



# INTERFACE SPECIFICATIONS

**HKEX Orion Market Data Platform  
Securities Market & Index Datafeed Products (OMD-C)  
Binary Protocol**

Version: 1.26  
21 May 2019

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## DOCUMENT HISTORY

| Version | Date of Issue   | Comments  |
|---------|-----------------|---|
| v1.0    | 20 April 2012   | First Distribution Issue  |
| v1.1    | 31 July 2012    | Revised Edition with the following updates; <ul style="list-style-type: none"> <li>• Add additional notes on Sections 3.4.2, 3.9.7</li> <li>• Section 3.7.2 – refine encoded method used in SecurityNameGB &amp; SecurityNameGCCS to be Unicode UTF-16LE &amp; the values for Style &amp; NoUnderlyingSecurities</li> <li>• Sections 3.9.1 – 3.9.6 – align to industry practice to use “ 0 for bid, 1 for offer” instead of “1 for buy &amp; 2 for sell”</li> <li>• Section 3.9.6 – add new UpdateAction “74 for Orderbook Clear” for the clients to clear their aggregate order books</li> <li>• Section 3.12.1 – provision for Chinese Exchange news</li> <li>• Section 4.1 – refine the diagram for gap detection mechanism</li> <li>• Section 5 – elaborate more on aggregate order book management with more typical examples for different book operations</li> <li>• Addition of 3 new indices in Appendix A</li> </ul>                                    |
| v1.2    | 31 October 2012 | Revised Edition with the following updates: <ul style="list-style-type: none"> <li>• Section 3.2 – packet sizing notes expanded for better clarity</li> <li>• Section 3.9.3 – Add a filler field to Delete Order (33)</li> <li>• Section 3.10.3 – add notes to state that “TradeTime” and “TrdType” are not applicable when TrdCancelFlag = Y</li> <li>• Section 3.10.3 – remove “104 Overseas Trade” from Trade Ticker (52) message</li> <li>• Section 4.4 – Remove Trade and Trade Ticker rows in RFS</li> <li>• Section 4.4 – Refine the wording for IEP in refresh</li> <li>• Section 5 – update example 5 for the correct message sent</li> </ul>  |
| v1.2.1  | 6 December 2012 | Revised Edition with the following updates: <ul style="list-style-type: none"> <li>• Section 3.1 – clarify string to be padded with spaces.</li> <li>• Section 3.5.2 – clarify that SessionStatus 5 covers both invalid username or invalid IP address</li> <li>• Section 3.9.7 – add indicator to extend the optional Broker Queue to SF client</li> <li>• Section 3.11.1 – elaborate more on the update logic of Short sell fields</li> <li>• Appendix A – add index codes information and 1 new index to the list of indexes table</li> </ul>  |
| v1.3    | 9 May 2013      | Revised Edition with the following updates: <ul style="list-style-type: none"> <li>• Section 1.3 – Message Formats column added</li> <li>• Section 3.1 – ASCII clarification added</li> <li>• Section 3.5 – Add opening phrase for retransmission</li> <li>• Section 3.7.2 – Values column of field ‘UnderlyingSecurityWeight’ added with a note</li> <li>• Section 3.7.2 – Note (1) clarification added</li> <li>• Section 3.9.1-3.9.5 – Revise wordings for description of OrderID</li> <li>• Section 3.11.1 – Clarification added in the first paragraph</li> <li>• Section 3.11.2 – Clarification added in the first paragraph</li> <li>• Section 3.11.2 – Values column of field “Currency Code” added with a note</li> <li>• Section 3.12.1 – Clarification added in the second paragraph</li> <li>• Section 4.4 – Revise snapshot description for Security Status</li> <li>• Appendix A – Index table added with 2 new indices and more content</li> </ul> |
| V1.4    | 24 July 2013    | Revised Edition with the following updates: <ul style="list-style-type: none"> <li>• Section 4.4 – Revised snapshot description for Aggregated Order Book and Broker Queue</li> <li>• Appendix A – Index code for CES China HK Mainland Index rectified</li> </ul>  |
| V1.5    | 7 Oct 2013      | Revised Edition with the following updates: <ul style="list-style-type: none"> <li>• Section 3.10.5 – Add notes on Nominal Price</li> <li>• Section 3.11.1 – Add notes on trading statistics during auction session</li> <li>• Section 2.2.1 – Updated system startup time</li> <li>• Section 4.4 – Updated snapshot notes for market turnover</li> </ul>   |
| V1.5A   | Jun 30, 2014    | Revised Edition with the following updates: <ul style="list-style-type: none"> <li>• Appendix A – adding one new indices CES China 280 Index</li> </ul>   |
| V1.6    | 04 Jul 2014     | Revised Edition with the following updates:   |

