to submit test transactions to Omgeo, or other institutional trade matching providers¹, and have those matched transactions automatically submitted to NSCC and/or DTC for clearance and settlement. Members will be able to exercise open option contracts in the OCC's test environment and have the corresponding option trades sent to NSCC for clearance as part of the OCC exercise and assignment (E&A) process. Specific test events will also be established to test option expiration dates and double settlement dates which will occur upon implementation.

T+2 testing will not be mandated. Members can test T+2 changes as they see fit based on the changes made to their respective systems and processes. Although this paper contains a number of suggested test scenarios, Members do not need to execute each scenario. Rather, the scenarios should be used as a guideline for each Member's own test plans.

As an alternative to generating test trades via the participating exchanges, DTCC will establish a Transaction Management Tool for Members to use, which will include the functionality to upload test trades directly in NSCC's Universal Trade Capture system (UTC) for processing (see Section 6 for additional information on the Transaction Management Tool).

The test scenarios contained in this paper are the suggested scenarios as determined by the T+2 Industry Testing Working Group. DTCC's test environment will be constructed to support each of the identified scenarios for those Members that choose to execute them. In most cases, supporting the test scenarios will be accomplished by identifying set CUSIPs that meet specific testing parameters (T+2 testing CUSIPs). Only existing production CUSIPs will be used to support T+2 testing; DTCC will not establish "dummy" CUSIPs for T+2 testing purposes. Most DTCC-eligible production CUSIPs will also be available in the test environment and available for Members to use for testing.

¹ The framework for testing of institutional transactions may be expanded to include other institutional trade matching providers once they establish direct interfaces with DTC and/or NSCC.

T+2 testing CUSIPs will include:

- CUSIPs for various product types such as Common Stock, Corporate Bonds, Municipal Bonds, UITs
- CNS and non-CNS-eligible CUSIPs such as multilaterally netted, bilaterally netted, trade-for-trade
- CUSIPs undergoing various corporate action events
- CUSIPs with position in DTC and CUSIPs without position in DTC

To ensure position in DTC, DTC will develop functionality to periodically reset position balances (see the Test Cycles section below). For those T+2 testing CUSIPs identified as having position in DTC, DTC will automatically establish securities positions for all DTC Members. For those CUSIPs identified as having no position in DTC, DTC will automatically delete any securities positions in DTC for all Members.

Please refer to the [Test CUSIPS for T+2 Industry Testing document](#) for the list of T+2 test CUSIPs.

Additionally, based on Member feedback DTCC is changing its earlier published plan (as included in version 1 of this document) (hyperlink for version 1: <http://www.ust2.com/pdfs/UST2-Testing-WhitePaper.pdf>) to update the Security Master File (SMF) refresh schedule in the PSE U environment. Currently, DTCC copies over SMF updates from production to PSE daily. To minimize the impact of production SMF changes on members T+2 test plans, DTCC had proposed modifying the SMF update schedule to coincide with the beginning of each test cycle.

Based on Member feedback regarding its potential impact on other parallel testing in the PSE U environment, DTCC will maintain its existing daily SMF refresh schedule in the PSE U environment during the T+2 industry testing period.

In the event the SMF refresh in the PSE U environment changes the parameters of any T+2 test CUSIPs over the course of a test cycle, DTCC will inform Members of the change and its resulting impact on the T+2 test scenario(s) via [UST2.com](#) and the [T+2 page](#) on the DTCC Learning Center website

Existing NSCC, DTC and Omgeo input and output formats will be utilized for T+2 industry testing with one exception: NSCC's Consolidated Trade Summary (CTS)² new output format will be utilized for T+2 testing.

T+2 Industry Testing Schedule

As outlined in the [February 2016 T+2 high-level test approach document](#), DTCC will be establishing a new test environment to allow Members to test in T+2 and T+3 environments concurrently. As a way to minimize changes required by Members, DTCC plans to use its current test environment (the "PSE U" environment) to support T+2 testing, and to use its newly developed test environment (the "PSE A" environment) to support T+3 testing. (This is addressed in greater detail later in Section 4)

The T+3 test environment (PSE A) will be available for Member testing beginning December 12, 2016. At that time, both environments (PSE U & PSE A) will be synchronized and running on a T+3 basis and producing new Consolidated Trade Summary (CTS) output formats. DTCC will begin converting its current test environment (PSE U) to T+2 on January 17, 2017. DTCC's T+2 test environment is scheduled to be available for Member testing beginning February 13, 2017, providing an approximate six-month period for industry testing, prior to T+2 implementation on September 5, 2017.

Although many DTCC Members are connected to the current DTCC test environment (PSE U), many may not have all the functionality required to test their T+2 changes. Similarly, DTCC's PSE A environment established to support T+3 testing

² NSCC's CTS Rewrite project is scheduled to be implemented in 2Q 2017, prior to the industry's move to T+2 on September 5, 2017.

is new. Any Member looking to test in the new T+3 test environment (PSE A) will require new connectivity and new system entitlements.

Detailed instructions are provided later in this paper to aid Members with their connectivity and entitlements to DTCC's test environments, and the test environments of the other supporting industry infrastructures. Members are strongly advised to begin this test set up process early, as we expect a high number of Members to be updating their test connectivity.

The industry's T+2 testing is scheduled to occur during regular business days and regular business hours. However, the timing of some key events may be different in DTCC's production environment and DTCC's test environment (See Table in Appendix A for the timing of key cut offs in DTCC's T+2 (PSE U) test environment).

As mentioned earlier in this paper, Nasdaq, Bats and OCC will be participating in the industry T+2 test. In addition to reviewing test connectivity to DTCC, Members looking to execute tests involving Nasdaq, Bats and OCC should also ensure they have all the connectivity and access they need to support such tests. (Please refer to Section 5 – 'Trade Execution via Exchanges' for test connectivity to Bats and Nasdaq, and OCC test scenarios in Section 7 for test connectivity to OCC).

Test Cycles

T+2 testing is scheduled to run from February 13, 2017 to implementation on September 5, 2017. Testing will be conducted using bi-weekly testing cycles.

The testing cycles will work as follows:

- Testing cycles will begin on a Monday, or first business day of the week, with the first testing cycle scheduled to begin February 13, 2017
- DTCC will reset the test environment at the end of each test cycle (end of day Friday or last business day of the applicable week)
 - o DTCC will purge all test transactions for the following products in the T+2 test environment. This will include all "in-flight"/unsettled test transactions. Members should note that all in-flight/unsettled transactions in the test environment will be purged including transactions in the CUSIPs not specifically identified as T+2 testing CUSIPs
 - » All incomplete/unsettled NSCC Equity Clearing test transactions, including:
 - Trades received in NSCC's Universal Trade Capture application (UTC) that are being stored as When-Issued (WI) or Sellers' Option (SO) for a future Settlement Date
 - Continuous Net Settlement (CNS) failing positions and future settling positions. This will include CNS positions for Exchange Traded Funds (ETF), Automated Customer Accounts Transfer Service (ACATS) and ID Net test transactions
 - » All incomplete/unsettled NSCC's Corporate, Municipal and UITs (CMU) test transactions
 - » All incomplete/unsettled ACATS test transactions
 - » All incomplete/unsettled Omgeo TradeSuite test transactions

- o As previously noted, DTC will automatically establish security positions in some defined T+2 testing CUSIPs across all DTC Members. This will allow transactions in certain CUSIPs to settle in DTC while ensuring transactions in other CUSIPs do not settle in DTC. DTC will reset security positions in the designated T+2 CUSIPs at the beginning of each testing cycle. At the beginning of each test cycle, DTCC will automatically give each participants a position of 500,000,000 in the T+2 test CUSIPs designated as “having” position and will automatically delete any position in the T+2 test CUSIPs designated as “having no position”. This process will only apply to the specific T+2 testing CUSIPs identified by DTCC, and will not impact Member positions in other non-controlled CUSIPs
- o Additionally, DTCC will modify the Obligation Warehouse (OW) refresh schedule in the PSE U to synchronize it with the test environment reset. Currently, OW data in the PSE U is refreshed with end of day Friday’s production data each week. DTCC will change the frequency of this refresh from once every week to once every two weeks to coincide with the end of the T+2 test cycle / PSE U environment refresh
- Members can submit test transactions throughout the testing cycle. Test transactions will be processed in accordance with the T+2 production life cycle
- Members can participate in as many testing cycles as they want
- The test environment will replicate production holiday processing; holidays naturally occurring during the industry testing window will allow Members to test holiday processing scenarios

Although bi-weekly test scenarios will be the standard cycle, cycles may be shortened or extended if required. Any change to the testing cycle will be done in coordination with the industry and communicated to the industry prior to the change. The following table shows the industry test cycle schedule.

Table 1:

TEST CALENDAR (bi-weekly testing cycles beginning February 13, 2017 through August 25, 2017. The test environment will continue to be available for T+2 testing post August 25, 2017.)

| | | |
|---|-------------------------|--|
| Test Cycle 1 | 2/13/17 through 2/24/17 | |
| Test Cycle 2 | 2/27/17 through 3/10/17 | |
| Test Cycle 3 | 3/13/17 through 3/24/17 | T+2 Implementation - Double Settlement Day Scenario (T+3 Production copy over EOD Friday 3/10/17, T= Monday 3/13/17. Double Settlement Day= Wednesday 3/15/17) |
| Test Cycle 4 | 3/27/17 through 4/7/17 | OCC Exercise & Assignment (E&A) test |
| Test Cycle 5 | 4/10/17 through 4/21/17 | T+2 Implementation - Double Settlement Day Scenario (T+3 Production copy over EOD Friday 4/7/17, T= Monday 4/10/17, Double Settlement Day = Wednesday 4/12/17) |
| Test Cycle 6 | 4/24/17 through 5/5/17 | Bank Holiday - Double Settlement Day Scenario (Bank Holiday in the PSE U = Monday 5/1/17, Double Settlement Day= Wednesday 5/3/17) |
| Test Cycle 7 | 5/8/17 through 5/19/17 | |
| Test Cycle 8 | 5/22/17 through 6/2/17 | T+2 Implementation - Double Settlement Day Scenario (T+3 Production copy over EOD Friday, 5/19/17, T = Monday 5/22/17, Double Settlement Day = Wednesday 5/24/17) Holiday Processing - Memorial Day, Monday 5/29/17 |
| Test Cycle 9 | 6/5/17 through 6/16/17 | |
| Test Cycle 10 | 6/19/17 through 6/30/17 | OCC E&A test |
| Test Cycle 11 | 7/3/17 through 7/14/17 | T+2 Implementation - Double Settlement Day Scenario (T+3 Production copy over EOD Fri, 6/30/17, T= Monday 7/3/17, Holiday- Independence Day-Tuesday 7/4/17, Double Settlement Day= Thursday 7/6/17) |
| Test Cycle 12 | 7/17/17 through 7/28/17 | OCC E&A test |
| Test Cycle 13 | 7/31/17 through 8/11/17 | |
| Test Cycle 14 | 8/14/17 through 8/25/17 | |
| | | |
| | | |
| HOLIDAYS DURING THE TESTING WINDOW | | |
| Presidents' Day | Monday, 2/20/2017 | |
| Good Friday | Friday, 4/14/2017 | |
| Memorial Day | Monday, 5/29/2017 | |
| Independence Day | Tuesday, 7/4/2017 | |

DTCC Member Test Support

In support of the industry T+2 test, DTCC is streamlining its test connectivity and access processes for Members (see Section 4 for test connectivity and access instructions).

DTCC will establish bi-weekly industry calls (at the end of each testing cycle) to discuss test results, issues and recommendations. DTCC will also establish a dedicated T+2 testing mailbox at T2testing@DTCC.com.

Members should submit all testing related questions and requests to this mailbox. The mailbox will be monitored by a DTCC T+2 test support team throughout regular business days and hours. The team will coordinate with Members to ensure timely resolution of issues and provide status update notifications.

DTCC will publish any updates to the T+2 test plan on the [UST2 web page](#), and on the [T+2 page](#) on the DTCC Learning Center website. DTCC will also send email notifications to its Members.

DTCC has issued an Important Notice (#z0136) to all DTCC Members in order to remind both the Members testing T+2 functionality and the Members testing non-T+2 functionality, regarding upcoming modifications to the PSE U environment for T+2 industry testing.

4. DTCC TEST ENVIRONMENT – CONNECTION AND ACCESS

DTCC will utilize its existing test environment (PSE U) for T+2 industry testing and establish a new test environment (PSE A) to support T+3 testing. DTCC is facilitating a streamlined process for Members to connect to DTCC’s test environments and to obtain subscriptions to NSCC, DTC and Omgeo functionality, input and output files, MQ messages and Web applications.

The current scope of testing functionality in the PSE U environment will not be impacted by T+2 industry testing; applications **unaffected** by the T+2 changes will continue to operate in the current PSE U environment.

Only Members looking to test T+3 functionality in the applications/outputs that are impacted by the T+2 changes will need to connect to the new PSE A environment. Any application/functionality that is not impacted by the T+2 changes can continue to be tested in the existing PSE U environment.

The chart below outlines the applications/functionality that will be available for testing in each test environment.

Table 2:

| APPLICATIONS | T+2 test environment (existing PSE U environment) | New T+3 test environment (PSE A environment) |
|--|---|--|
| NSCC Equity Clearing | | |
| Universal Trade Capture (UTC) | Yes | Yes |
| New Consolidated Trade Summary (CTS) output | Yes | Yes |
| Exchange Traded Funds (ETF) | Yes | Yes |
| Correspondent Clearing | Yes | Yes |
| SMART/Track for Buy-In | Yes | Yes |
| Continuous Net Settlement (CNS) | Yes | Yes |
| CNS Voluntary Organization | Yes | Yes |
| NSCC Cashiering/Settlement Close | Yes | Yes |
| Obligation Warehouse | Yes | Yes |
| Automated Customer Account Transfers (ACATS) | Yes | No |
| Cost Basis Reporting Service (CBRS) | Yes | No |
| Clearance Dashboard (new product), which includes: <ul style="list-style-type: none"> • CTS dashboard • UTC Web (replaces Correspondent Clearing, includes new Transaction Management Tool w/ upload feature) • CNS Web | Yes | Yes |
| All DTC Settlement applications/functionality including Settlement Web | Yes | Yes |
| Omgeo applications/functionality | Yes | No |
| Corporate, Municipal and UITs (CMU) Real-Time Trade Matching application (RTTM) | Yes | No |
| Wealth Management applications/functionality | Yes | No |
| Asset Servicing / Corporate Actions applications/functionality including CA Web | Yes | No |

DTCC T+2 Testing Set-Up:

DTCC has attempted to make the setup/connectivity to the test environments as simple and streamlined as possible. However, the connection and subscription process can be complicated. To aid in the process, DTCC has established a [T+2 page](#) on the DTCC Learning Center website to provide Members with a single, centralized location to access instructions and request forms relevant for testing set-up in both the DTCC PSE A and PSE U test environments.

