



# **CCASS/3 Participant Supplied Systems End-to-End Test User Guide**

**Version:** 1.7  
**Date:** January 2016

## Modification History

Version	Date	Description and reason for modification	Changed Section(s)
1.0	3 Dec 2002	1 <sup>st</sup> Release	N/A
1.1	12 Dec 2002	Add Appendix D & Amendment on Execution Note on Appendix A1	Section 1 & Appendix A1
1.2	20 Dec 2002	Add Appendix E & revise the test calendar for E2E Test. Early checkpoints added.	Section 1, Section 2, Section 3 & Appendix E
1.3	23 June 2003	Add Appendix F & revise accordingly to move some mandatory messages to the optional messages with amendments to Appendix A1, A2, B1, B2, D and E	All Sections & Appendix A1, A2, B1, B2, D, E & F
1.4	27 May 2005	Revise Section 1 (Overview) to detail when an end-to-end PG test will be necessary	Section 1
1.5	19 Apr 2006	Renamed "WT&T" to "Network provider" for SDNet Rollout	Section 3.1
1.6	5 Mar 2010	-Amend lead-time for installation of testing line -Remove Start-of-Day Data File Download	Table of Content, Section 3.1 & 3.2.1
1.7	29 Jan 2016	Corporate Re-Branding Campaign	Logo, "HKEX", Font

# Table of Contents

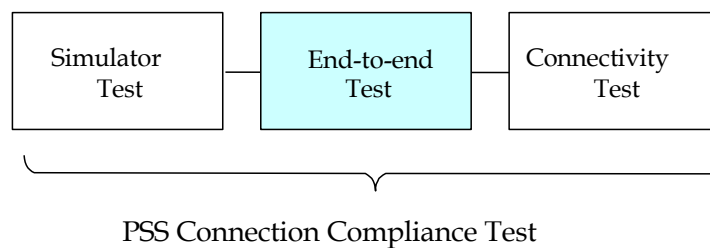
<b>1</b>	<b>Overview .....</b>	<b>4</b>
1.1	Situations Requiring an End-to-End Test .....	4
1.2	Notes to New PG Admission.....	5
<b>2</b>	<b>Scope &amp; Approach .....</b>	<b>6</b>
2.1	Scope of End-to-End Test.....	6
2.1.1	For PG Mandatory Tasks and selected Optional Messages .	6
2.1.2	PSS Interface Connection Compliance Test, not PSS Application Test	6
2.2	Approach .....	6
2.2.1	How to demonstrate the readiness of PSS Interface .....	6
2.2.2	PSS Interface Readiness Criteria.....	7
<b>3</b>	<b>Testing Arrangement &amp; Timetable .....</b>	<b>9</b>
3.1	Test Environment.....	9
3.2	Test Schedule.....	9
3.2.1	Connectivity Session .....	100
3.2.2	Cycle 1 Testing Session.....	100
3.2.3	Cycle 2 Testing Session.....	100
3.3	Site Visit .....	111
<b>4</b>	<b>Test Scenario Execution Guidelines.....</b>	<b>122</b>
<b>5</b>	<b>System Change &amp; Retest Arrangement .....</b>	<b>133</b>
5.1	System Changes .....	133
5.2	Retest Arrangement.....	133
<b>6</b>	<b>Site Visit &amp; On-site Demonstration Scope.....</b>	<b>144</b>

# 1 Overview

## 1.1 Situations Requiring an End-to-End Test

Participants who decide to connect their Participant Supplied System (PSS) with CCASS/3 are required to demonstrate their readiness through the **PSS connection compliance test program**.

The PSS connection compliance test program is composed of 3 major test steps : **Simulator test**, **End-to-End test**, and **Connectivity test** on participant production hardware in connecting with CCASS/3 Host.



This user guide provides detailed information about the end-to-end test.