|                                |   | <ul style="list-style-type: none"><li>Sections 1.1 and 1.4 – Add description and section for Scope of Information</li><li>Section 2.2 – Add notes on the possible test data transmission during non-production hours.</li><li>Section 2.2.2 –Clarify the heartbeat interval being “about every 2 seconds”</li><li>Sections 3.13, 3.13.1, 3.13.2 &amp; Appendix A – Add information on the new market information (Northbound Daily Quota Balance) via IndexSource “C”</li></ul>  |                |         |                                |   |                                |  |
|--------------------------------|---|--|----------------|---------|--------------------------------|---|--------------------------------|--|
| V1.7                           | 25 Jul 2014   | Revised Edition with the following updates: <ul style="list-style-type: none"><li>Sections 3.13.2 –Update the Note for Northbound Daily Quota Balance and add note to the value of IndexVolume field</li></ul>   |                |         |                                |   |                                |  |
| V1.8                           | 21 Nov 2014   | Revised Edition with the following updates: <ul style="list-style-type: none"><li>Appendix A – adding two new indices CES Stock Connect Hong Kong Select 100 Index and CES Shanghai-Hong Kong Stock Connect 300 Index</li></ul>  |                |         |                                |   |                                |  |
| V1.9                           | 3 Feb 2015  | Revised Edition with the following updates: <ul style="list-style-type: none"><li>Section 3.13.1 – Add description for index definition dissemination</li><li>Section 3.13.2 – Add note to IndexVolume field for Northbound Daily Quota Balance value</li></ul>  |                |         |                                |   |                                |  |
| V1.10                          | 19 May 2015   | Revised Edition with the following updates: <ul style="list-style-type: none"><li>Section 3.11.1 – Update description for Statistics (60) message</li></ul>  |                |         |                                |   |                                |  |
| V1.10A                         | 12 Aug 2015   | Revised Edition with the following updates: <ul style="list-style-type: none"><li>Section 3.8.2 – Typo Correction</li><li>Appendix A – Update the index name “CSI HK Mainland Enterprises 50 Index” and add six new HSI indices and add six new HSI indices</li></ul>  |                |         |                                |   |                                |  |
| V1.11                          | 5 Aug 2015  | Revised Edition with the following updates: <table border="1"><thead><tr><th>Effective Date</th><th>Changes</th></tr></thead><tbody><tr><td>Phrase 1 of CAS on 25 Jul 2016</td><td><b>Introduction of Closing Auction Session (CAS) &amp; Volatility Control Mechanism (VCM)</b><ul style="list-style-type: none"><li>Section 1.3 – Add new messages Order Imbalance (56), Reference Price (43), VCM Trigger (23)</li><li>Section 3.2 – Add New MsgType for Order Imbalance (56), Reference Price (43), VCM Trigger (23)</li><li>Section 3.7.2 – Introduce two fields “VCM Flag” and “CAS Flag” in Securities Definition</li><li>Section 3.8.1 – New field values for new trading sessions in CAS</li><li>Section 3.9.8 – Add new Order Imbalance (56) message</li><li>Section 3.10.6 – Revise description of Indicative Equilibrium Price (41) message</li><li>Section 3.10.7 – Add new Reference Price (43) message</li><li>Section 3.10.8 – Add new VCM Trigger (23) message</li><li>Section 4.4 – Include Order Imbalance (56), Reference Price (43), VCM Trigger (23) in refresh service</li></ul></td></tr><tr><td>VCM on 22 Aug 2016</td><td></td></tr></tbody></table> | Effective Date | Changes | Phrase 1 of CAS on 25 Jul 2016 | <b>Introduction of Closing Auction Session (CAS) &amp; Volatility Control Mechanism (VCM)</b> <ul style="list-style-type: none"><li>Section 1.3 – Add new messages Order Imbalance (56), Reference Price (43), VCM Trigger (23)</li><li>Section 3.2 – Add New MsgType for Order Imbalance (56), Reference Price (43), VCM Trigger (23)</li><li>Section 3.7.2 – Introduce two fields “VCM Flag” and “CAS Flag” in Securities Definition</li><li>Section 3.8.1 – New field values for new trading sessions in CAS</li><li>Section 3.9.8 – Add new Order Imbalance (56) message</li><li>Section 3.10.6 – Revise description of Indicative Equilibrium Price (41) message</li><li>Section 3.10.7 – Add new Reference Price (43) message</li><li>Section 3.10.8 – Add new VCM Trigger (23) message</li><li>Section 4.4 – Include Order Imbalance (56), Reference Price (43), VCM Trigger (23) in refresh service</li></ul> | VCM on 22 Aug 2016             |  |
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| VCM on 22 Aug 2016             |   |  |                |         |                                |   |                                |  |
| V1.11B                         | 14 Dec 2015   | Revised Edition with the following updates: <table border="1"><thead><tr><th>Effective Date</th><th>Changes</th></tr></thead><tbody><tr><td>Immediate</td><td><b>Clarifications</b><ul style="list-style-type: none"><li>Section 3.11.1 – Revise the description for Statistics (60) message to reflect the change effective in mid 2015 that Statistics message will be sent after every trade including off-exchange trades reported during auction session</li></ul></td></tr><tr><td>Phrase 1 of CAS on 25 Jul 2016</td><td><b>Other Enhancements</b><ul style="list-style-type: none"><li>Section 3.7.2 – Format change to Security Definition (11) message to insert a number of fillers inside the message</li><li>Section 3.7.2 – Add new possible value “O” for others for the data field CallPutFlag in addition to the existing possible values “C” for Call and “P” for Put</li></ul></td></tr></tbody></table>  | Effective Date | Changes | Immediate                      | <b>Clarifications</b> <ul style="list-style-type: none"><li>Section 3.11.1 – Revise the description for Statistics (60) message to reflect the change effective in mid 2015 that Statistics message will be sent after every trade including off-exchange trades reported during auction session</li></ul>  | Phrase 1 of CAS on 25 Jul 2016 | <b>Other Enhancements</b> <ul style="list-style-type: none"><li>Section 3.7.2 – Format change to Security Definition (11) message to insert a number of fillers inside the message</li><li>Section 3.7.2 – Add new possible value “O” for others for the data field CallPutFlag in addition to the existing possible values “C” for Call and “P” for Put</li></ul> |
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| V1.12                          | 19 Feb 2016   | <div>Revised Edition with the following updates</div> <table><tr><th>Effective Date</th><th>Changes</th></tr><tr><td>Immediate</td><td><b>Clarifications</b><ul style="list-style-type: none"><li>Section 3.4.2 – Revise description for Sequence Reset message</li><li>Section 3.8.2 – Rename the data field “SecurityTradingStatus” (at Offset#8) to “SuspensionIndicator” and revise its description</li></ul></td></tr><tr><td>6 Mar 2017</td><td><b>Introduction of a new Disaster Recovery (DR) mechanism</b><ul style="list-style-type: none"><li>Section 2.2.4.2 – Add paragraphs to describe the new DR mechanisms</li><li>Section 3.2 – Add message type 105 for Disaster Recovery Signal</li><li>Section 3.4.3 – Add Disaster Recovery Signal (105) message</li></ul></td></tr><tr><td>Phrase 1 of CAS on 25 Jul 2016</td><td><b>Clarifications</b><ul style="list-style-type: none"><li>Section 3.9 – Revise description for Order Book Data</li><li>Section 3.10.7 – Revise description for Reference Price message</li></ul></td></tr></table> | Effective Date | Changes | Immediate   | <b>Clarifications</b> <ul style="list-style-type: none"><li>Section 3.4.2 – Revise description for Sequence Reset message</li><li>Section 3.8.2 – Rename the data field “SecurityTradingStatus” (at Offset#8) to “SuspensionIndicator” and revise its description</li></ul> | 6 Mar 2017  | <b>Introduction of a new Disaster Recovery (DR) mechanism</b> <ul style="list-style-type: none"><li>Section 2.2.4.2 – Add paragraphs to describe the new DR mechanisms</li><li>Section 3.2 – Add message type 105 for Disaster Recovery Signal</li><li>Section 3.4.3 – Add Disaster Recovery Signal (105) message</li></ul>   | Phrase 1 of CAS on 25 Jul 2016 | <b>Clarifications</b> <ul style="list-style-type: none"><li>Section 3.9 – Revise description for Order Book Data</li><li>Section 3.10.7 – Revise description for Reference Price message</li></ul> |
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| Phrase 1 of CAS on 25 Jul 2016 | <b>Clarifications</b> <ul style="list-style-type: none"><li>Section 3.9 – Revise description for Order Book Data</li><li>Section 3.10.7 – Revise description for Reference Price message</li></ul>  |  |                |         |             |   |             |   |                                |  |
| V1.13                          | 01 Mar 2016   | <div>Revised Edition with the following updates</div> <table><tr><th>Effective Date</th><th>Changes</th></tr><tr><td>18 Apr 2016</td><td><b>Launch of new Index</b><ul style="list-style-type: none"><li>Appendix A – Add new index “CES Gaming Top 10 Index”</li></ul></td></tr></table>  | Effective Date | Changes | 18 Apr 2016 | <b>Launch of new Index</b> <ul style="list-style-type: none"><li>Appendix A – Add new index “CES Gaming Top 10 Index”</li></ul>   |             |   |                                |  |
| Effective Date                 | Changes   |  |                |         |             |   |             |   |                                |  |
| 18 Apr 2016                    | <b>Launch of new Index</b> <ul style="list-style-type: none"><li>Appendix A – Add new index “CES Gaming Top 10 Index”</li></ul>   |  |                |         |             |   |             |   |                                |  |
| V1.14                          | 13 May 2016   | <div>Revised Edition with the following updates</div> <table><tr><th>Effective Date</th><th>Changes</th></tr><tr><td>Immediate</td><td><b>Clarifications</b><ul style="list-style-type: none"><li>Sections 3.8.1 and 3.10.8 – Revise descriptions for Time fields to align across the document</li></ul></td></tr><tr><td>23 May 2016</td><td><b>Renaming of CES Shanghai-Hong Kong Stock Connect 300 Ind</b><ul style="list-style-type: none"><li>Appendix A – Rename “CES Shanghai-Hong Kong Stock Connect 300 Index” to “CES Stock Connect 300 Index”</li></ul></td></tr></table>   | Effective Date | Changes | Immediate   | <b>Clarifications</b> <ul style="list-style-type: none"><li>Sections 3.8.1 and 3.10.8 – Revise descriptions for Time fields to align across the document</li></ul>  | 23 May 2016 | <b>Renaming of CES Shanghai-Hong Kong Stock Connect 300 Ind</b> <ul style="list-style-type: none"><li>Appendix A – Rename “CES Shanghai-Hong Kong Stock Connect 300 Index” to “CES Stock Connect 300 Index”</li></ul>   |                                |  |
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| V1.15                          | 21 Jun 2016   | <div>Revised Edition with the following updates</div> <table><tr><th>Effective Date</th><th>Changes</th></tr><tr><td>Immediate</td><td><b>Clarifications</b><ul style="list-style-type: none"><li>Section 3.3 and 3.8.1 – Enhance descriptions to clarify Time fields</li></ul></td></tr><tr><td>5 Dec 2016</td><td><b>Launch of Shenzhen – Hong Kong Stock Connect</b><ul style="list-style-type: none"><li>Section 3.13.2 – Include Northbound Daily Quota Balances of Shenzhen Hong Kong Stock Connect</li><li>Appendix A – Add new market information for Northbound Daily Quota Balance of Shenzhen-Hong Kong Stock Connect</li></ul></td></tr></table>   | Effective Date | Changes | Immediate   | <b>Clarifications</b> <ul style="list-style-type: none"><li>Section 3.3 and 3.8.1 – Enhance descriptions to clarify Time fields</li></ul>   | 5 Dec 2016  | <b>Launch of Shenzhen – Hong Kong Stock Connect</b> <ul style="list-style-type: none"><li>Section 3.13.2 – Include Northbound Daily Quota Balances of Shenzhen Hong Kong Stock Connect</li><li>Appendix A – Add new market information for Northbound Daily Quota Balance of Shenzhen-Hong Kong Stock Connect</li></ul>   |                                |  |
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| V1.16                          | 04 Aug 2016   | <div>Revised Edition with the following updates</div> <table><tr><th>Effective Date</th><th>Changes</th></tr><tr><td>Immediate</td><td><b>Clarifications</b><ul style="list-style-type: none"><li>Sections 3.13.1 and 3.13.2 – Revise to clarify IndexCode, NetChgPrevDay and NetChgPrevDayPct</li></ul></td></tr><tr><td>29 Aug 2016</td><td><b>Launch of new Indices</b><ul style="list-style-type: none"><li>Sections 2.2.2 and 2.2.3 – Enhance to clarify descriptions</li><li>Section 3.1.2 – Add CNH</li><li>Section 3.13.1 – Add new IndexSource</li><li>Section 3.13.2 – Add TR under descriptions of NetChgPrevDay , PreviousSesClose and NetChgPrevDayPct</li><li>Appendix A – Add 4 new HKEX and Thomson Reuters co-branded indices</li></ul></td></tr></table>   | Effective Date | Changes | Immediate   | <b>Clarifications</b> <ul style="list-style-type: none"><li>Sections 3.13.1 and 3.13.2 – Revise to clarify IndexCode, NetChgPrevDay and NetChgPrevDayPct</li></ul>  | 29 Aug 2016 | <b>Launch of new Indices</b> <ul style="list-style-type: none"><li>Sections 2.2.2 and 2.2.3 – Enhance to clarify descriptions</li><li>Section 3.1.2 – Add CNH</li><li>Section 3.13.1 – Add new IndexSource</li><li>Section 3.13.2 – Add TR under descriptions of NetChgPrevDay , PreviousSesClose and NetChgPrevDayPct</li><li>Appendix A – Add 4 new HKEX and Thomson Reuters co-branded indices</li></ul> |                                |  |
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| V1.17                          | 24 Aug 2016   | <div>Revised Edition with the following updates</div> <table><tr><th>Effective Date</th><th>Changes</th></tr><tr><td>29 Aug 2016</td><td><b>Launch of new Indices</b><ul style="list-style-type: none"><li>Appendix A – HKEX and Thomson Reuters co-branded indices are listed as Third Party Content under the Licence Agreement</li></ul></td></tr></table>  | Effective Date | Changes | 29 Aug 2016 | <b>Launch of new Indices</b> <ul style="list-style-type: none"><li>Appendix A – HKEX and Thomson Reuters co-branded indices are listed as Third Party Content under the Licence Agreement</li></ul>   |             |   |                                |  |
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| V1.18          | 4 Jan 2017  | Revised Edition with the following updates <table><tr><th>Effective Date</th><th>Changes</th></tr><tr><td>6 Mar 2017</td><td><b>Updates on the DR mechanism</b><ul style="list-style-type: none"><li>Section 2.2.4.2 – Remove DR mechanism based on Sequence Reset message</li><li>Section 3.4.2 – Enhance descriptions to clarify Sequence Reset message</li></ul></td></tr></table>  | Effective Date | Changes | 6 Mar 2017  | <b>Updates on the DR mechanism</b> <ul style="list-style-type: none"><li>Section 2.2.4.2 – Remove DR mechanism based on Sequence Reset message</li><li>Section 3.4.2 – Enhance descriptions to clarify Sequence Reset message</li></ul>   |          |   |
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| V1.19          | 03 Feb 2017   | Revised Edition with the following updates <table><tr><th>Effective Date</th><th>Changes</th></tr><tr><td>Immediate</td><td><b>Clarifications</b><br/>Section 3.11.2 – Revise description for Market Turnover message</td></tr><tr><td>Jun 2017</td><td><b>Launch of Stock Connect Market Feed</b><ul style="list-style-type: none"><li>Section 1.3 – Include Stock Connect Data in Summary Table</li><li>Section 1.4 – Include Stock Connect Data in Scope of Information</li><li>Section 3.2 – Include Stock Connect Daily Quota Balance (80) and Stock Connect Market Turnover (81) in MsgType list</li><li>Section 3.14 – Introduce new messages on Stock Connect Data including Stock Connect Daily Quota Balance (80) and Stock Connect Market Turnover (81)</li><li>Section 4.4 – Include Stock Connect Data in Refresh Service</li></ul></td></tr></table>   | Effective Date | Changes | Immediate   | <b>Clarifications</b><br>Section 3.11.2 – Revise description for Market Turnover message  | Jun 2017 | <b>Launch of Stock Connect Market Feed</b> <ul style="list-style-type: none"><li>Section 1.3 – Include Stock Connect Data in Summary Table</li><li>Section 1.4 – Include Stock Connect Data in Scope of Information</li><li>Section 3.2 – Include Stock Connect Daily Quota Balance (80) and Stock Connect Market Turnover (81) in MsgType list</li><li>Section 3.14 – Introduce new messages on Stock Connect Data including Stock Connect Daily Quota Balance (80) and Stock Connect Market Turnover (81)</li><li>Section 4.4 – Include Stock Connect Data in Refresh Service</li></ul> |
| Effective Date | Changes   |  |                |         |             |   |          |   |
| Immediate      | <b>Clarifications</b><br>Section 3.11.2 – Revise description for Market Turnover message  |  |                |         |             |   |          |   |
| Jun 2017       | <b>Launch of Stock Connect Market Feed</b> <ul style="list-style-type: none"><li>Section 1.3 – Include Stock Connect Data in Summary Table</li><li>Section 1.4 – Include Stock Connect Data in Scope of Information</li><li>Section 3.2 – Include Stock Connect Daily Quota Balance (80) and Stock Connect Market Turnover (81) in MsgType list</li><li>Section 3.14 – Introduce new messages on Stock Connect Data including Stock Connect Daily Quota Balance (80) and Stock Connect Market Turnover (81)</li><li>Section 4.4 – Include Stock Connect Data in Refresh Service</li></ul>   |  |                |         |             |   |          |   |
| V1.20          | 27 Feb 2017   | Revised Edition with the following updates <table><tr><th>Effective Date</th><th>Changes</th></tr><tr><td>1 Apr 2017</td><td><b>Removal of Index</b><ul style="list-style-type: none"><li>Appendix A – Remove “H11124 – CSI Overseas Mainland Enterprises Index (HKD)”</li></ul></td></tr></table>   | Effective Date | Changes | 1 Apr 2017  | <b>Removal of Index</b> <ul style="list-style-type: none"><li>Appendix A – Remove “H11124 – CSI Overseas Mainland Enterprises Index (HKD)”</li></ul>  |          |   |
| Effective Date | Changes   |  |                |         |             |   |          |   |
| 1 Apr 2017     | <b>Removal of Index</b> <ul style="list-style-type: none"><li>Appendix A – Remove “H11124 – CSI Overseas Mainland Enterprises Index (HKD)”</li></ul>  |  |                |         |             |   |          |   |
| V1.21          | 27 Mar 2017   | Revised Edition with the following updates <table><tr><th>Effective Date</th><th>Changes</th></tr><tr><td>Immediate</td><td><b>Clarifications</b><ul style="list-style-type: none"><li>Section 2.2.1 – Revise description to clarify Start of Day</li></ul></td></tr></table>  | Effective Date | Changes | Immediate   | <b>Clarifications</b> <ul style="list-style-type: none"><li>Section 2.2.1 – Revise description to clarify Start of Day</li></ul>  |          |   |
| Effective Date | Changes   |  |                |         |             |   |          |   |
| Immediate      | <b>Clarifications</b> <ul style="list-style-type: none"><li>Section 2.2.1 – Revise description to clarify Start of Day</li></ul>  |  |                |         |             |   |          |   |
| V1.22          | 20 Oct 2017   | Revised Edition with the following updates <table><tr><th>Effective Date</th><th>Changes</th></tr><tr><td>30 Oct 2017</td><td><b>Remove Daily Quota Balance (DQB) from Index</b><ul style="list-style-type: none"><li>Section 3.13.2 – Remove all description related to “CSCSHQ Northbound Daily Quota Balance of Shanghai-Hong Kong Stock Connect” and “CSCSZQ Northbound Daily Quota Balance of Shenzhen-Hong Kong Stock Connect”</li><li>Appendix A – Remove “CSCSHQ Northbound Daily Quota Balance of Shanghai-Hong Kong Stock Connect” and “CSCSZQ Northbound Daily Quota Balance of Shenzhen-Hong Kong Stock Connect”</li></ul></td></tr></table>   | Effective Date | Changes | 30 Oct 2017 | <b>Remove Daily Quota Balance (DQB) from Index</b> <ul style="list-style-type: none"><li>Section 3.13.2 – Remove all description related to “CSCSHQ Northbound Daily Quota Balance of Shanghai-Hong Kong Stock Connect” and “CSCSZQ Northbound Daily Quota Balance of Shenzhen-Hong Kong Stock Connect”</li><li>Appendix A – Remove “CSCSHQ Northbound Daily Quota Balance of Shanghai-Hong Kong Stock Connect” and “CSCSZQ Northbound Daily Quota Balance of Shenzhen-Hong Kong Stock Connect”</li></ul>   |          |   |
| Effective Date | Changes   |  |                |         |             |   |          |   |
| 30 Oct 2017    | <b>Remove Daily Quota Balance (DQB) from Index</b> <ul style="list-style-type: none"><li>Section 3.13.2 – Remove all description related to “CSCSHQ Northbound Daily Quota Balance of Shanghai-Hong Kong Stock Connect” and “CSCSZQ Northbound Daily Quota Balance of Shenzhen-Hong Kong Stock Connect”</li><li>Appendix A – Remove “CSCSHQ Northbound Daily Quota Balance of Shanghai-Hong Kong Stock Connect” and “CSCSZQ Northbound Daily Quota Balance of Shenzhen-Hong Kong Stock Connect”</li></ul>   |  |                |         |             |   |          |   |
| V1.23          | 9 Mar 2018  | Revised Edition with the following updates <table><tr><th>Effective Date</th><th>Changes</th></tr><tr><td>30 Apr 2018</td><td><b>OMD-C Reference Data Enrichment :</b><br/><br/><b>More product attributes are added to Security Definition (11)</b><ul style="list-style-type: none"><li>Section 3.7.2 – Redefine Securities Definition (11) message with the following changes:<ul style="list-style-type: none"><li>a) Replace reserved fillers with new reference data :<ul style="list-style-type: none"><li>- Product Type;</li><li>- Upper Strike Price;</li><li>- Warrant Type;</li><li>- Call Price;</li><li>- Entitlement; and</li><li>- Number of Warrants per Entitlement</li></ul></li><li>b) Revise description of existing attributes to reflect the enlarged coverage after the enrichment<ul style="list-style-type: none"><li>- Conversion Ratio</li><li>- Style</li></ul></li></ul></li></ul></td></tr></table> | Effective Date | Changes | 30 Apr 2018 | <b>OMD-C Reference Data Enrichment :</b><br><br><b>More product attributes are added to Security Definition (11)</b> <ul style="list-style-type: none"><li>Section 3.7.2 – Redefine Securities Definition (11) message with the following changes:<ul style="list-style-type: none"><li>a) Replace reserved fillers with new reference data :<ul style="list-style-type: none"><li>- Product Type;</li><li>- Upper Strike Price;</li><li>- Warrant Type;</li><li>- Call Price;</li><li>- Entitlement; and</li><li>- Number of Warrants per Entitlement</li></ul></li><li>b) Revise description of existing attributes to reflect the enlarged coverage after the enrichment<ul style="list-style-type: none"><li>- Conversion Ratio</li><li>- Style</li></ul></li></ul></li></ul> |          |   |
| Effective Date | Changes   |  |                |         |             |   |          |   |
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|                |   | <table><tr><td></td><td><ul style="list-style-type: none"><li>c) Replace obsolete data fields with fillers<ul style="list-style-type: none"><li>- Test Security Flag</li><li>- Underlying Security Weight</li></ul></li><li>d) Remove reference to basket warrants</li></ul><p><b>Include more indices in the Index Feed</b></p><ul style="list-style-type: none"><li>• Appendix A – Add Index Code for the following new index:<ul style="list-style-type: none"><li>a) CES Stock Connect Hong Kong Premier 50 Index</li></ul></li></ul><p><b>Other housekeeping changes:</b></p><ul style="list-style-type: none"><li>• Section 1.1 – Include Market Data Application Service Provider Licence Agreement</li><li>• Section 2.4 – Revise the example of race conditions</li><li>• Section 3.1.1 – Present Null Values in table format</li><li>• Section 3.1.2 – Present Currency Codes in table format</li><li>• Section 3.7.1, 3.7.2, 3.11.2, 3.12.1 – Change all references to “market” to “market segment”</li><li>• Section 3.8.1 – Replace obsolete Trading Session ID with filler</li><li>• Section 3.10.1, 3.10.3 – Update reference to Public trade type</li></ul></td></tr></table>   |                | <ul style="list-style-type: none"><li>c) Replace obsolete data fields with fillers<ul style="list-style-type: none"><li>- Test Security Flag</li><li>- Underlying Security Weight</li></ul></li><li>d) Remove reference to basket warrants</li></ul> <p><b>Include more indices in the Index Feed</b></p> <ul style="list-style-type: none"><li>• Appendix A – Add Index Code for the following new index:<ul style="list-style-type: none"><li>a) CES Stock Connect Hong Kong Premier 50 Index</li></ul></li></ul> <p><b>Other housekeeping changes:</b></p> <ul style="list-style-type: none"><li>• Section 1.1 – Include Market Data Application Service Provider Licence Agreement</li><li>• Section 2.4 – Revise the example of race conditions</li><li>• Section 3.1.1 – Present Null Values in table format</li><li>• Section 3.1.2 – Present Currency Codes in table format</li><li>• Section 3.7.1, 3.7.2, 3.11.2, 3.12.1 – Change all references to “market” to “market segment”</li><li>• Section 3.8.1 – Replace obsolete Trading Session ID with filler</li><li>• Section 3.10.1, 3.10.3 – Update reference to Public trade type</li></ul> |            |   |              |  |
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| V1.24          | 12 Sep 2018   | <p>Revised Edition with the following updates</p> <table><tr><th>Effective Date</th><th>Changes</th></tr><tr><td>Immediate</td><td><p><b>Clarifications</b></p><ul style="list-style-type: none"><li>• Section 3.1.2 – Revise description for Currency Value</li><li>• Appendix A – Update the note for CSI and CES index data</li></ul></td></tr><tr><td>27 Oct 2018</td><td><p><b>Include more indices in the Index Feed</b></p><ul style="list-style-type: none"><li>• Appendix A – Add Index Code for the following new indices:<ul style="list-style-type: none"><li>a) Hang Seng Index (Gross Total Return Index)</li><li>b) Hang Seng Finance Sub-Index (Gross Total Return Index)</li><li>c) Hang Seng Utilities Sub-Index (Gross Total Return Index)</li><li>d) Hang Seng Properties Sub-Index (Gross Total Return Index)</li><li>e) Hang Seng Index Commerce &amp; Industry Sub-Index (Gross Total Return Index)</li><li>f) Hang Seng China Enterprises Index (Gross Total Return Index)</li><li>g) Hang Seng Index (Net Total Return Index)</li><li>h) Hang Seng Finance Sub-Index (Net Total Return Index)</li><li>i) Hang Seng Utilities Sub-Index (Net Total Return Index)</li><li>j) Hang Seng Properties Sub-Index (Net Total Return Index)</li><li>k) Hang Seng Index Commerce &amp; Industry Sub-Index (Net Total Return Index)</li><li>l) Hang Seng China Enterprises Index (Net Total Return Index)</li></ul></li></ul></td></tr></table> | Effective Date | Changes   | Immediate  | <p><b>Clarifications</b></p> <ul style="list-style-type: none"><li>• Section 3.1.2 – Revise description for Currency Value</li><li>• Appendix A – Update the note for CSI and CES index data</li></ul>  | 27 Oct 2018  | <p><b>Include more indices in the Index Feed</b></p> <ul style="list-style-type: none"><li>• Appendix A – Add Index Code for the following new indices:<ul style="list-style-type: none"><li>a) Hang Seng Index (Gross Total Return Index)</li><li>b) Hang Seng Finance Sub-Index (Gross Total Return Index)</li><li>c) Hang Seng Utilities Sub-Index (Gross Total Return Index)</li><li>d) Hang Seng Properties Sub-Index (Gross Total Return Index)</li><li>e) Hang Seng Index Commerce &amp; Industry Sub-Index (Gross Total Return Index)</li><li>f) Hang Seng China Enterprises Index (Gross Total Return Index)</li><li>g) Hang Seng Index (Net Total Return Index)</li><li>h) Hang Seng Finance Sub-Index (Net Total Return Index)</li><li>i) Hang Seng Utilities Sub-Index (Net Total Return Index)</li><li>j) Hang Seng Properties Sub-Index (Net Total Return Index)</li><li>k) Hang Seng Index Commerce &amp; Industry Sub-Index (Net Total Return Index)</li><li>l) Hang Seng China Enterprises Index (Net Total Return Index)</li></ul></li></ul> |
| Effective Date | Changes   |   |                |   |            |   |              |  |
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| V1.26          | 21 May 2019   | <p>Revised Edition with the following updates</p> <table><tr><th>Effective Date</th><th>Changes</th></tr><tr><td>Immediate</td><td><p><b>Clarification</b></p><ul style="list-style-type: none"><li>• Section 3.9.1 – Remove description of Market Order for AddOrder (31) message</li><li>• Section 3.11.1 – Update description for Statistics (60) message</li></ul></td></tr><tr><td>24 June 2019</td><td><p><b>Include more indices in the Index Feed</b></p><ul style="list-style-type: none"><li>• Appendix A – Add Index Code for the following new indices:<ul style="list-style-type: none"><li>a) CES China Semiconductor Index</li><li>b) HKEX CNH Gold Futures – Excess Return Index</li><li>c) HKEX CNH Gold Futures – Total Return Index</li><li>d) HKEX CNH Gold Futures – Spot Price Index</li><li>e) HKEX USD Gold Futures – Excess Return Index</li><li>f) HKEX USD Gold Futures – Total Return Index</li><li>g) HKEX USD Gold Futures – Spot Price Index</li></ul></li></ul></td></tr></table>   | Effective Date | Changes   | Immediate  | <p><b>Clarification</b></p> <ul style="list-style-type: none"><li>• Section 3.9.1 – Remove description of Market Order for AddOrder (31) message</li><li>• Section 3.11.1 – Update description for Statistics (60) message</li></ul>  | 24 June 2019 | <p><b>Include more indices in the Index Feed</b></p> <ul style="list-style-type: none"><li>• Appendix A – Add Index Code for the following new indices:<ul style="list-style-type: none"><li>a) CES China Semiconductor Index</li><li>b) HKEX CNH Gold Futures – Excess Return Index</li><li>c) HKEX CNH Gold Futures – Total Return Index</li><li>d) HKEX CNH Gold Futures – Spot Price Index</li><li>e) HKEX USD Gold Futures – Excess Return Index</li><li>f) HKEX USD Gold Futures – Total Return Index</li><li>g) HKEX USD Gold Futures – Spot Price Index</li></ul></li></ul>  |
| Effective Date | Changes   |   |                |   |            |   |              |  |
| Immediate      | <p><b>Clarification</b></p> <ul style="list-style-type: none"><li>• Section 3.9.1 – Remove description of Market Order for AddOrder (31) message</li><li>• Section 3.11.1 – Update description for Statistics (60) message</li></ul>  |   |                |   |            |   |              |  |
| 24 June 2019   | <p><b>Include more indices in the Index Feed</b></p> <ul style="list-style-type: none"><li>• Appendix A – Add Index Code for the following new indices:<ul style="list-style-type: none"><li>a) CES China Semiconductor Index</li><li>b) HKEX CNH Gold Futures – Excess Return Index</li><li>c) HKEX CNH Gold Futures – Total Return Index</li><li>d) HKEX CNH Gold Futures – Spot Price Index</li><li>e) HKEX USD Gold Futures – Excess Return Index</li><li>f) HKEX USD Gold Futures – Total Return Index</li><li>g) HKEX USD Gold Futures – Spot Price Index</li></ul></li></ul>   |   |                |   |            |   |              |  |

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|--|--|--|
|  |  | <ul style="list-style-type: none"> <li>Appendix A – Additional Note for Dissemination time of Indices with index source = T</li> </ul> <p><b>Change of System Operation Window</b></p> <ul style="list-style-type: none"> <li>Section 2.2.2 – Provide further details on the stop sending time for the real-time and refresh channels.</li> <li>Section 2.2.3 – Adjust OMD shutdown time</li> <li>Section 4.4 – Clarify on the refresh service available time for various channels.</li> </ul> |
|--|--|--|