The T+2 page will include the following information:

- Instructions and required forms to connect to DTCC's test environments (the T+2 (PSE U) test environment and the T+3 (PSE A) test environment)
- Instructions and required forms to subscribe to T+2 relevant NSCC, DTC and Omgeo input and output products in the PSE U environment
- Instructions and required forms to subscribe to DTC and NSCC input and output products in the PSE A environment
- Instructions and required forms to subscribe to web applications in the PSE U and the PSE A environment
- File specification and instructions for the upload feature of the new Transaction Management Tool

Member Connectivity to the existing PSE U or the new PSE A test environment

- DTCC will maintain its current procedure (outlined in detail below) for Members to request connectivity to the PSE U or the PSE A test environment
- Members are encouraged to review their existing interface with NSCC, DTC and Omgeo (as applicable), and engage with DTCC as early as possible if an additional interface to the PSE U or PSE A test environment is required
- Members are advised to allow at least 10 business days for new connectivity setup

Steps for requesting connectivity to DTCC's PSE U environment or PSE A environment:

- Complete a [Request for Router Exchange Form](#)
- DTCC's IP addresses for both the PSE U and the PSE A test environments are stated on the Router Exchange form. Firms must specify their IP addresses and ports for desired protocols (FTP, NDM, MQ, PBS, PTS)
- Complete an [MQ Page One Form](#) to request a new MQ channel to the PSE U and/or the PSE A test environment or to make changes to an existing MQ channel
- Firms that have existing connectivity to the PSE U test environment via internet and plan to connect to the PSE A test environment the same way, will not require any new connectivity setup. Their existing connection can also be utilized for the PSE A test environment. Firms should email their respective SFTP details to T2testing@dtcc.com
- Members can download the Router Exchange Request Form and the MQ Page One Form from the [T+2 page](#) on the DTCC Learning Center website, complete the forms and email the completed forms to T2testing@dtcc.com
- Once completed forms are received, DTCC will contact the relative Member firms, using the contact information provided on the form, to provide requested information, and execute connectivity and data transfer sets

Subscription to test input and output products in DTCC's test environments:

- DTCC has created interactive request forms for Members to specify T+2-relevant NSCC, DTC and Omgeo inputs and outputs (Datatrak, Autoroute, MQ inputs and outputs) they need to/from the PSE U environment and any NSCC and DTC inputs and outputs they need to/from the PSE A environment
- Member firms can download these forms from the [T+2 page](#) on the DTCC Learning Center website. Members can leverage the information on the forms to evaluate any gaps in their existing subscriptions to NSCC, DTC, and Omgeo inputs and outputs
- E-mail the completed forms to T2testing@DTCC.com
- Allow at least 10 business days for new subscription setup

Subscriptions to Web Products in the test environments

- DTCC has established an integrated process for Members subscription and entitlements to web products in the PSE U and PSE A test environments
- DTCC will automatically replicate each Member's existing access and entitlements to web products in the current PSE U environment to the same web products in the new PSE A environment, without any action on the part of the Member. This would apply to PBS/PTS/Settlement Web as well as to web products that are accessed via DTCC Test Web Portal
 - Similarly, Members will only need to request new access to web products in the PSE U environment. Requests can be made by submitting a DTCC Systems Super Access Coordinator (SAC) form to T2testing@dtcc.com. DTCC will automatically provide the same access to that web product in the PSE A environment
 - Once access is established, each Members' respective Super Access Coordinators would need to entitle internal users to the PSE U environment only. DTCC will replicate Members' entitlements from the PSE U to the PSE A environment on a daily basis

Specific instructions related to web applications that are in scope for T+2 testing are listed below.

Subscriptions to PTS/PBS/Settlement Web:

- DTCC will offer PBS/PTS/Settlement Web in both the PSE U and the PSE A test environments and each region will have a distinct IP address
- Firms that do not currently have access to PTS/PBS/ Settlement Web in the PSE U test environment and require access must:
 - Complete a [Request for Router Exchange Form](#)
 - Complete a [DTCC Systems Super Access Coordinator \(SAC\) form](#)
 - Complete [entitlement request form](#) for the creation of PBS User IDs
- Firms that already have access to PTS/PBS/Settlement Web in the PSE U environment and require access to it in the new PSE A environment must:
 - Complete a [Request for Router Exchange Form](#)
 - Members can utilize their existing user ID to log on the PBS/PTS/Settlement Web in the PSE A environment
 - No action is required for entitlements to the PTS/PBS/Settlement Web in the PSE A environment. Once the router form is complete, DTCC will automatically provision the Member's SAC with PTS/PBS/Settlement Web in

the new PSE A environment

- o As today, SACs will be responsible for provisioning users at their firms with access to PTS/PBS/Settlement Web in the PSE U test environment. DTCC will automatically copy over entitlements from the PSE U to the new PSE A environment
- Member firms can download these forms from the [T+2 page](#) on the DTCC Learning Center, complete the forms and email completed forms to T2testing@dtcc.com

DTCC Web Portal:

- DTCC is enhancing its Test Web Portal to include links to web applications in the new PSE A and the existing PSE U environments
 - o The application links in the portal will indicate whether this is using the PSE U or PSE A test environment; applications that connect to the new PSE A region will be represented as (New T+3). As an example, links to Real Time Obligation Warehouse (ROM) web application in the PSE U and PSE A environments will display as follows:
 - » PSE U – “ROM – Real Time Obligation Matching”
 - » PSE A – “ROM (New T+3) – Real Time Obligation Matching”
 - o Application links to the PSE A environment will be activated on the DTCC Test Web Portal in tandem with the new PSE A environment go-live scheduled for December 12, 2016
 - o On December 12, 2016, Super Access Coordinators will be able to view and access application links to web applications in the PSE A test environment, for which they have existing entitlements to in the current PSE U environment
- The following DTCC Web Portal applications are in-scope for T+2 testing:
 - o Corporate Action (CA) Web (**available in the PSE U environment only**)
 - o Exchange Traded Funds (ETF) (**available in both the PSE U and PSE A environments**)
 - o Real Time Obligation Matching (ROM) (**available in both the PSE U and PSE A environments**)
 - o Clearance Dashboard (CLD - new web product) (**available in both the PSE U and PSE A environments**)
 - » CTS Dashboard
 - » UTC Web (replacing Corresponding Clearing), will include the Transaction Management Tool with file upload feature. The following roles will be made available for this tool:
 - UTC Transaction Inquiry
 - UTC Transaction Enter
 - UTC Transaction Upload
 - UTC Transaction Submit
 - » CNS Web
 - o Member firms can continue to use their existing login credentials for accessing the DTCC Test Web Portal
- As mentioned before, for Members that already have access to web products in the PSE U environment, DTCC will automatically replicate their entitlements in the new PSE A environment and no further action is necessary

- The only exception is the Clearance Dashboard, which is a new web application. Members requiring access to the Clearance Dashboard or any other web products that they currently do not have access to in the PSE U environment must complete and submit a DTCC [Systems SAC form](#) to T2testing@dtcc.com
- Firms that plan to use NSCC's Transaction Management Tool (defined in more detail below) to submit test trades directly into NSCC's trade capture application (UTC) for testing must request access to the Clearance Dashboard.
 - o DTCC will establish SAC entitlements at the Clearance Dashboard level
 - o The SACs will be responsible for provisioning internal users within their respective firms to the underlying applications (UTC, CNS Web, CTS dashboard) and roles (such as UTC Transaction Inquiry, UTC Transaction input, UTC Transaction upload or UTC Transaction submit). The SACs will need to provision internal users in the existing PSE U environment only; DTCC will automatically replicate Members' entitlements from the PSE U to the PSE A test environment.
 - o The PC Web application will maintain its existing functionality. No new entitlements are required. Outputs from both the PSE U and the PSE A test environments will be available from the same location. Outputs from the new PSE A test environment will contain the suffix – T3. As an example:
 - » Report from existing PSE U test environment – CNS MISC ACTIV STMT
 - » Report from new PSE A test environment – CNS MISC ACTIV STMT T3

5. TRADE EXECUTION VIA EXCHANGES

Bats and Nasdaq will participate in T+2 testing allowing firms to test transactions from order execution, including each firm's own trade execution systems, internal trade routing and reconciliation processes.

- Members wanting to submit test transactions to Bats and Nasdaq must ensure they are connected to the respective test environments. Details on connecting to Bats' and Nasdaq's test environments are provided below
- Members can submit test transactions to Bats' or Nasdaq's test environment utilizing respective production input formats
- Exchanges will provide applicable transaction output to Members utilizing production formats
- DTCC will provide specific production CUSIPs for suggested test scenarios. However, all production CUSIPs listed on the exchanges will be eligible for testing
- As in production, Bats and Nasdaq will accept various settlement indicators on the test orders and report matched test transactions to NSCC's UTC in the test environment for downstream processing
- UTC will utilize the settlement indicator to assign the appropriate settlement date to these test transactions (test transactions with "Regular Way" (RW) settlement indicator will be assigned a T+2 settlement date versus T+3 currently)

Testing via Bats:

- The following four Bats exchanges will participate in T+2 testing: Bats Exchange, Inc. (BZX), Bats Y-Exchange, Inc. (BYX), EDGA Exchange, Inc. (EDGA) and EDGX Exchange, Inc. (EDGX)
 - o Each exchange has its own/separate test environment
 - o A single connectivity process provides access to all Bats exchanges
- Input/output formats for testing:
 - o All participating Bats exchanges share common production input and output formats. These existing production formats will be used to support testing
- Test environment availability:
 - o Test environments will be available during the following times on regular business days:
 - » BZX and BYX- 6:00 ET - 17:00 ET
 - » EDGA and EDGX – 6:00 ET – 20:00 ET
 - » Test environments will not be available on weekend and holidays
- Test Transaction Matching and Routing:
 - o Test transactions will be matched as in production
 - » Buy orders will be matched with sell orders in the same CUSIPs utilizing production matching parameters

- o In addition, Bats provides automated order generator functionality in the test environment, whereby Bats can provide simulated liquidity in identified CUSIPs
 - » Test transactions in identified CUSIPs can be matched versus NSCC's test contra account number 0122. NSCC will provide specific CUSIPs eligible for the automated order generator in Q4 2016
 - » Members may send orders priced at or more aggressive than the current NBBO in any of the identified test symbols for execution against this simulated liquidity
- o Bats will route matched transactions to NSCC's UTC in the test environment in real-time and provide standard output to members
- o Once received, NSCC will report the transaction to Members using existing UTC test output
- To connect to the Bats test environment:
 - o Members should contact Bats at tradedesk@Bats.com or call 913-815-7001. Bats Members that don't already have an order entry session in the test environment may request one

Testing via Nasdaq:

- Nasdaq exchange will participate in T+2 testing
- DTCC will provide specific production CUSIPs to be utilized for suggested scenario testing via Nasdaq. However, all production CUSIPs listed on the exchange will be eligible for testing
- Input/output formats for testing:
 - o Production input and output formats will be utilized for testing
 - o Members will utilize production input formats to submit test transactions to Nasdaq's test environment
 - o Nasdaq will provide applicable output to Members utilizing production formats
- Test environment availability:
 - o Test environment will be available from:
 - » Monday through Thursday, 7:30 ET to 22:00 ET (However, trades executed after 21:00 ET will be rejected by NSCC)
 - » Friday, 7:30 ET to 16:00 ET
- Test Transaction Matching and Routing:
 - o Test transactions will be matched as in production
 - » Buy orders will be matched with sell orders in the same CUSIPs utilizing production matching parameters
 - o As in production, Nasdaq will accept various settlement indicators, route matched transactions to NSCC's UTC in the test environment in real-time and provide standard output to Members
 - o Once received, NSCC will assign the appropriate settlement date to the test transactions based on settlement indicator from the exchanges
- To connect to Nasdaq's test environment:
 - o Members wanting access to Nasdaq's test environment should contact tradingservices@Nasdaq.com

6. TRANSACTION MANAGEMENT TOOL

NSCC will provide a Transaction Management Tool with file upload feature for Members that do not want to submit test transactions through exchanges.

- Members can utilize the file upload feature of the Transaction Management Tool to directly introduce test transactions into NSCC's UTC system in the test environment. One feature of the tool will also allow the manual entry and submission of transactions via a data entry form
 - o Members can submit test trades versus another NSCC Member as the counterparty to the transaction or versus NSCC's test contra account numbers 0122 or 0123 (Members are encouraged not to enter trades versus another NSCC Member without prior agreement from the contra-Member. Doing so could disrupt another Members' test results)
- This tool can also be utilized to submit Correspondent Clearing and Qualified Special Representative (QSR) test transactions to UTC in the test environment
 - o As in production, test transactions must be submitted by a 9A Member, and can only be between counterparties with existing 9A-9B relationships in the production environment (DTCC will replicate production 9A-9B relationships in the test environment)
- Additionally, Members that only want to test NSCC processing of OCC Exercise & Assignment (E&A) trades can utilize the Transaction Management Tool to create/simulate an OCC E&A test trade and directly submit it to UTC in the test environment
- The Transaction Management Tool will be accessible from the UTC product within the Clearance Dashboard. Firms planning to use this tool must request access to the Clearance Dashboard (See Section 4 for additional information on the Clearance Dashboard)
- File specification and instructions on the upload feature of the Transaction Management Tool can be accessed via [T+2 page](#) on the DTCC Learning website

7. DTCC TESTING SCENARIOS

This section outlines the suggested scenarios as determined by the T+2 Industry Testing Working Group with DTCC's subsidiaries – DTC, NSCC and Omgeo, and the involvement of other industry infrastructures participating in the test (Bats, Nasdaq and OCC). As mentioned earlier, T+2 testing is not mandated. Members can elect to test any of the scenarios based on their respective testing requirements.

NSCC Trade Capture and Trade Clearing

DTCC's subsidiary, NSCC, has a number of processes that will be supported in the industry T+2 test. These processes include, NSCC trade capture, trade matching (CMU), ETF creation and redemption and trade clearing.

NSCC Trade Capture

NSCC's Universal Trade Capture system (UTC) will accept trade input from 6:00 ET - 21:00 ET during regular business days in the T+2 (PSE U) test environment. DTCC will reject trade input received outside of this time window. Members have the following options to introduce trades into NSCC's UTC in the test environment:

- Members can submit test trades to Bats' or Nasdaq's test environment for execution. As in production, exchanges will report matched test transactions to NSCC's UTC in real-time
- Alternatively, NSCC Members can directly introduce test transactions into NSCC's UTC in the test environment via a new Transaction Management Tool which includes a file upload feature. The tool will be accessible from the Clearance Dashboard, which is a new web application on the DTCC Web. Firms planning to use this tool must request access to the Clearance Dashboard (See section 4 for additional information on the Clearance Dashboard)
- NSCC will also support trade input of Correspondent Clearing (CORR) and Qualified Special Representative (QSR) test transactions into NSCC's UTC in the test system. CORR and QSR test transactions must be between counterparties with an existing 9A/9B relationship status in production environment
- DTCC will also coordinate with the Options Clearing Corporation (OCC) to test the Exercise and Assignment (E&A) of option contracts. Exercised/Assigned option contracts generate transactions which are fed directly from OCC to NSCC

NSCC's UTC system will generate applicable output to Members in real-time via FIX/MQ and via a Member intraday MRO (02981673), which will be produced approximately hourly from 8:30 ET to 21:45 ET. This will allow Members to reconcile transactions executed with transactions reported by NSCC.

