

**CCSDS FILE DELIVERY PROTOCOL (CFDP)—
NOTEBOOK OF COMMON INTER-
AGENCY TESTS FOR STORE AND
FORWARD OVERLAY (SFO)**

CCSDS RECORD

CCSDS 720.6-Y-1

YELLOW BOOK
September 2007



CCSDS

The Consultative Committee for Space Data Systems

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CONTENTS

<u>Section</u>	<u>Page</u>
1 INTRODUCTION.....	1-1
1.1 PURPOSE.....	1-1
1.2 SCOPE.....	1-1
1.3 ORGANIZATION OF THIS REPORT.....	1-1
2 OVERVIEW.....	2-1
2.1 THE OVERALL PLACE OF THESE TESTS	2-1
2.2 OPERATION OF THE STORE AND FORWARD OVERLAY.....	2-2
2.3 TEST SERIES OVERVIEW	2-2
3 INTER-AGENCY FUNCTIONAL TEST SERIES.....	3-1
3.1 UNDERLYING CORE PROCEDURES SET-UP	3-1
3.2 TEST SERIES F6	3-4
3.3 TEST SERIES F7	3-8
3.4 TEST SERIES F8	3-13
3.5 TEST SERIES F9	3-17
3.6 TEST SERIES F10	3-22

Figure

2-1 Testing Progression	2-1
-------------------------------	-----

Table

2.3-1 SFO Testing Matrix	2-4
3.1-1 Interoperability Options.....	3-1
3.1-2 Timers	3-2
3.1-3 Counters	3-2
3.1-4 Local Options.....	3-3
3.2-1 SFO Settings for F6	3-5
3.2-2 Test Series F6 Segments	3-6
3.2-3 Test Series F6 Subtests	3-6
3.3-1 SFO Settings for F7	3-9
3.3-2 Test Series F7 Segments	3-10
3.3-3 Test Series F7 Subtests	3-11
3.4-1 SFO Settings for F8	3-14
3.4-2 Test Series F8 Segments	3-15
3.4-3 Test Series F8 Subtests	3-15

CONTENTS (continued)

<u>Table</u>	<u>Page</u>
3.5-1 SFO Settings for F9	3-18
3.5-2 Test Series F9 Segments	3-19
3.5-3 Test Series F9 Subtests	3-20
3.6-1 SFO Settings for F10	3-23
3.6-2 Test Series F10 Segments	3-25
3.6-3 Test Series F10 Subtests	3-25

1 INTRODUCTION

1.1 PURPOSE

This document is a notebook intended to help those planning, participating in, and/or evaluating inter-Agency testing of the Store and Forward Overlay (SFO) of the CCSDS File Delivery Protocol (CFDP). It is a 'living' document and will be updated, modified, and reissued as needed.

The SFO CFDP testing program has four distinct purposes. These are:

- to verify the correctness of the protocol specification by creating multiple implementations according to that specification and thoroughly testing those implementations;
- to provide measurements of the performance of the protocol and the resources required by the protocol from its hosting system, including the size of the software implementations;
- to demonstrate the interoperability of independent implementations by inter-implementation testing; and
- to make available the tested implementations as reference implementations for the use of projects and programs which wish to use the SFO.

1.2 SCOPE

This document is not a part of any CCSDS Recommended Standard.

1.3 ORGANIZATION OF THIS REPORT

This notebook is divided into three parts. Section 1 (this section) presents the purpose and organization of the notebook. Section 2 is a short overview of the Test Series and the place of the series in an overall testing program. Section 3 contains the descriptions of each of the functional Test Series, including the objective, configuration, and procedures.

1.4 REFERENCES

- [1] *CCSDS File Delivery Protocol (CFDP)—Notebook of Common Inter-Agency Tests for Core Procedures*. Space Data System Standards, CCSDS 720.4-Y-1. Yellow Book. Issue 1. Washington, D.C.: CCSDS, September 2007.
- [2] *CCSDS File Delivery Protocol (CFDP)—Notebook of Common Inter-Agency Tests for Extended Procedures*. Space Data System Standards, CCSDS 720.5-Y-1. Yellow Book. Issue 1. Washington, D.C.: CCSDS, September 2007.