# CONTENTS

## Contents

|   |           |
|---|-----------|
| <b>DOCUMENT HISTORY .....</b>                     | <b>2</b>  |
| <b>CONTENTS.....</b>                              | <b>8</b>  |
| <b>1. INTRODUCTION.....</b>                       | <b>10</b> |
| 1.1 PURPOSE .....                                 | 10        |
| 1.2 READING GUIDE.....                            | 10        |
| 1.3 SUMMARY TABLE .....                           | 10        |
| 1.4 SCOPE OF INFORMATION .....                    | 11        |
| <b>2. SYSTEM OVERVIEW.....</b>                    | <b>12</b> |
| 2.1 SCOPE .....                                   | 12        |
| 2.1.1 <i>Multicast</i> .....                      | 12        |
| 2.1.2 <i>Dual Multicast Channels</i> .....        | 12        |
| 2.1.3 <i>Recovery Mechanisms</i> .....            | 12        |
| 2.2 SESSION MANAGEMENT .....                      | 12        |
| 2.2.1 <i>Start of Day</i> .....                   | 13        |
| 2.2.2 <i>Normal Transmission</i> .....            | 13        |
| 2.2.3 <i>End of Day</i> .....                     | 13        |
| 2.2.4 <i>Error Recovery</i> .....                 | 13        |
| 2.3 TRADING SESSIONS .....                        | 14        |
| 2.4 RACE CONDITIONS.....                          | 14        |
| <b>3. MESSAGE FORMATS.....</b>                    | <b>15</b> |
| 3.1 DATA TYPES .....                              | 15        |
| 3.1.1 <i>Null Values</i> .....                    | 15        |
| 3.1.2 <i>Currency Values</i> .....                | 15        |
| 3.2 PACKET STRUCTURE .....                        | 16        |
| 3.3 PACKET HEADER.....                            | 17        |
| 3.4 CONTROL MESSAGES.....                         | 17        |
| 3.4.1 <i>Heartbeat</i> .....                      | 17        |
| 3.4.2 <i>Sequence Reset (100)</i> .....           | 17        |
| 3.4.3 <i>Disaster Recovery Signal (105)</i> ..... | 18        |
| 3.5 RETRANSMISSION .....                          | 18        |
| 3.5.1 <i>Logon (101)</i> .....                    | 19        |
| 3.5.2 <i>Logon Response (102)</i> .....           | 19        |
| 3.5.3 <i>Retransmission Request (201)</i> .....   | 20        |
| 3.5.4 <i>Retransmission Response (202)</i> .....  | 20        |
| 3.6 REFRESH .....                                 | 20        |
| 3.6.1 <i>Refresh Complete (203)</i> .....         | 21        |
| 3.7 REFERENCE DATA .....                          | 21        |
| 3.7.1 <i>Market Definition (10)</i> .....         | 21        |
| 3.7.2 <i>Security Definition (11)</i> .....       | 22        |
| 3.7.3 <i>Liquidity Provider (13)</i> .....        | 25        |



|           |  |           |
|-----------|--|-----------|
| 3.7.4     | Currency Rate (14) .....   | 26        |
| 3.8       | STATUS DATA .....  | 26        |
| 3.8.1     | Trading Session Status (20).....   | 26        |
| 3.8.2     | Security Status (21).....  | 28        |
| 3.9       | ORDER BOOK DATA .....  | 28        |
| 3.9.1     | Add Order (30).....  | 28        |
| 3.9.2     | Modify Order (31).....   | 29        |
| 3.9.3     | Delete Order (32).....   | 30        |
| 3.9.4     | Add Odd Lot Order (33).....  | 30        |
| 3.9.5     | Delete Odd Lot Order (34).....   | 31        |
| 3.9.6     | Aggregate Order Book Update (53).....  | 31        |
| 3.9.7     | Broker Queue (54).....   | 32        |
| 3.9.8     | Order Imbalance (56).....  | 33        |
| 3.10      | TRADE AND PRICE DATA .....   | 34        |
| 3.10.1    | Trade (50) .....   | 34        |
| 3.10.2    | Trade Cancel (51).....   | 35        |
| 3.10.3    | Trade Ticker (52).....   | 36        |
| 3.10.4    | Closing Price (62) .....   | 37        |
| 3.10.5    | Nominal Price (40) .....   | 37        |
| 3.10.6    | Indicative Equilibrium Price (41) .....  | 38        |
| 3.10.7    | Reference Price (43).....  | 38        |
| 3.10.8    | VCM Trigger (23) .....   | 39        |
| 3.11      | VALUE ADDED DATA .....   | 40        |
| 3.11.1    | Statistics (60) .....  | 40        |
| 3.11.2    | Market Turnover (61) .....   | 40        |
| 3.11.3    | Yield (44).....  | 41        |
| 3.12      | NEWS.....  | 42        |
| 3.12.1    | News (22).....   | 42        |
| 3.13      | INDEX DATA .....   | 43        |
| 3.13.1    | Index Definition (70) .....  | 43        |
| 3.13.2    | Index Data (71) .....  | 44        |
| 3.14      | STOCK CONNECT DATA .....   | 45        |
| 3.14.1    | Stock Connect Daily Quota Balance (80) .....                                     | 45        |
| 3.14.2    | Stock Connect Market Turnover (81) .....   | 46        |
| <b>4.</b> | <b>RECOVERY.....</b>   | <b>47</b> |
| 4.1       | GAP DETECTION .....  | 47        |
| 4.2       | LINE ARBITRATION .....   | 48        |
| 4.3       | RETRANSMISSION SERVICE .....   | 50        |
| 4.4       | REFRESH SERVICE .....  | 52        |
| <b>5.</b> | <b>AGGREGATE ORDER BOOK MANAGEMENT.....</b>                                      | <b>54</b> |
|           | <b>APPENDIX A – LIST OF INDICES AND MARKET INFORMATION UNDER OMD INDEX .....</b> | <b>62</b> |

# 1. INTRODUCTION

## 1.1 PURPOSE

This document specifies the Binary interface of the HKEX Orion Market Data Platform (“OMD”) Securities Market & Index Datafeed Products.

This document is the Transmission Specification(s) of the relevant Datafeed(s) under your Market Data Vendor Licence Agreement, Market Data End-User Licence Agreement or Market Data Application Service Provider Licence Agreement (“Licence Agreement”). Please refer to Section 1.2, the summary table at Section 1.3 and Section 1.4 for the information applicable to the Datafeed(s) under your Licence Agreement.

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## 1.2 READING GUIDE

The chapters following this introduction are:

- Chapter 2: System Overview
- Chapter 3: Message Formats
- Chapter 4: Recovery
- Chapter 5: Aggregated Order Book Management
- Appendix A: List of Indices under OMD Index

All chapters and appendices except Chapter 3 and Appendix A are applicable to all Datafeeds unless otherwise specified. In Chapter 3, there are indications\* in individual sections/sub-sections for their applicability to individual Datafeeds, and Appendix A is applicable to OMD Index only. The information is also summarised in Section 1.3 Summary Table.

\* Example

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.3     | ●                            | ●                           | ●                            | ●                 |

## 1.3 SUMMARY TABLE

| Section | Message Format   | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.1     | Data Types       | ●                            | ●                           | ●                            | ●                 |
| 3.2     | Packet Structure | ●                            | ●                           | ●                            | ●                 |
| 3.3     | Packet Header    | ●                            | ●                           | ●                            | ●                 |
| 3.4     | Control Messages | ●                            | ●                           | ●                            | ●                 |
| 3.5     | Retransmission   | ●                            | ●                           | ●                            | ●                 |
| 3.6     | Refresh          | ●                            | ●                           | ●                            | ●                 |
| 3.7     | Reference Data   | ●                            | ●                           | ●                            |                   |

|        |                                   |   |   |   |   |
|--------|-----------------------------------|---|---|---|---|
| 3.8    | Status Data                       | ● | ● | ● |   |
| 3.9.1  | Add Order (30)                    |   |   | ● |   |
| 3.9.2  | Modify Order (31)                 |   |   | ● |   |
| 3.9.3  | Delete Order (32)                 |   |   | ● |   |
| 3.9.4  | Add Odd Lot Order (33)            | ▲ | ▲ | ▲ |   |
| 3.9.5  | Delete Odd Lot Order (34)         | ▲ | ▲ | ▲ |   |
| 3.9.6  | Aggregate Order Book Update (53)  | ● | ● |   |   |
| 3.9.7  | Broker Queue (54)                 | ● | ▲ | ▲ |   |
| 3.9.8  | Order Imbalance (56)              | ● | ● | ● |   |
| 3.10.1 | Trade (50)                        |   | ● | ● |   |
| 3.10.2 | Trade Cancel (51)                 |   | ● | ● |   |
| 3.10.3 | Trade Ticker (52)                 | ● |   |   |   |
| 3.10.4 | Closing Price (62)                | ● | ● |   |   |
| 3.10.5 | Nominal Price (40)                | ● | ● |   |   |
| 3.10.6 | Indicative Equilibrium Price (41) | ● | ● | ● |   |
| 3.10.7 | Reference Price (43)              | ● | ● | ● |   |
| 3.10.8 | VCM End (23)                      | ● | ● | ● |   |
| 3.11.1 | Statistics (60)                   | ● | ● |   |   |
| 3.11.2 | Market Turnover (61)              | ● | ● |   |   |
| 3.11.3 | Yield (44)                        | ● | ● |   |   |
| 3.12   | News                              | ● | ● |   |   |
| 3.13   | Index Data                        |   |   |   | ● |
| 3.14   | Stock Connect Data                | ▲ | ▲ | ▲ |   |

● The information supplied in the corresponding sub-section applies to the Datafeed(s)

▲ Complimentary service to the Datafeed(s).

## 1.4 SCOPE OF INFORMATION

HKEX Orion Market Data Platform – Securities Market & Index Datafeed Products (“OMD-C”) provides real time trading information of all instruments listed and traded on the securities market, indices and market information to the Licensees. The information can be grouped into the following categories:

### Securities Products

- Equity Securities
- Depository Receipts
- Stapled Securities
- Debt Securities
- Unit Trusts/Mutual Funds
  - Exchange Traded Funds
  - Real Estate Investment Trusts
  - Other Unit Trusts/Mutual Funds
- Structured Products
  - Derivatives Warrants
  - Callable Bull/Bear Contracts
  - Listed Equity Linked Instruments
- Trading Only Securities

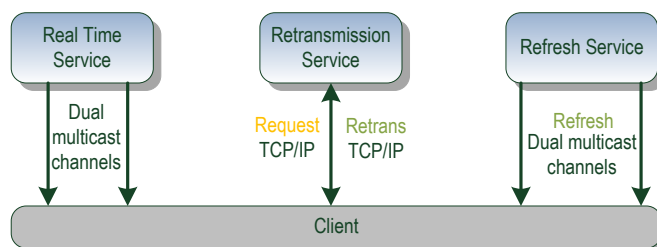
### Indices and Market Information

### Stock Connect Market Information

## 2. SYSTEM OVERVIEW

### 2.1 SCOPE

Figure 1: Access to Market Data



OMD provides market data represented in an efficient binary message format for all instruments listed on the Securities Market. It has been designed for high throughput and low latency.

#### 2.1.1 Multicast

Messages are published in a one-to-many fashion using the IP multicast and UDP transport protocols. Multicast is not a connection-oriented protocol. Data is sent strictly in one direction from server to clients.

#### 2.1.2 Dual Multicast Channels

Due to the inherently unreliable nature of the UDP transport, packets may be lost or delivered out-of-order. To mitigate the risk of packet loss, the messages are duplicated and sent over two separate multicast channels (dual channels). Technically, a multicast channel corresponds to a multicast group.

Each pair of dual multicast channels has a unique identifier, which is referred to as the ChannelID.

*More details regarding the configuration parameters (including IP addresses, port numbers corresponding to the multicast channels) will be found in a Connectivity Guide which will be provided at a later stage.*

#### 2.1.3 Recovery Mechanisms

OMD provides two recovery mechanisms:

- A retransmission server provides on request gap-fill retransmission of lost messages. The retransmission requests and gap-fill replies are point-to-point (TCP/IP connection).
- A refresh server provides snapshots of the market state at regular intervals throughout the business day. Snapshots are sent using multicast on separate channels for the real time messages.

## 2.2 SESSION MANAGEMENT

Each multicast channel maintains its own session. A session is limited to one business day. During this day the message sequence number is strictly increasing and therefore unique within the channel.

OMD-C does not operate on non-trading days of the Hong Kong Securities Market except those days when there are real-time index data calculated and disseminated by the index compiler. HKEX may perform system testing on Saturdays, Sundays or days when OMD-C is not in operation. Clients should treat data transmitted via OMD-C on those days as non production data and disregard them.

## 2.2.1 Start of Day

Housekeeping and system maintenance work may take place overnight until 6:00am. In this regard, Clients are advised to make connection to OMD Securities Market ("OMD-C") at or after 6:00am every business day to ensure that the data received from OMD-C are good for the start of the day. Please also refer to the OMD-C Developer's Guide for more information.

On each channel the first message at the start of the business day is the Sequence Reset message. The Sequence Reset message carries sequence number 1. On receipt of this message, the client must clear all cached data for all instruments.

The reference data for all markets, securities, liquidity providers and currency rates is published each day shortly after the start of day.

If a client starts listening after the start of business day and misses the Sequence Reset message and reference data, it must use the refresh service to recover and synchronize with the real time channels.

## 2.2.2 Normal Transmission

Normal order and trade message transmission in Securities Market Datafeed Products channels (i.e. SS, SP & SF) is expected between when the market opens for trading and when the market is closed. OMD will normally stop sending messages (including heartbeats) on all real-time and refresh channels around 6:30pm except the following channels until End of Day:

- DR signal channels (channels 9 and 49)
- Real-time and Refresh channels from Thomson Reuters Channel (channels 44 and 544)

Heartbeats are sent around every 2 seconds on each channel whenever there is no activity.

## 2.2.3 End of Day

OMD will normally be shutdown shortly after 3:00am, next day across midnight. The shutdown time and the message stop sending time, however, are not rigid and the Exchange has the right to adjust this time according to the different trading situations.

## 2.2.4 Error Recovery

### 2.2.4.1 System Component Failure

If a system component fails and requires a failover or restart, there will be a short interruption in multicast dissemination from either Line A or Line B. The system is deployed in an active-active configuration with Line A and Line B being generated independently and so line arbitration will allow the client to continue receiving messages – see section 4 for more information about recovery.

### 2.2.4.2 Disaster Recovery

In the unlikely event of a disaster recovery situation at the primary site, OMD will be brought up at the disaster recovery (DR) site.

During the interruption, no data will be sent including heartbeats.

A Disaster Recovery (DR) Signal message indicating the DR status will also be sent on its dedicated channel when OMD is brought up – see section 3 for more information about the DR Signal message.

IP addresses and ports that have been provided for the disaster site's retransmission service should be used. See *Connectivity Guide* for more details.

## 2.3 TRADING SESSIONS

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Normally, trading is conducted in auction trading session(s) and continuous trading session(s) every trading day. However, there are situations where there is only half day trading with fewer trading session(s) (Christmas eve, New Year eve and Chinese New Year eve), or a trading session is suspended due to a typhoon etc. OMD is not affected by the number of trading sessions and will continue to provide real time data as long as the Exchange's trading system is available.

## 2.4 RACE CONDITIONS

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The information supplied in this section does not apply to OMD Index.

Due to the nature of the exchange matching system the real time order/trade data and reference data are disseminated via separate channels so users need to be aware that there is a race condition.

As an example the Trading Session Status (20) messages and market activity are decoupled; e.g. for a short time after a TradingSesStatus of "Halted" is reported realtime data for that same market may continue to arrive.

## 3. MESSAGE FORMATS

### 3.1 DATA TYPES

*The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]*

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.1     | ●                            | ●                           | ●                            | ●                 |

The following table lists all the data types used by OMD.

| Format | Description  |
|--------|--|
| String | ASCII characters which are left aligned and padded with spaces, unless otherwise specified |
| UInt8  | 8 bit unsigned integer   |
| UInt16 | Little-Endian encoded 16 bit unsigned integer  |
| UInt32 | Little-Endian encoded 32 bit unsigned integer  |
| UInt64 | Little-Endian encoded 64 bit unsigned integer  |
| Int16  | Little-Endian encoded 16 bit signed integer  |
| Int32  | Little-Endian encoded 32 bit signed integer  |
| Int64  | Little-Endian encoded 64 bit signed integer  |
| Binary | Unicode encoding used for Chinese characters   |

#### 3.1.1 Null Values

From time to time certain fields cannot be populated and specific values are used to represent null. This is currently used within Int64 fields of the Index Data (71) message.

| Data Type | Null Representation   | Example of Usage                       |
|-----------|---|--|
| Int64     | 0x8000000000000000 (Hex 2's complement)<br>or<br>-9223372036854775808 (Decimal) | HighValue, LowValue of Index Data (71) |

#### 3.1.2 Currency Values

Please refer to the [Third Schedule of Rules of the Exchange in HKEX website](#) for possible ISO-4217 Currency Codes used in OMD-C. Apart from the Currency Codes listed in the aforesaid Schedule, OMD-C will also use the Currency Code listed below:

| Currency Code | Currency                    |
|---------------|-----------------------------|
| CNH           | Chinese Renminbi (Offshore) |

HKEX may add or delete currency code(s), whenever applicable, in the future.

## 3.2 PACKET STRUCTURE

*The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]*

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.2     | ●                            | ●                           | ●                            | ●                 |

Multicast packets are structured into a common packet header followed by zero or more messages. Messages within a packet are laid out sequentially, one after another without any spaces between them.

|               |           |           |     |           |
|---------------|-----------|-----------|-----|-----------|
| Packet Header | Message 1 | Message 2 | ... | Message n |
|---------------|-----------|-----------|-----|-----------|

The maximum length of a packet is 1500 bytes which includes the multicast headers, Packet Header and Messages.

The packet header provides information including the total packet length, the number of messages within the packet, the sequence number of the first message and a send timestamp.

A packet will only ever contain complete messages. A single message will never be fragmented across packets.

The format of each message within a packet will vary according to message type. However, regardless of the message type, each message will start with a two-byte message size (MsgSize) followed by a two-byte message type (MsgType). These are described in the following table.

**Table 1: MsgSize and MsgType Fields**

| Field   | Format | Len | Description  |
|---------|--------|-----|--|
| MsgSize | UInt16 | 2   | Message length (including this field)  |
| MsgType | UInt16 | 2   | Type of message.<br><br>The valid values for MsgType are below:<br><br>Sequence Reset (100)<br>Logon (101)<br>Logon Response (102)<br>Disaster Recovery Signal (105)<br>Retransmission Request (201)<br>Retransmission Response (202)<br>Refresh Complete (203)<br>Market Definition (10)<br>Security Definition (11)<br>Liquidity Provider (13)<br>Currency Rate (14)<br>Trading Session Status (20)<br>Security Status (21)<br>Add Order (30)<br>Modify Order (31)<br>Delete Order (32)<br>Add Odd Lot Order (33)<br>Delete Odd Lot Order (34)<br>Aggregate Order Book Update (53)<br>Broker Queue (54)<br>Order Imbalance (56)<br>Trade (50)<br>Trade Cancel (51)<br>Trade Ticker (52)<br>Closing Price (62)<br>Nominal Price (40)<br>Indicative Equilibrium Price (41)<br>Reference Price (43) |



| Field | Format | Len | Description  |
|-------|--------|-----|--|
|       |        |     | VCM Trigger (23)<br>Statistics (60)<br>Market Turnover (61)<br>Yield (44)<br>News (22)<br>Index Definition (70)<br>Index Data (71)<br>Stock Connect Daily Quota Balance (80)<br>Stock Connect Market Turnover (81) |

### 3.3 PACKET HEADER

*The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]*

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.3     | ●                            | ●                           | ●                            | ●                 |

All packets will begin with a common packet header.

| Offset        | Field    | Format | Len | Description  |
|---------------|----------|--------|-----|--|
| 0             | PktSize  | UInt16 | 2   | Size of the packet (including this field)  |
| 2             | MsgCount | UInt8  | 1   | Number of messages included in the packet  |
| 3             | Filler   | String | 1   |  |
| 4             | SeqNum   | UInt32 | 4   | Sequence number of the first message in the packet   |
| 8             | SendTime | UInt64 | 8   | The number of nanoseconds since midnight Coordinated Universal Time (UTC) of January 1, 1970, precision is provided to the nearest millisecond |
| Packet length |          |        | 16  |  |

### 3.4 CONTROL MESSAGES

*The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]*

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.4     | ●                            | ●                           | ●                            | ●                 |

#### 3.4.1 Heartbeat

Heartbeats consist of a packet header with MsgCount set to 0. They do not carry a sequence number and therefore do not increment the sequence number of the multicast channel. SeqNum is set to the sequence number of the previous message sent on the channel.

