



# HKEx Orion Market Data Platform (OMD)

## Derivatives Market

### Briefing on Readiness Test

12 December 2013



# OMD Phase 2 Readiness Test

1

Overview

2

The Readiness Test

3

Test Timetable & Schedule

4

Testing Line Installation

# OMD Phase 2 Readiness Test

1

Overview

2

The Readiness Test

3

Test Timetable & Schedule

4

Testing Line Installation

# OMD Phase 2 Readiness Test

## Overview – Test Environments



### OMD-D Readiness Test (RT) Environment

- For clients to complete the OMD-D Readiness Test so as to declare their readiness for receiving OMD-D production data
- Clients are required to install two testing lines with bandwidth as set out in the Connectivity Guide according to their feed enrolment

#### Test Sessions

- ✓ Readiness Test
- ✓ Practice Session
- ✓ Open Test

### HKATS Testing Environment

- For EP clients to perform loop test with the HKATS, the Derivatives Market Trading System
- Clients can install a single line to connect to this environment. The bandwidth requirements are specified in the Connection Notification Form
- Availability follows the HKATS testing timetable for EPs

#### Test Sessions

- ✓ End-to-End Loop Test with HKATS (Optional)

# OMD Phase 2 Readiness Test

## Overview – Readiness Test



### Purpose

#### For HKEx

- Facilitate comprehensive system testing by clients
- Ascertain readiness of clients for entering into the Market Rehearsal

#### For Clients

- Verify their applications in HKEx provided environment
- Ensure the ability of their applications to properly interpret the market messages under various business scenarios
- Ensure the ability of their applications to handle exceptions such as data loss

***Pre-requisite for Market Rehearsal***

# OMD Phase 2 Readiness Test

## Overview – Readiness Test



### Six (6) Test Areas

1. Message Decoding
2. Order Book Building
3. Data Recovery
  - Line Arbitration
  - Retransmission
  - Refresh
4. Performance / Capacity
5. Failover / Disaster Recovery
6. Special Scenarios, e.g. Index and half day, etc.

# OMD Phase 2 Readiness Test

## Overview – Readiness Test



### Test Arrangement

1. Same multicast channel assignment as production
2. Timetable covering all market status in a normal trading day for message decoding and order book building
3. HKEx provided Answer Book
4. Self verification by clients

# OMD Phase 2 Readiness Test



1 Overview

**2 The Readiness Test**

3 Test Timetable & Schedule

4 Testing Line Installation

# OMD Phase 2 Readiness Test

## Test Session



### Six (6) Test Sessions

1. Message Decoding and Order Book Building
2. Data Recovery - Refresh
3. Data Recovery – Line Arbitration and Retransmission
4. Performance / Capacity
5. Failover / Disaster Recovery
6. Special Scenarios, e.g. Index and half day, etc.

# OMD Phase 2 Readiness Test

## Test Session 1A – Message Decoding



### Highlights

Cover all message types except trades and orders which are covered in order book building

Cover cases to enable clients to verify their recognition of series attributes from the reference data structure of 5 elements

Cover cases to enable clients to verify their identification of Trading Session States (TSS) and Instrument Session State (ISS) from Market Status messages

Cover cases to enable clients to verify their interpretation of numeric fields with implied decimal places