2 OVERVIEW

2.1 THE OVERALL PLACE OF THESE TESTS

The Test Series in this document are suggested for initial inter-Agency compatibility testing of implementations of the CFDP. The tests described in this document are intended to be a part of a progressive set of tests, proceeding from initial internal software development testing to whatever level of testing is appropriate for the intended use of the implementations. An example of such a progression of tests is shown in figure 2-1.

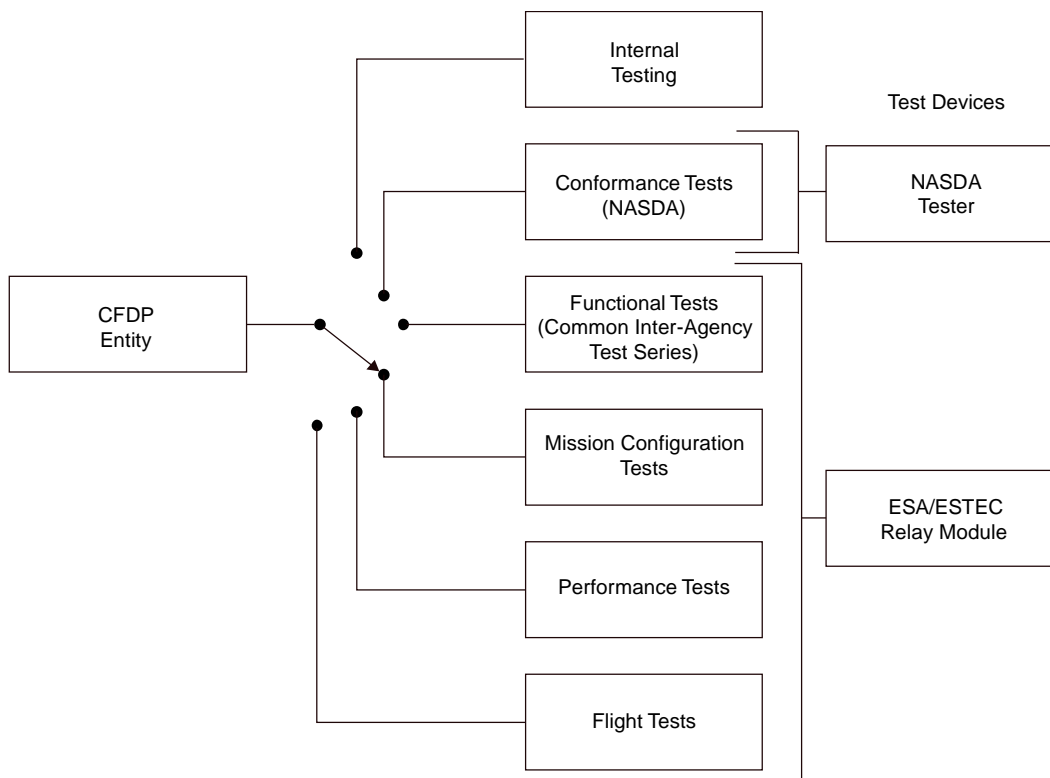


Figure 2-1: Testing Progression

The tests described in this document are not totally comprehensive and are not conformance tests. However, they do test the various procedures and options of the CFDP and provide a set of performance measurements of the interoperating implementations. This establishes a high level of confidence in interoperability for follow-on testing specifically oriented toward the planned application.

Testing aids are available to implementers, including the document *CCSDS File Delivery Protocol (CFDP)—Notebook of Common Inter-Agency Tests for Core Procedures* (reference [1]), the document *CCSDS File Delivery Protocol (CFDP)—Notebook of Common Inter-Agency Tests for Extended Procedures* (reference [2]), this document, a Conformance Tester and associated tests scripts contributed by NASDA/NEC, and testing software, called a ‘Relay Module’, contributed by ESA/ESTEC. The latter is a general purpose CFDP testing item that is especially useful in executing the tests described in this document.

2.2 OPERATION OF THE STORE AND FORWARD OVERLAY

The CFDP Store and Forward Overlay (SFO) system is an alternative mechanism for transmitting files between users of CFDP entities which may never be in direct communication; this mechanism does not rely on implementation of the Extended Procedures.