As mentioned earlier, DTCC, with the input from the T+2 Industry Testing Working Group, identified a number of suggested test scenarios for Members to consider in their test planning. DTCC will designate specific CUSIPs to these test scenarios which will be monitored and controlled as part of the T+2 test. Members are encouraged to use the suggested test scenarios but can also do their own free form testing in other CUSIPs. Not all NSCC output will be supported as part of the T+2 test, and some output that is supported will be produced at a time that is different from when they are currently distributed in production (see Appendix A for key cut-offs in DTCC's T+2 test environment).

High Level Summary of Scripted Test Scenarios

The suggested trade capture test scenarios are grouped by a common denominator (such as test trades in CNS-eligible CUSIPs, non-CNS-eligible CUSIPs, CUSIPs undergoing corporate action event), and are structured in a similar manner:

- Members can assign various trade types/submission types to test trades (such as "Regular Way"-RW, "Next

Day"-ND, "Seller's Option"-SO, "Cash" - see column 3 "Submission Type")

- Members can submit test trades during different windows of time (see column 5 – "Days until settlement" & column 6- "Received by") and can test the expected CTS output across the various distribution cycles (see column 8 - "Process on CTS cycle #")
- Each test scenario will be processed in accordance with the production lifecycle. The netting type applicable to each of the suggested test scenario (C= CNS, Z= Cash, M= Multilaterally netted balance order, B=Bilaterally netted balance order, T=Trade-for-Trade balance order) and the net reason codes that CTS will assign to those netted trades are listed under column 9 – "Netting Type" and column 10 – "Net Reason Code" respectively
- As an example, test scenario 1 pertains to a "Regular Way" test trade (submission type = RW) in CNS-eligible CUSIP that is received by NSCC's UTC in the test environment before CTS Cycle 1 cutoff on Trade Date (T), which is two days before settlement. The test trade will be netted within CNS (Netting Type=CNS) and will be reported on CTS Cycle 1 with net reason code=1

Section A test scenarios:

Testing in CNS eligible trades (scenarios 1 through 24)

- These test scenarios will allow Members to test NSCC clearing under T+2 conditions for trades in CNS-eligible CUSIPs, while simultaneously testing new CTS output and the net reason codes that CTS will assign to those netted trades. These transactions will appear on the CNS Projection File and new Midday Projection File depending on the time they are received by UTC

Section B test scenarios:

Test CNS-eligible trades undergoing a Voluntary Corporate Action event (scenarios 25 through 48)

- These test scenarios will allow Members to test trades in CNS-eligible securities undergoing a voluntary corporate action event with two day cover/protect period
- Depending on the key dates of the voluntary corporate action event, trades will be processed as CNS, multilaterally netted balance order (M) or trade-for-trade balance order (T) (as indicated in column 9-"Netting Type")
- As an example, assuming Monday is expiration of a voluntary offer and Wednesday is cover protect date of the voluntary offer, trades will be processed as "M" or "T" in the following scenarios:
 - o As of regular way test trades received by UTC on Tuesday (i.e., T+1), between CTS Cycle 2 and CTS Cycle 3, with a trade date of Monday will be processed as multilaterally netted balance orders (example: test scenario 29)
 - o As of regular way test trades received by UTC on Tuesday (T+1) after CTS Cycle 3 with a trade date of Monday, all "Next day" settling trades (received on T+1), and Same day settling trades received on T+2 prior to CTS cycle 3, will be processed by NSCC as trade-for-trade (example: test scenario 34)

Section C test scenarios:

Test in CNS eligible trades undergoing a Dividend Distribution event (scenarios 49 through 72)

- These test scenarios will allow Members to test trades received by UTC undergoing a dividend under T+2 conditions (under T+2, the Ex-Date on a declared dividend will become one business day prior to record date). DTCC will provide specific CNS-eligible CUSIPs to test these scenarios
- Depending upon the Ex-Date and record date of the dividend and the type of trade and time it is received by UTC, it

NSCC Clearing T+2 Test Scenarios

| | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|------------------|--|------------------|---------|-----------------------|-------------------------------|-----------------------|------------------------|--------------|-----------------|
| | Testing Conditions | Submission type | | Days until Settlement | Received by | Trade received by UTC | Process on CTS cycle # | Netting Type | Net Reason Code |
| | | RW, ND, Cash, SO | | | | | | C,M,B,T,Z | |
| Section A | Trades in CNS Eligible CUSIPs | | | | | | | | |
| 1 | RW | RW | | 2 | before Cycle 1 cutoff | T | 1 | C | 1 |
| 2 | Seller's Option | SO | | 2 | before Cycle 1 cutoff | T | 1 | C | 1 |
| 3 | RW | RW | | 2 | btwn Cycle1 & Cycle 2 | T | 2 | C | 1 |
| 4 | Seller's Option | SO | | 2 | btwn Cycle1 & Cycle 2 | T | 2 | C | 1 |
| 5 | As of RW | RW | | 1 | btwn Cycle 2 & Cycle 3 | T+1 | 3 | C | 1 |
| 6 | As of Sellers Option | SO | non-Std | 1 | btwn Cycle 2 & Cycle 3 | T+1 | 3 | C | 1 |
| 7 | OCC E & A trade | RW | | 1 | before Cycle 1 cutoff | T | 3 | C | 3 |
| 8 | As of OCC E & A trade | RW | | 1 | btwn Cycle 2 & Cycle 3 | T+1 | 3 | C | 3 |
| 9 | Next Day | ND | non-Std | 1 | btwn Cycle 2 & Cycle 3 | T | 3 | C | 1 |
| 10 | As of RW | RW | | 1 | after Cycle 3, before Cycle 1 | T+1 | 1 | C | 1 |
| 11 | As of RW OCC E & A trade | RW | | 1 | after Cycle 3, before Cycle 1 | T+1 | 1 | C | 1 |
| 12 | As of Sellers Option | SO | non-Std | 1 | after Cycle 3, before Cycle 1 | T+1 | 1 | C | 1 |
| 13 | Next Day | ND | non-Std | 1 | after Cycle 3, before Cycle 1 | T | 1 | C | 1 |
| 14 | As of RW | RW | | 1 | btwn Cycle1 & Cycle 2 | T+1 | 2 | C | 1 |
| 15 | As of Sellers Option | SO | non-Std | 1 | btwn Cycle1 & Cycle 2 | T+1 | 2 | C | 1 |
| 16 | As of OCC E & A trade | RW | | 1 | btwn Cycle1 & Cycle 2 | T+1 | 2 | C | 1 |
| 17 | Next Day | ND | non-Std | 1 | btwn Cycle1 & Cycle 2 | T | 2 | C | 1 |
| 18 | As of RW | RW | | 0 | btwn Cycle 2 & Cycle 3 | T+2 | 3 | C | 2 |
| 19 | As of Sellers Option | SO | non-Std | 0 | btwn Cycle 2 & Cycle 3 | T+2 | 3 | C | 2 |
| 20 | As of OCC E & A trade | RW | | 0 | btwn Cycle 2 & Cycle 3 | T+2 | 3 | C | 2 |
| 21 | As of Next Day | ND | non-Std | 0 | btwn Cycle 2 & Cycle 3 | T+1 | 3 | C | 2 |
| 22 | Cash | Cash | non-Std | 0 | btwn Cycle 2 & Cycle 3 | T | 3 | C | 2 |
| 23 | As of RW late submission | RW | | 0 | after Cycle 3, before Cycle 1 | T+2 | 1 | C | 1 |
| 24 | Cash late submission | Cash | Z | 0 | after Cycle 3, before Cycle 1 | T | | Z | 100 |
| Section B | CNS Eligible Trades undergoing a Voluntary Corporate Action Event | | | | | | | | |
| 25 | RW | RW | | 2 | before Cycle 1 cutoff | T | 1 | C | 1 |
| 26 | Seller's Option | SO | | 2 | before Cycle 1 cutoff | T | 1 | C | 1 |
| 27 | RW | RW | | 2 | btwn Cycle1 & Cycle 2 | T | 2 | C | 1 |
| 28 | Seller's Option | SO | | 2 | btwn Cycle1 & Cycle 2 | T | 2 | C | 1 |
| 29 | As of RW | RW | | 1 | btwn Cycle 2 & Cycle 3 | T+1 | 3 | M | 13 |
| 30 | As of Sellers Option | SO | non-Std | 1 | btwn Cycle 2 & Cycle 3 | T+1 | 3 | M | 13 |
| 31 | OCC E & A trade | RW | | 1 | before Cycle 1 cutoff | T | 3 | M | 14 |
| 32 | As of OCC E & A trade | RW | | 1 | btwn Cycle 2 & Cycle 3 | T+1 | 3 | M | 14 |
| 33 | Next Day | ND | non-Std | 1 | btwn Cycle 2 & Cycle 3 | T | 3 | T | 54 |
| 34 | As of RW | RW | | 1 | after Cycle 3, before Cycle 1 | T+1 | 1 | T | 52 |
| 35 | As of RW OCC E & A trade | RW | | 1 | after Cycle 3, before Cycle 1 | T+1 | 1 | T | 52 |
| 36 | As of Sellers Option | SO | non-Std | 1 | after Cycle 3, before Cycle 1 | T+1 | 1 | T | 54 |
| 37 | Next Day | ND | non-Std | 1 | after Cycle 3, before Cycle 1 | T | 1 | T | 54 |
| 38 | As of RW | RW | | 1 | btwn Cycle1 & Cycle 2 | T+1 | 2 | T | 52 |
| 39 | As of Sellers Option | SO | non-Std | 1 | btwn Cycle1 & Cycle 2 | T+1 | 2 | T | 54 |
| 40 | As of OCC E & A trade | RW | | 1 | btwn Cycle1 & Cycle 2 | T+1 | 2 | T | 52 |
| 41 | Next Day | ND | non-Std | 1 | btwn Cycle1 & Cycle 2 | T | 2 | T | 54 |
| 42 | As of RW | RW | | 0 | btwn Cycle 2 & Cycle 3 | T+2 | 3 | T | 52 |
| 43 | As of Sellers Option | SO | non-Std | 0 | btwn Cycle 2 & Cycle 3 | T+2 | 3 | T | 54 |
| 44 | As of OCC E & A trade | RW | | 0 | btwn Cycle 2 & Cycle 3 | T+2 | 3 | T | 52 |
| 45 | As of Next Day | ND | non-Std | 0 | btwn Cycle 2 & Cycle 3 | T+1 | 3 | T | 54 |
| 46 | Cash | Cash | non-Std | 0 | btwn Cycle 2 & Cycle 3 | T | 3 | T | 54 |
| 47 | As of RW late submission | RW | | 0 | after Cycle 3, before Cycle 1 | T+2 | 1 | T | 54 |
| 48 | Cash late submission | Cash | Z | 0 | after Cycle 3, before Cycle 1 | T | | Z | 100 |

NSCC Clearing T+2 Test Scenarios (continued)

| | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|------------------|---|---------------------|---------|-----------------------|-------------------------------|-----------------------|------------------------|--------------|-----------------|
| | Testing Conditions | Submission type | | Days until Settlement | Received by | Trade received by UTC | Process on CTS cycle # | Netting Type | Net Reason Code |
| | | RW, ND, Cash, SO | | | | | | C,M,B,T,Z | |
| Section C | CNS Eligible Trades undergoing a Dividend Distribution event | | | | | | | | |
| 49 | RW | RW | | 2 | before Cycle 1 cutoff | T | 1 | C | 1 |
| 50 | Seller's Option | SO | | 2 | before Cycle 1 cutoff | T | 1 | C | 1 |
| 51 | RW | RW | | 2 | btwn Cycle1 & Cycle 2 | T | 1 | C | 1 |
| 52 | Seller's Option | SO | | 2 | btwn Cycle1 & Cycle 2 | T | 1 | C | 1 |
| 53 | As of RW | RW | | 1 | btwn Cycle 2 & Cycle 3 | T+1 | 3 | C | 1 |
| 54 | As of Sellers Option | SO | non-Std | 1 | btwn Cycle 2 & Cycle 3 | T+1 | 3 | T | 53 |
| 55 | OCC E & A trade | RW | | 1 | before Cycle 1 cutoff | T | 3 | C | 3 |
| 56 | As of OCC E & A trade | RW | | 1 | btwn Cycle 2 & Cycle 3 | T+1 | 3 | C | 3 |
| 57 | Next Day | ND | non-Std | 1 | btwn Cycle 2 & Cycle 3 | T | 3 | T | 53 |
| 58 | As of RW | RW | | 1 | after Cycle 3, before Cycle 1 | T+1 | 1 | C | 1 |
| 59 | As of RW OCC E & A trade | RW | | 1 | after Cycle 3, before Cycle 1 | T+1 | 1 | C | 1 |
| 60 | As of Sellers Option | SO | non-Std | 1 | after Cycle 3, before Cycle 1 | T+1 | 1 | T | 53 |
| 61 | Next Day | ND | non-Std | 1 | after Cycle 3, before Cycle 1 | T | 1 | T | 53 |
| 62 | As of RW | RW | | 1 | btwn Cycle1 & Cycle 2 | T+1 | 2 | C | 1 |
| 63 | As of Sellers Option | SO | non-Std | 1 | btwn Cycle1 & Cycle 2 | T+1 | 2 | T | 53 |
| 64 | As of OCC E & A trade | RW | | 1 | btwn Cycle1 & Cycle 2 | T+1 | 2 | C | 3 |
| 65 | Next Day | ND | non-Std | 1 | btwn Cycle1 & Cycle 2 | T | 2 | T | 53 |
| 66 | As of RW | RW | | 0 | btwn Cycle 2 & Cycle 3 | T+2 | 3 | C | 2 |
| 67 | As of Sellers Option | SO | non-Std | 0 | btwn Cycle 2 & Cycle 3 | T+2 | 3 | T | 53 |
| 68 | As of OCC E & A trade | RW | | 0 | btwn Cycle 2 & Cycle 3 | T+2 | 3 | C | 3 |
| 69 | As of Next Day | ND | non-Std | 0 | btwn Cycle 2 & Cycle 3 | T+1 | 3 | T | 53 |
| 70 | Cash | Cash | non-Std | 0 | btwn Cycle 2 & Cycle 3 | T | 3 | T | 53 |
| 71 | As of RW late submission | RW | | 0 | after Cycle 3, before Cycle 1 | T+2 | 1 | T | 53 |
| 72 | Cash late submission | Cash | Z | 0 | after Cycle 3, before Cycle 1 | T | | Z | 100 |
| Section D | Trades in non-CNS Eligible CUSIPs | | | | | | | | |
| 73 | RW | RW | | 2 | before Cycle 1 cutoff | T | 1 | M | 10 |
| 74 | Seller's Option | SO | | 2 | before Cycle 1 cutoff | T | 1 | M | 10 |
| 75 | RW | RW | | 2 | btwn Cycle1 & Cycle 2 | T | 2 | M | 10 |
| 76 | Seller's Option | SO | | 2 | btwn Cycle1 & Cycle 2 | T | 2 | M | 10 |
| 77 | As of RW | RW | | 1 | btwn Cycle 2 & Cycle 3 | T+1 | 3 | M | 10 |
| 78 | OCC E & A trade | RW | | 1 | before Cycle 1 cutoff | T | 3 | M | 11 |
| 79 | As of OCC E & A trade | RW | | 1 | btwn Cycle 2 & Cycle 3 | T+1 | 3 | M | 11 |
| 80 | As of Sellers Option | SO | non-Std | 1 | btwn Cycle 2 & Cycle 3 | T+1 | 3 | T | 45 |
| 81 | Next Day | ND | non-Std | 1 | btwn Cycle 2 & Cycle 3 | T | 3 | T | 45 |
| 82 | As of RW | RW | | 1 | after Cycle 3, before Cycle 1 | T+1 | 1 | B | 22 |
| 83 | As of RW OCC E & A trade | RW | | 1 | after Cycle 3, before Cycle 1 | T+1 | 1 | B | 22 |
| 84 | As of Sellers Option | SO | non-Std | 1 | after Cycle 3, before Cycle 1 | T+1 | 1 | T | 45 |
| 85 | Next Day | ND | non-Std | 1 | after Cycle 3, before Cycle 1 | T | 1 | T | 45 |
| 86 | As of RW | RW | | 1 | btwn Cycle1 & Cycle 2 | T+1 | 2 | B | 22 |
| 87 | As of Sellers Option | SO | non-Std | 1 | btwn Cycle1 & Cycle 2 | T+1 | 2 | T | 45 |
| 88 | As of OCC E & A trade | RW | | 1 | btwn Cycle1 & Cycle 2 | T+1 | 2 | B | 22 |
| 89 | Next Day | ND | non-Std | 1 | btwn Cycle1 & Cycle 2 | T | 2 | T | 45 |
| 90 | As of RW | RW | | 0 | btwn Cycle 2 & Cycle 3 | T+2 | 3 | T | 44 |
| 91 | As of Sellers Option | SO | non-Std | 0 | btwn Cycle 2 & Cycle 3 | T+2 | 3 | T | 45 |
| 92 | As of OCC E & A trade | RW | | 0 | btwn Cycle 2 & Cycle 3 | T+2 | 3 | T | 44 |
| 93 | As of Next Day | ND | non-Std | 0 | btwn Cycle 2 & Cycle 3 | T+1 | 3 | T | 45 |
| 94 | Cash | Cash | non-Std | 0 | btwn Cycle 2 & Cycle 3 | T | 3 | T | 45 |
| 95 | As of RW late submission | RW | | 0 | after Cycle 3, before Cycle 1 | T+2 | 1 | B | 22 |