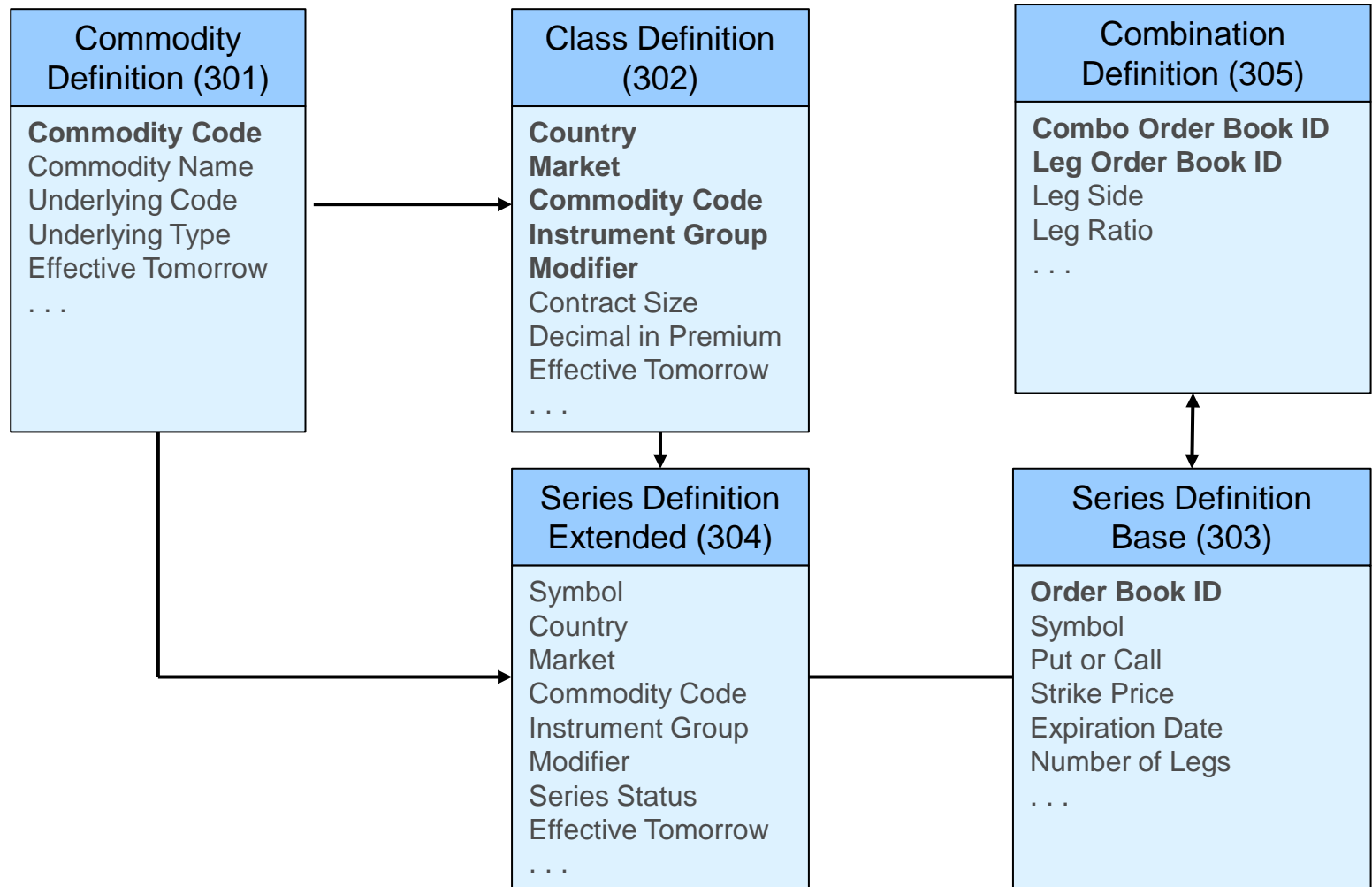
Cover cases to enable clients to verify their interpretation of bitmap fields

# OMD Phase 2 Readiness Test

## Test Session 1A – Message Decoding



### Series Attributes from Reference Data Hierarchy



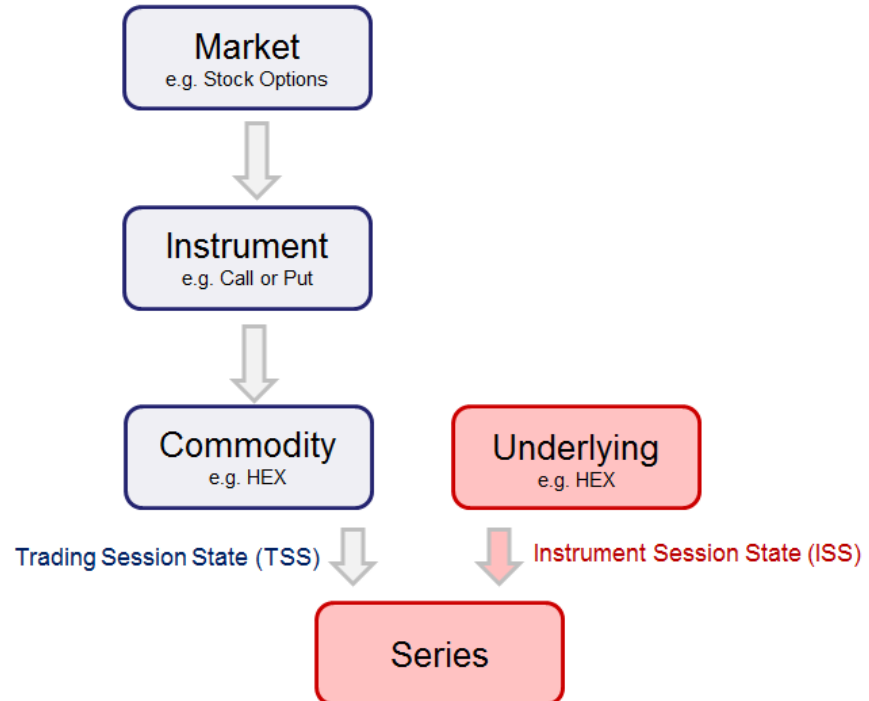
# OMD Phase 2 Readiness Test

## Test Session 1A – Message Decoding



### Series States from Market States

Market Status (320)
<b>StateLevel</b>
1 – Market
2 – Instrument (Instrument Type)
3 – Commodity (Instrument Class)
4 – Series (Instrument Series)
5 – Underlying
<b>Market</b>
<b>Instrument</b>
<b>Commodity</b>
<b>Order Book ID</b>
State
Priority
...