Each transmitted file is received, stored, and forwarded in a hop-by-hop manner by intermediate *waypoint users* (rather than intermediate waypoint CFDP entities, as in the Extended Procedures) until it finally reaches a user, termed the *agent*, whose CFDP entity can directly communicate with that of the *destination* user. The file to be transmitted and all associated metadata are encapsulated in an *SFO transmission file delivery unit* for transmission to each waypoint. The SFO transmission file delivery unit metadata additionally contains an 'SFO Request' Message to User that identifies and characterizes the transmission.

The agent user transmits the content of the received SFO transmission file delivery unit (the original file, together with the original associated metadata as extracted from the SFO transaction's own metadata) to the destination user in a conventional single-hop CFDP transaction termed an *SFO final delivery transaction*. The agent is then responsible for transmitting an *SFO transmission report file delivery unit*, again via waypoint users, back to the user which was the original *source* of the file.

Errors in routing or relaying and (optionally) successful relay operations are likewise reported back to the original source user in SFO transmission report file delivery units. Relaying failures and (optionally) successes are additionally reported to the final destination user where possible.

2.3 TEST SERIES OVERVIEW

The primary purpose of the Functional Test Series is to provide a high level of confidence that the separately developed implementations under test will interoperate correctly.

The Test Series are numbered as a continuation of the tests for the Core Procedures as described in *CCSDS File Delivery Protocol (CFDP)—Notebook of Common Inter-Agency Tests for Core Procedures* (reference [1]). It is necessary that those tests be performed on the entities before attempting the tests described in this document.

The tests in this document are shown in summary form in table 2.3-1. The tests are divided into five Test Series numbered from F6 through F10 (as noted above, a continuation of the numbering of the tests for the Core Procedures).

Each Test Series is constituted of a number of Segments. A Segment is the unit of 'executed test', so that a Test Series is made up of a group of executed Test Segments. The first Test Series, F6, verifies the establishment of communications among the entities in both unacknowledged and acknowledged modes, and the ability to perform basic file transfers in

these modes. Test Series F7 checks the other capabilities of the SFO, specifically Messages to User, Flow Labels, Fault Handler Overrides, Filestore requests and responses, and Segmentation control. Test Series F8 tests the responses to the two error conditions of the maximum allowable number of Waypoints being exceeded, and the failure of the completion of the transaction by the SFO Agent to the Final Destination. Test Series F6, 7, and 8 test the Waypoint as the SFO agent. Test Series F9 utilizes two Waypoints so that the first is tested as a Waypoint only (not as an SFO Agent), and thus also allows testing of the Trace reporting options. Test Series F10 utilizes three Waypoints and tests relaying of Trace reports.

Table 2.3-1: SFO Testing Matrix

SFO Interoperability Tests	Items Under Test	Start-up		Msg Types				Error Conditions		Trace				Trace				
		One-way (Unreliable)	Two-way (Reliable)	Msg to user	Flow Label	Fault Handler Override	Filestore request and response	Segmentation control	Max Number of Waypoints exceeded	Delivery from Agent to Final Destination fails	Trace to original source	Trace to final destination	Trace to both	No trace, report failure	Trace to original source	Trace to final destination	Trace to both	No trace, report failure
		Test Series F6, Segs. 1, 2	Seg. 3, 4	Test Series F7, Seg. 1	Seg. 2	Seg. 3	Seg. 4	Seg. 5	Test Series F8, Seg. 1	Seg. 2	Test Series F9, Seg. 3	Seg. 4	Seg. 5	Seg. 6	Test Series F10, Seg. 3	Seg. 4	Seg. 5	Seg. 6
Number of Entities	Field value	3	3	3	3	3	3	3	3	4	4	4	4	5	5	5	5	
SFO Msg Types																		
SFO Request	40	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
SFO Message to User	41			x														
SFO Flow Label	42				x													
SFO Fault Handler Override	43					x												
SFO Filestore Request	44						x											
SFO Report	45			x	x	x	x	x	x	x	x	x	x	x	x	x	x	
SFO Filestore Response	46						x											
Options																		
<u>Trace control flag</u>																		
No trace	0	x	x										x				x	
Trace toward source only	1									x				x				
Trace toward destination only	2										x				x			
Trace in both directions	3			x	x	x	x	x	x			x				x		