may result in Trade-for-Trade (T) obligations

Section D test scenarios:

Test in non-CNS-eligible CUSIPs (scenarios 73 through 95)

- These test scenarios will allow Members to test the NSCC clearing processing under T+2 conditions for trades in non-CNS-eligible CUSIPs, while simultaneously testing new CTS output and the net reason codes that CTS will assign to those trades. These will be processed as Bilaterally netted balance orders (B), Multilaterally netted balance orders (M) and/or Trade-for-Trade balance orders (T)
 - o Non-CNS obligations will be sent to Obligation Warehouse (OW)
- DTCC will provide a separate set of CUSIPs for each non-CNS-eligible security type

NSCC – ETF Create and Redeem Processing

NSCC will allow Members to test coding changes to its ETF creation and redemption system to update the rules the system uses to assign settlement date to create/redeem transactions in a T+2 scenario.

ETF Agent Testing

Testing of the T+2 functional changes to the Enhanced ETF Create/Redeem Instruction Input File will be mandatory for all ETF Agents. Successfully testing these changes will require a two day process which will include submission of the ETF Enhanced Consolidated Portfolio Composition Test Input File (DataTrak #41301) and the Enhanced ETF Create and Redeem Instruction Test Data File (DataTrak #41300) to the ETF application in the test environment (PSE U).

- ETF Agents will select a create/redeem eligible listing for which they are the agent
- ETF Agents will select one existing portfolio basket associated with the selected ETF listing
- ETF Agents will deliver the ETF Enhanced Consolidated Portfolio Composition Test Input Data File for specific portfolio baskets to the T+2 test environment (PSE U) on the day prior to testing trade capture
- ETF Agents will test trade capture by delivering one or more Enhanced ETF Create and Redeem Instruction Data Input File (DataTrak Input #41300) to the PSE U test environment with create/redeem orders for testing of the following three conditions:
 - o **Condition 1:** Two day settlement is no longer an acceptable value for shortened settlements for orders received on trade date or As/of submissions
 - o **Condition 2:** Two day settlement is the default when no value is specified for shortened settlements on orders received on trade date
 - o **Condition 3:** One day settlement remains an acceptable value for shortened settlement for orders received on trade date
- ETF Agents will have the option to submit create/redeem instructions versus NSCC's test contra account numbers 0122 or 0123. ETF Agents will verify results using the test version of the EOD Instruction Create/Redeem Reject Report (AutoRoute # 02980098)
- ETF Agents will verify results using the test version of the Enhanced Create/Redeem Instruction Print Image Report (AutoRoute# 02980291)

ETF Authorized Participants

No functional changes are being made to any AutoRoute output files for the move to T+2.

ETF Authorized Participants (APs) may test on a voluntary basis by contacting DTCC and by subscribing to required test outputs (see Section 4 for instructions to subscribe to inputs/outputs in the test environment). APs will be paired with ETF Agents with whom they have existing trading relationships in order to facilitate the test. APs may receive the following test outputs:

- Enhanced ETF Create Redeem Receipt /Reject Report – AutoRoute # 02980098
- Enhanced C/R Blotter Detail Report – AutoRoute # 02980291
- Create / Redeem Blotter MRO – AutoRoute # 02981254

Corporate Bonds, Municipal Bonds and UITs (CMU)

The CMU RTTM trade matching cut-off in the test environment will mirror the T+2 production time schedule. That is, CMU transactions must be matched in RTTM by 11:30 ET on T+2/ Settlement Day (SD) in order to be assigned a T+2 Settlement Date. CMU transactions matched after 11:30 ET on SD will be given a settlement date of the next available business day.

DTCC will assign specific production CUSIPs to support the suggested test scenarios. This will include:

- o CUSIPs for various product types (such as Corporate Bond, Municipal Bond, Certificate of Deposit and UIT)
- o CNS and non-CNS-eligible (Balance Order) CUSIPs, “Regular Way” and “When Issued” CUSIPs
- o CUSIPs with positions in DTC and CUSIPs without position in DTC
- Production CMU input and output formats will be utilized for testing
- Members will bilaterally submit test trades into NSCC’s CMU RTTM system in the test environment utilizing existing production input mechanisms:
 - o Trades may be submitted via RTTM Web or MQ Interactive Messaging (MT515) trade input messages
- Members will identify their own counterparties for testing
- Members can submit CMU test trades from 7:15 ET to 17:30 ET on regular business days; test trades submitted outside of this time window will be held overnight and processed the following morning
- RTTM will send matched eligible test trades to NSCC for downstream settlement processing
- DTCC will send to MSRB Muni trades designated by Members to be sent to MSRB
- DTCC will enable all applicable CMU outputs in the test environment. This will include:
 - o Real-time status of test trades via RTTM web in the test environment, real-time messages: MT509 (trade status information to both counterparties of the transaction), MT518 (trade advisory to the testing contra party) and MT599 (administrative message for EOD and SOD)
 - o End of day AutoRoute files:
 - » 02982237 Municipal Bond Contract File
 - » 02982433 Corporate Bond/UIT Contract File

High Level Summary of Scripted Test Scenarios

Section A test scenarios: RTTM Trade matching for CNS-eligible CUSIPs (scenarios 1 through 5)

Test scenarios in Section A will allow Members to test trade matching for trades in CNS-eligible CUSIPs.

- Members can assign different settlement dates to test trades (T, T+1, T+2, T+3..T+n)
- Test trades settling the same day (Trade Date=Settlement Date (SD)) will be processed as Comparison-Only. Comparison-only trades are not sent to NSCC’s settlement systems
- Trades with a future Settlement Date (T+1, T+2, T+3..T+n) must be matched by 11:30 ET on SD in order to settle on the scheduled date

| CMU T+2 Test Scenarios | | | | | | | | |
|---|---------------|---------------------|---------------|---|--|---|--------------------------------------|--|
| | Security Type | Settlement Location | Business Date | Settlement Date | Eligible/ Ineligible for NSCC CTS processing/ settlement | Matched before 11:30 a.m. (ET) on S/D | Matched after 11:30 a.m. (ET) on S/D | |
| Section A RTTM Trade matching for CNS eligible CUSIPs | | | | | | | | |
| 1 | Fixed | CNS | T | T | Inelig | N/A | N/A | |
| 2 | Fixed | CNS | T | T+1 | Elig | Settles T+1, reported on NSCC CTS | Settles T+2, reported on NSCC CTS | |
| 3 | Fixed | CNS | T | T+2 | Elig | Settles T+2, reported on NSCC CTS | Settles T+3, reported on NSCC CTS | |
| 4 | Fixed | CNS | T | T+3 | Elig | Settles T+3, reported on NSCC CTS | Settles T+4, reported on NSCC CTS | |
| 5 | Fixed | CNS | T | T+4 and on | Elig | Settles T+4, reported on NSCC CTS | Settles T+5, reported on NSCC CTS | |
| Section B RTTM Trade matching for non-CNS eligible (Balance Order) CUSIPs | | | | | | | | |
| 6 | Fixed | Balance Order/DTC | T | T | Inelig | N/A | N/A | |
| 7 | Fixed | Balance Order/DTC | T | T+1 | Elig | Settles T+1, reported on NSCC CTS | Settles T+2, reported on NSCC CTS | |
| 8 | Fixed | Balance Order/DTC | T | T+2 | Elig | Settles T+2, reported on NSCC CTS | Settles T+3, reported on NSCC CTS | |
| 9 | Fixed | Balance Order/DTC | T | T+3 | Elig | Settles T+3, reported on NSCC CTS | Settles T+4, reported on NSCC CTS | |
| 10 | Fixed | Balance Order/DTC | T | T+4 and on | Elig | Settles T+4, reported on NSCC CTS | Settles T+5, reported on NSCC CTS | |
| Section C 'Regular Way' and 'When-issued' trades in new Municipal Bond issuances | | | | | | | | |
| 11 | Fixed | CNS | T | S/D = Issue Date (I/D) | Elig | Settles on Issue Date, reported on NSCC CTS | | |
| 12 | Fixed | CNS | T | S/D = Issue Date +1 (I/D is 2 days after T in this example, so S/D = T+3). Firms must submit with Extended Settlement Days of 01 in CMU RTTM. | Elig | Elig (Processed as WI in CMU RTTM) | | |
| 13 | Fixed | Balance Order/DTC | T | S/D = Issue Date (I/D) | Elig | Settles on Issue Date, reported on NSCC CTS | | |
| 14 | Fixed | Balance Order/DTC | T | S/D = Issue Date +1 (I/D is 2 days after T in this example, so S/D = T+3). Firms must submit with Extended Settlement Days of 01 in CMU RTTM. | Elig | Elig (Processed as WI in CMU RTTM) | | |

- RTTM will assign a settlement date of the next business day to trades matched after 11:30 ET on SD
- Matched trades will be routed to NSCC for CNS netting and settlement processing. These trades will also be reported on the NSCC CTS output (scenarios 2 through 5)

Section B test scenarios: RTTM Trade matching for non-CNS (Balance Order) CUSIPs (scenarios 6 through 10)

Test scenarios in Section B will allow Members to test trade matching for trades in non-CNS-eligible (Balance Order) CUSIPs

- Members can assign different settlement dates to test trades (T, T+1, T+2, T+3..T+n)
- Test trades settling the same day (Trade Date=Settlement Date (SD)) will be processed as Comparison-Only. Comparison-only trades are not sent to NSCC's settlement systems (scenario 6)
- Similar to CMU test trades in CNS-eligible CUSIPs, test trades in non-CNS-eligible CUSIPs must also be matched in the CMU RTTM by 11:30 ET on SD in order to settle on that date. RTTM will assign a settlement date of the next business day to trades matched after 11:30 ET on SD
- RTTM will route matched test trades to NSCC for Balance Order processing. These trades will also be reported on the NSCC CTS output (scenarios 7 through 10)

Section C test scenarios: “Regular Way” and “When-Issued” trades in new Municipal Bond issuances (scenarios 11 through 14)

Test scenarios in Section C will allow Members to test new Municipal bonds issuances in a T+2 scenario

- Trades with a “T” for Issue Date (ID) -2, and with Settlement Date = Issue Date will be processed as “When-Issued” (scenarios 11 and 13)
 - o Trades will be routed to NSCC's CNS or Balance Order system, as applicable, for settlement on Issue Date
- Trades with a “T” for Issue Date (ID) -2, and with Settlement Date = Issue Date+1 will be treated as “When Issued” (scenarios 12 and 14). Members must submit this trades with 1 Extended Settlement Day and submit the actual S/D for the trade (Issue Date +1 in this case)
 - o Trades will be routed to NSCC's CNS or Balance Order system, as applicable, for settlement on Issue Date +1

Test Scenario – OCC Trades

On specific, designated testing dates, DTCC and OCC will provide Members the opportunity to test the full lifecycle of OCC trades under T+2 scenario. Testing will be conducted over a two weeks cycle beginning Monday prior to Expiration date and continuing through the delivery settlement the following week.

To facilitate this testing, the OCC will copy all production data from start-of-day backup as of the Monday prior to the options Expiration date to its test environment.