The Heartbeat message will be identical for all the services.

#### 3.4.2 Sequence Reset (100)

The Sequence Reset message is sent on each multicast channel at start of day. It may also be sent when there is a need for the rectification of stock reference data before market open.

The client must ignore the sequence number of the Sequence Reset message itself, and set the next expected sequence number to NewSeqNo. The client may receive multiple sequence reset messages from all channels. Whenever the

Sequence Reset message is received, clients must clear all cached data for all instruments traded in the Cash Market and indices and then subscribe to the refresh channels to receive the current state of the market.

### Message Fields

| Offset       | Field    | Format | Len | Description         | Values             |
|--------------|----------|--------|-----|---------------------|--------------------|
| 0            | MsgSize  | UInt16 | 2   | Size of the message |                    |
| 2            | MsgType  | UInt16 | 2   | Type of message     | 100 Sequence Reset |
| 4            | NewSeqNo | UInt32 | 4   | New sequence number | Always set to 1    |
| Total Length |          |        | 8   |                     |                    |

### 3.4.3 Disaster Recovery Signal (105)

The Disaster Recovery (DR) Signal message is sent on a dedicated multicast channel (DR channel) whenever site failover is triggered. In normal situation, the dedicated DR channel only carries Heartbeat till end of business day.

When site failover begins, DR Signal is sent with "DRStatus=1" indicating that the DR process has been activated. Clients should then clear all cached market data and prepare their own system for the site failover. When the site failover process finishes, DR Signal will be sent with "DRStatus=2" thereupon clients could start rebuild the latest market image from the refresh service. The same DR Signal will be sent periodically until end of business day.

### Message Fields

| Offset       | Field    | Format | Len | Description                 | Values                             |
|--------------|----------|--------|-----|-----------------------------|------------------------------------|
| 0            | MsgSize  | UInt16 | 2   | Size of the message         |                                    |
| 2            | MsgType  | UInt16 | 2   | Type of message             | 105 DR Message                     |
| 4            | DRStatus | UInt32 | 4   | Status during site failover | 1 DR in progress<br>2 DR completed |
| Total Length |          |        | 8   |                             |                                    |

## 3.5 RETRANSMISSION

*The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]*

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.5     | ●                            | ●                           | ●                            | ●                 |

Refer to Retransmission service for details on the retransmission messages.

Note that when the Logon (101) or Retransmission Request (201) messages are sent to the OMD server, the client must also include a packet header as shown below:

| Offset | Field    | Format | Len | Values | Notes   |
|--------|----------|--------|-----|--------|---|
| 0      | PktSize  | UInt16 | 2   | 32     | 16 bytes for this header plus 16 bytes for either the Logon (101) or Retransmission Request (201) message |
| 2      | MsgCount | UInt8  | 1   | 1      | One message only  |

| Offset | Field    | Format | Len | Values | Notes                 |
|--------|----------|--------|-----|--------|-----------------------|
| 3      | Filler   | String | 1   |        | Empty Filler          |
| 4      | SeqNum   | UInt32 | 4   | 0      | The field is not used |
| 8      | SendTime | UInt64 | 8   | 0      | The field is not used |

After this header, the fields for either Logon (101) or Retransmission Request (201) should follow.

Also note that the same header is used by the RTS server when sending either Logon Response (102) or Retransmission Response (202) messages to clients. Again in this case the SeqNum and SendTime fields are not relevant and can be discarded.

### 3.5.1 Logon (101)

The Logon message enables client authentication. This is not required for multicast channels and is only used to for retransmission requests.

Normal operation: Client sends a Logon message containing username to the OMD, which responds with a Logon Response message with the SessionStatus set to 0 (Session Active).

#### Message Fields

| Offset       | Field    | Format | Len | Description  | Values    |
|--------------|----------|--------|-----|--|-----------|
| 0            | MsgSize  | UInt16 | 2   | Size of the message                                    |           |
| 2            | MsgType  | UInt16 | 2   | Type of message  | 101 Logon |
| 4            | Username | String | 12  | Username to log on, padded with binary null characters |           |
| Total Length |          |        | 16  |  |           |

### 3.5.2 Logon Response (102)

#### Message Fields

| Offset       | Field         | Format | Len | Description           | Values   |
|--------------|---------------|--------|-----|-----------------------|--|
| 0            | MsgSize       | UInt16 | 2   | Size of the message   |  |
| 2            | MsgType       | UInt16 | 2   | Type of message       | 102 Logon Response   |
| 4            | SessionStatus | UInt8  | 1   | Status of the session | 0 Session Active<br>5 Invalid username or IP Address<br>100 User already connected |
| 5            | Filler        | String | 3   |                       |  |
| Total Length |               |        | 8   |                       |  |

### 3.5.3 Retransmission Request (201)

#### Message Fields

| Offset       | Field       | Format | Len | Description   | Values                            |
|--------------|-------------|--------|-----|---|-----------------------------------|
| 0            | MsgSize     | UInt16 | 2   | Size of the message   |                                   |
| 2            | MsgType     | UInt16 | 2   | Type of message.  | <b>201</b> Retransmission Request |
| 4            | ChannelID   | UInt16 | 2   | Multicast Channel ID with which the retransmission relates    |                                   |
| 6            | Filler      | String | 2   |   |                                   |
| 8            | BeginSeqNum | UInt32 | 4   | Beginning of sequence   |                                   |
| 12           | EndSeqNum   | UInt32 | 4   | Message sequence number of last message in range to be resent |                                   |
| Total Length |             |        | 16  |   |                                   |

### 3.5.4 Retransmission Response (202)

#### Message Fields

| Offset       | Field         | Format | Len | Description   | Values  |
|--------------|---------------|--------|-----|---|---|
| 0            | MsgSize       | UInt16 | 2   | Size of the message   |   |
| 2            | MsgType       | UInt16 | 2   | Type of message   | <b>202</b> Retransmission Response  |
| 4            | ChannelID     | UInt16 | 2   | Multicast Channel ID with which the retransmission relates    |   |
| 6            | RetransStatus | UInt8  | 1   | Status of the Retransmission response                         | <b>0</b> Request accepted<br><b>1</b> Unknown/Unauthorized channel ID<br><b>2</b> Messages not available<br><b>100</b> Exceeds maximum sequence range<br><b>101</b> Exceeds maximum requests in a day |
| 7            | Filler        | String | 1   |   |   |
| 8            | BeginSeqNum   | UInt32 | 4   | Beginning of sequence   |   |
| 12           | EndSeqNum     | UInt32 | 4   | Message sequence number of last message in range to be resent |   |
| Total Length |               |        | 16  |   |   |

## 3.6 REFRESH

*The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]*

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.6     | ●                            | ●                           | ●                            | ●                 |

Refer to Refresh service for details on the Refresh Complete message.

### 3.6.1 Refresh Complete (203)

This message is published to mark the end of a refresh.

#### Message Fields

| Offset       | Field      | Format | Len | Description  | Values               |
|--------------|------------|--------|-----|--|----------------------|
| 0            | MsgSize    | UInt16 | 2   | Size of the message                                    |                      |
| 2            | MsgType    | UInt16 | 2   | Type of message  | 203 Refresh Complete |
| 4            | LastSeqNum | UInt32 | 4   | Sequence number with which the refresh is synchronized | Numerical            |
| Total Length |            |        | 8   |  |                      |

## 3.7 REFERENCE DATA

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.7     | ●                            | ●                           | ●                            |                   |

### 3.7.1 Market Definition (10)

The Market Definition message is generated at the start of the business day for each market segment.

#### Message Fields

| Offset            | Field              | Format | Len | Description                                    | Values   |
|-------------------|--------------------|--------|-----|--|--|
| 0                 | MsgSize            | UInt16 | 2   | Size of the message                            |  |
| 2                 | MsgType            | UInt16 | 2   | Type of message                                | 10 Market Definition   |
| 4                 | MarketCode         | String | 4   | Market segment identifier                      | MAIN<br>GEM<br>NASD<br>ETS   |
| 8                 | MarketName         | String | 25  | Market segment name                            | Alphanumerical   |
| 33                | CurrencyCode       | String | 3   | Base currency code of the market segment       | See <a href="#">Currency Values</a> in section 3.1.2 for full details. |
| 36                | NumberOfSecurities | UInt32 | 4   | Number of securities within the market segment |  |
| Total Length..... |                    |        | 40  |  |  |

## 3.7.2 Security Definition (11)

This Security Definition message contains all the reference data for a security.

Security Definition messages may be received intraday – for example the 'FreeText' field may be updated during the day.

### Message Fields

| Offset | Field             | Format | Len | Description  | Values   |
|--------|-------------------|--------|-----|--|--|
| 0      | MsgSize           | UInt16 | 2   | Size of the message                                  |  |
| 2      | MsgType           | UInt16 | 2   | Type of message.                                     | <b>11</b> Security Definition  |
| 4      | SecurityCode      | UInt32 | 4   | Uniquely identifies a security available for trading | 5 digit security codes with possible values <b>1 – 99999</b>   |
| 8      | MarketCode        | String | 4   | Market segment identifier                            | <b>MAIN</b><br><b>GEM</b><br><b>NASD</b><br><b>ETS</b>   |
| 12     | ISINCode          | String | 12  | ISIN code of the security.                           |  |
| 24     | InstrumentType    | String | 4   | Instrument type of the security                      | <b>BOND</b> Bonds<br><b>EQTY</b> Equities<br><b>TRST</b> Trusts<br><b>WRNT</b> Warrants & structured products  |
| 28     | ProductType       | UInt8  | 1   | Product type of the security                         | <b>1</b> Equity – Ordinary Shares<br><b>2</b> Equity – Preference Shares<br><b>7</b> Equity – Depository Receipt (HDR) – Ordinary Shares<br><b>12</b> Equity – Depository Receipt (HDR) – Preference Shares<br><b>6</b> Equity – Rights<br><b>13</b> Warrant – Equity Warrant<br><b>3</b> Warrant – Derivative Warrant (DW)<br><b>14</b> Warrant – Equity Linked Instrument (ELI)<br><b>11</b> Warrant – Callable Bull/Bear Contract (CBBC)<br><b>4</b> Bond – Debt Security<br><b>5</b> Trust – Exchange Traded Fund (ETF)<br><b>8</b> Trust – Real Estate Investment Trust (REIT)<br><b>9</b> Trust – Other Unit Trusts<br><b>10</b> Trust – Leveraged and Inverse Product (LIP)<br><b>99</b> Others – None of the above |
| 29     | Filler            | String | 1   |  |  |
| 30     | SpreadTableCode   | String | 2   | Spread table code of the security.                   | Spread table as per Second Schedule of Rules of the Exchange:<br><b>01</b> Part A<br><b>03</b> Part B  |
| 32     | SecurityShortName | String | 40  | Security short name                                  |  |
| 72     | CurrencyCode      | String | 3   | Currency code of the security                        | See <a href="#">Currency Values</a> in section 3.1.2 for full details.   |
| 75     | SecurityNameGCCS  | Binary | 60  | Security name in Traditional                         | <b>Unicode UTF-16LE encoded</b>  |

|  |                      |        |    |   |  |
|--|----------------------|--------|----|---|--|
|  |                      |        |    | Chinese using Unicode   |  |
| 135  | SecurityNameGB       | Binary | 60 | Security name in Simplified Chinese using Unicode   | <b>Unicode UTF-16LE encoded</b>  |
| 195  | LotSize              | UInt32 | 4  | Board lot size for the security   |  |
| 199  | Filler               | String | 4  |   |  |
| 203  | PreviousClosingPrice | Int32  | 4  | Previous closing price of the security  | 3 implied decimal places   |
| 207  | VCMFlag              | String | 1  | Indicates whether Volatility Control Mechanism (VCM) is applicable to the security  | <b>Y</b> VCM applicable<br><b>N</b> VCM not applicable                                       |
| 208  | ShortSellFlag        | String | 1  | Indicator for short-sell authorization.   | <b>Y</b> Short-sell allowed<br><b>N</b> Short-sell not allowed                               |
| 209  | CASFlag              | String | 1  | Indicates whether Closing Auction Session (CAS) is applicable to the security   | <b>Y</b> CAS applicable<br><b>N</b> CAS not applicable                                       |
| 210  | CCASSFlag            | String | 1  | Indicates whether or not the security is a CCASS security   | <b>Y</b> CCASS security<br><b>N</b> Non CCASS security                                       |
| 211  | DummySecurityFlag    | String | 1  | Dummy Security Flag.  | <b>Y</b> Dummy security<br><b>N</b> Normal security  |
| 212  | Filler               | String | 1  |   |  |
| 213  | StampDutyFlag        | String | 1  | Indicator for stamp duty requirement  | <b>Y</b> Stamp duty required<br><b>N</b> Stamp duty not required                             |
| 214  | Filler               | String | 1  |   |  |
| 215  | ListingDate          | UInt32 | 4  | Date of security listing  | The representation is YYYYMMDD<br>Value is <b>19000101</b> for unknown listing date          |
| 219  | DelistingDate        | UInt32 | 4  | Date of security delisting  | The representation is YYYYMMDD<br>Value is <b>0</b> if no date exists                        |
| 223  | FreeText             | String | 38 | Free text associated to the security  | Fixed length array of free text. When there is no free text, spaces will be present instead. |
| 261  | Filler               | String | 82 |   |  |
| <b>Bonds Specific Data</b>                           |                      |        |    |   |  |
| 343  | EFNFlag              | String | 1  | EFN Indicator   | <b>Y</b> EFN<br><b>N</b> Non-EFN   |
| 344  | AccruedInterest      | UInt32 | 4  | Accrued interest of the security  | 3 implied decimal places   |
| 348  | CouponRate           | UInt32 | 4  | Coupon rate of a bond security  | 3 implied decimal places   |
| 352  | Filler               | String | 42 |   |  |
| <b>Warrants and Structured Product specific data</b> |                      |        |    |   |  |
| 394  | ConversionRatio      | UInt32 | 4  | Conversion ratio for Structured Product   | 3 implied decimal places   |
| 398  | StrikePrice1         | Int32  | 4  | Strike price of the security if it has only one strike price, or Lower strike price of the security if it has lower and upper strike prices (i.e. upper strike price not = 0) | 3 implied decimal places   |
| 402  | StrikePrice2         | Int32  | 4  | Upper strike price of the security if it has lower and  | 3 implied decimal places<br>Value is <b>0</b> if the securities has only                     |

|                   |                          |                       |    |   |   |
|-------------------|--------------------------|-----------------------|----|---|---|
|                   |                          |                       |    | upper strike prices   | one strike price  |
| 406               | MaturityDate             | UInt32                | 4  | Date of maturity of a warrant or structured security  | The representation is YYYYMMDD  |
| 410               | CallPutFlag              | String                | 1  | Indicator of whether the warrant or structured product is a call or put option                            | For Derivative Warrant :<br>C Call<br>P Put<br>O Others<br><br>For ELI & CBBC:<br>C Bull<br>P Bear / Rang   |
| 411               | Style                    | String                | 1  | Style of the warrant  | A American style<br>E European style<br><blank> Other   |
| 412               | Filler                   | String                | 2  |   |   |
| 414               | WarrantType              | String                | 1  | Warrant type of the warrant   | N Normal instrument<br>X Exotic instrument<br>"O" Not available   |
| 415               | CallPrice                | Int32                 | 4  | Call price for CBBC   | See DecimalsInCallPrice for the number of decimal places defined<br>O Not available   |
| 419               | DecimalsInCallPrice      | UInt8                 | 1  | Number of decimal places in Call Price  | Not applicable if CallPrice = 0   |
| 420               | Entitlement              | Int32                 | 4  | Entitlement of the warrant  | See DecimalsInEntitlement for the number of decimal places defined<br>O Not available   |
| 424               | DecimalsInEntitlement    | UInt8                 | 1  | Number of decimal places in Entitlement   | Not applicable if Entitlement = 0   |
| 425               | NoWarrantsPerEntitlement | UInt32                | 4  | Number of warrants per entitlement  | Not applicable if Entitlement = 0   |
| 429               | Filler                   | String                | 33 |   |   |
| 462               | NoUnderlyingSecurities   | UInt16                | 2  | Number of underlying securities if the underlying security is defined in Security Definition (11) message | 0 for structured product of which the underlying is not a security defined in Security Definition (11) message<br>1 for structured product of which the underlying is defined in Security Definition (11) message |
| 464               | UnderlyingSecurityCode   | UInt32                | 4  | 5-digit code identifying the underlying security  |   |
| 468               | Filler                   | String                | 4  |   |   |
| Total Length..... |                          | 464 + 8 <sub>NU</sub> |    |   |   |

(<sub>NU</sub> = value of NoUnderlyingSecurities)

Note:

(1) PreviousClosingPrice may be set to 0, for example on the first day of listing (no existing previous closing price)

(2) Fields in Bonds Specific Data & Warrants and Structured Product Specific Data should be ignored if they are not applicable to the InstrumentType



### 3.7.3 Liquidity Provider (13)

The Liquidity Provider message is generated at the start of the business day for securities that have at least one liquidity provider.

#### Message Fields

| Offset            | Field                | Format | Len         | Description  | Values   |
|-------------------|----------------------|--------|-------------|--|--|
| 0                 | MsgSize              | UInt16 | 2           | Size of the message                                  |  |
| 2                 | MsgType              | UInt16 | 2           | Type of message.                                     | <b>13</b> Liquidity Provider                                 |
| 4                 | SecurityCode         | UInt32 | 4           | Uniquely identifies a security available for trading | 5 digit security codes with possible values <b>1 – 99999</b> |
| 8                 | NoLiquidityProviders | UInt16 | 2           | Number of liquidity providers within this message    | <b>1 to 50</b>   |
| 10                | LPBrokerNumber       | UInt16 | 2           | Broker number of the liquidity provider              |  |
| Total Length..... |                      |        | $10 + 2n_T$ |  |  |

( $n_T$  = value of NoLiquidityProviders)

### 3.7.4 Currency Rate (14)

The Currency Rate message provides the foreign exchange conversion rates between various foreign currencies and the Hong Kong dollar.

The Currency Factor and Currency Rate fields should be interpreted as below:

For example if 1 Euro is valued 10.22 HKD

- Currency Factor will be 0 (1 EUR)
- Currency Rate will be 102200 (4 decimals implied)

For example if 1000 Japanese Yen is worth 90.678 HKD

- Currency Factor will be 3 (1000 JPY)
- Currency Rate will be 906780 (4 decimals implied)

#### Message Fields

| Offset            | Field          | Format | Len | Description                 | Values  |
|-------------------|----------------|--------|-----|-----------------------------|---|
| 0                 | MsgSize        | UInt16 | 2   | Size of the message         |   |
| 2                 | MsgType        | UInt16 | 2   | Type of message             | 14 Currency Rate  |
| 4                 | CurrencyCode   | String | 3   | Currency code               | See <a href="#">Currency Values</a> in section 3.1.2 for full details   |
| 7                 | Filler         | String | 1   |                             |   |
| 8                 | CurrencyFactor | UInt16 | 2   | Currency factor conversion. | A non-zero value <i>n</i> means all price fields for this security should be interpreted as a value equal to the price multiplied by 10 <sup><i>n</i></sup> |
| 10                | Filler         | String | 2   |                             |   |
| 12                | CurrencyRate   | UInt32 | 4   | Currency rate               | Rate, expressed in HKD for one foreign currency unit. 4 decimals implied.   |
| Total Length..... |                |        | 16  |                             |   |

## 3.8 STATUS DATA

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.8     | ●                            | ●                           | ●                            |                   |

### 3.8.1 Trading Session Status (20)

The Trading Session Status provides information on the status of a market segment. It is sent whenever there is change of trading session.