<u>Transmission mode</u>																		
Acknowledged	0		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Unacknowledged	1	x																
<u>Segmentation control</u>																		
Record boundaries respected	0																	
Record boundaries not respected	1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Reports to Original Source																		
Relay transaction success			x	x		x	x	x	x		x			x			x	
Relay transaction failure					x							x					x	
Reports to Final Destination																		
Relay transaction success			x	x		x	x	x	x		x			x			x	
Relay transaction failure					x							x					x	
Error Conditions																		
Max number of Waypoints exceeded								x										
Delivery from Agent to Final Destination fails									x									
Transaction to succeed/fail																		
		succeed	succeed	succeed	succeed	fail	succeed	succeed	fail	fail	succeed	succeed	succeed	fail	succeed	succeed	succeed	fail

3 INTER-AGENCY FUNCTIONAL TEST SERIES

3.1 UNDERLYING CORE PROCEDURES SET-UP

Default settings of Protocol Options are as shown in ***bold italic*** in table 3.1-1. When a test or subtest requires a deviation from one or more of the default settings, the different setting is noted in the test description.

Table 3.1-1: Interoperability Options

Put Modes	Effect
UnACK	Selects Unreliable mode of operation
<i>NAK</i>	<i>Selects Reliable mode of operation</i>
Put NAK Modes	Effect
<i>Deferred</i>	<i>NAK is sent when EOF is received.</i>
Immediate	NAKs are sent as soon as missing data is detected.
Prompted	NAK is sent when a Prompt (NAK) is received
Asynchronous	NAK is sent upon a local (implementation specific) trigger at the receiving entity
Put PDU CRC	Effect
True	Requires that a CRC be calculated and inserted into each File Data PDU.
<i>False</i>	<i>No CRC is inserted in File Data PDUs.</i>
Put File Types	Effect
<i>Bounded</i>	<i>Sends a normal file, i.e., one in which the file is completely known before transmission.</i>
Unbounded	Sends a file the length of which is not known when transmission is initiated (intended primarily for real-time data).
Segmentation Control	Effect
Yes	Causes each File Data PDU to begin at a record boundary.
<i>No</i>	<i>Ignores record structure when building PDUs.</i>

Note that testing of the timers and counters is a local matter. However, settings of the timers and counters must be appropriate in order to attain successful interoperations testing.

Suggested settings for the ACK and Inactivity Timers are shown in table 3.1-2. These settings assume that the entities are connected in a manner in which the one way light time delay is essentially zero (as via a LAN) and that the link rate is in the region of 10 Kb/sec to 1 Mb/sec. If the links used in a test operate significantly differently (e.g., via the Internet) it may be necessary to adjust the Timer settings appropriately. These settings are not optimal and should not be used either operationally or for protocol performance tests. They are simply a convenience for these functional tests.

Table 3.1-2: Timers

TIMER NAME	Setting (seconds)
NAK Retry Timer	For file sizes up to 300 Kbytes - 25 For file sizes from 300 Kbytes to 1 Mbyte - 45 For file sizes from 1 Mbyte to 2 Mbytes - 90
ACK Retry Timer	2
Inactivity Timer	60

Table 3.1-3: Counters

COUNTER NAME	Counter Limit
NAK Timer Expiration Limit	5
ACK Timer Expiration Limit	3

The following options affect the *local* behavior of a CFDP entity and therefore are not a part of interoperability testing. If an implementer wishes to test these options it is suggested that it be done as a local matter during the execution of the interoperability tests, or as separate tests outside the scope of the interoperability tests.