Active Instrument State (AIS) is the same as

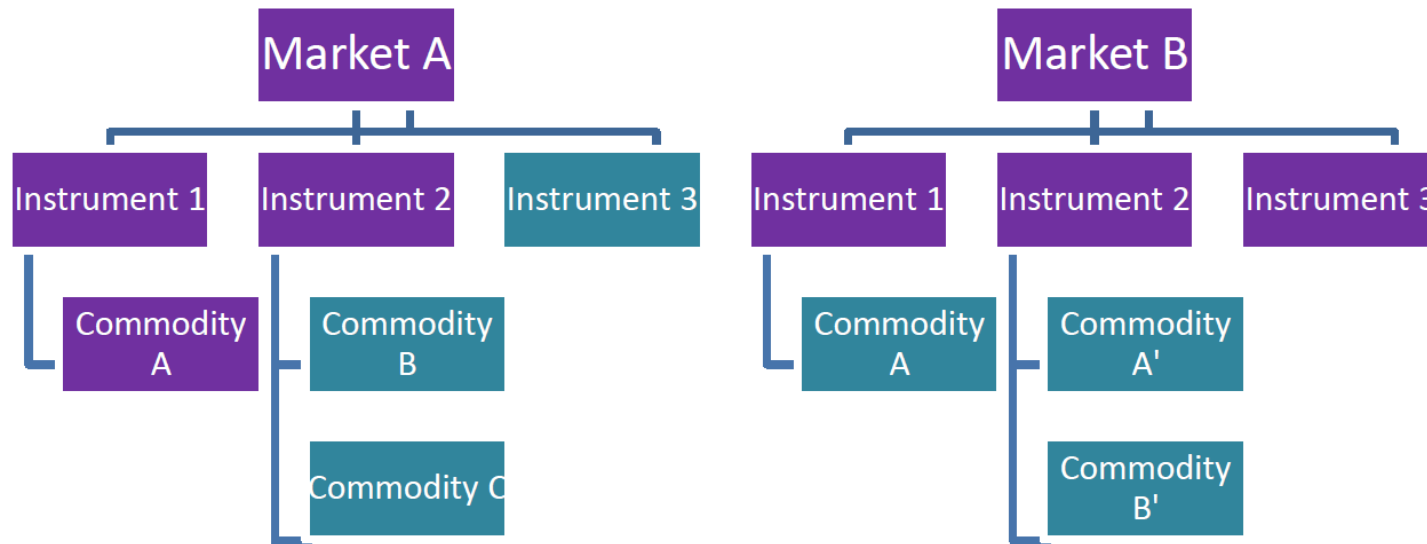
- ISS if priority (ISS) higher than priority (TSS)
- TSS otherwise

# OMD Phase 2 Readiness Test

## Test Session 1A – Message Decoding



### TSS from Predefined Market State Hierarchy



- Predefined Market State Hierarchy:**
- Market Status (320) at start of day
  - Market Status (320) for changes during the day
  - Do not follow market states of higher level



- Levels outside the Predefined Hierarchy:**
- No Market Status (320) at that level at start of day nor during the day
  - Follow the market states of the next higher level within the predefined hierarchy, e.g. in Market A, Commodity B follows Instrument 2 & all Commodities under Instrument 3 follows Market A

# OMD Phase 2 Readiness Test

## Test Session 1A – Message Decoding



### Data Fields with Implied Decimals

Clients are required to decode numeric fields, such as prices, strike price and contract size, with implied decimal places to their actual values

Example:

Class Definition (302)	
Country	1
Market	20
Commodity Code	4099
Instrument Group	23
Modifier	0
Decimal in Strike Price	2
Decimal in Contract Size	4
Decimal in Premium	3
Contract Size	5000000

Contract Size = 500.0000

Series Definition Extended (304)	
Country	1
Market	20
Commodity Code	4099
Instrument Group	23
Modifier	0
Symbol	ABC3K5
Strike Price	2250

Strike Price = 22.50

Series Definition Base (303)	
Order Book ID	1383838
Symbol	ABC3K5

Add Order (330)	
Order Book ID	1383838
Price	5835

Price = 5.835

# OMD Phase 2 Readiness Test

## Test Session 1A – Message Decoding

### Data Fields with Bitmap Format

Clients are required to identify the multiple properties represented in a bitmap field:

Example:

Trade (350)	
Order Book ID	1383838
Order ID	234
Side	2
Deal Type (bitmap) 0 None 1 Printable 2 Occurred at cross 4 Reported Trade	3



Deal Type = 3 means, the trade is both printable and occurred at cross.

Clients will find the followings in the Readiness Test Answer Book:

- None
- Printable
- Occurred at cross
- Reported Trade

# OMD Phase 2 Readiness Test

## Test Session 1A – Sample Answer Book



**Test case 1: Interpretation of Reference Data:**

- [Series Definition Base \(message type: 303\)](#)
- [Series Definition Extended \(message type: 304\)](#)
- [Commodity Definition \(message type: 301\)](#)
- [Class Definition \(message type: 302\)](#)
- [Combination Definition \(message type: 305\)](#)

Clients should identify the Series by the OrderBookID, which is the unique key for Series, and then retrieve all related reference data.