In addition to admission of new PG participants, HKEX could request existing PG participants to perform an end-to-end PG test whenever it deems necessary. The following are some examples of situations requiring an end-to-end test:

- The PG participant has performed substantial modification of its PSS or intends to deploy additional PG messages in production. In this situation, HKEX would require an end-to-end PG test for the participant to demonstrate the correct functionality of its PSS in regard to the PSS' modification or the support of additional PG messages. HKEX will usually schedule such test in the next regular batch of PG admission end-to-end test for new PG participants. This is a chargeable item and the associated test fees are listed in Section 5 and 6 in the Introduction to PG.
- There is change in PG messages or other PG technical details affecting the way a PSS interfaces with PG. In this situation, HKEX will notify PG participants of the details of change and provide sufficient lead time (usually 2 to 3 months depending on the complexity of change) for participants to modify and test their PSS before commencing the end-to-end test. There are no associated test fees.
- There is major CCASS/3 technology change or upgrade which requires participants to verify the PG's system behaviour according to the test conditions prescribed by HKEX. In such situation, participants will be informed on a regular basis and sufficient lead time will be given to PG participants in preparation for the end-to-end test. There are no associated test fees.

If necessary, HKEX will distribute any new PG software and the associated installation procedures for participants to set up their end-to-end test PG machines. Before commencing the actual test, HKEX will perform a connectivity test with participants to ensure that participants are using the correct PG software and the PG can connect properly to the test environment.

Participants need to ensure that they meet the test schedule defined by HKEX. After the end-to-end test, participants will need to return the signed off test results to HKEX. If the participant fails to produce satisfactory test results, HKEX could demand that the respective PSS refrain from deploying in production those PG messages or functionality that it failed in the end-to-end test.

For other CCASS/3 functional or technical changes that are transparent to PSS, no end-to-end test will be required. PG participants, like other CCASS Participants, would be informed of those changes according to the standard practice of notification through circulars (depending on the scope of the change, a circular is normally issued 2 months before the production effective date). The following are some examples of CCASS/3 changes that would not involve an end-to-end test:

- Change in length or contents of reports downloaded through PG. In this situation, HKEX will announce the new report formats through circulars
- Minor CCASS/3 technology upgrade or change where HKEX can independently verify the upgrade results. If such upgrade requires change in PG software, HKEX will use the remote software distribution tool to upgrade the software on each production PG machine at participants' premises. HKEX would prescribe the relevant test for participants to test on the production PSS after the PG upgrade. Participants will confirm to HKEX that they have completed the prescribed test successfully.

## 1.2 Notes to New PG Admission

During the end-to-end test for new PG admission, participants are required to **demonstrate the readiness of their PSS interfaces (through their PSS application)** in handling the PG mandatory tasks and the selected PG optional messages. The end-to-end test is operated under a testing environment, connecting participants' PSS with a testing PG, testing CCASS/3 host and testing CCASS/3 WAN, instead of simulators. Participants could also make use of this opportunity to verify their PSS applications.

As the exercise is aimed at end-to-end test between CCASS/3 and participants' PSS facilities, it is mandatory for participants to use their full-blown version of PSS application to perform the test. Participant's use of a PSS simulator or an interface driver program will not be accepted by HKEX as adequate for the test.

The user guide is organised into the following 6 sections, with 6 appendices :

Section 1	: Overview
Section 2	: Scope & Approach
Section 3	: Detailed Arrangement & Timetable
Section 4	: Test Scenario Execution Guidelines
Section 5	: System Change & Retest Arrangement
Section 6	: Site Visit & On-site Demonstration Scope
Appendix A1	: Test Scenario List and Execution Notes for Mandatory Tasks
Appendix A2	: Test Scenario List and Execution Notes for Optional Messages
Appendix B1	: Execution Checklist for Mandatory Tasks
Appendix B2	: Execution Checklist for Optional Messages
Appendix C	: PSS Interface Readiness Confirmation Reply
Appendix D	: PSS-PG Interface End-to-End Test Pre-Validation Exercise
Appendix E	: Cycle 1 End-to-End Test Result Checklist
Appendix F	: PG Testing Network Order Confirmation Form

## 2 Scope & Approach

### 2.1 Scope of End-to-End Test

#### 2.1.1 For PG Mandatory Tasks and selected Optional Messages

The scope of the end-to-end test will cover PG mandatory tasks and selected optional messages. The system functionality will be up to CCASS/3 stage 2. That is, the PG messages will incorporate Market Codes, 5-digit stock codes, etc.

#### 2.1.2 PSS Interface Connection Compliance Test, not PSS Application Test

The end-to-end test is a **functional verification** on the implementation of PG messages by the PSS Interface. This is to ensure the PSS interface design/implementation follows the message formats and message flows defined in the CCASS/3 Messaging Specifications for PSS.