Table 3.1-4: Local Options

Action on Detection of a Fault	Effect
Cancel	Cancels subject transaction.
Suspend	Suspends subject transaction.
Ignore	Ignores error (but sends Fault.indication to local user).
Abandon	Abandons transaction with no further action.
Put Primitives (Receiving End)	Effect
EOF-sent.ind	Indicates to User at source entity that the EOF for the identified transaction was sent.
Transaction-finished.ind	Mandatory at source entity, optional at destination entity.
File-segment-receive.ind	Indicates to the user at destination entity that a File Data PDU has been received.
Action on Cancel At Receiving End	Effect
Discard data	Discards all data received in the transaction.
Forward incomplete	Forwards all data received to the local destination.
Put Report Modes (Sending End)	Effect
Prompted Rpt	Returns report on Prompt from local user.
Periodic	Returns report to local user at specified intervals.
Release of Retransmission Buffers	Effect
Incremental and Immediate	Releases local retransmission buffer as soon as sent.
In total When 'Finished' Received	Releases local retransmission buffer only when Finished PDU is received.
Suspended.indication	Effect
True	Issues Suspend.indication to local user on receipt of Suspend PDU.
False	No action.
Resumed.indication	Effect
True	Issues Resume.indication to local user on receipt of Resume PDU.
False	No action.

3.2 TEST SERIES F6

3.2.1 OBJECTIVE OF TEST

This Test Series checks the basic functioning of the SFO in order to establish a confidence baseline for Series F7 tests, which will initiate thorough checking of the SFO. It utilizes one Waypoint. Demonstrations are made of Unacknowledged and Acknowledged modes.

3.2.2 TEST PARTICIPANTS

AGENCY A

AGENCY B

3.2.3 TEST DESCRIPTION

File transfers are from Entity A via Entity B to Entity C.

In the File Size column, 'S' designates a short file with a file length equal to 20 bytes (therefore requiring only a single File Data PDU). 'M' designates a medium file with a file length of 50 Kbytes, and 'L' designates a long file with a file length of 5000 Kbytes. Note that the actual file lengths used in the Test Segments are not of great importance in themselves, except where specifically noted (as in the single File Data PDU test). The file lengths should, however, provide a reasonable number of File Data PDUs, perhaps greater than 200. Other than that, file lengths appropriate and convenient for the data rates used in the tests should be selected.

Settings of SFO options and parameters are as shown in table 3.2-1. Items not shown are not used or are selected 'Off'. The underlying Core Procedures should be set as shown in 3.1.

Table 3.2-1: SFO Settings for F6

	field value	Test Numbers 1 and 2	Segment Test Numbers 3 and 4
<u>SFO Msg Types</u>			
SFO Request	40	x	x
<u>Options</u>			
<u>Trace control flag</u>			
No trace	0	x	x
<u>Transmission mode</u>			
Acknowledged	0		x
Unacknowledged	1	x	
<u>Segmentation control</u>			
Record boundaries not respected	1	x	x
Transaction succeed/fail	to	succeed	succeed

Table 3.2-2: Test Series F6 Segments

Seg. Nbr	Purpose	Mode	File size	File data loss	Notes
1	Establish one-way connectivity	Unacknowledged	S	0	Single File Data PDU
2	Exercise multiple file data pdus	Unacknowledged	M	0	Multiple File Data PDUs
3	Establish two-way connectivity and establish performance baseline	Acknowledged	M	0	
4	Check Reliable Mode operation	Acknowledged	M	~1% of data dropped	

3.2.4 TEST PROCEDURE

For each subtest execute all Test Segments with test setup configured as shown in table 3.2-3.

Table 3.2-3: Test Series F6 Subtests

Subtest	Entity A (Source) provided by	Entity B (Waypoint) provided by	Entity C (Destination) provided by	Notes
F6.1	Agency A	Agency B	Agency A	
F6.2	Agency B	Agency A	Agency B	

3.2.5 TEST RESULTS

3.3 TEST SERIES F7

3.3.1 OBJECTIVE OF TEST

This Test Series checks the optional functions of the SFO not previously tested. It utilizes one Waypoint.

3.3.2 TEST PARTICIPANTS

AGENCY A

AGENCY B

3.3.3 TEST DESCRIPTION

File transfers are from Entity A via Entity B to Entity C.

In this Test Series all files are of medium size with an approximate file length of 50 Kbytes. Note that the actual file lengths are not of great importance in themselves. The file lengths should, however, provide a reasonable number of File Data PDUs, perhaps greater than 200. Other than that, file lengths appropriate and convenient for the data rates used in the tests should be selected.

Settings of SFO options and parameters are as shown in table 3.3-1. Items not shown are not used or are selected 'Off'. The underlying Core Procedures should be set as shown in 3.1.