OMD Field Name	Message	Expected Value	Result (Check the box if matched)
Order Book ID	303	23488344	<input type="checkbox"/>
Symbol	303	HEXK3	<input type="checkbox"/>
Financial Product	303	3	<input type="checkbox"/>
Number Of Decimals - Price	303	2	<input type="checkbox"/>
Number Of Legs	303	2	<input type="checkbox"/>
Strike Price	303	0	<input type="checkbox"/>
Expiration Date	303	20131228	<input type="checkbox"/>
Decimals In Strike Price	303	0	<input type="checkbox"/>
Put Or Call	303	0	<input type="checkbox"/>
Order Book ID	304	23488344	<input type="checkbox"/>
Symbol	304	HEXK3	<input type="checkbox"/>
Commodity Code	304	3883	<input type="checkbox"/>
...	304		<input type="checkbox"/>
Effective Tomorrow	304	0	<input type="checkbox"/>
...	304		<input type="checkbox"/>
Commodity Code	301	3883	<input type="checkbox"/>

# OMD Phase 2 Readiness Test

## Test Session 1A – Sample Answer Book



Case nn: Series with market states set at Market Level

OMD Field Name	Expected Value	Result (Check the box if matched)
StateLevel	1	<input type="checkbox"/>
Markert	20	<input type="checkbox"/>
Instrument	0	<input type="checkbox"/>
OrderbookID	0	<input type="checkbox"/>
CommodityCode	0	<input type="checkbox"/>
...		<input type="checkbox"/>
State	3	<input type="checkbox"/>
Priortiy	1	<input type="checkbox"/>

...

Case nn: Identification of Trading Session States (TSS) for Seris

OMD Field Name	Expected Value	Result (Check the box if matched)
OrderbookID	35335568	<input type="checkbox"/>
State (TSS)	2	<input type="checkbox"/>
Priority	1	<input type="checkbox"/>

Case nn: Identification of Instrument Session States (ISS) for Seris

OMD Field Name	Expected Value	Result (Check the box if matched)
OrderbookID	35335568	<input type="checkbox"/>
State (ISS)	3	<input type="checkbox"/>
Priority	2	<input type="checkbox"/>

# OMD Phase 2 Readiness Test

## Test Session 1B – Order Book Building



### Highlights

Cover all order book activities described in the OMD Interface Specification, both explicitly sent by OMD or expected to be implicitly done by client applications

Cover order book activities in the various trading sessions, e.g. market orders in auction session

Cover trade and trade cancellation

Cover change in order book position

# OMD Phase 2 Readiness Test

## Test Session 1B – Sample Answer Book



### Part B – Order Book Building

During the same session as Part A, OMD disseminates Order Book (i.e. Add/Delete Order (DF only), Aggregate Order Book Update (DS and DP only) and Trade messages with various order/trade activities. DS, DP and DF Clients are required to construct the Top 10 bid/ask queues, Top 10 + 1 (accumulated for orders beyond the Top 10) bid/ask queues and full order book respectively from the messages received and verify if the respective order book built in your system matches the results provided in this answer book.

For each test case below, please check the box for each order book entry where your system records the same details as the expected details.

#### Aggregate Order Book “10BBO” (DS Subscribers only)

Bid				Sell				OrderBookID : 56758178
Price Level	Price	Agg. Quantity	Num Of Order	Price Level	Price	Agg. Quantity	Num Of Orders	Result (Check the box if matched)
5	23600	10	1					<input type="checkbox"/>
4	23700	10	1					<input type="checkbox"/>
3	23800	10	1					<input type="checkbox"/>
2	23900	10	1					<input type="checkbox"/>
1	24000	10	1					<input type="checkbox"/>
				1	24500	10	1	<input type="checkbox"/>
				2	24600	10	1	<input type="checkbox"/>
				3	24700	10	1	<input type="checkbox"/>
				4	24800	10	1	<input type="checkbox"/>
				5	24900	10	1	<input type="checkbox"/>

# OMD Phase 2 Readiness Test

## Test Session 1B – Sample Answer Book



### Full Order Book (DF Subscribers only)

Bid						Sell						Order Book ID: 56758178
Order ID	Order Book Position	Price	Qty	Lot Type	Order Type	Order ID	Order Book Position	Price	Qty	Lot Type	Order Type	Result (Check the box if matched)
636961317	3	23.2	12	2	<input checked="" type="checkbox"/> N/A							<input type="checkbox"/>
636961316	2	23.5	6	2	<input checked="" type="checkbox"/> N/A							<input type="checkbox"/>
636961318	1	23.8	8	2	<input checked="" type="checkbox"/> N/A							<input type="checkbox"/>
						636961319	1	24.5	10	2	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/>
						636961320	2	24.6	146	2	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/>
						636961321	3	24.7	35	2	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/>