- Products/series will include the applicable production series available as of the market open Monday prior to the expiration date
- Members will be able to interact with this data in OCC's test environment (e.g. to exercise options) between 8:00 ET and 12:00 ET on regular business days
- OCC will run its normal assignment process in the test environment
- Delivery obligations from OCC to NSCC's UTC in the test environment would be driven off position exercise/assignment processing at OCC's test environment, and would be received by NSCC's UTC in the test environment at approximately 14:00 ET
- NSCC will replicate production clearing and settlement processing of OCC trades in the test environment
 - o NSCC will utilize the SMF data in the test environment, to determine eligibility of securities underlying test trades (such as CNS eligibility), and will process the test trades accordingly
 - o OCC trades will be reported on CTS Cycle 3, which will be produced on T+1
- OCC generated trades will be netted with other trades received by NSCC, resulting in a net settlement obligation which will ultimately be routed to DTC for settlement
- Firms that want to test OCC trades under T+2 conditions must connect with OCC's and DTCC's respective test environments
- Firms will be required to register for each two week testing window and there will be a firm cutoff for registration with OCC
- Please contact John Kobos (jkobos@theocc.com) or Karen Glad (kglad@theocc.com) to request new connectivity to the OCC's test environment
- As stated before, firms that are only interested in testing NSCC processing of OCC trades can utilize NSCC's Transaction Management Tool to simulate an OCC E&A trade and directly submit these trades to NSCC's trade capture application (UTC) in the test environment for processing

Omgeo

Omgeo clients can test trade matching and/or affirmation in a T+2 scenario for all institutional trades, including ID Net-eligible trades, prime broker trades (CNS) and non-ID Net institutional trades (PDQ). DTCC will establish suggested test scenarios for testing and will assign specific CUSIPs to these scenarios.

This will include:

- CUSIPs For various product types (Equity, Fixed Income securities), Regular Way (RW) and When-Issued (WI) securities
- CUSIPs with non-DTC settlement location
- CUSIPs with positions in DTC and CUSIPs without positions in DTC.

Omgeo's existing processing lifecycle will be replicated in the test environment and all applicable inputs and outputs will be available for testing.

The trade matching/affirmation cut-off times in the test environment will mirror the T+2 production time schedule. That is, test transactions must be affirmed by 11:30 ET on T+1/SD-1 to benefit from automatic introduction of these transactions into NSCC and DTC.

Omgeo's existing production and test environments can process transactions with multiple settlement timeframes (T, T+1, T+2, T+3..T+n) with the settlement date contained on the trade input.

Omgeo clients must instruct Omgeo of their intent to test for T+2 to ensure they have all the necessary setups for testing (e.g. Custodian, Investment Manager (IM), Broker, Prime Broker) by sending an email to Omgeo Product Operations at OmgeoProductOps@omgeo.com. As it exists today, Omgeo will not copy clients' setup profiles from the production to the test environment.

- Broker-Dealers will submit test transactions to Omgeo's TradeSuite application in the test environment utilizing production input formats (such as via CCF, TSWeb, MQ, PBS, SWIFT) Broker-Dealers that elect to test institutional trade matching will need to pair up with a counterparty for testing:
 - o Broker-Dealers and Prime Brokers in the test environment would need to pair up for testing in prime broker transactions
 - o Broker-Dealers and Custodian-Banks/Institutions would need to pair up for testing in ID Net and non-ID Net institutional transactions
- Broker-Dealers are expected to submit multiple transactions for each scenario in order to test match/affirm at different times in the trade lifecycle (affirmed by 11:30 ET on SD-1, affirmed between SD-1 11:30 ET through SD 11:30 ET, and affirmed after SD)
- Test transactions will be processed as in production:
 - o All applicable eligibility checks will be performed
 - o Matched/Affirmed eligible transactions will be routed to DTC/NSCC for downstream processing
- All applicable Institutional confirmation and report outputs will be available in the test environment
- Omgeo test systems will be available 24x6, Sunday 12:00 ET – Saturday 16:00 ET. Members can submit trades at any time within this window. Any transaction submitted after 16:00 ET Saturday through 12:00 ET Sunday will be rejected

High-Level Summary of Scripted Test Scenarios

Section A test scenarios³: Test trade matching and/or affirmations cut-off for ID Net-Eligible transactions, Prime Broker transactions (CNS) and non-ID Net-eligible (PDQ) transactions utilizing “Regular Way” CUSIPs

- Members can assign various settlement dates to test transactions (T, T+1, T+2, T+3..T+n)
- Transactions settling the same day (Trade Date=Settlement Date) will be ineligible for automated settlement processing via ID Net, CNS or PDQ processing (scenarios 1 and 6). These transactions can settle via DTC Deliver Order (DO) functionality
- Testing with future settlement dates (T+1, T+2, T+3..T+n) will be processed as follows:
 - o ID Net-eligible transactions (scenarios 2 through 5 and scenarios 7 through 10)
 - » Transactions that are affirmed by 11:30 ET on T+1/SD-1 will be eligible for ID Net processing and will be automatically sent to DTC’s Inventory Management System (IMS) and subsequently sent to NSCC for downstream processing
 - » Transactions affirmed after 11:30 ET on SD-1 will not be eligible for NSCC’s ID Net processing.
 - » Transactions that are affirmed between 11:30 ET on SD-1 and 11:30 ET on SD will be sent to IMS, but marked Late affirm in TradeSuite. The process to settle the transactions is LMIT
 - » Transactions affirmed after 11:30 ET on SD will not be routed to IMS for processing; clients would need to send in these transactions via DTC Deliver Order (DO) functionality, as they do today
 - o Non-ID Net/PDQ transactions (scenarios 2 through 5, and scenarios 7 through 10)
 - » Transactions that are affirmed by 11:30 ET on T+1/S-1 will be eligible for PDQ processing and will be automatically introduced into DTC
 - » Transactions that are affirmed between 11:30 ET on SD-1 and 11:30 ET on SD will be sent to IMS, but marked Late affirm in TradeSuite (LMIT) for those Members that elect LMIT processing
 - » Transactions affirmed after 11:30 ET on SD will not be routed to IMS for processing; clients would need to settle these transactions via DTC Deliver Order (DO) functionality, as they do today
 - o Prime Broker transactions (scenarios 2 through 5, and scenarios 7 through 10)
 - » Transactions affirmed by 11:30 ET on T+1/SD-1 will be automatically introduced into NSCC
 - » Transactions affirmed between 11:30 ET on SD-1 and 11:30 ET on SD will be sent to IMS / PDQ Trade-for-Trade settlement for those Members that elect LMIT processing
 - » Transactions affirmed after 11:30 ET on SD will not settle via IMS for processing; clients would need to settle these transactions via DTC Deliver Order (DO) functionality, as they do today
 - » Prime Brokers can also test disaffirmation of Prime Broker transactions in the test environment (cut-off time: 9:30 ET on T+1/SD-1)

³ The counterparties of the trade will determine the type of institutional transactions. For example:

- Affirmed institutional transactions between two ID Net-eligible members will automatically generate ID-Net institutional transactions
- Affirmed institutional transactions where one or both members are non-ID Net-eligible will automatically generate a non-ID Net institutional transaction
- Institutional trades between two NSCC-eligible broker Members will automatically generate a prime broker institutional transaction

o Transactions with non-DTC settlement location (e.g. Fed-eligible securities) will be ineligible for PDQ, ID Net or CNS processing (scenarios 11 through 15)

- **Section B test scenarios:** Test transactions with ‘non-DTC’ settlement locations (scenarios 16 through 30)
- Transactions with ‘non-DTC’ settlement are eligible for Omgeo processing but are ineligible for settlement
- **Section C test scenarios:** Test transactions in ‘When-Issued’ securities (scenarios 31 through 40) Transactions in ‘When Issued Securities’ are eligible for Omgeo processing but are ineligible for settlement

Testing for interoperability with Bloomberg, SS&C and Omgeo

Based on discussions with Omgeo, Bloomberg and SS&C, it has been determined that no additional test scenarios need to be created to support interoperability testing in a T+2 environment. Members looking to test interoperability in a T+2 environment need to find a testing counter-party, using a different institutional trade matching provider, and execute the institutional trade processing scenarios outlined in the Omgeo section of this document.

Omgeo T+2 Test Scenarios

| | WI/Reg Way | Sec Type | Settlement Location | Business Date | Settlement Date | Eligible/ Ineligible for DTC/NSCC processing | Affirmed by SD-1 11.30 ET | Affirmed between SD-1 11.30 ET - SD 11.30 ET | Affirmed after SD |
|------------------|--|----------|---------------------|---------------|-----------------|--|---------------------------|--|-------------------|
| Section A | Trade Matching for ID Net eligible, Prime Broker (CNS) and Non-ID Net (PDQ) trades utilizing Regular Way CUSIPs | | | | | | | | |
| 1 | Reg Way | Equity | DTC | T | T | Inelig | Inelig | Inelig | Inelig |
| 2 | Reg Way | Equity | DTC | T | T+1 | Elig | PDQ or CNS or ID-Net | PDQ | Inelig |
| 3 | Reg Way | Equity | DTC | T | T+2 | Elig | PDQ or CNS or ID-Net | PDQ | Inelig |
| 4 | Reg Way | Equity | DTC | T | T+3 | Elig | PDQ or CNS or ID-Net | PDQ | Inelig |
| 5 | Reg Way | Equity | DTC | T | T+4 and on | Elig | PDQ or CNS or ID-Net | PDQ | Inelig |
| 6 | Reg Way | Fixed | DTC | T | T | Inelig | Inelig | Inelig | Inelig |
| 7 | Reg Way | Fixed | DTC | T | T+1 | Elig | PDQ or CNS or ID-Net | PDQ | Inelig |
| 8 | Reg Way | Fixed | DTC | T | T+2 | Elig | PDQ or CNS or ID-Net | PDQ | Inelig |
| 9 | Reg Way | Fixed | DTC | T | T+3 | Elig | PDQ or CNS or ID-Net | PDQ | Inelig |
| 10 | Reg Way | Fixed | DTC | T | T+4 and on | Elig | PDQ or CNS or ID-Net | PDQ | Inelig |
| 11 | Reg Way | Equity | Non-DTC | T | T | Inelig | Inelig | Inelig | Inelig |
| 12 | Reg Way | Equity | Non-DTC | T | T+1 | Inelig | Inelig | Inelig | Inelig |
| 13 | Reg Way | Equity | Non-DTC | T | T+2 | Inelig | Inelig | Inelig | Inelig |
| 14 | Reg Way | Equity | Non-DTC | T | T+3 | Inelig | Inelig | Inelig | Inelig |
| 15 | Reg Way | Equity | Non-DTC | T | T+4 and on | Inelig | Inelig | Inelig | Inelig |
| | | | | | | | | | |
| Section B | Trades with non-DTC settlement location | | | | | | | | |
| 16 | Reg Way | Fixed | Non-DTC | T | T | Inelig | Inelig | Inelig | Inelig |
| 17 | Reg Way | Fixed | Non-DTC | T | T+1 | Inelig | Inelig | Inelig | Inelig |
| 18 | Reg Way | Fixed | Non-DTC | T | T+2 | Inelig | Inelig | Inelig | Inelig |
| 19 | Reg Way | Fixed | Non-DTC | T | T+3 | Inelig | Inelig | Inelig | Inelig |
| 20 | Reg Way | Fixed | Non-DTC | T | T+4 and on | Inelig | Inelig | Inelig | Inelig |
| 21 | When-Issued | Fixed | Non-DTC | T | T | Inelig | Inelig | Inelig | Inelig |
| 22 | When-Issued | Fixed | Non-DTC | T | T+1 | Inelig | Inelig | Inelig | Inelig |
| 23 | When-Issued | Fixed | Non-DTC | T | T+2 | Inelig | Inelig | Inelig | Inelig |
| 24 | When-Issued | Fixed | Non-DTC | T | T+3 | Inelig | Inelig | Inelig | Inelig |
| 25 | When-Issued | Fixed | Non-DTC | T | T+4 and on | Inelig | Inelig | Inelig | Inelig |
| 26 | When-Issued | Equity | Non-DTC | T | T | Inelig | Inelig | Inelig | Inelig |
| 27 | When-Issued | Equity | Non-DTC | T | T+1 | Inelig | Inelig | Inelig | Inelig |
| 28 | When-Issued | Equity | Non-DTC | T | T+2 | Inelig | Inelig | Inelig | Inelig |
| 29 | When-Issued | Equity | Non-DTC | T | T+3 | Inelig | Inelig | Inelig | Inelig |
| 30 | When-Issued | Equity | Non-DTC | T | T+4 and on | Inelig | Inelig | Inelig | Inelig |

Omgeo T+2 Test Scenarios (continued)

| | WI/Reg Way | Sec Type | Settlement Location | Business Date | Settlement Date | Eligible/ Ineligible for DTC/NSCC processing | Affirmed by SD-1 11.30 ET | Affirmed between SD-1 11.30 ET - SD 11.30 ET | Affirmed after SD |
|------------------|---|----------|---------------------|---------------|-----------------|--|---------------------------|--|-------------------|
| Section C | Trades in 'When-Issued' securities | | | | | | | | |
| 31 | When-Issued | Equity | DTC | T | T | Inelig | Inelig | Inelig | Inelig |
| 32 | When-Issued | Equity | DTC | T | T+1 | Inelig | Inelig | Inelig | Inelig |
| 33 | When-Issued | Equity | DTC | T | T+2 | Inelig | Inelig | Inelig | Inelig |
| 34 | When-Issued | Equity | DTC | T | T+3 | Inelig | Inelig | Inelig | Inelig |
| 35 | When-Issued | Equity | DTC | T | T+4 and on | Inelig | Inelig | Inelig | Inelig |
| 36 | When-Issued | Fixed | DTC | T | T | Inelig | Inelig | Inelig | Inelig |
| 37 | When-Issued | Fixed | DTC | T | T+1 | Inelig | Inelig | Inelig | Inelig |
| 38 | When-Issued | Fixed | DTC | T | T+2 | Inelig | Inelig | Inelig | Inelig |
| 39 | When-Issued | Fixed | DTC | T | T+3 | Inelig | Inelig | Inelig | Inelig |
| 40 | When-Issued | Fixed | DTC | T | T+4 and on | Inelig | Inelig | Inelig | Inelig |

In addition to above listed scenarios to test trade matching cut-off under T+2 conditions, DTCC has structured additional test conditions to allow Members to test NSCC and DTC processing of various ID Net scenarios. This includes the following:

- ID Net test transactions settle at DTC by 11:30 ET on SD (“Made”)
- ID Net Reversal of test transactions that do not settle by 11:30 ET on SD
- ID Net Reversal of test transactions that are cancelled by the Custodian Bank in RAD
- ID Net Reversal of test transactions that are cancelled in CNS due to CNS Buy-In in the same security