Table 3.3-1: SFO Settings for F7

<u>SFO Interoperability Tests</u>	field value	<i>Msg Types</i>				
		<i>Test Segment Number</i>	<i>Test Segment Number</i>	<i>Test Segment Number</i>	<i>Test Segment Number</i>	<i>Test Segment Number</i>
		1	2	3	4	5
Things to be tested		<i>Msg to user</i>	<i>Flow Label</i>	<i>Fault Handler Override</i>	<i>Filestore request and response</i>	<i>Segmentation control</i>
<u>SFO Msg Types</u>						
SFO Request	40	x	x	x	x	x
SFO Message to User	41	x				
SFO Flow Label	42		x			
SFO Fault Handler Override	43			x		
SFO Filestore Request	44				x	
SFO Report	45	x	x	x	x	x
SFO Filestore Response	46				x	
<u>Options</u>						
<u>Trace control flag</u>						
Trace in both directions	3	x	x	x	x	x
<u>Transmission mode</u>						
Acknowledged	0	x	x	x	x	x
<u>Segmentation control</u>						
Record boundaries respected	0					x
Record boundaries not respected	1	x	x	x	x	

		<i>Msg Types</i>				
		<i>Test Segment Number</i>	<i>Test Segment Number</i>	<i>Test Segment Number</i>	<i>Test Segment Number</i>	<i>Test Segment Number</i>
		1	2	3	4	5
<u>SFO Interoperability Tests</u>						
Things to be tested	field value	<i>Msg to user</i>	<i>Flow Label</i>	<i>Fault Handler Override</i>	<i>Filestore request and response</i>	<i>Segmentation control</i>
<u>Reports to Original Source</u>						
Relay transaction success		x	x		x	x
Relay transaction failure				x		
<u>Reports to Final Destination</u>						
Relay transaction success		x	x		x	x
Relay transaction failure				x		
Transaction to succeed/fail		succeed	succeed	fail	succeed	succeed

Table 3.3-2: Test Series F7 Segments

Seg. Nmbr	Purpose	Fault	Notes
1	Test Message to User		
2	Test Flow Label		
3	Test Fault Handler Override		
4	Test Filestore Request and Response		
5	Test Segmentation Control		

3.3.4 TEST PROCEDURE

For each subtest execute all Test Segments with test setup configured as shown in table 3.3-3.

Table 3.3-3: Test Series F7 Subtests

Subtest	Entity A (Source) provided by	Entity B (Waypoint) provided by	Entity C (Destination) provided by	Notes
F7.1	Agency A	Agency B	Agency A	
F7.2	Agency B	Agency A	Agency B	

3.3.5 TEST RESULTS

3.4 TEST SERIES F8

3.4.1 OBJECTIVE OF TEST

Two error conditions are tested, namely, the maximum allowable number of Waypoints' being exceeded, and the failure of the final transaction between the SFO Agent and the Final Destination (utilizing one Waypoint).

3.4.2 TEST PARTICIPANTS

AGENCY A

AGENCY B

3.4.3 TEST DESCRIPTION

File transfers are from Entity A via Entity B to Entity C.

In this Test Series all files are of medium size with an approximate file length of 50 Kbytes. Note that the actual file lengths are not of great importance in themselves. The file lengths should, however, provide a reasonable number of File Data PDUs, perhaps greater than 200. Other than that, file lengths appropriate and convenient for the data rates used in the tests should be selected.

Settings of SFO options and parameters are as shown in table 3.4-1. Items not shown are not used or are selected 'Off'. The underlying Core Procedures should be set as shown in 3.1.

Table 3.4-1: SFO Settings for F8

SFO Interoperability Tests		<i>Error Conditions</i>	
		<i>Max Number of Waypoints exceeded</i>	<i>Delivery from Agent to Final Destination fails</i>
Things to be tested	field value	Test Segment Number 1	Test Segment Number 2
<u>SFO Msg Types</u>			
SFO Request	40	x	x
SFO Report	45	x	x
<u>Options</u>			
<u>Trace control flag</u>			
Trace in both directions	3	X	X
<u>Transmission mode</u>			
Acknowledged	0	x	x
<u>Segmentation control</u>			
Record boundaries not respected	1	x	x
<u>Reports to Original Source</u>			
Relay transaction failure		X	X
<u>Reports to Final Destination</u>			
Relay transaction failure		X	X
<u>Error Conditions</u>			
Max number of Waypoints exceeded		x	
<i>Delivery from Agent to Final Destination fails</i>			X
Transaction to succeed/fail		fail	fail

Table 3.4-2: Test Series F8 Segments

Seg. Nmbr	Purpose	Fault	Notes
1	Test response to error condition	Maximum number of Waypoints exceeded	
2	Test response to error condition	Transaction from SFO Agent to Final Destination fails	

3.4.4 TEST PROCEDURE

For each subtest execute all Test Segments with test setup configured as shown in table 3.4-3.