# OMD Phase 2 Readiness Test

## Test Session 1B – Sample Answer Book



### Trade (DP and DF Subscribers only)

Trade ID	Price	Quantity	Deal Type	Trade Condition	Deal Info	Trade Time	Order Book ID: 56758178
							Result (Check the box if matched)
63409119041683463	21.000	10	Value = 1 <input type="checkbox"/> None <input checked="" type="checkbox"/> Printable <input type="checkbox"/> Occurred at cross <input type="checkbox"/> Reported Trade	Value = 0 <input checked="" type="checkbox"/> None	Value = 0 <input checked="" type="checkbox"/> None	2013-11-11 12:05:45	<input type="checkbox"/>
63409119041683463	21.000	10	Value = 1 <input type="checkbox"/> None <input checked="" type="checkbox"/> Printable <input type="checkbox"/> Occurred at cross <input type="checkbox"/> Reported Trade	Value = 0 <input checked="" type="checkbox"/> None	Value = 0 <input checked="" type="checkbox"/> None	2013-11-11 12:05:45	<input type="checkbox"/>
63409119041683485	20.000	1000	Value = 3 <input type="checkbox"/> None <input checked="" type="checkbox"/> Printable <input checked="" type="checkbox"/> Occurred at cross <input type="checkbox"/> Reported Trade	Value = 0 <input checked="" type="checkbox"/> None	Value = 0 <input checked="" type="checkbox"/> None	2013-11-11 12:09:56	<input type="checkbox"/>

# OMD Phase 2 Readiness Test

## Test Session 2 – Data Recovery (Refresh)



### Highlights

Simulate various data loss scenarios to enable Clients to verify the ability of their feed handler to recover lost data by Refresh

Example:

A large gap is introduced to both Line A and Line B that exceeds the cached storage of Retransmission server, and hence the client application will be forced to request latest market states from the Refresh service

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Clients to rebuild order book from Refresh

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Clients to identify latest Trading Session States (TSS) and Instrument Session States (ISS) from Refresh

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# OMD Phase 2 Readiness Test

## Test Session 2 – Sample Answer Book



During this session, OMD simulates missing packet scenarios to force the client application to reinstate the latest market states by requesting Refresh service. The latest market states are provided below. Testers are required to verify the respective data values in your system and make sure that all are correct.

For each test case below, please check the box for each data item where your system records the same value as the expected value. Bold item(s) is/are key data field(s) of the message.

**Test case 1: Final Image of Reference Data:**

**Series Definition Base** (message type: **303**)

**Series Definition Extended** (message type: **304**)

**Commodity Definition** (message type: **301**)

**Class Definition** (message type: **302**)

**Combination Definition** (message type: **305**)

OMD Field Name	Message	Expected Value	Result (Check the box if matched)
<b>Order Book ID</b>	<b>303</b>	<b>23488344</b>	<input type="checkbox"/>
Symbol	303	HEXK3	<input type="checkbox"/>
Financial Product	303	3	<input type="checkbox"/>
Number Of Decimals - Price	303	2	<input type="checkbox"/>
Number Of Legs	303	2	<input type="checkbox"/>
Strike Price	303	0	<input type="checkbox"/>
Expiration Date	303	20131228	<input type="checkbox"/>
Decimals In Strike Price	303	0	<input type="checkbox"/>
Put Or Call	303	0	<input type="checkbox"/>
<b>Order Book ID</b>	<b>304</b>	<b>23488344</b>	<input type="checkbox"/>
Symbol	304	HEXK3	<input type="checkbox"/>
Commodity Code	304	3883	<input type="checkbox"/>
	304		<input type="checkbox"/>

# OMD Phase 2 Readiness Test

## Test Session 3 – Data Recovery (Line Arbitration & Retransmission)



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### Highlights

Message gap scenarios for client applications to detect and recover missing messages by line arbitration

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Message gap scenarios where missing messages cannot be recovered by line arbitration but by retransmission

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Client applications to test reception of positive responses from Retransmission service and fill in the gap with returned data and continue processing

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# OMD Phase 2 Readiness Test

## Test Session 4 – Performance / Capacity



### Highlights

Market data will be disseminated at increasing rates on all OMD datafeed products. Clients are expected to receive market data volume at a rate that will drive to the peak bandwidth requirements for each datafeed product.

50% of maximum

100% of maximum

Clients must handle all rates without dropping data.

# OMD Phase 2 Readiness Test

## Test Session 4 – Sample Answer Book



### Session 4: Performance / Capacity

Test Date: \_\_\_\_\_

During this session, OMD disseminates high volume data at increasing rate up to the OMD installed limit. Testers are required to verify if their application can handle the volume without data loss.

Please put a tick (✓) in the box for each scenario where your system can handle without data loss.