T+2 Test Scenarios for ID Net-Eligible Transactions

| | | CNS OUTPUT | | | |
|------------------|--|-----------------|-------------------------|------------------------------|----------------------------|
| | | Projection File | Mid Day Projection File | Night Miscellaneous Activity | Day Miscellaneous Activity |
| Section A | Some ID Net trades settle and some do not. The later are reversed on SD | | | | |
| 1 | Bank and Executing Broker have customer sell trade affirmed on T before midnight | Yes | Yes | Yes | N/A |
| 2 | Bank and Executing Broker have customer buy trade affirmed on T before midnight | Yes | Yes | Yes | N/A |
| 3 | Bank and Executing Broker have customer sell trade affirmed on T+1 before 11:30 ET | No | Yes | Yes | N/A |
| 4 | Bank and Executing Broker have customer buy trade affirmed on T+1 before 11:30 ET | No | Yes | Yes | N/A |
| 5 | Bank delivers ID trade (#3) to 719 by 11:30 ET on settlement date | N/A | N/A | N/A | No |
| 6 | Bank receives ID trade (#2) from 919 by 11:30 ET on settlement date | N/A | N/A | N/A | No |
| 7 | (Reversal) Bank does not deliver ID trade (#1) to 719 by 11:30 ET on settlement date | N/A | N/A | N/A | Yes |
| 8 | (Reversal) Bank does not receive ID trade (#4) from 919 by 11:30 ET on settlement date (Bank does not approve if delivery hits RAD) | N/A | N/A | N/A | Yes |
| Section B | All ID Net trades do not settle and are reversed on SD | | | | |
| 9 | Bank and Executing Broker have customer sell trade affirmed on T before midnight | Yes | Yes | Yes | N/A |
| 10 | Bank and Executing Broker have customer buy trade affirmed on T before midnight | Yes | Yes | Yes | N/A |
| 11 | Bank and Executing Broker have customer sell trade affirmed on T+1 before 11:30 ET | No | Yes | Yes | N/A |
| 12 | Bank and Executing Broker have customer buy trade affirmed on T+1 before 11:30 ET | No | Yes | Yes | N/A |
| 13 | (Reversal) Bank does not deliver ID trade (#3) to 719 by 11:30 ET on settlement date | N/A | N/A | N/A | Yes |
| 14 | (Reversal) Bank does not receive ID trade (#2) from 919 by 11:30 ET on settlement date (Bank does not approve if delivery hits RAD) | N/A | N/A | N/A | Yes |
| 15 | (Reversal) Bank does not deliver ID trade (#1) to 719 by 11:30 ET on settlement date | N/A | N/A | N/A | Yes |
| 16 | (Reversal) Bank does not receive ID trade (#4) from 919 by 11:30 ET on settlement date (Bank does not approve if delivery hits RAD) | N/A | N/A | N/A | Yes |
| Section C | All ID Net trades settle on SD | | | | |
| 17 | Bank and Executing Broker have customer sell trade affirmed on T before midnight | Yes | Yes | Yes | N/A |
| 18 | Bank and Executing Broker have customer buy trade affirmed on T before midnight | Yes | Yes | Yes | N/A |
| 19 | Bank and Executing Broker have customer sell trade affirmed on T+1 before 11:30 ET | No | Yes | Yes | N/A |
| 20 | Bank and Executing Broker have customer buy trade affirmed on T+1 before 11:30 ET | No | Yes | Yes | N/A |
| 21 | Bank delivers ID trade (#3) to 719 by 11:30 ET on settlement date | N/A | N/A | N/A | No |
| 22 | Bank receives ID trade (#2) from 919 by 11:30 ET on settlement date | N/A | N/A | N/A | No |
| 23 | Bank delivers ID trade (#1) to 719 by 11:30 ET on settlement date | N/A | N/A | N/A | No |
| 24 | Bank receives ID trade (#4) from 919 by 11:30 ET on settlement date | N/A | N/A | N/A | No |
| Section D | Broker Cancels ID Net Trade in RAD; only cancels only are reversed | | | | |
| 25 | Bank and Executing Broker have customer sell trade affirmed on T before midnight | Yes | Yes | Yes | N/A |
| 26 | Bank and Executing Broker have customer buy trade affirmed on T before midnight | Yes | Yes | Yes | N/A |
| 27 | Bank and Executing Broker have customer sell trade affirmed on T+1 before 11:30 ET | No | Yes | Yes | N/A |
| 28 | Bank and Executing Broker have customer buy trade affirmed on T+1 before 11:30 ET | No | Yes | Yes | N/A |
| 29 | Before night cycle on SD, Executing Broker cancels ID Net trade (#1) in RAD | N/A | N/A | Yes | N/A |
| 30 | Before night cycle on SD, Executing Broker cancels ID Net trade (#2) in RAD | N/A | N/A | Yes | N/A |
| 30 | Bank delivers ID trade (#3) to 719 by 11:30 ET on settlement date | N/A | N/A | N/A | N/A |
| 31 | Bank receives ID trade (#4) from 919 by 11:30 ET on settlement date | N/A | N/A | N/A | N/A |
| Section E | CNS Cancels ID Net Trade due to CNS Buy-in; all transactions are reversed | | | | |
| 32 | Bank and Executing Broker have customer sell trade affirmed on T before midnight | Yes | Yes | Yes | N/A |
| 33 | Bank and Executing Broker have customer buy trade affirmed on T before midnight | Yes | Yes | Yes | N/A |
| 34 | Bank and Executing Broker have customer sell trade affirmed on T+1 before 11:30 ET | No | Yes | Yes | N/A |
| 35 | Bank and Executing Broker have customer buy trade affirmed on T+1 before 11:30 ET | No | Yes | Yes | N/A |
| 36 | On the day prior to SD, CNS receives a buy-in in this security | N/A | N/A | N/A | N/A |
| 37 | CNS initiatives reversal (ID Trades #1 thru 4 are reversed) | N/A | N/A | Yes | N/A |

Wealth Management Services – Fund/SERV®

Fund/SERV clients can use the existing test capabilities to test any changes to the standard settlement date of Fund/SERV securities. No new testing functionality is required specifically for T+2.

DTC Asset Services – Corporate Actions

DTCC will enable Members to test Corporate Action processing under T+2 conditions. This includes:

- Test scenarios where DTC has functional changes:
 - o Scenarios/Events related to the interim accounting process when the Ex-Dividend Date (a.k.a. Ex-Date) ruled by an Organized Securities Exchange is deemed to be “irregular way”
 - o IVORS process for UIT Redemptions and UIT Rollovers
- Test scenarios where DTC does not have any functional changes:
 - o Scenarios / Events related to “regular way” Ex-Date processing
 - o PTOP/PSOP will be available for Member testing to test shortened Cover/Protect windows

DTCC will create corporate action test events and assign specific CUSIPs for each test event. These CUSIPs will be provided in Q4/2016 with the other CUSIPs supporting the industry T+2 test.

Testing will be available in the T+2 test environment (PSE U) using the CA Web, Participant Terminal System (PTS) and Participant Browser System (PBS) mediums. ISO 20022 and Computer to Computer Facility Files (CCF) for Corporate Actions will also be available for firms wishing to subscribe in order to test their full end-to-end processes. Testing for ISO 20022 and CCF for Corporate Actions is voluntary and not required. Additional information regarding connectivity to CA Web, PTS/PBS, ISO 20022 and CCF will be available on the [T+2 page on the DTCC Learning Center](#).

DTCC will provide for testing the full corporate action lifecycle, i.e., DTCC will create corporate action events, generate announcements, capture positions and allocate corporate action proceeds. In addition to ensuring that their systems are compatible with the specific corporate action changes related to T+2, Members are encouraged to execute transactions on and around the key corporate action dates to ensure internal position capture, allocation and reconciliation processes are functioning correctly.

The following detailed Corporate Actions test scenarios will be available for testing in the T+2 test environment (PSE U):

Scenario 1: “Regular Way” Ex-Date processing where Ex-Date, as determined by an Organized Securities Exchange, equals Record Date minus one business day will be available for cash distribution events such as Cash Dividends, Capital Gains and others as well as stock distribution events such as Stock Splits, Stock Dividends, Rights Distributions and Spin Offs.

- Members should focus their testing on entitlements (i.e. position eligible for the event’s distribution) once Record Date position capture occurs. Additional focus should be on trading activities prior to, on and after the event’s Ex-Date. Members will be able to view their entitlements, projected payments, allocations and any applicable adjustments related to fail tracking, repos and stock loans via the CA Web application

Important considerations for Scenario 1:

- Canadian Distributions will be announced and processed during the T+2 testing effort
- The Elective Dividend Service (EDS) process will be supported for Scenario 1 in certain cases to support the Tax Relief, Optional Dividends, Voluntary DRIP and DRIP Opt-out services for cash distribution events. Testing will be available via CA Web and ISO 20022 and will be voluntary and not required. If specific requests are needed for the EDS process in the T+2 test environment (PSE U) requests should be sent to T2testing@dtcc.com
- Members should note the event expiration cut-off times on the CA Web Event Record Detail announcement if they will be testing this EDS process in the T+2 test environment (PSE U)
- Adjustments (Stock Loan/Repos/Fail Tracking and Misc/GL) tracking will be available for testing in the T+2 test environment (PSE U) but not required for testing. Members wishing to test adjustment tracking should ensure they use Deliver Orders (DOs) that have the tracking reason codes required to ensure that the DO is picked-up for tracking

Scenario 2: “Irregular Way” Ex-Date processing where Due Bill Off Date (a.k.a. Settlement Date or Due Bill Redemption Date), as determined by an Organized Securities Exchange, equals Ex-Date plus one business day for cash distribution events such as Cash Dividends, Capital Gains and others as well as stock distribution events such as Stock Splits, Stock Dividends, Rights Distributions and Spin Offs.

- Members should focus their testing on entitlements (i.e. position eligible for the event’s distribution), during the Interim Accounting period between Record Date and Due Bill Off Date. Additional focus should be on trading activities during the Interim Accounting period. Members will be able to view their entitlements, projected payments, allocations and any applicable adjustments related to fail tracking, repos and stock loans via the CA Web application

Important considerations for Scenario 2:

- Canadian Distributions will be announced and processed during the T+2 testing effort
- The Elective Dividend Service (EDS) process will be supported for Scenario 1 in certain cases to support the Tax Relief, Optional Dividends, Voluntary DRIP and DRIP Opt-out services for cash distribution events. Testing will be available via CA Web and ISO 20022 and will be voluntary and not required. If specific requests are need for the EDS process in the T+2 test environment (PSE U) requests should be sent to T2testing@dtcc.com
- Members should note the event expiration cut-off times on the CA Web Event Record Detail announcement if they will be testing this EDS process in the T+2 test environment (PSE U)
- Adjustments (Stock Loan/Repos / Fail Tracking and Misc/GL) tracking will be available for testing in the T+2 test environment (PSE U) but is not required to be tested. Members wishing to test adjustment tracking should ensure they use Deliver Orders (DOs) that have the tracking reason codes required to ensure that the DO is picked-up for tracking

Scenario 3: IVORS – Redeem UITs at the Transfer Agent (TA) or Sponsor to test the systematically generated Settlement Date now equaling Transaction Date plus two business days.

- Members who utilize the IVORS service at DTC will be able to test functionality changes in the IVOR/NIVR (for Night IVORS submissions) application via PTS or PBS and track the instruction through cash allocation on Transaction Date plus two business days

- UIT Transfer Agents and Sponsors who wish to test the IVORS suite of applications should send requests to T2testing@dtcc.com

Scenario 4: IVORS – Rollover UITs at the Transfer Agent (TA) or Sponsor to test the systematically generated Settlement Date now equaling Transaction Date plus two business days.

- Members who utilize the IVORS service at DTC will be able to test functionality changes in the IVOR/NIVR (for Night IVORS Submissions)
- application via PTS or PBS and track the instruction through allocation of new UITs on Transaction Date plus two business days
- UIT Transfer Agents and Sponsors who wish to test the IVORS suite of applications should send requests to T2testing@dtcc.com

Scenario 5: PTOP Cover/Protect processing for Voluntary Reorganizations. DTC Members will be able to test the ability to input a protect on a Voluntary Tender Offer or Voluntary Exchange Offer in the PTOP application in PTS/PBS mediums and cover that protect in PTOP to simulate a shortened Cover/Protect Expiration window once the migration to a T+2 settlement cycle is implemented.

- Members should focus their testing when an offer has a Guaranty of Delivery feature and the Member does not have position or enough position in their account in the T+2 test environment (PSE U) and wants to simulate participating in the offer one business day prior to the offer's Expiration Date or on the offer's Expiration Date. To do so properly, the Member will need to have position delivered into their account prior to the Cover/Protect Expiration Date and then cover that protect. This testing will be available via RIPS (Reorganizations and Redemptions) and PTOP (PBS Voluntary Tenders and Exchanges) via the PTS or PBS mediums in the T+2 test environment (PSE U)

Important considerations for Scenario 5:

- DTC has not made any functional changes to the Cover/Protect process on the PTOP application. This scenario is available solely for Members looking to simulate a production T+2 settlement cycle
- The Cover/Protect on 'Behalf of Another' feature will be available for testing but is not required to be tested. To use this feature in the T+2 test environment (PSE U) the Members will need to find another Member who is participating in the test for that event to cover the protect on their behalf
- The expiration cut-off times for ATOP I offers will be in line with what they are in the T+3 production environment

Scenario 6: PSOP Cover/Protect processing for Rights Subscriptions. DTC Members will be able to test the ability to input a protect on a Rights Subscriptions in the PSOP application in PTS/PBS mediums and cover that protect in PSOP to simulate a shortened Cover/Protect Expiration window once the migration to a T+2 settlement cycle is implemented.