Table 3.4-3: Test Series F8 Subtests

Subtest	Entity A (Source) provided by	Entity B (Waypoint) provided by	Entity C (Destination) provided by	Notes
F8.1	Agency A	Agency B	Agency A	
F8.2	Agency B	Agency A	Agency B	

3.4.5 TEST RESULTS

3.5 TEST SERIES F9

3.5.1 OBJECTIVE OF TEST

All previous tests have tested the Waypoint as the SFO Agent. This Test Series utilizes two Waypoints so that the first is tested as a Waypoint only (not as an SFO agent). Also, in all previous tests the Source and the Destination were provided by the same Agency (implementation). In this Test Series the Source and the Destination are provided by different Agencies (implementations). This Test Series checks the Tracing and Reporting functions and options of the SFO.

3.5.2 TEST PARTICIPANTS

AGENCY A

AGENCY B

3.5.3 TEST DESCRIPTION

File transfers are from Entity A via Entity B via Entity C to Entity D.

In this Test Series all files are of medium size with an approximate file length of 50 Kbytes. Note that the actual file lengths are not of great importance in themselves. The file lengths should, however, provide a reasonable number of File Data PDUs, perhaps greater than 200. Other than that, file lengths appropriate and convenient for the data rates used in the tests should be selected.

Settings of SFO options and parameters are as shown in table 3.5-1. Items not shown are not used or are selected 'Off'. The underlying Core Procedures should be set as shown in 3.1.

Table 3.5-1: SFO Settings for F9

SFO Interoperability Tests	field value	Setup		Trace			
		One Way	Two Way	Trace to original source	Trace to final destination	Trace to both	No trace, report failure
		Test Segment Number	Test Segment Number	Test Segment Number	Test Segment Number	Test Segment Number	Test Segment Number
		1	2	3	4	5	6
Transmission mode							
Acknowledged	0		x	X	X	X	X
Unacknowledged	1	x					
SFO Msg Types							
SFO Request	40	X	x	x	x	x	x
SFO Report	45			x	x	x	x
Options							
<u>Trace control flag</u>							
No trace	0						x
Trace toward source only	1			x			
Trace toward destination only	2				x		
Trace in both directions	3					x	
Transmission mode							
Acknowledged	0			x	x	x	x
Segmentation control							
Record boundaries not respected	1			x	x	x	x
Reports to Original Source							
Relay transaction success				x		x	
Relay transaction failure							x

<p>SFO Interoperability Tests</p> <p>Things to be tested</p> <p><u>Reports to Final Destination</u> Relay transaction success Relay transaction failure</p> <p>Error Conditions Max number of Waypoints exceeded</p> <p>Transaction to succeed/fail</p>	field value	<i>Setup</i>		<i>Trace</i>			
		<i>One Way</i>	<i>Two Way</i>	<i>Trace to original source</i>	<i>Trace to final destination</i>	<i>Trace to both</i>	<i>No trace, report failure</i>
		Test Segment Number	Test Segment Number	Test Segment Number	Test Segment Number	Test Segment Number	Test Segment Number
		1	2	3	4	5	6
		x				x	
						x	
		succeed	succeed	succeed	fail		

Table 3.5-2: Test Series F9 Segments

Seg. Nmbr	Purpose	Mode	Fault	File Size	Notes
1	Establish one-way connectivity	Unacknowledged		M	
2	Establish two-way connectivity	Acknowledged		M	
3	Trace to Original Source	Acknowledged		M	
4	Trace to Final Destination	Acknowledged		M	
5	Trace to both	Acknowledged		M	
6	No trace, report failure	Acknowledged	Maximum number of Waypoints exceeded.	M	

3.5.4 TEST PROCEDURE

For each subtest execute all Test Segments with test setup configured as shown in table 3.5-3.