OMD Data Rate Scenario	Expected Result	Result (✓ if correct)
50% of installed maximum	No data loss and the client system is running normal	<input type="checkbox"/>
100% of installed maximum	No data loss and the client system is running normal	<input type="checkbox"/>

# OMD Phase 2 Readiness Test

## Test Session 5 – Failover and Disaster Recovery



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### Highlights

Simulate internal recovery process where clients will experience stoppage of transmission from one line and then resumption of transmission via the line

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Simulate failover of Refresh process

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Simulate failover of Retransmission process

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Simulate DR site failover during trading hours

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# OMD Phase 2 Readiness Test



1 Overview

2 The Readiness Test

**3 Test Timetable & Schedule**

4 Testing Line Installation

# OMD Phase 2 Readiness Test

## Client Tests



### Readiness Test

Part	Time (tentative)	Test Session	Remarks
1	09:00 am – 12:00 noon	Session 1: Message Decoding & Order Book Building	After the end of each test Session, Clients saves the last data image for verification later, then clears the database to prepare for the following test session
	01:00 pm – 02:30 pm	Session 2: Refresh	
	02:40 pm – 04:10 pm	Session 3: Line Arbitration & Retransmission	
	04:20 pm – 04:50 pm	Session 4: Performance / Capacity	
2	02:00 pm – 02:30 pm	Session 5a: Internal Recovery Process	
	02:40 pm – 03:10 pm	Session 5b: Refresh Failover	
	03:20 pm – 03:50 pm	Session 5c: Retransmission Failover	
	04:00 pm – 04:30 pm	Session 5d: DR Site Failover	
3	09:00 am – 12:00 noon	Session 6a: Trading day without night session	Index data will be transmitted during the test sessions
	01:00 pm – 03:00 pm	Session 6b: Half trading day	

# OMD Phase 2 Readiness Test

## Client Tests



### Practice Session

Time (tentative)	Test Session	Remarks
09:00 am – 12:00 noon	Session 1: Message Decoding & Order Book Building	

# OMD Phase 2 Readiness Test

## Client Tests



### Open Test

Time (tentative)	Test Session	Remarks
10:00 am – 04:00 pm	<p>Data replay to facilitate the following tests:</p> <ol style="list-style-type: none"> <li>Late connection after market open <ul style="list-style-type: none"> <li>After logon, OMD returns a Logon Response for “Refresh Required”</li> <li>Client application will then issue a Refresh request to obtain the latest market states and then continue processing</li> </ul> </li> <li>Processing of unfavourable responses (see possible return codes * in remarks, any value other 0 is unfavourable) from Retransmission (RTS) service <ul style="list-style-type: none"> <li>Client application has built in logic to react properly to any unfavourable response from RTS without causing problem to the system</li> </ul> </li> </ol>	<p>* Possible return codes from Retransmission service:</p> <p>0 Request accepted</p> <p>1 Unknown/ Unauthorized channel ID</p> <p>2 Messages not available</p> <p>100 Exceeds maximum sequence range</p> <p>101 Exceeds maximum requests in a day</p>

# OMD Phase 2 Readiness Test

## Tentative Test Timetable



Client Test Period (Tentative):  
End Jan 2014 to Apr 2014

Stage	Duration	Tentative Schedule		
1	7 weeks	Day	AM	PM
		Mon	Readiness Test (Part 1)	
		Tue	Practice Session	
		Wed	Readiness Test (Part 1)	
		Thu	Readiness Test (Part 1)	
		Fri	Open Test / Readiness Test (Part 3) every third week	
2	5 weeks	Day	AM	PM
		Mon	Readiness Test (Part 1)	
		Tue	Practice Session	Readiness Test (Part 2)
		Wed	Readiness Test (Part 1)	
		Thu	Practice Session	Readiness Test (Part 2)
		Fri	Open Test / Readiness Test (Part 3) every third week	

# OMD Phase 2 Readiness Test

## Upcoming Test Events



Event	Tentative Schedule
HKEx to distribute Readiness Test Document to Clients	Mid-Dec 2013
HKEx to upload Readiness Test Briefing presentation to HKEx website	Dec 2013
HKEx to distribute Practice Session Answer Book to Clients	Jan 2014
HKEx to distribute Readiness Test Answer Book to Clients	Jan 2014
Clients to return Declaration Form and completed Answer Book	Apr 2014
Shakedown Connectivity Test/Market Rehearsal	Apr/May 2014

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**4 Testing Line Installation**