- o Members should focus their testing when an offer has a Guaranty of Delivery feature and the Member does not have position or enough position in their account in the T+2 test environment (PSE U) and they want to simulate participating in the offer one business day prior to the offer's Expiration Date or on the offer's Expiration Date. To do so properly, the Member will need to have position delivered into their account prior to the Cover/Protect Expiration Date and then cover that protect. This testing will be available via RIPS (Reorganizations and Redemptions) and PSOP (PBS Rights Subscriptions) via the PTS or PBS mediums in the T+2 test environment (PSE U)

Important considerations for Scenario 6:

- DTC has not made any functional changes to the Cover/Protect process on the PSOP application. This scenario is available solely for Member testing to simulate a production T+2 settlement cycle
- The Cover/Protect on Behalf of Another feature will be available for testing but is not required to be tested. To use this feature in the T+2 test environment the Member will need to find another Member who is participating in the test for that event to cover the protect on behalf of their behalf
- The expiration cut-off times for ASOP I offers will be inline with what they are in the T+3 production environment

DTC will produce event announcements as described within during a two-week cycle. The actual event announcements will be communicated to DTC Members testing in the T+2 test environment (PSE U) prior to testing commencing. All inquiries concerning Corporate Actions T+2 testing performed in the T+2 test environment (PSE U) should be sent to T2testing@dtcc.com.

| Corporate Actions T+2 Test Scenarios | Medium | Output Available* |
|---|---|---|
| Scenario 1: Regular Way Ex-Date (Ex-Date = Record Date - 1 Business Day) | | |
| Cash Dividend (including Cash Distributions such as Capital Gains, Special Dividends, Liquidations, etc.) event ** | CA Web Announcement | ISO 20022 CANO |
| Record Date Position | CA Web Entitlements | ISO 20022 CANO-E, DIVRDP CCF |
| Projected Payment | CA Web Entitlements | ISO 20022 CAPA, CSHPRJ CCF |
| Allocation | CA Web Entitlements, Allocation Overview | ISO 20022 CACO, CSHSET CCF |
| Stock Loan, Repo or Fail Tracked Adjustment *** | CA Web Entitlements, Adjustments, Allocation Overview, Adjustments Overview | ISO 20022 CANO-E, CAPA, CAPS, CACO, CSHSET CCF |
| Stock Split event | CA Web Announcement | ISO 20022 CANO |
| Record Date Position | CA Web Entitlements | ISO 20022 CANO-E, DIVRDP CCF |
| Projected Payment | CA Web Entitlements | ISO 20022 CAPA, STKPND CCF |
| Allocation | CA Web Entitlements, Allocation Overview | ISO 20022 CACO, SDARSTK CCF |
| Stock Loan, Stock Adjustment or Fail Tracked Adjustment *** | CA Web Entitlements, Adjustments Allocation Overview, Adjustments Overview | ISO 20022 CANO-E, CAPA, CAPS, CACO, SDARSTK CCF |
| Stock Dividend event | CA Web Announcement | ISO 20022 CANO |
| Record Date Position | CA Web Entitlements | ISO 20022 CANO-E, DIVRDP CCF |
| Projected Payment | CA Web Entitlements | ISO 20022 CAPA, STKPND CCF |
| Allocation | CA Web Entitlements, Allocation Overview | ISO 20022 CACO, SDARSTK CCF |
| Stock Adjustment or Fail Tracked Adjustment *** | CA Web Entitlements, Adjustments, Allocation Overview, Adjustments Overview | ISO 20022 CANO-E, CAPA, CAPS, CACO, SDARSTK CCF |
| Spin Off event (including Spin Off security eligible for DTC services and not eligible for DTC services to be exited) | CA Web Announcement | ISO 20022 CANO |
| Record Date Position | CA Web Entitlements | ISO 20022 CANO-E, DIVRDP CCF |
| Projected Payment | CA Web Entitlements | ISO 20022 CAPA, STKPND CCF |
| Allocation | CA Web Entitlements, Allocation Overview | ISO 20022 CACO, SDARSTK CCF |
| Stock Adjustment or Fail Tracked Adjustment *** | CA Web Entitlements, Adjustments, Allocation Overview, Adjustments Overview | ISO 20022 CANO-E, CAPA, CAPS, CACO, SDARSTK CCF |
| Rights Distribution event | CA Web Announcement | ISO 20022 CANO |
| Record Date Position | CA Web Entitlements | ISO 20022 CANO-E, DIVRDP CCF |
| Projected Payment | CA Web Entitlements | ISO 20022 CAPA, STKPND CCF |
| Allocation | CA Web Entitlements, Allocation Overview | ISO 20022 CACO, SDARSTK CCF |
| Stock Adjustment or Fail Tracked Adjustment *** | CA Web Entitlements, Adjustments, Allocation Overview, Adjustments Overview | ISO 20022 CANO-E, CAPA, CAPS, CACO, SDARSTK CCF |
| Note: Depending on interest from clients connected and using ISO 20022 instructions messages for EDS services, DTC would have the ability to open instructions windows for the DRIP (including Opt-Out), Tax Relief, Cash-in-Round (CRS) and Foreign Currency services for the scenarios listed above. | CA Web Instructions | ISO 20022 CAIN, CAIS, CAIC, CACS****, CAST |
| Optional Dividend event | CA Web Announcement | ISO 20022 CANO |
| Record Date Position | CA Web Entitlements | ISO 20022 CANO-E, DIVRDP CCF |
| Instructions | CA Web Instructions | ISO 20022 CAIN, CAIS, CAIC, CACS, CAST |
| Projected Payment | CA Web Entitlements | ISO 20022 CAPA, CSHPRJ CCF, STKPND CCF |
| Allocation | CA Web Entitlements, Allocation Overview | ISO 20022 CACO, CSHSET CCF, SDARSTK CCF |
| Stock Adjustment *** | CA Web Entitlements, Adjustments, Allocation Overview, Adjustments Overview | ISO 20022 CANO-E, CAPA, CAPS, CACO, CSHSET CCF, SDARSTK CCF |

| Corporate Actions T+2 Test Scenarios (continued) | Medium | Output Available* |
|--|---|---|
| Scenario 2: Irregular Way Ex-Date (Due Bill Off = Ex-Date + 1 Business Day) | | |
| Cash Dividend (including Cash Distributions such as Capital Gains, Special Dividends, Liquidations, etc.) event ** | CA Web Announcement | ISO 20022 CANO |
| Entitled Position (including Interim Accounting) | CA Web Entitlements | ISO 20022 CANO-E, DIVRDP CCF |
| Projected Payment | CA Web Entitlements | ISO 20022 CAPA, CSHPRJ CCF |
| Allocation | CA Web Entitlements, Allocation Overview | ISO 20022 CACO, CSHSET CCF |
| Stock Loan, Repo or Fail Tracked Adjustment *** | CA Web Entitlements, Adjustments, Allocation Overview, Adjustments Overview | ISO 20022 CANO-E, CAPA, CAPS, CACO, CSHSET CCF |
| Stock Split event | CA Web Announcement | ISO 20022 CANO |
| Entitled Position (including Interim Accounting) | CA Web Entitlements | ISO 20022 CANO-E, DIVRDP CCF |
| Projected Payment | CA Web Entitlements | ISO 20022 CAPA, STKPND CCF |
| Allocation | CA Web Entitlements, Allocation Overview | ISO 20022 CACO, SDARSTK CCF |
| Stock Loan, Stock Adjustment or Fail Tracked Adjustment *** | CA Web Entitlements, Adjustments, Allocation Overview, Adjustments Overview | ISO 20022 CANO-E, CAPA, CAPS, CACO, SDARSTK CCF |
| Stock Dividend event | CA Web Announcement | ISO 20022 CANO |
| Entitled Position (including Interim Accounting) | CA Web Entitlements | ISO 20022 CANO-E, DIVRDP CCF |
| Projected Payment | CA Web Entitlements | ISO 20022 CAPA, STKPND CCF |
| Allocation | CA Web Entitlements, Allocation Overview | ISO 20022 CACO, SDARSTK CCF |
| Stock Adjustment or Fail Tracked Adjustment *** | CA Web Entitlements, Adjustments, Allocation Overview, Adjustments Overview | ISO 20022 CANO-E, CAPA, CAPS, CACO, SDARSTK CCF |
| Spin Off event (including Spin Off security eligible for DTC services and not eligible for DTC services to be exited) | CA Web Announcement | ISO 20022 CANO |
| Entitled Position (including Interim Accounting) | CA Web Entitlements | ISO 20022 CANO-E, DIVRDP CCF |
| Projected Payment | CA Web Entitlements | ISO 20022 CAPA, STKPND CCF |
| Allocation | CA Web Entitlements, Allocation Overview | ISO 20022 CACO, SDARSTK CCF |
| Stock Adjustment or Fail Tracked Adjustment *** | CA Web Entitlements, Adjustments, Allocation Overview, Adjustments Overview | ISO 20022 CANO-E, CAPA, CAPS, CACO, SDARSTK CCF |
| Rights Distribution event | CA Web Announcement | ISO 20022 CANO |
| Entitled Position (including Interim Accounting) | CA Web Entitlements | ISO 20022 CANO-E, DIVRDP CCF |
| Projected Payment | CA Web Entitlements | ISO 20022 CAPA, STKPND CCF |
| Allocation | CA Web Entitlements, Allocation Overview | ISO 20022 CACO, SDARSTK CCF |
| Stock Adjustment or Fail Tracked Adjustment *** | CA Web Entitlements, Adjustments, Allocation Overview, Adjustments Overview | ISO 20022 CANO-E, CAPA, CAPS, CACO, SDARSTK CCF |
| Note: Based on demand, certain Instructions windows may be opened to facilitate EDS services for DRIP, Foreign Tax Relief and CRS. It must be noted however, that the EDS process is based on Record Date position and normally a second event that is Mandatory with only 1 option is used to facilitate the capture of due bill positions via Interim Accounting. | CA Web Instructions | ISO 20022 CAIN, CAIS, CAIC, CACS****, CAST |
| Optional Dividend event | CA Web Announcement | ISO 20022 CANO |
| Entitled Position (including Interim Accounting) | CA Web Entitlements | ISO 20022 CANO-E, DIVRDP CCF |
| Instructions | CA Web Instructions | ISO 20022 CAIN, CAIS, CAIC, CACS, CAST |
| Projected Payment | CA Web Entitlements | ISO 20022 CAPA, CSHPRJ CCF, STKPND CCF |
| Allocation | CA Web Entitlements, Allocation Overview | ISO 20022 CACO, CSHSET CCF, SDARSTK CCF |
| Stock Adjustment *** | CA Web Entitlements, Adjustments, Allocation Overview, Adjustments Overview | ISO 20022 CANO-E, CAPA, CAPS, CACO, CSHSET CCF, SDARSTK CCF |

| Corporate Actions T+2 Test Scenarios (continued) | | Medium | Output Available* |
|--|---|--------|--|
| Scenario 3: IVORS Redeem at TA or Sponsor (Settlement Date = Transaction Date + 2 Business Days) | | | |
| View Eligible IVORS CUSIPs | PTS/PBS IVORS Inquiries or PTS/PBS RIPS | | No IVORS outputs supported for testing |
| Ensure Available Position in your Settlement Account for Selected CUSIP | PTS/PBS Position Inquiry or Settlement Web | | No IVORS outputs supported for testing |
| Input Redeem at TA or Sponsor Instruction | PTS/PBS IVORS Instruction Submissions | | No IVORS inputs/outputs supported for testing |
| Inquire About Instructions Status | PTS/PBS IVORS Inquiries, PTS/PBS ART or Settlement Web | | No IVORS outputs supported for testing |
| Confirm Allocated IVORS Transaction | PTS/PBS IVORS Inquiries, PTS/PBS ART or Settlement Web | | No IVORS outputs supported for testing |
| Scenario 4: IVORS Rollover at TA or Sponsor (Settlement Date = Transaction Date + 2 Business Days) | | | |
| | | | N/A |
| View Eligible IVORS CUSIPs | PTS/PBS IVORS Inquiries or PTS/PBS RIPS | | No IVORS outputs supported for testing |
| Ensure Available Position in your Settlement Account for Selected CUSIP | PTS/PBS Position Inquiry or Settlement Web | | No IVORS outputs supported for testing |
| Input Rollover at TA or Sponsor Instruction | PTS/PBS IVORS Instruction Submissions | | No IVORS inputs/outputs supported for testing |
| Inquire About Instructions Status | PTS/PBS IVORS Inquiries, PTS/PBS ART or Settlement Web | | No IVORS outputs supported for testing |
| Confirm Allocated IVORS Transaction | PTS/PBS IVORS Inquiries, PTS/PBS ART or Settlement Web | | No IVORS outputs supported for testing |
| Scenario 5: PTOp Cover / Protect Processing (Cover / Protect Expiration Date = Instruction Expiration Date + 2)***** | | | |
| | | | N/A |
| View Eligible Tender / Exchange Offer Events with Guaranty of Delivery Privileges Attached to the Offer | PTS/PBS RIPS | | ISO 20022 CANO or REGO2 CCF |
| Ensure that ATP Settlement Position is 0 | PTS/PBS Position Inquiry or Settlement Web | | No Corporate Actions Supported Outputs Available |
| Place a Protect Instruction | PTS/PBS Voluntary Tenders and Exchanges - Submit Instruction - Protect | | No Inbound CCF Files Supported |
| Ensure that Position Equaling the Protected Amount or Greater is now In your ATP Settlement Account | PTS/PBS Position Inquiry or Settlement Web for Delivery Orders | | No Corporate Actions Supported Outputs Available |
| Once Position is Available, Cover the Protect within 2 Business Days | PTS/PBS Voluntary Tenders and Exchanges - Submit Instruction - Cover Protect Submitted to DTC | | No Inbound CCF Files Supported |
| Have Another Contra Party Cover the Protect on your Behalf within 2 Business Days ***** | PTS/PBS Voluntary Tenders and Exchanges - Submit Instruction - Cover Protect on Behalf of Another | | No Inbound CCF Files Supported |
| Inquire as to Status of the Protect | PTS/PBS Voluntary Tenders and Exchanges - Inquiry | | No Corporate Actions Supported Outputs Available |
| View Allocation of Covered Protect | PTS/PBS Reorg Allocations | | CSHSET CCF |
| Corporate Actions T+2 Test Scenarios (continued) | | | |
| | | | N/A |
| Scenario 6: PSOP Cover / Protect Processing (Cover / Protect Expiration Date = Instruction Expiration Date + 2)***** | | | |
| | | | N/A |
| View Eligible Tender / Exchange Offer Events with Guaranty of Delivery Privileges Attached to the Offer | PTS/PBS RIPS | | ISO 20022 CANO or REGO2 CCF |
| Ensure that ATP Settlement Position is 0 | PTS/PBS Position Inquiry or Settlement Web | | No Corporate Actions Supported Outputs Available |
| Place a Protect Instruction | PTS/PBS Rights Subscriptions - Submit Instruction - Protect | | No Inbound CCF Files Supported |
| Ensure that Position Equaling the Protected Amount or Greater is now In your ATP Settlement Account | PTS/PBS Position Inquiry or Settlement Web for Delivery Orders | | No Corporate Actions Supported Outputs Available |
| Once Position is Available, Cover the Protect within 2 Business Days | PTS/PBS Rights Subscriptions - Cover Protect Submitted to DTC | | No Inbound CCF Files Supported |
| Have Another Contra Party Cover the Protect on your Behalf within 2 Business Days ***** | PTS/PBS Rights Subscriptions - Cover Protect on Behalf of Another | | No Inbound CCF Files Supported |
| Inquire as to Status of the Protect | PTS/PBS Rights Subscriptions - Inquiry | | No Corporate Actions Supported Outputs Available |
| View Allocation of Covered Protect | PTS/PBS Reorg Allocations | | CSHSET CCF |
| Critical Information Related to Testing Support / Processes Available | | | |
| * Outputs for Corporate Actions in either ISO 20022 or CCF will not be required to test, but will be available for firms connected to the T+2 environment. | | | |
| ** Canadian Distributions will also be announced and processed during T+2 testing as it is a dependency that Canada makes the move to a T+2 settlement cycle the same day that the US does. | | | |
| *** Adjustments (Stock Loan, Repos, Fails and Misc. / GL) tracking will be available but not required for testing. If members wish to test adjustments tracking they must ensure that they have the proper scenarios occur in their ATP account via special codes on their Delivery Orders. | | | |
| **** ISO 20022 Instructions messages for EDS will not be available for the CRS service, as that service is not eligible for messaging. | | | |
| ***** For both scenarios 4 and 5 for PTOp and PSOP Cover/Protect processes, DTC does not have any systematic changes associated to the T+2 settlement cycle. DTC inputs the dates for the Cover/Protect period based on the language of the Guaranty of Delivery found in the event's offering circular. Both the PTOp and PSOP processors will be available and supported to test if firms wish to do so. | | | |
| ***** The Cover Protect on Behalf of Another feature will be available for testing but not required. To use the functionality in test, the member must find a contra party that has participated in the offer and will provide position to cover on behalf of the primary test member. | | | |

Double Settlement Day Test Scenarios

Testing the Double Settlement Day Scenarios for T+2 implementation (first T+2 settlement day), and Double Settlement Day Scenario for Bank Holiday

As part of the T+2 implementation NSCC will change its rules for CTS trade reporting. In the current T+3 settlement environment, regular-way settling trades received by NSCC are generally reported on the CTS on T+1. As part of the move to T+2, NSCC will change its CTS reporting rules so that regular-way settling trades received by NSCC will generally be reported on the CTS on T.