This message may be sent on a separate multicast channel from order and trade data and therefore may not be synchronized.

#### Message Fields

| Offset | Field | Format | Len | Description | Values |
|--------|-------|--------|-----|-------------|--------|
|--------|-------|--------|-----|-------------|--------|

| Offset | Field                 | Format | Len | Description  | Values   |
|--------|-----------------------|--------|-----|--|--|
| 0      | MsgSize               | UInt16 | 2   | Size of the message  |  |
| 2      | MsgType               | UInt16 | 2   | Type of message  | <b>20</b> Trading Session Status   |
| 4      | MarketCode            | String | 4   | Market segment identifier  | <b>MAIN</b><br><b>GEM</b><br><b>NASD</b><br><b>ETS</b>   |
| 8      | Filler                | String | 1   |  |  |
| 9      | TradingSessionSubID   | UInt8  | 1   | Trading session sub-identifier.  | <b>0</b> Day Close (DC)<br><b>1</b> Pre-trading [Pre-Opening Session (POS)] Order Input (OI)<br><b>2</b> Opening or Opening Auction [POS] Matching (MA)<br><b>3</b> Continuous trading (CT)<br><b>4</b> Closing or Closing Auction [Closing Auction Session (CAS)] Matching (MA)<br><b>5</b> Post-trading [CAS] Order Input (OI)<br><b>7</b> Quiescent (i.e. Blocking) (BL)<br><b>100</b> Not Yet Open (NO)<br><b>101</b> No Cancel/Modification [POS] (NC)<br><b>102</b> Exchange Intervention (EI)<br><b>103</b> Close (CL)<br><b>104</b> Order Cancel (OC)<br><b>105</b> Reference Price Fixing [CAS] (RP)<br><b>106</b> No Cancellation [CAS] (NW)<br><b>107</b> Random Close [CAS] (RC) |
| 10     | TradingSesStatus      | UInt8  | 1   | Status of the current trading session  | <b>0</b> Unknown (for NO)<br><b>1</b> Halted (for BL, EI)<br><b>2</b> Open (for [POS] OI, [POS] NC, [POS] MA, CT, OC)<br><b>3</b> Closed (for CL)<br><b>5</b> Pre-Close (for [CAS] RP, [CAS] NW, [CAS] RC, [CAS] MA, [CAS] OI)<br><b>100</b> Day Closed (for DC)   |
| 11     | TradingSesControlFlag | String | 1   | Indicates how control of trading session and sub-session transitions are performed | <b>0</b> Automatic (Default)<br><b>1</b> Manual (this invalidates the normal schedule for the day)   |
| 12     | Filler                | String | 4   |  |  |
| 16     | StartDateTime         | UInt64 | 8   | Start time of the trading status   | The number of nanoseconds elapsed since midnight Coordinated Universal Time (UTC) of January 1, 1970, precision is provided to the nearest second.<br>Set to <b>0</b> if no time is available  |
| 24     | EndDateTime           | UInt64 | 8   | End time of the trading status   | The number of nanoseconds elapsed since midnight Coordinated Universal Time (UTC) of January 1, 1970, precision is provided to the nearest second<br>Set to <b>0</b> if no time is available   |

| Offset            | Field | Format | Len | Description | Values |
|-------------------|-------|--------|-----|-------------|--------|
| Total Length..... |       |        | 32  |             |        |

### 3.8.2 Security Status (21)

The Security Status message is generated

- At the start of the business day if the security is not available for trading.
- Whenever a security state changes.

#### Message Fields

| Offset            | Field               | Format | Len | Description  | Values   |
|-------------------|---------------------|--------|-----|--|--|
| 0                 | MsgSize             | UInt16 | 2   | Size of the message  |  |
| 2                 | MsgType             | UInt16 | 2   | Type of message  | <b>21</b> Security Status                                    |
| 4                 | SecurityCode        | UInt32 | 4   | Uniquely identifies a security available for trading                     | 5 digit security codes with possible values <b>1 – 99999</b> |
| 8                 | SuspensionIndicator | UInt8  | 1   | Indicate whether the security is currently halted/ suspended for trading | <b>2</b> Trading Halt or Suspend<br><b>3</b> Resume          |
| 9                 | Filler              | String | 3   |  |  |
| Total Length..... |                     |        | 12  |  |  |

Note: 'Resume' in Suspension Indicator means the security is now available for trading,

## 3.9 ORDER BOOK DATA

The full order book information is not available in Pre-Opening Auction Session and Closing Auction Session.

### 3.9.1 Add Order (30)

*The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]*

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.9.1   |                              |                             | ●                            |                   |

The Add Order message is generated when a new order is inserted into the order book.. The OrderId is unique per security but will not increment consecutively.

Note for Securities instruments the OrderBookPosition is always set to zero.

#### Message Fields

| Offset | Field   | Format | Len | Description         | Values              |
|--------|---------|--------|-----|---------------------|---------------------|
| 0      | MsgSize | UInt16 | 2   | Size of the message |                     |
| 2      | MsgType | UInt16 | 2   | Type of message     | <b>30</b> Add Order |

| Offset            | Field             | Format | Len | Description   | Values   |
|-------------------|-------------------|--------|-----|---|--|
| 4                 | SecurityCode      | UInt32 | 4   | Uniquely identifies a security available for trading                                  | 5 digit security codes with possible values <b>1 – 99999</b> |
| 8                 | OrderId           | UInt64 | 8   | Unique identifier for each order performed within the trading day                     | Values may not be consecutive                                |
| 16                | Price             | Int32  | 4   | Price   | 3 implied decimal places                                     |
| 20                | Quantity          | UInt32 | 4   | Number of shares  |  |
| 24                | Side              | UInt16 | 2   | Side of the order   | <b>0</b> Bid<br><b>1</b> Offer                               |
| 26                | OrderType         | String | 1   | Order type  | <b>1</b> Market<br><b>2</b> Limit                            |
| 27                | Filler            | String | 1   |   |  |
| 28                | OrderBookPosition | Int32  | 4   | Order rank information for the order position within the order book for each security | Integer  |
| Total Length..... |                   |        | 32  |   |  |

### 3.9.2 Modify Order (31)

*The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]*

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.9.2   |                              |                             | ●                            |                   |

The Modify Order message is generated when an existing order identified by the OrderId is modified. The only attribute that can be modified is the quantity.

Note for Securities instruments the OrderBookPosition is always set to zero.

#### Message Fields

| Offset            | Field             | Format | Len | Description   | Values   |
|-------------------|-------------------|--------|-----|---|--|
| 0                 | MsgSize           | UInt16 | 2   | Size of the message   |  |
| 2                 | MsgType           | UInt16 | 2   | Type of message   | <b>31</b> Modify Order                                       |
| 4                 | SecurityCode      | UInt32 | 4   | Uniquely identifies a security available for trading                                  | 5 digit security codes with possible values <b>1 – 99999</b> |
| 8                 | OrderId           | UInt64 | 8   | Unique identifier for each order performed within the trading day                     | Values may not be consecutive                                |
| 16                | Quantity          | UInt32 | 4   | Number of shares  |  |
| 20                | Side              | UInt16 | 2   | Side of the order   | <b>0</b> Bid<br><b>1</b> Offer                               |
| 22                | Filler            | String | 2   |   |  |
| 24                | OrderBookPosition | Int32  | 4   | Order rank information for the order position within the order book for each security | Integer  |
| Total Length..... |                   |        | 28  |   |  |

### 3.9.3 Delete Order (32)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.9.3   |                              |                             | ●                            |                   |

The Delete Order message is generated when an existing order identified by the OrderId is deleted.

#### Message Fields

| Offset            | Field        | Format | Len | Description   | Values  |
|-------------------|--------------|--------|-----|---|---|
| 0                 | MsgSize      | UInt16 | 2   | Size of the message   |   |
| 2                 | MsgType      | UInt16 | 2   | Type of message   | 32 Delete Order                                       |
| 4                 | SecurityCode | UInt32 | 4   | Uniquely identifies a security available for trading              | 5 digit security codes with possible values 1 – 99999 |
| 8                 | OrderId      | UInt64 | 8   | Unique identifier for each order performed within the trading day | Values may not be consecutive                         |
| 16                | Side         | UInt16 | 2   | Side of the order   | 0 Bid<br>1 Offer                                      |
| 18                | Filler       | String | 2   |   |   |
| Total Length..... |              |        | 20  |   |   |

### 3.9.4 Add Odd Lot Order (33)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

| Section | OMD Securities Standard (SS)                | OMD Securities Premium (SP)                 | OMD Securities FullTick (SF)                | OMD Index (Index) |
|---------|---|---|---|-------------------|
| 3.9.4   | ▲<br>(via complimentary odd lot order feed) | ▲<br>(via complimentary odd lot order feed) | ▲<br>(via complimentary odd lot order feed) |                   |

▲ Complimentary service to the Datafeed(s)

The Add Odd Lot Order message is generated when a new odd lot order is inserted into the order book.

#### Message Fields

| Offset | Field        | Format | Len | Description   | Values  |
|--------|--------------|--------|-----|---|---|
| 0      | MsgSize      | UInt16 | 2   | Size of the message   |   |
| 2      | MsgType      | UInt16 | 2   | Type of message   | 33 Add Odd Lot Order                                  |
| 4      | SecurityCode | UInt32 | 4   | Uniquely identifies a security available for trading              | 5 digit security codes with possible values 1 – 99999 |
| 8      | OrderId      | UInt64 | 8   | Unique identifier for each order performed within the trading day | Values may not be consecutive                         |
| 16     | Price        | Int32  | 4   | Price   | 3 implied decimal places                              |
| 20     | Quantity     | UInt32 | 4   | Number of shares  |   |

| Offset            | Field    | Format | Len | Description  | Values           |
|-------------------|----------|--------|-----|--|------------------|
| 24                | BrokerID | UInt16 | 2   | Integer identifier uniquely identifying the Broker | Integer          |
| 26                | Side     | UInt16 | 2   | Side of the order                                  | 0 Bid<br>1 Offer |
| Total Length..... |          |        | 28  |  |                  |

### 3.9.5 Delete Odd Lot Order (34)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

| Section | OMD Securities Standard (SS)                | OMD Securities Premium (SP)                 | OMD Securities FullTick (SF)                | OMD Index (Index) |
|---------|---|---|---|-------------------|
| 3.9.5   | ▲<br>(via complimentary odd lot order feed) | ▲<br>(via complimentary odd lot order feed) | ▲<br>(via complimentary odd lot order feed) |                   |

▲ Complimentary service to the Datafeed(s)

The Delete Odd Lot Order message is generated when an existing odd lot order identified by the OrderId is deleted.

#### Message Fields

| Offset            | Field        | Format | Len | Description   | Values  |
|-------------------|--------------|--------|-----|---|---|
| 0                 | MsgSize      | UInt16 | 2   | Size of the message   |   |
| 2                 | MsgType      | UInt16 | 2   | Type of message   | 34 Delete Odd Lot Order                               |
| 4                 | SecurityCode | UInt32 | 4   | Uniquely identifies a security available for trading              | 5 digit security codes with possible values 1 – 99999 |
| 8                 | OrderId      | UInt64 | 8   | Unique identifier for each order performed within the trading day | Values may not be consecutive                         |
| 16                | BrokerID     | UInt16 | 2   | Integer identifier uniquely identifying the Broker                | Integer   |
| 18                | Side         | UInt16 | 2   | Side of the order   | 0 Bid<br>1 Offer                                      |
| Total Length..... |              |        | 20  |   |   |

### 3.9.6 Aggregate Order Book Update (53)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.9.6   | ●                            | ●                           |                              |                   |

Refer to Section 5 - Aggregate Order Book Management for details on the Aggregate Order Book Update message. The Aggregate Order Book Update message only applies to Board Lots.

For an UpdateAction of '74 – Orderbook Clear' please refer to Example 6 within the Aggregate Order Book Management section 5.

## Message Fields

| Offset             | Field             | Format | Len                   | Description  | Values  |
|--------------------|-------------------|--------|-----------------------|--|---|
| 0                  | MsgSize           | UInt16 | 2                     | Size of the message                                  |   |
| 2                  | MsgType           | UInt16 | 2                     | Type of message                                      | <b>53</b> Aggregate Order Book Update   |
| 4                  | SecurityCode      | UInt32 | 4                     | Uniquely identifies a security available for trading | 5 digit security codes with possible values <b>1 – 99999</b>                    |
| 8                  | Filler            | String | 3                     |  |   |
| 11                 | NoEntries         | UInt8  | 1                     | Number of book entries within the message            |   |
| 12                 | AggregateQuantity | UInt64 | 8                     | Aggregated number of shares.                         |   |
| 20                 | Price             | Int32  | 4                     | Price  | 3 implied decimal places  |
| 24                 | NumberOfOrders    | UInt32 | 4                     | Number of orders                                     |   |
| 28                 | Side              | UInt16 | 2                     | Side of the order                                    | <b>0</b> Bid<br><b>1</b> Offer  |
| 30                 | PriceLevel        | UInt8  | 1                     | Price level  |   |
| 31                 | UpdateAction      | UInt8  | 1                     | Type of market data update action                    | <b>0</b> New<br><b>1</b> Change<br><b>2</b> Delete<br><b>74</b> Orderbook Clear |
| 32                 | Filler            | String | 4                     |  |   |
| Total Length ..... |                   |        | 12 + 24n <sub>0</sub> |  |   |

(n<sub>0</sub> = value of NoEntries)

### 3.9.7 Broker Queue (54)

*The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]*

| Section      | OMD Securities Standard (SS) | OMD Securities Premium (SP)                          | OMD Securities FullTick (SF)                         | OMD Index (Index) |
|--------------|------------------------------|--|--|-------------------|
| <b>3.9.7</b> | ●                            | ▲<br>(via complimentary conflated broker queue feed) | ▲<br>(via complimentary conflated broker queue feed) |                   |

▲ Complimentary service to the Datafeed(s)

The Broker Queue message contains the priority list of the (max) top 40 broker IDs for a given side, and is generated whenever any of the entries in the list are modified. Entries are ordered according to distance away from the best price with best price brokers being at the front of the queue. The queue will also include spread level entries between each price level, which are marked when the Type field is set to 'S'. When the Type field is set to 'S', there are two possibilities;

- The Item is non-zero – indicating the number of spread levels away from the best price
- The Item is zero – indicating that there are no brokers with orders at the spread level indicated by the previous entry of Type set to 'S'

Example: if the active offers are as below, and assuming a spread level is 0.01:

| Ask Price | Broker ID |
|-----------|-----------|
| 20.28     | 2137      |
| 20.28     | 4138      |
| 20.29     | 2141      |



| Ask Price | Broker ID |
|-----------|-----------|
| 20.29     | 5123      |
| 20.31     | 3145      |

Then the resulting Ask side Broker Queue will be represented as below:

| Entry | 1    | 2    | 3 | 4    | 5    | 6 | 7 | 8 | 9    |
|-------|------|------|---|------|------|---|---|---|------|
| Item  | 2137 | 4138 | 1 | 2141 | 5123 | 2 | 0 | 3 | 3145 |
| Type  | B    | B    | S | B    | B    | S | S | S | B    |

The Conflated Broker Queue Feed ("CBQ") which is included in SS (OMD Securities Standard), is provided to the Licensee of SP (OMD Securities Premium) as a complimentary service. The service provides broker queue information in conflated mode whilst SP provides market data in streaming mode. The service level between CBQ and SP is therefore inherently different by nature and the information in these two products is not synchronized. Licensed vendors are therefore reminded that if they plan to provide the CBQ along with the market depth available from SP, appropriate disclaimers and warnings should be provided to subscribers highlighting the service level difference.

### Message Fields

| Offset             | Field        | Format | Len                  | Description  | Values  |
|--------------------|--------------|--------|----------------------|--|---|
| 0                  | MsgSize      | UInt16 | 2                    | Size of the message  |   |
| 2                  | MsgType      | UInt16 | 2                    | Type of message  | <b>54</b> Broker Queue  |
| 4                  | SecurityCode | UInt32 | 4                    | Uniquely identifies a security available for trading   | 5 digit security codes with possible values <b>1 – 99999</b>              |
| 8                  | ItemCount    | UInt8  | 1                    | This field contains the number of items in the message – repeating items are shown indented below. | <b>0 to 40</b>  |
| 9                  | Side         | UInt16 | 2                    | Side of the order  | <b>1</b> Buy<br><b>2</b> Sell   |
| 11                 | BQMoreFlag   | String | 1                    | Flag indicating if there are more broker numbers in the queue                                      | <b>Y</b> More broker numbers exist in the queue<br><b>N</b> No more exist |
| 12                 | Item         | UInt16 | 2                    | This field contains either the broker number or the number of spreads away from the best price     |   |
| 14                 | Type         | String | 1                    | Indicates the type of information contained in the item  | <b>B</b> Broker number<br><b>S</b> Number of Spread                       |
| 15                 | Filler       | String | 1                    |  |   |
| Total Length ..... |              |        | 12 + 4n <sub>i</sub> |  |   |

(n<sub>i</sub> = value of ItemCount)

### 3.9.8 Order Imbalance (56)

*The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]*

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.9.8   | ●                            | ●                           | ●                            |                   |

The Order Imbalance message provides order imbalance information at the Indicative Equilibrium Price (IEP) during the Closing Auction Session (CAS).

### Message Fields

| Offset            | Field                   | Format | Len | Description  | Values   |
|-------------------|-------------------------|--------|-----|--|--|
| 0                 | MsgSize                 | UInt16 | 2   | Size of the message  |  |
| 2                 | MsgType                 | UInt16 | 2   | Type of message  | <b>56</b> Order Imbalance  |
| 4                 | SecurityCode            | UInt32 | 4   | Uniquely identifies a security available for trading   | 5 digit security codes with possible values <b>1 – 99999</b>   |
| 8                 | OrderImbalanceDirection | String | 1   | Indicates the imbalance direction when the matchable buy quantity and sell quantity at IEP are not equal   | <b>N</b> Buy = Sell<br><b>B</b> Buy Surplus<br><b>S</b> Sell Surplus<br><space> Not applicable, i.e. when IEP is not available |
| 9                 | Filler                  | String | 1   |  |  |
| 10                | OrderImbalanceQuantity  | UInt64 | 8   | The absolute difference between the matchable buy quantity and the sell quantity at IEP<br><br>Value should be ignored if Order Imbalance Direction is <space> |  |
| 18                | Filler                  | String | 2   |  |  |
| Total Length..... |                         |        | 20  |  |  |

## 3.10 TRADE AND PRICE DATA

### 3.10.1 Trade (50)

*The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]*

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.10.1  |                              | ●                           | ●                            |                   |

The Trade message is generated each time a trade has been performed.