Participants are required to conduct their end-to-end test through their PSS applications. However, the functionality and technical architecture (e.g. reliability / fail-over) of the PSS applications will not be within the scope of this end-to-end test. Participants should identify their own approaches and tools to verify the readiness of their PSS applications.

### 2.2 Approach

#### 2.2.1 How to demonstrate the readiness of PSS Interface

It is a 3-step process to demonstrate the readiness of the PSS Interface.

##### Step 1 : Complete relevant test scenarios within end-to-end testing session

Participants should demonstrate the readiness of their PSS interface through the successful completion of HKEX prescribed test scenarios during the **“testing session”** of the end-to-end test.

As illustrated in the CCASS/3 Messaging Specification for PSS, the PG messages are organised into message groups based on their corresponding system tasks. HKEX has proposed the end-to-end test scenarios for each message group documented in the CCASS/3 Messaging Specification for PSS (Appendix A1 – “Test Scenario List and Execution Notes for Mandatory Tasks” and Appendix A2 “Test Scenario List and Execution Notes for Optional Messages”). It should be noted that these test scenarios should not be regarded as exhaustive list for the PG-PSS interfaces testing, but critical test items that HKEX would conduct sample review. Participants should base on their own PSS design to define specific / additional test cases for the verification of their PSS-PG interfaces and PSS applications.

Participants are required to record down the **execution details / results** for submission to HKEX verification (Appendix B1 – “Execution Checklist for Mandatory Tasks” and Appendix B2 – “Execution Checklist for Optional Messages”). The execution results should be substantiated with **objective evidences** (e.g., PSS input screen dumps, PSS output screen dumps and relevant C3T screen dumps) which can prove the test scenarios have been successfully completed through the PSS Interface (together with the PSS application). The objective evidences, however, are not required to be submitted to HKEX, but will be sample reviewed by HKEX during selective site visit.

Participants have to demonstrate they can successfully complete all the test scenarios prescribed for the associated message group. If any one of the test scenarios is not successfully executed, participants will NOT be able to declare their PSS interface readiness to implement that particular system function.

### **Step 2 : Submit “PSS Interface Readiness Confirmation Reply”**

Participants are required to complete and submit an Execution Checklist (Appendix B1 and Appendix B2) and a formal PSS Interface readiness confirmation reply (Appendix C) to confirm their PSS interface readiness (through PSS application) in connecting with CCASS/3 if the test results satisfied the “readiness criteria” defined which should be returned by the end of the End-to-End test period (i.e., Cycle 2 Testing Session).

The confirmation reply will include an official sign-off from the participant (with Authorised Signature(s) and Company Chop).

In addition, in the middle of the test (which is after the completion of the Cycle 1 testing session), participants are also requested to complete the “Cycle 1 End-to-End Test Result Checklist” (Appendix E of the End to End Test User Guide) to HKEX to indicate which test scenarios (as documented in Appendix A1 and A2 of the End to End Test User Guide) have been successfully completed. Participants should complete all test scenarios in Cycle 1 testing session and use Cycle 2 testing session as retest / regression windows.

### **Step 3 : Prepare for HKEX site visit & sample checking**

To confirm the readiness of the PSS Interface, HKEX will also conduct the following actions upon the receipt of the confirmation replies.

- Ensure CCASS/3 transaction log contains the same transaction details as reported by participant that have been executed during the testing session.
- Conduct site visit on sampled participants and check the objective evidences of the test execution results (e.g., PSS input screen dumps, PSS output screen dumps and relevant C3T screen dump). HKEX may also request for on the spot demonstration of selective system functions and test scenarios, if required.

#### **2.2.2 PSS Interface Readiness Criteria**

To demonstrate the readiness of their PSS interfaces (through their PSS application) for production launch, the followings are criteria participants should observe :

##### **2.2.2.1 PSS-PG Connection, Logon and Logoff**

- PSS can connect to PG, Logon and Logoff PG properly.
- Under circumstances of connection failure, PSS can re-connect and/or re-logon to re-establish the communication with PG.
- PSS can cater for downtime of CCASS/3 servers due to day-end system maintenance.