Due to the change in the CTS reporting rules, DTCC will support the testing of two different double settlement day scenarios – the double settlement day scenario related to a bank holiday and the double settlement day scenario related to the implementation of T+2. The key difference between double settlement day processing in a bank holiday scenario versus the T+2 implementation scenario is related to NSCC CTS reporting.

In a double settlement day scenario for bank holiday, trade dates with coinciding settlement dates will both conform to a T+2 settlement cycle; trades will be reported on the CTS on T. For example, if Friday April 28, 2017 was the day prior to the bank holiday and Monday May 1, 2017 was the day of the bank holiday, the CTS issued on Friday April 28, 2017 and Monday May 1, 2017 will each report regular way trades settling two business days after the bank holiday or Wednesday May 3, 2017.

In the implementation day scenario, trade dates with coinciding settlement dates will follow two different settlement cycles and two different CTS reporting rules. Trades reported on the last T+3 trade date will be reported on the CTS on T+1, while trades reported on the first T+2 trade date will be reported on the CTS on T. For example, trades received on Friday September 3, 2017 (last T+3 trade date) will settle on a T+3 basis and will be reported on the CTS on T+1 or Tuesday September 7, 2017, and trades submitted on Tuesday September 7, 2017 (first T+2 trade date) will settle on a T+2 basis and will be reported on the CTS on T or Tuesday September 7, 2017. Hence, Tuesday's CTS output will include trades submitted on both Friday September 3, 2017 and Tuesday September 7, 2017, which will have the same settlement date of September 9, 2017.

Testing for the First T+2 Settlement Day/Double Settlement Day Scenario

DTCC will provide opportunities for the industry to test a double settlement scenario, where “Regular Way” (RW) trades executed on the last T+3 trade date and RW trades executed on the first trade day of T+2 will both settle on the same day.

Please refer to the test calendar (table 1) for testing dates.

Double Settlement scenarios will be tested as follows:

Test Setup (over the weekend):

- DTCC will copy the following production data to the test environment (PSE U):
 - o Following completion of the Friday night cycle (for Monday settlement), DTCC will copy each Member's open positions in CNS for Monday settlement, and all trades CNS has projected to settle on Tuesday. **This information will be identical to what will be reported in production on the CNS projection file/report issued Saturday morning at 00:35 ET (Note: CNS will not be copying ACATS positions in Sub-Accounts R&S)**
 - o On Friday night, after all UTC goodnight messages have been processed, DTCC will copy all trades scheduled to settle on Wednesday. This will include extended settlement (Seller's Option) trades received prior to Friday that

are scheduled to settle on Wednesday

- o Members should copy their Friday's production data to their own respective test environments
- o It is important for Members to note that from this point onwards, each Member's trade data in the test environment will be updated based on transactions processed in the test environment only. As such, data in the test environment may differ from production data

Test Day 1 (T) - Monday

- o Members will submit test trades to the T+2 test environment (PSE U); "Regular way" trades will be assigned Wednesday's settlement date (T+2)
- o NSCC will produce Cycle 1 CTS output, which will include both Friday's production data and Monday's test trades with Wednesday settlement

Test Day 2 (T+1) - Tuesday

- o No action necessary. Members can elect to submit one day or same day settling trades in the test environment (PSE U). Test trades will be reported on the applicable CTS output distribution

Test Day 3 (T+3) - Wednesday

- o No action necessary. Members can elect to submit same day settling test trades. Test trades will be reported on the applicable CTS output distribution
- o T+3 trades executed on Friday and T+2 trades executed on Monday will settle
- o Please note: Any Member not participating in the double settlement day test, i.e., not copying Friday production data into its test environment, may have difficulty reconciling with DTCC during the double settlement test period since DTCC's test output will include the Friday night production data copied into the test system.

Double Settlement Day Test –Bank Holiday Scenario

During certain bank holidays, the markets are open for trading and NSCC, DTC and Omgeo are open to receive trade activity, though trades will not settle on that day (as an example, Columbus Day).

As a result, under T+2 conditions, regular way settling transactions submitted to NSCC the day before and the day of the bank holiday will both settle two business days following the bank holiday, making that day a "double settlement" day. Similarly, the CTS issued on the day prior to the bank holiday and on the bank holiday will each report regular way trades settling two business days after the bank holiday.

DTCC will enable Members to test Bank Holiday processing/Double Settlement Day scenario on Monday May 1, 2017. For the test, DTCC will modify the PSE U (T+2) test environment to replicate production bank holiday processing as follows:

- NSCC, DTC and Omgeo in the PSE U will accept test trade input from Members on May 1, 2017 although trades will not settle on that date
 - o Test transactions submitted to NSCC's CMU Real-Time Trade Matching application (RTTM) in the PSE U environment having settlement date of May 1, 2017 will be rejected
 - o Test transactions submitted to the Omgeo Trade Suite application in the PSE U environment having settlement date of May 1, 2017 will be rejected
 - o Test transactions submitted to NSCC's Fund/SERV application (Mutual Fund orders) having settlement date of May 1, 2017 will be rejected

- o Valued DTC Deliver Order (DO) instructions will not be processed in the PSE U environment on May 1, 2017. Instead they will be carried over and processed on the following business day (May 2, 2017)
- o Free (not for value) DTC DO instructions will be processed in the PSE U on May 1, 2017
- o NSCC's Universal Trade Capture system (UTC) in the PSE U environment will deem May 1, 2017 a non-settlement date and will assign settlement dates to Equity Clearing test transactions accordingly
 - » Regular way settling transactions submitted to NSCC the day before, and the day of, the bank holiday will both settle two business days following the holiday ("double settlement" day) as depicted in the below table:

| TRADE DATE (T) | T+1 | T+2 SETTLEMENT DAY |
|--|------------------|--------------------|
| Thursday 4/27/17 | Friday 4/28/17 | Tuesday 5/2/17 |
| Friday 4/28/17 (One Business Day Before Bank Holiday) | Tuesday 5/2/17 | Wednesday 5/3/17* |
| Monday 5/1/17 (Bank Holiday) | Tuesday 5/2/17 | Wednesday 5/3/17* |
| Tuesday 5/2/17 | Wednesday 5/3/17 | Thursday 5/4/17 |

*Double Settlement Day

- NSCC will generate CTS output on April 28, 2017 (day before the bank holiday) and on May 1, 2017 (the bank holiday), as it would on any regular business day
 - o The CTS issued on the day prior to the bank holiday and on the bank holiday will each report regular way trades settling two business days after the bank holiday (in example above, the settlement date is May 3, 2017)
 - o CTS reporting on the day before and the day of the bank holiday along with CNS processing is depicted in the below table:

| CTS Cycle | Approximate Distribution Timeframe | Trade Activity Output Reported: AutoRoute# 02043339 (MRO) and # 02042340 (.CSV) |
|--|------------------------------------|---|
| DAY PRIOR TO BANK HOLIDAY (FRIDAY, 4/28/2017) | | |
| CTS Cycle 1 | Daily – 21:00 ET | <ul style="list-style-type: none"> • Trades received by UTC settling in two business days • Will generally include: <ul style="list-style-type: none"> » Regular way trades with T=Friday (4/28/17), SD=Wednesday (5/3/17) » Seller's Option trades with T before 4/28/17), SD = Wednesday (5/3/17) » As of trades with SD=Tuesday (5/2/17) » Next day trades with T=Friday (4/28/17), SD=Tuesday (5/2/17) |
| CTS Cycle 2 | Daily- 24:00 ET | <ul style="list-style-type: none"> • Same as Cycle 1 above for those trades received on Friday 4/28/17 after Cycle 1 is distributed |

| CTS Cycle | Approximate Distribution Timeframe | Trade Activity Output Reported: AutoRoute# 02043339 (MRO) and # 02042340 (.CSV) |
|--|---|--|
| CNS Night Cycle | No CNS Files/ Reports issued (i.e., Projection) | No CNS Night Cycle |
| BANK HOLIDAY (MONDAY, 5/1/2017) | | |
| CTS Cycle 3 | Daily- 12:00 ET | Will primarily include: <ul style="list-style-type: none"> » Next day trades with T=Monday (5/1/17), SD=Tuesday (5/2/17) » As of trades with SD= Tuesday (5/2/17) |
| CNS Day Cycle | No CNS Day Cycle | No CNS Reports/Files issued (i.e., Mid-Day Projection, Accounting Summary) |
| CTS Cycle 1 | Daily- 21:00 ET | Will primarily include: <ul style="list-style-type: none"> » Regular way trades with T=Monday (5/1/17), SD=Wednesday (5/3/17) » As of trades with SD=Tuesday (5/2/17) » Next day trades with T=Monday (5/1/17), SD=Tuesday (5/2/17) |
| CTS Cycle 2 | Daily- 24:00 ET | Same as Cycle 1 above for those trades received on Monday (5/1/17) after Cycle 1 is distributed |
| CNS Night Cycle | CNS Night Cycle runs for Tuesday Settlement | CNS Reports/Files issued (i.e., Projection) - On the Projection File/Report issued Tuesday morning at 00:30 ET, the settling trades column will include all positions for that Member from each CTS issued that has a settlement date of Wednesday (5/3/17) |

8. APPENDIX A

| Applications/Processes | PSE U Time Schedule/Cut-Offs |
|---|--|
| NSCC | |
| Universal Trade Capture System (UTC) | |
| Trade Input- UTC | Start-of-Day 6:00ET - 21:00 ET End- of -Day. <i>Test trades received outside of this time window will be rejected.</i> <i>UTC will auto-close all sending entities that have not closed out by 21:00 ET</i> |
| Key UTC Outputs | |
| Participant MRO - Intraday 02981673 | 02981673- Participant MRO- Intraday will be produced in the following cycles Cycle 1 - 8:30 ET Cycle 2 - 9:30 ET Cycle 3 - 10:30 ET Cycle 4 - 11:30 ET Cycle 5 - 12:30 ET Cycle 6 - 13:30 ET Cycle 7 - 14:30 ET Cycle 8 - 15:30 ET Cycle 9 -16:30 ET Cycle 10 - 17:30 ET Cycle 11 - 18:30 ET Cycle 12 - 18:40 ET Cycle 13 - 18:50 ET Cycle 14 - 19:00 ET Cycle 15 - 19:10 ET Cycle 16 - 21:45 ET |
| UTC Real-time output via FIX/MQ | Available throughout the day |
| New Consolidated Trade Summary (CTS) Output | Cycle 1 - 18:50 ET on T (21:00 ET in production) Cycle 2 - 21:45 ET on T (24:00 ET in production) Cycle 3 - 11:30 ET on T+1 (same time in production) |
| CTS Customer MRO - 02982339 | |
| CTS Customer CSV - 02982340 | |
| Continuous Net Settlement (CNS) | |
| Output | |
| CNS Open Position Prior to Day Cycle MRO - 02980949 | 00:30 ET |
| CNS Open Position Prior to Night Cycle MRO - 02980951 | 19:00 ET |
| CNS Day Miscellaneous Activity MRO - 02981236 | 15:30 ET |
| CNS Night Miscellaneous Activity MRO - 02982008 | 21:50 ET |
| CNS Day Settlement Activity MRO - 02981234 | 15:30 ET |
| CNS Night Settlement Activity MRO - 02982023 | 21:50 ET |
| CNS Projection MRO - 02982022 | 00:30 ET |
| CNS Accounting Summary MRO- 02982024 | 015:30 ET |
| CNS Deliver and Receive Instructions MRO - 02980996 | 19:00 ET |
| Exchange Traded Fund (ETF) | |
| Primary Cycle | |
| Input | |
| Portfolio Composition File - 41301 and ETF Create/Redeem Instructions (41300) | 11:30 ET through 15:30 ET |
| Output | |
| Portfolio Composition Output File - 02981256 | 15:40 ET |
| Create/Redeem Blotter Detail Report - 02980291 | 15:40 ET |
| Create/Redeem Blotter MRO - 02981254 | 15:40 ET |
| Supplemental Cycle | |
| Input | |
| Portfolio Composition File - 41301 and ETF Create/Redeem Instructions (41300) | 8:00 ET through 11:00 ET |
| Output | |
| Portfolio Composition Output File - 02981256 | 11:10 ET |
| Create/Redeem Blotter Detail Report - 02980291 | 11:10 ET |
| Create/Redeem Blotter MRO - 02981254 | 11:10 ET |

APPENDIX A CONTINUED

| | |
|--|---|
| CMU | |
| Trade Input - CMU RTTM | 7:15 ET through 17:30 ET |
| RTTM Trade Match cut-off | Trades received after 17:30 ET will be held overnight and processed the next business day |
| End of day AutoRoute products: Municipal Bond Contract File - 02982237 Corporate Bond/UIT Contract File - 02982433 | 11:30 ET on T+2 (Settlement Date) |
| | 18:00 ET |
| DTC | |
| Settlement | |
| Day Settlement Cycle | 8:00 ET through 15:30ET <i>DO input 15:20 ET</i> <i>Valued Input to RAD/RAD approval - 15:20 ET</i> <i>Valued Recycle/Drop - 15:10 ET</i> <i>Final CNS slice/cut-off - 15:15</i> <i>Final Figures - 15:30 ET</i> |
| Night Settlement Cycle | 18:30 ET through 21:45 ET |
| DO Settlement Output and Activity DTFPART is available throughout the day in bath on real-time ISO messages | |
| Corporate Actions | |
| Corporate Action Movement Preliminary Advice (CAPA) for distribution | 00:30 ET |
| Corporate Action Notification Eligible Balance (CANO-E) for distribution | 13:45 ET |
| PTOP (ATOP 1) | 17:00 ET |
| PTOP (ASOP 1) | 17:00 ET |
| Elective Dividend System (EDS) | 00:00 ET through 18:00ET (ISO cut-off @ 16:00 ET) |
| Position Capture | 19:00 ET |
| Omgeo | |
| Trade Input - TradeSuite | 24*6, Sunday 12:00 ET through Saturday 16:00 ET. Trades received outside of this time window will be rejected |
| Trade match/affirm cut-off | 11:30 ET on T+1 (Settlement Day-1) |
| Interactive outputs will be available throughout the day | |