### Message Fields

| Offset | Field        | Format | Len | Description  | Values   |
|--------|--------------|--------|-----|--|--|
| 0      | MsgSize      | UInt16 | 2   | Size of the message  |  |
| 2      | MsgType      | UInt16 | 2   | Type of message  | <b>50</b> Trade  |
| 4      | SecurityCode | UInt32 | 4   | Uniquely identifies a security available for trading   | 5 digit security codes with possible values <b>1 – 99999</b> |
| 8      | TradeID      | UInt32 | 4   | Unique identifier per security for each trade performed within the trading system. The ID is | Starting from <b>1</b> , incrementing by 1 for each trade    |

| Offset             | Field     | Format | Len | Description                | Values  |
|--------------------|-----------|--------|-----|----------------------------|---|
|                    |           |        |     | reset for each trading day |   |
| 12                 | Price     | Int32  | 4   | Price                      | 3 implied decimal places  |
| 16                 | Quantity  | UInt32 | 4   | Number of shares           |   |
| 20                 | TrdType   | Int16  | 2   | Public trade type          | <b>0</b> Automatch normal (Public Trade Type <space>)<br><b>4</b> Late Trade (Off-exchange previous day) (Public Trade Type "P")<br><b>22</b> Non-direct Off-Exchange Trade (Public Trade Type "M")<br><b>100</b> Automatch internalized (Public Trade Type "Y")<br><b>101</b> Direct off-exchange Trade (Public Trade Type "X")<br><b>102</b> Odd-Lot Trade (Public Trade Type "D")<br><b>103</b> Auction Trade (Public Trade Type "U")<br><b>104</b> Overseas Trade |
| 22                 | Filler    | String | 2   |                            |   |
| 24                 | TradeTime | UInt64 | 8   | Time of trade              | The number of nanoseconds elapsed since midnight Coordinated Universal Time (UTC) of January 1, 1970<br><br>TradeTime precision is currently provided to the nearest second   |
| Total Length ..... |           |        | 32  |                            |   |

### 3.10.2 Trade Cancel (51)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.10.2  |                              | ●                           | ●                            |                   |

The Trade Cancel message is generated when a trade has been cancelled.

#### Message Fields

| Offset             | Field        | Format | Len | Description   | Values   |
|--------------------|--------------|--------|-----|---|--|
| 0                  | MsgSize      | UInt16 | 2   | Size of the message   |  |
| 2                  | MsgType      | UInt16 | 2   | Type of message   | <b>51</b> Trade cancel                                       |
| 4                  | SecurityCode | UInt32 | 4   | Uniquely identifies a security available for trading  | 5 digit security codes with possible values <b>1 – 99999</b> |
| 8                  | TradeID      | UInt32 | 4   | Unique identifier per security for each trade performed within the trading system. The ID is reset for each trading day | Starting from <b>1</b> , incrementing by 1 for each trade    |
| Total Length ..... |              |        | 12  |   |  |

### 3.10.3 Trade Ticker (52)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.10.3  | ●                            |                             |                              |                   |

The Trade Ticker is an aggregation of several trades into one message, combining quantities of subsequent trades made on a given instrument at a given fixed price.

When a trade is cancelled, a Trade Ticker message will be generated with the TickerID set to the ticker which contains the cancelled trade and with the AggregateQuantity set to remaining quantity outstanding.

#### Message Fields

| Offset | Field             | Format | Len | Description   | Values  |
|--------|-------------------|--------|-----|---|---|
| 0      | MsgSize           | UInt16 | 2   | Size of the message   |   |
| 2      | MsgType           | UInt16 | 2   | Type of message   | 52 Trade ticker   |
| 4      | SecurityCode      | UInt32 | 4   | Uniquely identifies a security available for trading  | 5 digit security codes with possible values 1 – 99999   |
| 8      | TickerID          | UInt32 | 4   | Unique identifier per security for each trade ticker generated within the trading system. The ID is unique per security for each trading day. | Starting from 1, incrementing by 1 for each trade ticker  |
| 12     | Price             | Int32  | 4   | Price   | 3 implied decimal places  |
| 16     | AggregateQuantity | UInt64 | 8   | Aggregated number of shares.  | Remaining quantity if TrdCancelFlag = Y   |
| 24     | TradeTime         | UInt64 | 8   | Time of trade   | The number of nanoseconds elapsed since midnight Coordinated Universal Time (UTC) of January 1, 1970<br><br>Tradetime is up to seconds<br><br>Not applicable when TrdCancelFlag = Y   |
| 32     | TrdType           | Int16  | 2   | Public trade type   | 0 Automatch normal (Public Trade Type <space><br>4 Late Trade (Off-exchange previous day) (Public Trade Type "P")<br>22 Non-direct Off-Exchange Trade (Public Trade Type "M")<br>100 Automatch internalized (Public Trade Type "Y")<br>101 Direct off-exchange Trade (Public Trade Type "X")<br>102 Odd-Lot Trade (Public Trade Type "D")<br>103 Auction Trade (Public Trade Type "U")<br><br>Not applicable when TrdCancelFlag = Y |

| Offset             | Field         | Format | Len | Description  | Values                                       |
|--------------------|---------------|--------|-----|--|--|
| 34                 | TrdCancelFlag | String | 1   | Indicates that a trade covered in the original Trade Ticker has been cancelled | <b>Y</b> Cancelled<br><b>N</b> Not cancelled |
| 35                 | Filler        | String | 1   |  |  |
| Total Length ..... |               |        | 36  |  |  |

### 3.10.4 Closing Price (62)

*The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]*

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.10.4  | ●                            | ●                           |                              |                   |

The Closing Price message is generated near the end of the business day for each security. If the closing price is not available, the field 'ClosingPrice' is set to 0. Note that the 'NumberOfTrades' field is not populated for SS (OMD Securities Standard) clients.

#### Message Fields

| Offset             | Field          | Format | Len | Description  | Values   |
|--------------------|----------------|--------|-----|--|--|
| 0                  | MsgSize        | UInt16 | 2   | Size of the message                                      |  |
| 2                  | MsgType        | UInt16 | 2   | Type of message  | <b>62</b> Closing Price                                      |
| 4                  | SecurityCode   | UInt32 | 4   | Uniquely identifies a security available for trading     | 5 digit security codes with possible values <b>1 – 99999</b> |
| 8                  | ClosingPrice   | Int32  | 4   | Current Day Closing Price                                | 3 implied decimal places                                     |
| 12                 | NumberOfTrades | UInt32 | 4   | Total Number of Trades performed on the given instrument |  |
| Total Length ..... |                |        | 16  |  |  |

### 3.10.5 Nominal Price (40)

*The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]*

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.10.5  | ●                            | ●                           |                              |                   |

The Nominal message may be generated when an order is added, deleted or modified in a book or when trade or trade cancel is performed. Before the arrival of the first Nominal Price message, the nominal price should be the same as the previous closing price provided in the Security Definition (11) message.

#### Message Fields

| Offset | Field   | Format | Len | Description         | Values                  |
|--------|---------|--------|-----|---------------------|-------------------------|
| 0      | MsgSize | UInt16 | 2   | Size of the message |                         |
| 2      | MsgType | UInt16 | 2   | Type of message     | <b>40</b> Nominal Price |

| Offset            | Field        | Format | Len | Description  | Values   |
|-------------------|--------------|--------|-----|--|--|
| 4                 | SecurityCode | UInt32 | 4   | Uniquely identifies a security available for trading | 5 digit security codes with possible values <b>1 – 99999</b> |
| 8                 | NominalPrice | Int32  | 4   | Nominal price of a security                          | 3 implied decimal places                                     |
| Total Length..... |              |        | 12  |  |  |

Note: Nominal Price may be 0 in specific cases (e.g. no reference price)

### 3.10.6 Indicative Equilibrium Price (41)

*The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]*

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.10.6  | ●                            | ●                           | ●                            |                   |

The Indicative Equilibrium Price (IEP) message is generated whenever there is change of the Indicative Equilibrium Price (IEP) or Indicative Equilibrium Volume (IEV) during the Pre-Opening Session (POS) or Closing Auction Session (CAS). The IEP will become 0 when IEP does not exist.

#### Message Fields

| Offset            | Field             | Format | Len | Description  | Values  |
|-------------------|-------------------|--------|-----|--|---|
| 0                 | MsgSize           | UInt16 | 2   | Size of the message                                  |   |
| 2                 | MsgType           | UInt16 | 2   | Type of message                                      | <b>41</b> Indicative Equilibrium Price                                |
| 4                 | SecurityCode      | UInt32 | 4   | Uniquely identifies a security available for trading | 5 digit security codes with possible values <b>1 – 99999</b>          |
| 8                 | Price             | Int32  | 4   | IEP  | 3 implied decimal places<br>Value is <b>0</b> if IEP is not available |
| 12                | AggregateQuantity | UInt64 | 8   | IEV  |   |
| Total Length..... |                   |        | 20  |  |   |

### 3.10.7 Reference Price (43)

*The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]*

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.10.7  | ●                            | ●                           | ●                            |                   |

This message provides the reference price, lower and upper price limits for order input during an applicable auction session and will be sent again when there is any change of the reference price, lower and upper price limits during the session. Also the same information may be resent during the auction session.

For Closing Auction Session (CAS), a Reference Price message is generated at the start of the session for all the securities tradable on the day, regardless of whether it is a CAS applicable security or not.

For Pre-Opening Session (POS), no Reference Price messages are sent.

#### Message Fields

| Offset | Field | Format | Len | Description | Values |
|--------|-------|--------|-----|-------------|--------|
|--------|-------|--------|-----|-------------|--------|

| Offset            | Field          | Format | Len | Description   | Values   |
|-------------------|----------------|--------|-----|---|--|
| 0                 | MsgSize        | UInt16 | 2   | Size of the message                                   |  |
| 2                 | MsgType        | UInt16 | 2   | Type of message                                       | <b>43</b> Reference Price  |
| 4                 | SecurityCode   | UInt32 | 4   | Uniquely identifies a security available for trading  | 5 digit security codes with possible values <b>1 – 99999</b>                   |
| 8                 | ReferencePrice | Int32  | 4   | Reference price of the security for order input       | 3 implied decimal places<br>Value is 0 if the reference price is not available |
| 12                | LowerPrice     | Int32  | 4   | Lower price of the allowed price band for order input | 3 implied decimal places<br><b>0</b> means Not available                       |
| 16                | UpperPrice     | Int32  | 4   | Upper price of the allowed price band for order input | 3 implied decimal places<br><b>0</b> means Not available                       |
| Total Length..... |                |        | 20  |   |  |

Note: Reference Price may be 0 in special cases (e.g. no nominal price).

### 3.10.8 VCM Trigger (23)

The VCM Trigger message is generated whenever a cooling off period is triggered by Volatility Control Mechanism (VCM).

#### Message Fields

| Offset            | Field               | Format | Len | Description   | Values   |
|-------------------|---------------------|--------|-----|---|--|
| 0                 | MsgSize             | UInt16 | 2   | Size of the message   |  |
| 2                 | MsgType             | UInt16 | 2   | Type of message   | <b>23</b> VCM Trigger  |
| 4                 | SecurityCode        | UInt32 | 4   | Uniquely identifies a security available for trading                | 5 digit security codes with possible values <b>1 – 99999</b>   |
| 8                 | CoolingOffStartTime | UInt64 | 8   | Time when the cooling off period starts                             | The number of nanoseconds elapsed since midnight Coordinated Universal Time (UTC) of January 1, 1970, precision is provided to the nearest second. |
| 16                | CoolingOffEndTime   | UInt64 | 8   | Time when the cooling off period ends                               | The number of nanoseconds elapsed since midnight Coordinated Universal Time (UTC) of January 1, 1970, precision is provided to the nearest second. |
| 24                | VCMReferencePrice   | Int32  | 4   | Reference Price for the cooling off period                          | 3 implied decimal places   |
| 28                | VCMLowerPrice       | Int32  | 4   | Lower price in the price band allowed during the cooling off period | 3 implied decimal places   |
| 32                | VCMUpperPrice       | Int32  | 4   | Upper price in the price band allowed during the cooling off period | 3 implied decimal places   |
| Total Length..... |                     |        | 36  |   |  |

## 3.11 VALUE ADDED DATA

### 3.11.1 Statistics (60)

*The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]*

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.11.1  | ●                            | ●                           |                              |                   |

The Statistics message provides statistics including volume-weighted average price and turnover. It is generated, excluding overseas trades, once after:

- all corresponding trades matched in Continuous Trading Session (CTS) or in an auction session
- manual trade
- odd lot trade
- trade cancel

Note that the 'VWAP' field is not populated for SS (OMD Securities Standard) clients.

The ShortSellSharesTraded and ShortSellTurnover fields (the shortsell fields) are only updated twice each day at most for securities with shortselling activities - at the end of the morning session if the shortsell fields are non-zero and at the end of the afternoon session if the value of any of the shortsell fields are different from that disseminated at the end of the morning session.

#### Message Fields

| Offset             | Field                 | Format | Length | Description   | Values  |
|--------------------|-----------------------|--------|--------|---|---|
| 0                  | MsgSize               | UInt16 | 2      | Size of the message                                     |   |
| 2                  | MsgType               | UInt16 | 2      | Type of message   | 60 Statistics   |
| 4                  | SecurityCode          | UInt32 | 4      | Uniquely identifies a security available for trading    | 5 digit security codes with possible values 1 – 99999 |
| 8                  | SharesTraded          | UInt64 | 8      | Number of shares traded for a security                  |   |
| 16                 | Turnover              | Int64  | 8      | Current turnover  | 3 implied decimal places                              |
| 24                 | HighPrice             | Int32  | 4      | Highest trade price currently performed for a security. | 3 implied decimal places                              |
| 28                 | LowPrice              | Int32  | 4      | Lowest trade price currently performed for a security   | 3 implied decimal places                              |
| 32                 | LastPrice             | Int32  | 4      | Last trade price for a security                         | 3 implied decimal places                              |
| 36                 | VWAP                  | Int32  | 4      | Volume-Weighted Average Price.                          | 3 implied decimal places                              |
| 40                 | ShortSellSharesTraded | UInt32 | 4      | Number of short-sell shares traded for a security       |   |
| 44                 | ShortSellTurnover     | Int64  | 8      | Current short-sell turnover for a security.             | 3 implied decimal places                              |
| Total Length ..... |                       |        | 52     |   |   |

### 3.11.2 Market Turnover (61)

*The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]*



| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.11.2  | ●                            | ●                           |                              |                   |

The Market Turnover message contains the total turnover (excluding the turnover of overseas trades) for all securities on a given market segment for a given trading currency. It also provides the total turnover (excluding the turnover of overseas trades) for all securities regardless of trading currency on a given market segment in HKD equivalent. Under normal circumstances, the updates are disseminated around every 2 seconds during the trading hours.

When the CurrencyCode is blank, the turnover represents the total turnover traded on the given market segment for all trading currencies, expressed in HKD.

### Message Fields

| Offset             | Field        | Format | Len | Description   | Values  |
|--------------------|--------------|--------|-----|---|---|
| 0                  | MsgSize      | UInt16 | 2   | Size of the message   |   |
| 2                  | MsgType      | UInt16 | 2   | Type of message   | 61 Market Turnover  |
| 4                  | MarketCode   | String | 4   | Market segment identifier   | MAIN<br>GEM<br>NASDAQ<br>ETS  |
| 8                  | CurrencyCode | String | 3   | Currency code of all securities of which the market turnover is derived.                    | See <a href="#">Currency Values</a> in section 3.1.2 for full details. Blank for total turnover for the Market Segment (i.e. MarketCode) in HKD equivalent. |
| 11                 | Filler       | String | 1   |   |   |
| 12                 | Turnover     | Int64  | 8   | Total Traded Turnover of the stocks traded on the market segment in the respective currency | 3 implied decimal places  |
| Total Length ..... |              |        | 20  |   |   |

### 3.11.3 Yield (44)

*The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]*

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.11.3  | ●                            | ●                           |                              |                   |

The Yield message is generated for bond securities when their yield percentage changes.

### Message Fields

| Offset | Field        | Format | Len | Description  | Values  |
|--------|--------------|--------|-----|--|---|
| 0      | MsgSize      | UInt16 | 2   | Size of the message                                    |   |
| 2      | MsgType      | UInt16 | 2   | Type of message.                                       | 44 Yield  |
| 4      | SecurityCode | UInt32 | 4   | Uniquely identifies a security available for trading   | 5 digit security codes with possible values 1 – 99999 |
| 8      | Yield        | Int32  | 4   | Current yield of the bond security based on its coupon | 3 implied decimal places<br>0 means Not available     |

| Offset            | Field | Format | Len | Description            | Values |
|-------------------|-------|--------|-----|------------------------|--------|
|                   |       |        |     | rate and nominal price |        |
| Total Length..... |       |        | 12  |                        |        |

## 3.12 NEWS

### 3.12.1 News (22)

*The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]*

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.12    | ●                            | ●                           |                              |                   |

The News message is generated whenever a news update occurs. The message indicates which markets and/or securities the news is applied to. If NoMarketCode and NoSecurityCodes are both set to zero, the news applies to all markets.

The news may be fragmented across multiple consecutive messages. The LastFragment field will be set to 'Y' in the message that contains the last fragment. The "Headline" will only be carried in the first message and blanked from the second message onwards.

#### Message Fields

| Offset | Field         | Format          | Len | Description   | Values  |
|--------|---------------|-----------------|-----|---|---|
| 0      | MsgSize       | UInt16          | 2   | Size of the message   |   |
| 2      | MsgType       | UInt16          | 2   | Type of message   | 22 News   |
| 4      | NewsType      | String          | 3   | Type of Exchange news   | EXN Exchange news<br>EXC Chinese Exchange news  |
| 7      | NewsID        | String          | 3   | Unique number for the news page within each NewsType  |   |
| 10     | Headline      | String / Binary | 320 | News headline   | If NewsType is EXN the Headline is ASCII encoded<br>If NewsType is EXC the Headline is Unicode UTF-16LE encoded   |
| 330    | CancelFlag    | String          | 1   | Indicator of whether previously released exchange news (identified by NewsType and NewsID) has been cancelled | Y Cancelled<br>N Not cancelled  |
| 331    | LastFragment  | String          | 1   | Indicates whether this message is the last in a sequence of messages  | Y Complete<br>N Not complete  |
| 332    | Filler        | String          | 4   |   |   |
| 336    | ReleaseTime   | UInt64          | 8   | Release time of the news.   | The number of nanoseconds elapsed since midnight Coordinated Universal Time (UTC) of January 1, 1970<br><br>ReleaseTime precision is currently provided to the nearest second |
| 344    | Filler        | String          | 2   |   |   |
| 346    | NoMarketCodes | UInt16          | 2   | Number of Market segment  | 0 to 4  |

| Offset  | Field           | Format   | Len | Description  | Values  |
|---|-----------------|--|-----|--|---|
|   |                 |  |     | identifier within this message                       |   |
| 348   | MarketCode      | String   | 4   | Market segment identifier                            | <b>MAIN</b><br><b>GEM</b><br><b>NASD</b><br><b>ETS</b>  |
| 348 + 4 <sub>n<sub>M</sub></sub>                              | Filler          | String   | 2   |  |   |
| 350 + 4 <sub>n<sub>M</sub></sub>                              | NoSecurityCodes | Uint16   | 2   | Number of security codes within this message         | <b>0</b> to <b>200</b>  |
| 352 + 4 <sub>n<sub>M</sub></sub>                              | SecurityCode    | Uint32   | 4   | Uniquely identifies a security available for trading | 5 digit security codes with possible values <b>1 – 99999</b>  |
| 352 + 4 <sub>n<sub>M</sub></sub> + 4 <sub>n<sub>S</sub></sub> | Filler          | String   | 2   |  |   |
| 354 + 4 <sub>n<sub>M</sub></sub> + 4 <sub>n<sub>S</sub></sub> | NoNewsLines     | Uint16   | 2   | Number of news lines.                                | Maximum of 10 lines per “news page” is currently supported  |
| 356 + 4 <sub>n<sub>M</sub></sub> + 4 <sub>n<sub>S</sub></sub> | NewsLine        | String / Binary  | 160 | News line  | If NewsType is <b>EXN</b> the NewsLine is ASCII encoded<br>If NewsType is <b>EXC</b> the NewsLine is Unicode UTF-16LE encoded |
| Total Length.....   |                 | 356 + 4 <sub>n<sub>M</sub></sub> + 4 <sub>n<sub>S</sub></sub> + 160 <sub>n<sub>P</sub></sub> |     |  |   |

(n<sub>M</sub> = value of NoMarketCodes)(n<sub>S</sub> = value of NoSecurityCodes)(n<sub>P</sub> = value of NoNewsLines)

## 3.13 INDEX DATA

*The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]*

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.13    |                              |                             |                              | ●                 |

The indices supplied under the OMD Index are described in more detail in Appendix A, as it may be amended from time to time.