# HKEx Orion Market Data Platform Phase 2

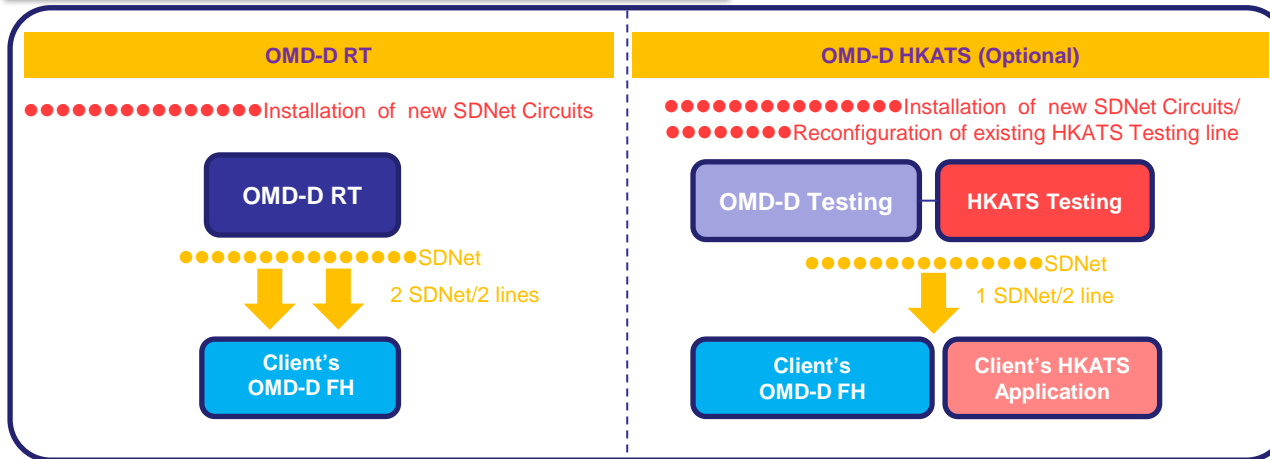


## - Illustration of OMD-D Connection Models

### Scenario:

Access to OMD-D Readiness Test Environment (**OMD-D RT**) and HKATS Testing Environment with OMD-D (**OMD-D HKATS**) via 2 individual SDNet/2 circuit sets (3 SDNet/2 lines)

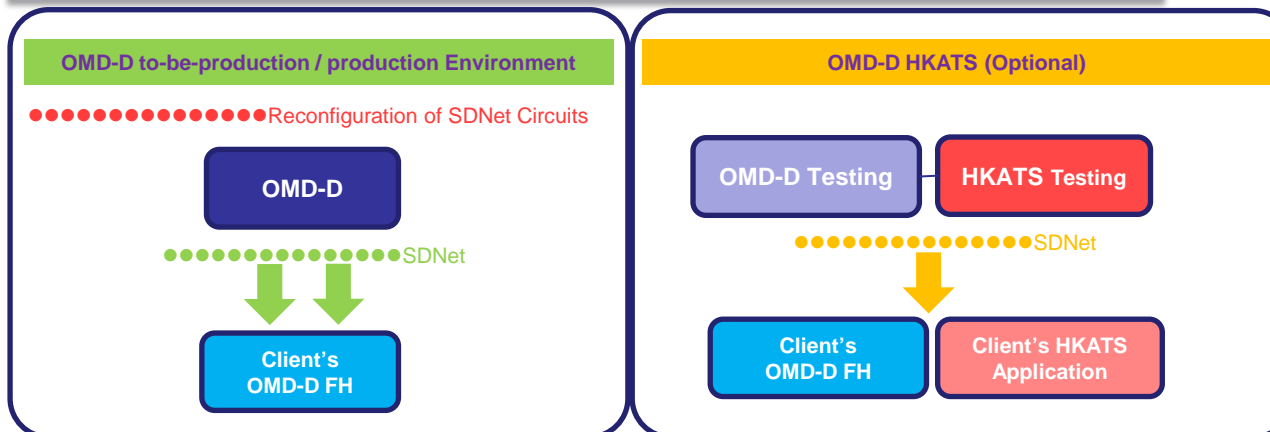
### Connection setup during OMD-D Testing Phase



### Individual SDNet/2 Circuit Sets (Testing Phase)

- Circuit Set 1: 2 SDNet/2 lines to access OMD-D RT
- Circuit Set 2: 1 SDNet/2 line to access OMD-D HKATS (can upgrade existing HKATS testing line or install a new line)

### Connection setup for OMD-D to-be-production activities (i.e. Market Rehearsals)



### Individual SDNet/2 Circuit Set (to be production)

- Circuit Set 1: Reconfigure 2 SDNet/2 lines from testing to production for to-be-production activities such as shake-down connectivity test and market rehearsals
- Circuit Set 2: - Retain 1 SDNet/2 line to access both HKATS Testing and OMD-D HKATS environments (optional)