**2.2.2.2 Perform CCASS/3 Updating and Single-Enquiry Functions**

- PSS can use the mandatory tasks and selected optional messages to perform the corresponding CCASS/3 functions.
- PSS can handle warning or error acknowledgements for each of the mandatory tasks and selected optional messages
- PSS can follow message formatting rules and features as defined for CCASS
- For updating functions, PSS can handle PG timeout scenario by re-submitting the request message and duplicate checking

**2.2.2.3 Perform Multiple-Enquiry Functions**

- For each of the Multiple-Enquiry Functions, PSS can handle no-record-found, single-page as well as multiple-page scenarios where applicable.
- PSS can handle Enquiry-key timeout scenario. That is, timeout occurs when PSS request the next page using the Enquiry-key in the previous page where applicable.



## 3 Testing Arrangement & Timetable

This section would provide detailed information concerning the test environment / schedule and arrangement of the end-to-end test.

### 3.1 Test Environment

End-to-end test would be conducted through the use of to-be-production PG software, testing network and testing CCASS/3 host. To-be-production PGs application software provided by HKEX will be connected to testing CCASS/3 host through Metro Ethernet circuit.

HKEX will prepare for a basic CCASS/3 testing database for each participant.

Participants should prepare their own testing hardware to support the testing, except smartcard and card reader (which to be provided by HKEX but at the cost of the participant as per fee schedule defined in the PG Information package). For participant testing dual-PG scenario, they should request HKEX to provide an additional smartcard and card reader. HKEX will provide a detail self-commissioning procedure later for participants to prepare and verify their testing environment and connectivity. Participants are required to apply for the testing line using the attached **PG Testing Network Order Confirmation Form** as per Appendix F. Upon receipt of the application, the network provider will arrange with relevant participants to install the testing network lines. **Please ensure to apply for the testing line 6 weeks before the end-to-end test**, as the installation work needs 6 weeks lead-time.

In addition to the to-be-production testing PG, each Participant should also set up a test C3T to connect to the test CCASS/3 host. The testing C3T serves to verify the data in CCASS/3 testing host after performing an updating function via PSS or to compare the enquiry results from PSS. Participants should prepare their own hardware for the testing C3T.

HKEX will prepare the testing participant ID, testing smart cards and card readers for the participants.

### 3.2 Test Schedule

The end-to-end test would be a 4-week exercise, with 1-day connectivity session, 9-day Cycle 1 testing session and 10-day Cycle 2 testing session. All sessions will be conduct on working day beginning from 10:00am to 5:30pm.

The following shows the schedule for the test:

Day 1	Day 2	Day 3	Day 4	Day 5
<b>Connectivity Session</b>	<b>Cycle 1 Testing Session</b>	<b>Cycle 1 Testing Session</b>	<b>Cycle 1 Testing Session</b>	<b>Cycle 1 Testing Session</b>
Day 6	Day 7	Day 8	Day 9	Day 10
<b>Cycle 1 Testing Session</b>	<b>Cycle 1 Testing Session</b>	<b>Cycle 1 Testing Session</b>	<b>Cycle 1 Testing Session</b>	<b>Cycle 1 Testing Session</b>
Day 11	Day 12	Day 13	Day 14	Day 15
<b>Cycle 2 Testing Session</b>	<b>Cycle 2 Testing Session</b>	<b>Cycle 2 Testing Session</b>	<b>Cycle 2 Testing Session</b>	<b>Cycle 2 Testing Session</b>

Day 16	Day 17	Day 18	Day 19	Day 20
<b>Cycle 2 Testing Session</b>	<b>Cycle 2 Testing Session</b>	<b>Cycle 2 Testing Session</b>	<b>Cycle 2 Testing Session</b>	<b>Cycle 2 Testing Session</b>

### 3.2.1 Connectivity Session

Testing environment of the testing session will be simulated in this connectivity session. There will be no execution of any CCASS/3 batch processing.

Results from connectivity session are only for participant’s internal verification, and no need to submit for HKEX review.

Participants should ensure the successful connection between their PSS application and testing CCASS/3 host during this session. It can be achieved by subscribing for the Asynchronous Messages.

During this session, participants are also suggested to verify the PG “Connectivity” test scenario (as recommended in Appendix A1 for Mandatory Tasks and A2 for Optional Messages) as well as the PG Administration functions.