### 3.13.1 Index Definition (70)

The Index Definition message contains the static referential data for the given index and is generated at the start of the business day and may be re-disseminated during the trading hours.

#### Message Fields

| Offset | Field       | Format | Len | Description   | Values  |
|--------|-------------|--------|-----|---|---|
| 0      | MsgSize     | Uint16 | 2   | Size of the message   |   |
| 2      | MsgType     | Uint16 | 2   | Type of message   | <b>70</b> Index Definition                                    |
| 4      | IndexCode   | String | 11  | Upstream source's index code or market information identifier | See <a href="#">Index Code</a> in Appendix A for full details |
| 15     | IndexSource | String | 1   | Index or market information                                   | <b>C</b> CSI and CES  |

| Offset             | Field        | Format | Len | Description                      | Values  |
|--------------------|--------------|--------|-----|----------------------------------|---|
|                    |              |        |     | source.                          | <b>H</b> HSI<br><b>S</b> S&P<br><b>T</b> TR   |
| 16                 | CurrencyCode | String | 3   | Currency code of Index Turnover. | See <a href="#">Currency Values</a> in section 3.1.2 for full details.<br>CurrencyCode can be blank if not defined by third party index compilers |
| 19                 | Filler       | String | 1   |                                  |   |
| Total Length ..... |              |        | 20  |                                  |   |

### 3.13.2 Index Data (71)

The Index Data message contains all the real-time data for a given index. Fields within this message may be populated with null values to identify when an update is not provided. See section 3.1.1 (Null Values) for more information about null values.

#### Message Fields

| Offset | Field         | Format | Len | Description   | Values  |
|--------|---------------|--------|-----|---|---|
| 0      | MsgSize       | UInt16 | 2   | Size of the message   |   |
| 2      | MsgType       | UInt16 | 2   | Type of message   | <b>71</b> Index Data  |
| 4      | IndexCode     | String | 11  | Upstream source's index code or market information identifier.                | See <a href="#">Index Code</a> in Appendix A for full details   |
| 15     | IndexStatus   | String | 1   | Index status.   | <b>C</b> Closing value<br><b>I</b> Indicative<br><b>O</b> Opening index<br><b>P</b> Last close value (prev. ses.)<br><b>R</b> Preliminary close<br><b>S</b> Stop loss index<br><b>T</b> Real-time index value<br><br>IndexStatus can be blank if not defined by third party index compilers |
| 16     | IndexTime     | Int64  | 8   | Publisher timestamp.  | The number of nanoseconds elapsed since midnight Coordinated Universal Time (UTC) of January 1, 1970<br><br>IndexTime precision is currently provided to the nearest second.  |
| 24     | IndexValue    | Int64  | 8   | Current value of the index.   | 4 implied decimal places  |
| 32     | NetChgPrevDay | Int64  | 8   | Net change of IndexValue from the previous close, as provided in index source | 4 implied decimal places  |
| 40     | HighValue     | Int64  | 8   | Highest value for an index.   | 4 implied decimal places  |
| 48     | LowValue      | Int64  | 8   | Lowest value for an index   | 4 implied decimal places  |

| Offset             | Field            | Format | Len | Description   | Values  |
|--------------------|------------------|--------|-----|---|---|
| 56                 | EASValue         | Int64  | 8   | Estimated Average Settlement Value  | 2 implied decimal places  |
| 64                 | IndexTurnover    | Int64  | 8   | Current turnover of underlying constituents   | 4 implied decimal places  |
| 72                 | OpeningValue     | Int64  | 8   | First value for an index.   | 4 implied decimal places  |
| 80                 | ClosingValue     | Int64  | 8   | Last value for an index   | 4 implied decimal places  |
| 88                 | PreviousSesClose | Int64  | 8   | Previous session closing value (previous day's closing value for CSI, CES and S&P, previous session's closing value for HSI and TR) | 4 implied decimal places  |
| 96                 | IndexVolume      | Int64  | 8   | Index volume of underlying constituents. Only applicable for CSI and CES.   |   |
| 104                | NetChgPrevDayPct | Int32  | 4   | Percentage change of IndexValue from the previous close, as provided in index source  | 4 implied decimal places  |
| 108                | Exception        | String | 1   | Exception indicator   | # Index with HSIL defined exceptional rule applied<br>' ' Normal index (empty string) |
| 109                | Filler           | String | 3   |   |   |
| Total Length ..... |                  |        | 112 |   |   |

## 3.14 STOCK CONNECT DATA

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

| Section | OMD Securities Standard (SS) | OMD Securities Premium (SP) | OMD Securities FullTick (SF) | OMD Index (Index) |
|---------|------------------------------|-----------------------------|------------------------------|-------------------|
| 3.14    | ▲                            | ▲                           | ▲                            |                   |

▲ Complimentary service to the Datafeed(s)

### 3.14.1 Stock Connect Daily Quota Balance (80)

The Stock Connect Daily Quota Balance message provides updates on the Northbound Daily Quota Balance (DQB) for Shanghai-Hong Kong Stock Connect and Shenzhen-Hong Kong Stock Connect separately. Under normal circumstances, the updates are disseminated around every 5 seconds during the trading hours.

#### Message Fields

| Offset | Field              | Format | Len | Description                                   | Values   |
|--------|--------------------|--------|-----|---|--|
| 0      | MsgSize            | UInt16 | 2   | Size of the message                           |  |
| 2      | MsgType            | UInt16 | 2   | Type of message                               | 80 Stock Connect Daily Quota Balance (DQB)               |
| 4      | StockConnectMarket | String | 2   | Markets connected under Stock Connect Program | SH Shanghai Stock Exchange<br>SZ ShenZhen Stock Exchange |
| 6      | TradingDirection   | String | 2   | Trading Direction                             | NB Northbound trading                                    |

| Offset       | Field                 | Format | Len | Description  | Values   |
|--------------|-----------------------|--------|-----|--|--|
| 8            | DailyQuotaBalance     | Int64  | 8   | Northbound Daily Quota Balance (DQB) value for specified Stock Connect Program | DQB in Renminbi (RMB)<br>0 when the respective DQB is used up  |
| 16           | DailyQuotaBalanceTime | UInt64 | 8   | Time of DailyQuotaBalance  | The number of nanoseconds elapsed since midnight Coordinated Universal Time (UTC) of January 1, 1970<br><br>DailyQuotaBalanceTime precision is currently provided to the nearest second. |
| Total Length |                       |        | 24  |  |  |

### 3.14.2 Stock Connect Market Turnover (81)

The Stock Connect Market Turnover message provides aggregate turnover under Shanghai-Hong Kong Stock Connect and Shenzhen-Hong Kong Stock Connect ("the Stock Connect programs"). The aggregate turnover is provided for the Northbound trading and the Southbound trading separately under each of the Stock Connect programs. Under normal circumstances, the updates are disseminated around every one minute during the trading hours.

#### Message Fields

| Offset             | Field              | Format | Len | Description  | Values  |
|--------------------|--------------------|--------|-----|--|---|
| 0                  | MsgSize            | UInt16 | 2   | Size of the message  |   |
| 2                  | MsgType            | UInt16 | 2   | Type of message.   | 81 Stock Connect Market Turnover                                      |
| 4                  | StockConnectMarket | String | 2   | Markets connected under Stock Connect Program  | SH Shanghai Stock Exchange<br>SZ ShenZhen Stock Exchange              |
| 6                  | TradingDirection   | String | 2   | Trading Direction  | NB Northbound trading<br>SB Southbound trading                        |
| 8                  | BuyTurnover        | Int64  | 8   | Total turnover of Buy trades from the Northbound or Southbound trading (as specified in TradingDirection) under the Stock Connect Program rounded down to integer  | Turnover in RMB for Northbound trading and HKD for Southbound trading |
| 16                 | SellTurnover       | Int64  | 8   | Total turnover of Sell trades from the Northbound or Southbound trading (as specified in TradingDirection) under the Stock Connect Program rounded down to integer | Turnover in RMB for Northbound trading and HKD for Southbound trading |
| 24                 | Buy+SellTurnover   | Int64  | 8   | Sum of the values of BuyTurnover and SellTurnover rounded down to integer  | Turnover in RMB for Northbound trading and HKD for Southbound trading |
| Total Length ..... |                    |        | 32  |  |   |

## 4. RECOVERY

OMD provides three different mechanisms for recovering missed data:

- Line arbitration – using dual multicast channels (Line A and Line B)
- Retransmission Server – recovery of a limited number of messages
- Refresh Server – snapshot of current market state

These mechanisms should be used as described in the following table.

**Table 2: Recovery Mechanisms**

| Event                                       | Action   |
|---|--|
| Packet lost on one either Line A or Line B  | Try to recover data from the other line with a configurable timeout ("arbitration mechanism"). |
| Dropped packet(s) on both Line A and Line B | Recover dropped message(s) from the Retransmission Server.                                     |
| Late start up or extended intraday outage   | Wait for a refresh of the current market state and then continue with real time messages.      |

### 4.1 GAP DETECTION

Each packet provides the sequence number (SN) of the first message it contains. This sequence number starts at 1 and increases with each subsequent message.

The sequence numbers provided in every packet header is calculated by adding the previous sequence number and the message count, as shown in table below:

**Table 3: Sequence Number Calculation**

| Packet   | Sequence Number | Message Count |
|----------|-----------------|---------------|
| Packet 1 | 1               | 4             |
| Packet 2 | 5               | 2             |
| Packet 3 | 7               | 1             |
| Packet 4 | 8               | 3             |
| Packet 5 | 11              | 1             |

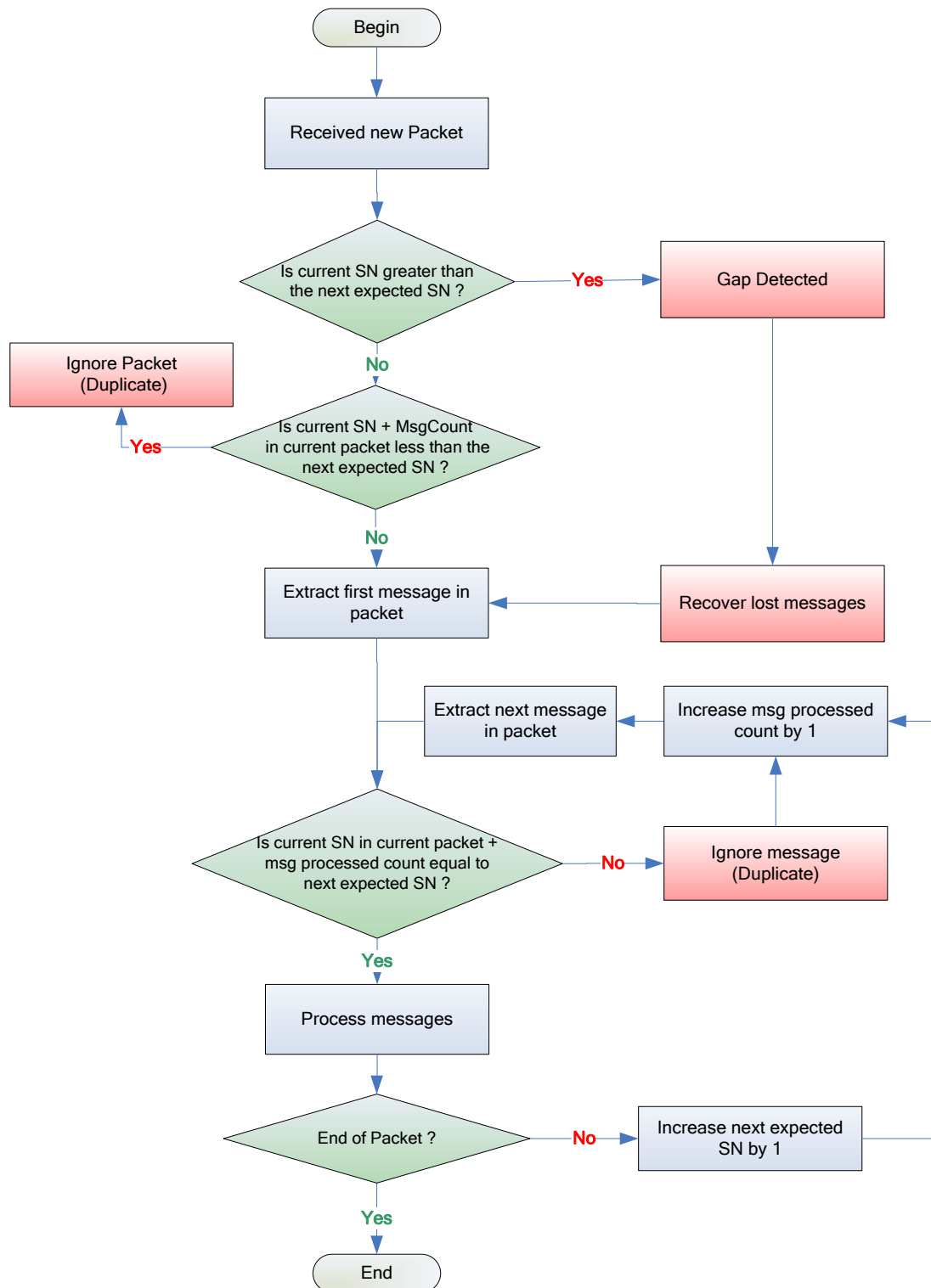
If the client drops the first five packets they would request a gap fill for messages 1-11.

All messages conform to the message level sequencing. Each channel has its own sequence number. This allows recipients to detect gaps or duplicates in each message sequence number and, if appropriate, reconcile them (line arbitration) with the primary or secondary multicast groups or request retransmission of the missing / corrupted messages.

Users should use this sequence number to detect gaps in the transmission of messages.

The following diagram illustrates how the message sequence number should be used to detect gaps in the feed.

Figure 2: Gap Detection using the Sequence Number (SN)



## 4.2 LINE ARBITRATION

Client applications should check the sequence number (SN) and message count (MC) for every packet received. SNs are unique and increase monotonically for each service, the MC indicates the number of messages within each packet.

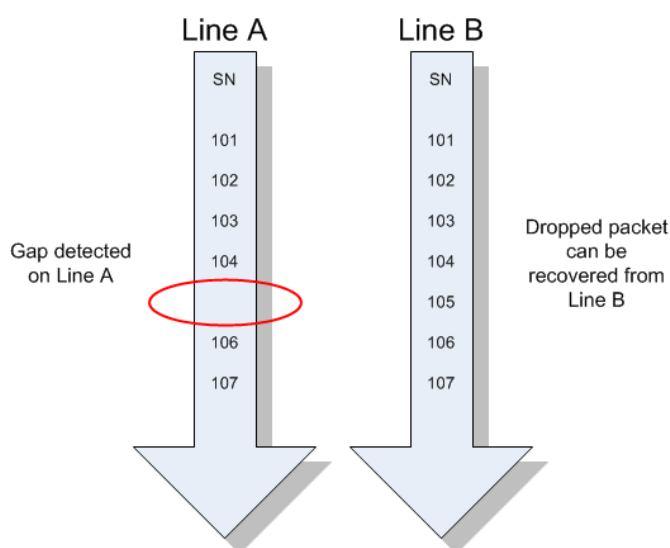
Line A and Line B are identical in terms of:



- SNs
- Messages that are sent
- Sequence in which messages are sent

However it is not guaranteed that a packet content between Line A and Line B will be the same. For example the third packet of the day from the Line A could contain SN 10 with MC 3, whereas the third packet of the day from Line B could contain SN 9 with MC 4. For this reason clients must arbitrate on SN (at the message level) rather than packet content. Client applications should listen to both Line A and Line B in real-time. Clients should look at packets coming from both lines and process the ones that arrive first, regardless of whether they came from Line A or Line B. It is advisable to apply the “first come – first served” rule.

Figure 3 – Detecting Missing Packets



Additional Notes;

- The above example of a dropped packet is a simplified example assuming 1 message per packet, in reality each packet is likely to contain multiple messages
- Whilst the order of individual messages between Line A and Line B will be identical, there is no guarantee that the packets will contain exactly the same messages.
- In the example below, three packets are sent on each line, but message ‘OrderUpdate3’ appears in one packet from Line A but in the subsequent packet on Line B.

Figure 4 – Normal Message Delivery

| Primary                                      |    |     | Secondary |    |  |
|--|----|-----|-----------|----|--|
| Messages                                     | MC | SN  | SN        | MC | Messages                               |
| OrderUpdate1<br>OrderUpdate2<br>OrderUpdate3 | 3  | 101 | 101       | 2  | OrderUpdate1<br>OrderUpdate2           |
| Trade1<br>OrderUpdate4                       | 2  | 104 | 103       | 3  | OrderUpdate3<br>Trade1<br>OrderUpdate4 |
| Trade2<br>Statistics1                        | 2  | 106 | 106       | 2  | Trade2<br>Statistics1                  |

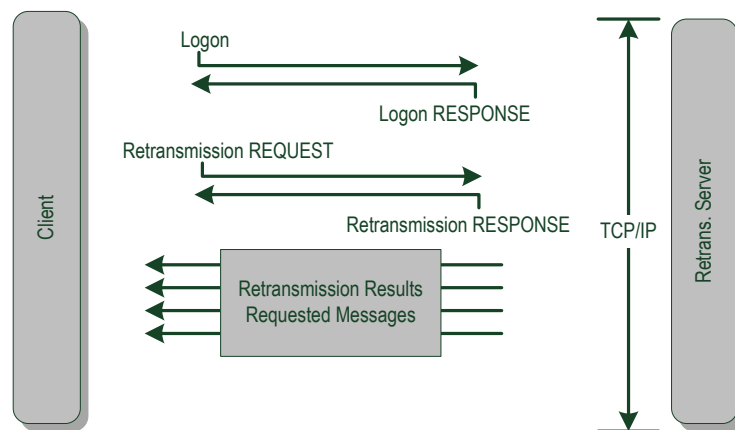
## 4.3 RETRANSMISSION SERVICE

The retransmission service is provided via the TCP/IP protocol and is designed to allow clients to recapture a small number of missed messages already published on the real time channels.