# HKEx Orion Market Data Platform Phase 2

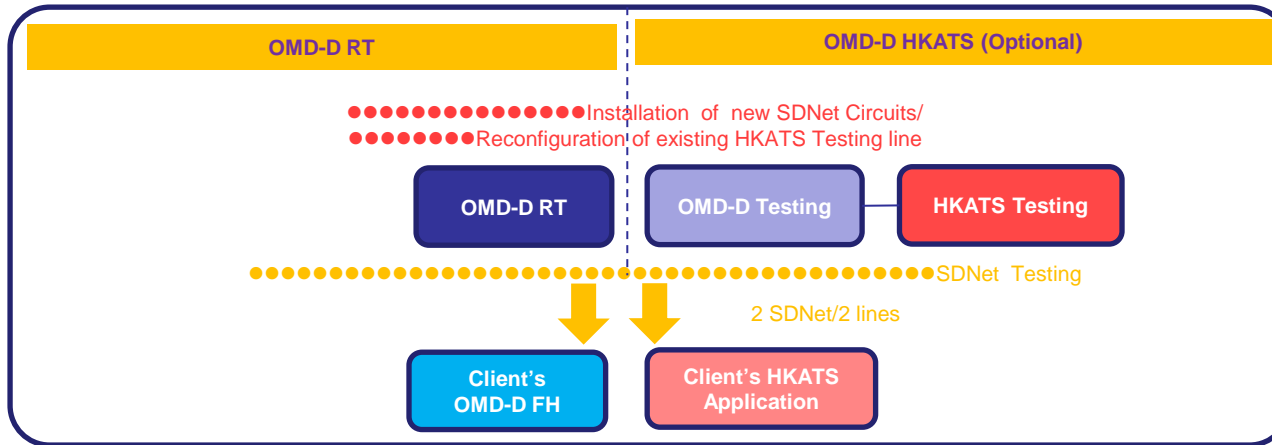


## - Illustration of OMD-D Connection Models

### Scenario:

Access to OMD-D Readiness Test Environment (**OMD-D RT**) and HKATS Testing Environment with OMD-D (**OMD-D HKATS**) via a single SDNet/2 circuit set (2 SDNet/2 lines)

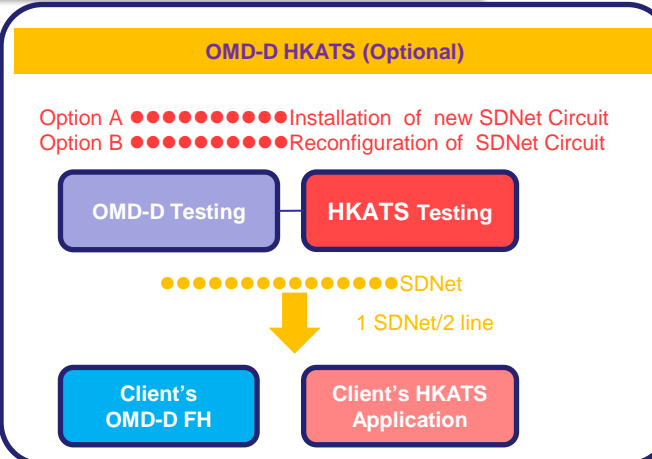
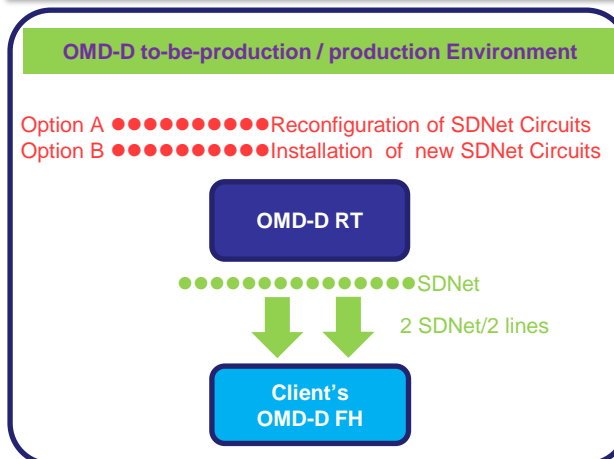
### Connection setup during OMD-D Testing Phase



### Sharing SDNet/2 Circuit Set (Testing Phase)

- One set (SDNet/2 lines) to access both OMD-D RT and OMD-D HKATS
- Bandwidth Requirement: OMD-D RT + OMD-D HKATS + HKATS Testing.

### Connection setup for OMD-D to-be-production activities (i.e. Market Rehearsals)



### Individual SDNet/2 Circuit Set (to be production)

#### Option A

- Circuit Set 1: Reconfigure the 2 SDNet/2 lines from testing to production for OMD-D rollout

- Circuit Set 2: - Install 1 new SDNet/2 line for access to HKATS Testing Environment with OMD-D (optional)

#### Option B

- Circuit Set 1: Install new pair of SDNet/2 lines for OMD-D production rollout

- Circuit Set 2: Retain one or both of the SDNet/2 lines and reconfigure the line(s) for access to HKATS Testing Environments with OMD-D (optional)

# HKEx Orion Market Data Platform Phase 2

## - Preparation for the Readiness Test by Clients



HKEx will provide the following materials for Clients to prepare for the Readiness Test

- Connection Notification Form which is tailored for clients according to their OMD-D datafeed product enrolment
- Updated OMD-D Interface Specification
- Updated Connectivity Guide
- Updated Developer's Guide

Clients are advised to:

- Consider their need for the connections to HKEx end-to-end test environments and fill in the Connection Notification Form
- Liaise with the selected Carrier on the testing line installation arrangement according to the completed Connection Notification Form
- Return the completed Connection Notification Form to HKEx for record
- Read the updated OMD-D materials carefully and ensure that the development of your feed handler and the system setup are finished accordingly before joining the Readiness Test

# Questions and Answers

For Enquiry:

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