Table 3.5-3: Test Series F9 Subtests

Subtest	Entity A (Source) provided by	Entity B (Waypoint) provided by	Entity C (Waypoint) provided by	Entity D (Destination) provided by	Notes
F9.1	Agency A	Agency B	Agency A	Agency B	
F9.2	Agency B	Agency A	Agency B	Agency A	

3.5.5 TEST RESULTS

3.6 TEST SERIES F10

3.6.1 OBJECTIVE OF TEST

Five entities are used in this Test Series, including three Waypoints. The objective of the Test Series is to verify the relaying of Trace reports by a Waypoint.

3.6.2 TEST PARTICIPANTS

AGENCY A

AGENCY B

3.6.3 TEST DESCRIPTION

File transfers are from Entity A via Entities B, C and D to Entity E.

In this Test Series all files are of medium size with an approximate file length of 50 Kbytes. Note that the actual file lengths are not of great importance in themselves. The file lengths should, however, provide a reasonable number of File Data PDUs, perhaps greater than 200. Other than that, file lengths appropriate and convenient for the data rates used in the tests should be selected.

Settings of SFO options and parameters are as shown in table 3.6-1. Items not shown are not used or are selected 'Off'. The underlying Core Procedures should be set as shown in 3.1.

Table 3.6-1: SFO Settings for F10

SFO Interoperability Tests	field value	<i>Setup</i>		<i>Trace</i>			
		<i>One Way</i>	<i>Two Way</i>	<i>Trace to original source</i>	<i>Trace to final destination</i>	<i>Trace to both</i>	<i>No trace, report failure</i>
		Test Segment Number	Test Segment Number	Test Segment Number	Test Segment Number	Test Segment Number	Test Segment Number
Things to be tested		1	2	3	4	5	6
<u>Transmission mode</u>							
Acknowledged	0		x	X	X	X	X
Unacknowledged	1	x					
<u>SFO Msg Types</u>							
SFO Request	40	X	x	x	x	x	x
SFO Report	45			x	x	x	x
<u>Options</u>							
<u>Trace control flag</u>							
No trace	0						x
Trace toward source only	1			x			
Trace toward destination only	2				x		
Trace in both directions	3					x	
<u>Transmission mode</u>							
Acknowledged	0			x	x	x	x

SFO Interoperability Tests	field value	Setup		Trace			
		One Way	Two Way	Trace to original source	Trace to final destination	Trace to both	No trace, report failure
		Test Segment Number	Test Segment Number	Test Segment Number	Test Segment Number	Test Segment Number	Test Segment Number
		1	2	3	4	5	6
<u>Segmentation control</u>	1						
Record boundaries not respected				x	x	x	x
<u>Reports to Original Source</u>							
Relay transaction success				x		x	
Relay transaction failure							x
<u>Reports to Final Destination</u>							
Relay transaction success					x	x	
Relay transaction failure							x
<u>Error Conditions</u>							
Max number of Waypoints exceeded							
Transaction to succeed/fail				succeed	succeed	succeed	fail

Table 3.6-2: Test Series F10 Segments

Seg. Nmbr	Purpose	Mode	Fault	File Size	Notes
1	Establish one-way connectivity	Unacknowledged		M	
2	Establish two-way connectivity	Acknowledged		M	
3	Trace to Original Source	Acknowledged		M	
4	Trace to Final Destination	Acknowledged		M	
5	Trace to both	Acknowledged		M	
6	No trace, report failure	Acknowledged	Maximum number of Waypoints exceeded.	M	

3.6.4 TEST PROCEDURE

For each subtest execute all Test Segments with test setup configured as shown in table 3.6-3.

Table 3.6-3: Test Series F10 Subtests

Subtest	Entity A (Source) provided by	Entity B (Waypoint) provided by	Entity C (Waypoint) provided by	Entity D (Waypoint) provided by	Entity E (Destination) provided by	Notes
F10.1	Agency A	Agency B	Agency A	Agency B	Agency A	
F10.2	Agency B	Agency A	Agency B	Agency A	Agency B	

3.6.5 TEST RESULTS