### 3.2.2 Cycle 1 Testing Session

Participants should verify the readiness of all mandatory tasks and selected optional messages during the Cycle 1 Testing session, covering test scenarios documented in Appendix A1 - “Test Scenario List and Execution Notes for Mandatory Tasks” (and A2 - “Test Scenario List and Execution Notes for Optional Messages” if subscribed Optional Messages rollout).

Participants should complete all test scenarios in Cycle 1 testing session and use Cycle 2 testing session as retest / regression windows.

Participants can also perform functional test for the messages according to their own testing objectives. It is recommended that participants should test various combinations of qualifiers and options of the messages. .

Stress test or volume test with CCASS/3 testing host is not allowed. CCASS/3 batch process will not be executed.

At the end of this testing session, participants should pass the “**Cycle 1 End-to-End Test Execution Checklist**” (Appendix E) to HKEX for indication of test scenarios which have been successfully completed.

Participants should properly document the test results of Cycle 1 testing session given they can be treated as objective evidences substantiated for HKEX subsequent site visit / sample checking. Depending on the testing approach of participants, participants can decide not to repeat all the successfully completed test scenarios in Cycle 2 Testing Session (but just the retest / regression test scenarios).

### 3.2.3 Cycle 2 Testing Session

Cycle 2 testing sessions serves as retest or regression tests. Participants can choose to repeat some or all test scenarios covering the test scenarios documented in Appendix A1 - “Test Scenario List and Execution Notes for Mandatory Tasks” (and A2 - “Test Scenario List and Execution Notes for Optional Messages” if subscribed Optional Messages rollout) and Appendix

B1 – “Execution Checklist for Mandatory Tasks” (and B2 – “Execution Checklist for Optional Messages” if subscribed Optional Messages rollout).

Test cases and test results are required to be properly documented for HKEX review, with objective (i.e., PSS input screen dumps, PSS output screen dumps and relevant C3T screen dumps) evidences substantiated for HKEX subsequent site visit / sample checking.

This is with the same arrangements as the Cycle 1 testing.

Participants should also make use of this opportunity to perform test cases / scenarios defined by themselves.

At the end of this testing session, participants should pass the “**PSS Interface Readiness Confirmation Reply**” (Appendix C) to HKEX.

### **3.3 Site Visit**

The review scope will include the sample checking of end-to-end test results ( PSS input screen dumps, PSS output screen dumps and relevant C3T screen dumps), on-site demonstration on selective end-to-end test scenarios and also on-site demonstration on critical PSS interface technical and operational items.

Reviewers will record down the observation results and issues confirmation receipt (together with participant explanation) throughout the site visit and demonstration. The records will serve as the basis to assess the PSS readiness in operating under the CCASS/3 environment. HKEX will reserve the rights to classify PSS as non-ready when major incidents be identified without proper explanation (e.g. system abend, incorrect handling of SI records).

Participants will be notified about the site visit schedule and should ensure their availability during the site visit period.

Participants should arrange appropriate representatives from the firms to participate in the site visit. The representatives would represent the participants in replying questions raised by the reviewers, and formally sign-off the site visit results, which also includes on-site PSS demonstration results.

## 4 Test Scenario Execution Guidelines

As discussed in previous sections, participants are required to successfully execute all test scenarios of a particular message group to be qualified for implementing the message group.

Test scenarios of the end-to-end test are documented in Appendix A1 – “Test Scenario List and Execution Notes for Mandatory Tasks”, Appendix A2 – “Test Scenario List and Execution Notes for Optional Messages”, Appendix B1 - “Execution Checklist for Mandatory Tasks” and Appendix B2 - “Execution Checklist for Optional Messages”, with the following documentation structure :

### Appendix A1 and A2 – Test Scenario List and Execution Notes

There are two sections :

**List of Test Scenarios :** This lists out test scenarios required for completion for corresponding message groups for HKEX sample review. It also highlights which “execution record form” of Appendix B1 – “Execution Checklist for Mandatory Tasks” and Appendix B2 – “Execution Checklist for Optional Messages” that should be completed.

**Test Scenario Execution Notes :** There are “points to note” that participants have to pay attention when executing some specific test scenarios (e.g. data requirement, execution sequences, etc).

### Appendix B1 and B2 - Execution Checklist

This is for participants to record down the execution details / results (e.g. data input, output details, execution time, etc) for each test scenario executed for submission for HKEX review.

For example, for the “Maintain Account Transfer Instruction” message group, participants are suggested to follow the steps below :

- i. Go through the corresponding section in Appendix A1 and A2. In this case, from the List of Test Scenarios, participants should know that the test scenarios “Input ATI”, “Enquire ATI”, “Input Mass ATI”, “Change Mass ATI”, “Cancel Mass ATI” and “Enquire Mass ATI” have to be completed in order to be qualified for implementing the “Maintain Account Transfer Instruction” message group.
- ii. Execute the test scenario and capture representing screen. Participants have to decide which stock code together with the transfer quantity to be used and perform the test scenario.
- iii. Fill in the corresponding table in Appendix B1 and B2. Participants have to fill in the required details into the checklist.

## 5 System Change & Retest Arrangement

### 5.1 System Changes

System changes of the PSS Interface will be restricted after the submission of the PSS Interface Readiness Confirmation Reply.

- After the submission of the Confirmation Reply, for any PSS system change identified, participants have to determine whether it should be classified as :
  - **Message related change**, which affects the current message handling approach, or message flow design.
  - **Material change**, which may not necessarily be message related, but may affect the integrity or stability of the PSS interface.

Should these system changes be considered as necessary before system launch, participants have to notify HKEX to request for re-admission to the next available end-to-end test session for readiness re-assessment. This implies their PSS launch day will be deferred.

- System changes before launch date, however, will not be fully prohibited as long as participants can confirm the system changes are non-material, and would not affect the overall system integrity / stability. These changes are not required to report to HKEX immediately, but have to be well documented to prepare for subsequent HKEX review.
- After system launch, if there is any plan to implement any Optional Messages, participants are required to re-admit the new version of PSS interface (i.e. with the Optional Messages implemented) for another end-to-end test.
- For message changes initiated by HKEX, additional testing sessions will be arranged with appropriate prior notice to ensure participant's readiness to demonstrate the capability of their PSS.

### 5.2 Retest Arrangement

For participants who fail to demonstrate and confirm their readiness in the end-to-end test, they are required to participate in a second round of end-to-end test. The followings are major highlights of the retest arrangement :

**Additional Charges** : To cover the supporting cost of the end-to-end test environment, each participant will only offer one "free-of-charge" end-to-end testing period (which is a 4-week arrangement as depicted in Section 3.2). Charges will be imposed on participants which require additional testing sessions to complete the test.

**Rollout Batch Assignment** : Participant will be re-assigned to next available rollout batch and end-to-end test window. It is possible that there is no vacancy for the next rollout batch and assignment to other subsequent batches may have to be arranged.

## 6 Site Visit & On-site Demonstration Scope

The following are activities to be performed by reviewers during the site visit for on-site demonstration. The review time for each review items has also been defined.

- (a) **End-to-End Test Execution Result Review** : Participants to demonstrate the objective evidences of the test execution results (screen dumps, reports and system logs) – around ½ - 1 hour.
- (b) **PSS Interface On-site Demonstration** : Participants to conduct demonstration of selected test scenarios specified in the End-to-End User Guide, “Appendix A1 - Test Scenario List and Execution Notes for Mandatory Tasks” and “Appendix A2 - Test Scenario List and Execution Notes for Optional Messages” via terminal facilities supported by the PSS. It is expected neither system error nor abnormal system behaviour would be observed – around 1 - 2 hours.
- (c) **PSS Interface Contingency Arrangement Demonstration** : The demonstration, not only covers the testing scope of PSS end-to-end test (which is a functional testing of the PSS Interface), but also covers some major PSS Interface technical and operational items. This is to sample verify the successful completion of the acceptance of PSS Interface.

Participants may be requested to demonstrate (or describe) the contingency arrangements for the following scenarios – around 1 hour.

- For single PG configuration, if the PG is out of services for a period of time, the PSS could reconnect back to PG when it is reactivated. PSS can function properly afterward.
- For dual PG configuration, one of the PG is out of services for a period of time and the PSS can switch to another PG (either automatically or manually) and continue function.
- Under CCASS/3 disaster situations, CCASS/3 database may be rolled back to a previous Quiesce point, say at 3:45pm (pre-defined by HKEX). After the rollback of CCASS/3 database (within 3 hours), participants should be able to re-inputted the backed out transactions (via PSS or C3T) starting from the Quiesce point. Participant should ensure the integrity of their PSS either through manual procedures or specific system features.