It is not intended that clients use the retransmission server to recover data after long outages or on late start up (in these situations, clients should use the Refresh service). To that end, it supports the retransmission of the last 50,000 messages per multicast channel only. The sequence range of messages that a client can request and the number of retransmission requests permitted per day is also limited.

The following diagram illustrates the message flow during a retransmission session:

**Figure 5: Retransmission Request**



### Logon

The client establishes a TCP/IP connection and initiates a session by sending the Logon message. Once the client is authenticated the server will respond immediately with the Logon Response message. If the client does not send a Logon message within the logon timeout interval, the server will close the connection.

Logons may be rejected for the following reasons:

- Invalid username
- User already connected

In all cases the server will close the connection after sending the Logon Response message.

### Making a request

The client can make a retransmission request by sending the Retrans Request message. The server will respond with a Retrans Response message to indicate whether the request has been accepted or not.

In the case of a successful request the server will send the requested messages immediately after the Retrans Response message.

The sequence numbers will be the same as when they were first sent on the real time multicast channel. The framing of the retransmitted messages into a packet may differ from the original transmission.

Retransmission requests may be rejected for the following reasons:

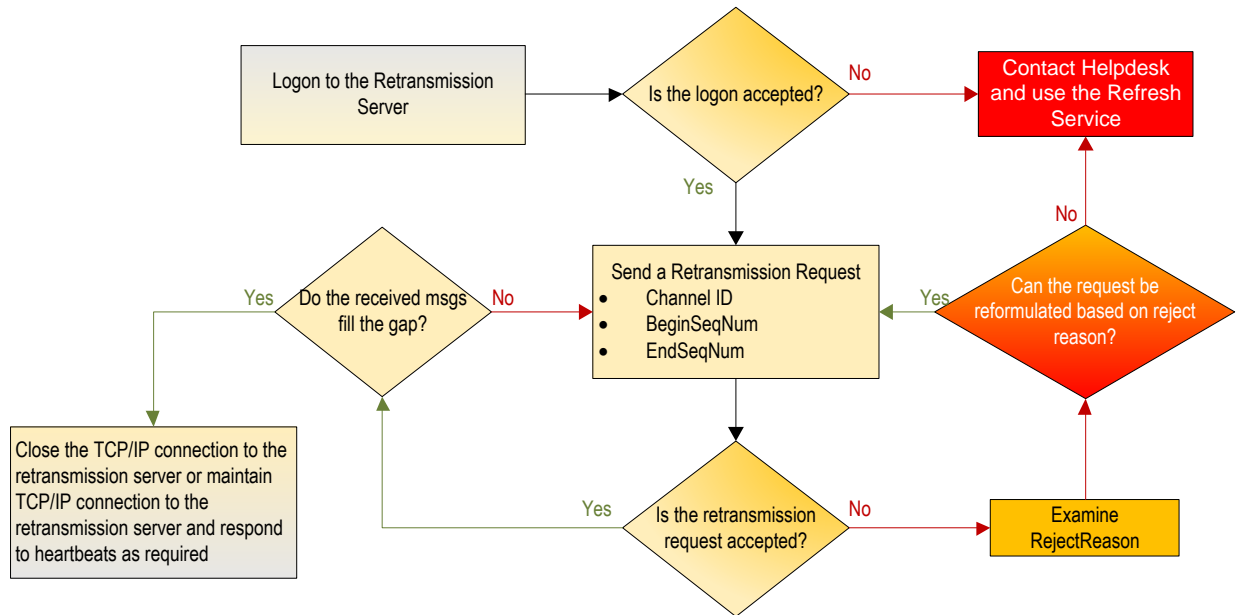
- Unknown channel ID or illegal (not authorized)
- Messages not available
- Exceeds maximum sequence range

- Exceeds maximum requests in a day

In the case where the client has exceeded the maximum number of requests allowed in a day, the server will close the connection after sending the Retrans Response message.

The following diagram is a guideline of the flow of logic when making a request:

Figure 6: Requesting Dropped Packets



### Multiple requests and concurrent sessions

Clients can send multiple requests during a session and can keep the session open during idle periods by responding to heartbeats sent by the server. Concurrent sessions however will not be supported. Each user can only have one session open at a time.

If a client makes multiple requests, the server will process them serially. Clients are unable to cancel outstanding requests.

### Heartbeats

To determine the health of the user connection on the TCP/IP channel, the Retransmission Server will send regular heartbeat packets to the user. The heartbeat frequency is 30 seconds. The client application must respond with a “Heartbeat Response” packet. The time out for this heartbeat response packet is set at 5 seconds. If no response is received by the server within this timeframe, the TCP/IP session will be disconnected.

Figure 7: Retransmission Server Heartbeat Message



A “heartbeat response” packet consists in an exact copy of the incoming heartbeat packet.

### Closing the session

Sessions should be terminated by gracefully closing the TCP/IP connection.

### System limits

The system limits mentioned above are set as follows:

| System Limit                                     | Value  |
|--|--------|
| Last number of messages available per channel ID | 50,000 |
| Maximum sequence range that can be requested     | 10,000 |
| Maximum number of requests per day               | 1,000  |
| Logon timeout (seconds)                          | 5      |
| Heartbeat interval (seconds)                     | 30     |
| Heartbeat response timeout (seconds)             | 5      |

Please note that the maximum number of requests per day limit is across all channels.

### High availability

For each site, two sets of IP address and port are provided for the retransmission service in order to facilitate high availability. Clients may connect to both retransmission servers at the start of the day and maintain the connection during the day by responding to heartbeats.

In the event that Retransmission Server A (RTS A) does not respond to a logon or retransmission request, Retransmission Server B (RTS B) should be used.

In the event of a failure of either RTS A or RTS B, there may be a short period of unavailability. This failure should be detected by clients through the loss of connection. In this case the other RTS should be used.

RTS B should not be used as a means of requesting from two sources at the same time.

### Disaster recovery

Two sets of backup IP address and port are also provided for the disaster site's retransmission service.

During normal conditions the retransmission service at the disaster site is not available. If clients attempt to connect, this will fail.

In the unlikely event of a disaster recovery situation, the retransmission service at the disaster site will be brought up and clients may connect via the backup IP addresses and ports.

## 4.4 REFRESH SERVICE

The refresh service is designed to allow clients to recover from a large scale data loss. This can happen after a late start or during a major outage.

Synchronization is on a per channel basis. For each real time multicast channel, there exists a corresponding refresh multicast channel on which snapshots of the market state are sent at regular intervals throughout the business day until the time as stated in [Section 2.2.2](#) for various channels.

### Market state

A snapshot of the market state is described in the table below.

| Message                | Snapshot description                                   |
|------------------------|--|
| Market Definition      | Latest market static message for each market.          |
| Security Definition    | Latest security static message for each security.      |
| Liquidity Provider     | Latest liquidity provider message for each security.   |
| Trading Session Status | Latest trading session status message for each market. |

| Message                           | Snapshot description  |
|-----------------------------------|---|
| Security Status                   | Security Status message for halted securities and securities resumed trading with status changed to 'resumed' on the current trading day.   |
| VCM Trigger                       | Latest VCM Trigger message for each VCM applicable security with cooling off period triggered by VCM.   |
| Add Order                         | Snapshot for all non-empty books.   |
| Add Odd Lot Order                 | Snapshot for all non-empty books.   |
| Aggregate Order Book Update       | Snapshot for all non-empty books. Occasionally Aggregated Order Book Update messages will be sent for emptied order books after cancellation or matching of all outstanding orders. In such cases the value of the NoEntries will be "0". |
| Broker Queue                      | Snapshot for all non-empty books. Occasionally Broker Queue messages will be sent for emptied broker queues after cancellation or matching of all outstanding orders. In such cases the value of the ItemCount will be "0".               |
| Order Imbalance                   | Latest Order Imbalance for each CAS applicable security.  |
| Closing Price                     | Closing Price message if available for each security.   |
| Indicative Equilibrium Price      | Latest Indicative Equilibrium Price message for each security.  |
| Nominal Price                     | Latest Nominal Price message for each security.   |
| Reference Price                   | Latest Reference Price for each security.   |
| Statistics                        | Latest Statistics message for each security.  |
| Market Turnover                   | Latest Market Turnover message per market / currency pair.  |
| Currency Rate                     | Latest Currency Rate message for each currency.   |
| News                              | All News messages.  |
| Index Definition                  | Latest Index Definition message for each index.   |
| Index Data                        | Latest Index Data message for each index.   |
| Yield                             | Latest Yield message generated for bond securities when their yield percentage last changed   |
| Stock Connect Daily Quota Balance | Latest Stock Connect Daily Quota Balance for each Stock Connect Program   |
| Stock Connect Market Turnover     | Latest Stock Connect Market Turnover for each Stock Connect Program and trading direction.  |

### Refresh complete

A Refresh Complete message is sent at the end of a snapshot indicating the sequence number with which the snapshot is synchronized.

### Snapshot processing

Below is an overview of the steps to carry out in order to process a channel snapshot.

- Subscribe to the real time multicast channel and cache received messages.
- Subscribe to the corresponding refresh multicast channel and discard messages until the Refresh Complete message is received.
- Process received messages until the next Refresh Complete message is received.
- Store the LastSeqNum sequence number provided in the Refresh Complete.
- Unsubscribe to the refresh multicast channel.
- Discard the cached real time messages with sequence number less than or equal to LastSeqNum.
- Process the remaining cached real-time messages and resume normal processing.

### Missed messages

The retransmission server does not support refresh channels. If a client misses messages, it must wait for the next snapshot. Similarly if a client starts listening during the middle of a snapshot, it must wait for the next snapshot.

## 5. AGGREGATE ORDER BOOK MANAGEMENT

### Book Identification

For each security there exists an odd lot book and a board lot book in the trading system. A book is therefore uniquely identified by SecurityCode.

### Partial Price Depth

Securities shall be traded in accordance with the scale of spreads set out in the Second Schedule of the Rules of the Exchange respective to the Spread Table Code specified in their Securities Definition message. The tick level provides information on how many spreads from the best price for an order price whereas a price level is assigned to each price existing in the OMD order book. An order price with tick level 1 means the order price is the best price, a tick level of 2 means the order price is one spread from the best price, etc. The Aggregate Order Book Update message sends out the price level but not the tick level.

The concept of tick and price levels is illustrated in the table below, assuming that the best bid price of a security is 9800 and the spread is 10 for this price range. In the table there are orders in 5 bid prices so the number of price levels is 5 (contiguous price levels from 1 to 5); these orders are distributed over 10 spreads (tick levels) so the tick levels are from 1 to 10. Taking orders with bid price 9710 as example, it is the 5<sup>th</sup> price in the book so the price level will be 5 and it is 9 spreads from the best bid price so the tick level will be 10.

| Bid Side |            |                   |       |
|----------|------------|-------------------|-------|
| Tick     | PriceLevel | AggregateQuantity | Price |
| 1        | 1          | 700               | 9800  |
| 2        | 2          | 350               | 9790  |
| 3        |            |                   |       |
| 4        |            |                   |       |
| 5        | 3          | 150               | 9760  |
| 6        |            |                   |       |
| 7        |            |                   |       |
| 8        |            |                   |       |
| 9        | 4          | 250               | 9720  |
| 10       | 5          | 100               | 9710  |

OMD provides a view of 10 tick depths of the aggregate order book for securities market and does not provide updates on price levels which are more than 9 spreads away from the best price. This view can be visualized as a number of rows in a table for each of the bid and ask sides. On each side there are a number of rows showing the aggregate quantity available at a number of price levels and tick levels.

| Bid Side |            |                   |       | Ask Side |                   |            |      |
|----------|------------|-------------------|-------|----------|-------------------|------------|------|
| Tick     | PriceLevel | AggregateQuantity | Price | Price    | AggregateQuantity | PriceLevel | Tick |
| 1        | 1          | 700               | 9730  | 9760     | 500               | 1          | 1    |
| 2        | 2          | 350               | 9720  | 9770     | 300               | 2          | 2    |
| 3        | 3          | 150               | 9710  | 9780     | 100               | 3          | 3    |
| 4        | 4          | 250               | 9700  | 9790     | 150               | 4          | 4    |
| 5        | 5          | 100               | 9690  |          |                   |            | 5    |
| 6        | 6          | 150               | 9680  |          |                   |            | 6    |
| 7        | 7          | 50                | 9670  |          |                   |            | 7    |
| 8        | 8          | 200               | 9660  |          |                   |            | 8    |
| 9        | 9          | 100               | 9650  |          |                   |            | 9    |
| 10       |            |                   |       |          |                   |            | 10   |

OMD only sends updates within the 10 tick levels in the aggregate order book except for Explicit Deletion (please refer Example 5 illustrated below for details)

### Book Updates

Book update messages are generated by OMD as delta messages defined in section 3.9.6 (Aggregate Order Book Update (53)). Each message may contain any combination of new, changed or deleted entries for a book. The nature of an entry is defined by its UpdateAction.

**New**, to create/insert a new price level

**Delete**, to remove a price level

**Change**, to update aggregate quantity at a price level

**Orderbook Clear**, to inform users that all price levels should be cleared

### Example 1 – Quantity Reduction and Explicit Addition

For example suppose the Ask order at price level 9770 is reduced in quantity and at the same time a new order is added at price level 9850, then the following message is sent;

| Offset | Field Name        | Value     |
|--------|-------------------|-----------|
| 0      | MsgSize           | 60        |
| 2      | MsgType           | 53        |
| 4      | SecurityCode      | 1234      |
| 8      | Filler            | NULL      |
| 11     | NoEntries         | 2         |
| 12     | AggregateQuantity | 200       |
| 20     | Price             | 9770      |
| 24     | NumberOfOrders    | 1         |
| 28     | Side              | 1 (Offer) |
| 30     | PriceLevel        | 2         |
| 31     | UpdateAction      | 1         |
| 32     | Filler            | NULL      |
| 36     | AggregateQuantity | 300       |
| 44     | Price             | 9850      |
| 48     | NumberOfOrders    | 1         |
| 52     | Side              | 1 (Offer) |
| 54     | PriceLevel        | 5         |
| 55     | UpdateAction      | 0         |
| 56     | Filler            | NULL      |

The resulting book should now be as follows:

| Bid Side |            |                   |       | Ask Side |                   |            |      |
|----------|------------|-------------------|-------|----------|-------------------|------------|------|
| Tick     | PriceLevel | AggregateQuantity | Price | Price    | AggregateQuantity | PriceLevel | Tick |
| 1        | 1          | 700               | 9730  | 9760     | 500               | 1          | 1    |
| 2        | 2          | 350               | 9720  | 9770     | 200               | 2          | 2    |
| 3        | 3          | 150               | 9710  | 9780     | 100               | 3          | 3    |
| 4        | 4          | 250               | 9700  | 9790     | 150               | 4          | 4    |
| 5        | 5          | 100               | 9690  |          |                   |            | 5    |
| 6        | 6          | 150               | 9680  |          |                   |            | 6    |
| 7        | 7          | 50                | 9670  |          |                   |            | 7    |
| 8        | 8          | 200               | 9660  |          |                   |            | 8    |
| 9        | 9          | 100               | 9650  |          |                   |            | 9    |
| 10       |            |                   |       | 9850     | 300               | 5          | 10   |

### Example 2 – Implicit Level Adjustments

The client must adjust the price level of entries below deleted or inserted entries. Potential level adjustments must be carried out after each single entry in Aggregate Order Book message.

For example, if a bid order with price 9740 and quantity 50 is added to the order book above, it will cause the following message to be sent:

| Offset | Field Name        | Value   |
|--------|-------------------|---------|
| 0      | MsgSize           | 36      |
| 2      | MsgType           | 53      |
| 4      | SecurityCode      | 1234    |
| 8      | Filler            | NULL    |
| 11     | NoEntries         | 1       |
| 12     | AggregateQuantity | 50      |
| 20     | Price             | 9740    |
| 24     | NumberOfOrders    | 1       |
| 28     | Side              | 0 (Bid) |
| 30     | PriceLevel        | 1       |
| 31     | UpdateAction      | 0       |
| 32     | Filler            | NULL    |

After processing this message, the client's book should look as follows:

| Bid Side |            |                   |       | Ask Side |                   |            |      |
|----------|------------|-------------------|-------|----------|-------------------|------------|------|
| Tick     | PriceLevel | AggregateQuantity | Price | Price    | AggregateQuantity | PriceLevel | Tick |
| 1        | 1          | 50                | 9740  | 9760     | 500               | 1          | 1    |
| 2        | 2          | 700               | 9730  | 9770     | 200               | 2          | 2    |
| 3        | 3          | 350               | 9720  | 9780     | 100               | 3          | 3    |
| 4        | 4          | 150               | 9710  | 9790     | 150               | 4          | 4    |
| 5        | 5          | 250               | 9700  |          |                   |            | 5    |
| 6        | 6          | 100               | 9690  |          |                   |            | 6    |
| 7        | 7          | 150               | 9680  |          |                   |            | 7    |
| 8        | 8          | 50                | 9670  |          |                   |            | 8    |
| 9        | 9          | 200               | 9660  |          |                   |            | 9    |
| 10       | 10         | 100               | 9650  | 9850     | 300               | 5          | 10   |

**Price levels of the other 9 Bid orders must all be incremented although there will not be Aggregate Order Book Update messages sent for the increment.**

### Example 3 – Implicit Deletions

If a new book entry causes the bottom entry of a book to be shifted out of the book (i.e. more than 9 spreads away from the best price), the client must delete the excess entry. If the book shrinks again, the server resends the entries that have temporarily fallen out.

For example, if a bid order with price 9750 and quantity 250 is added to the book above, and the bid quantity at price 9660 is reduced from 200 to 150, it will cause the following message to be sent:

| Offset | Field Name | Value |
|--------|------------|-------|
| 0      | MsgSize    | 60    |
| 2      | MsgType    | 53    |



|    |                   |         |
|----|-------------------|---------|
| 4  | SecurityCode      | 1234    |
| 8  | Filler            | NULL    |
| 11 | NoEntries         | 2       |
| 12 | AggregateQuantity | 250     |
| 20 | Price             | 9750    |
| 24 | NumberOfOrders    | 1       |
| 28 | Side              | 0 (Bid) |
| 30 | PriceLevel        | 1       |
| 31 | UpdateAction      | 0       |
| 32 | Filler            | NULL    |
| 36 | AggregateQuantity | 150     |
| 44 | Price             | 9660    |
| 48 | NumberOfOrders    | 1       |
| 52 | Side              | 0 (Bid) |
| 54 | PriceLevel        | 10      |
| 55 | UpdateAction      | 1       |
| 56 | Filler            | NULL    |

After processing this message, the client's book should look as follows:

| Bid Side |            |                   |       | Ask Side |                   |            |      |
|----------|------------|-------------------|-------|----------|-------------------|------------|------|
| Tick     | PriceLevel | AggregateQuantity | Price | Price    | AggregateQuantity | PriceLevel | Tick |
| 1        | 1          | 250               | 9750  | 9760     | 500               | 1          | 1    |
| 2        | 2          | 50                | 9740  | 9770     | 200               | 2          | 2    |
| 3        | 3          | 700               | 9730  | 9780     | 100               | 3          | 3    |
| 4        | 4          | 350               | 9720  | 9790     | 150               | 4          | 4    |
| 5        | 5          | 150               | 9710  |          |                   |            | 5    |
| 6        | 6          | 250               | 9700  |          |                   |            | 6    |
| 7        | 7          | 100               | 9690  |          |                   |            | 7    |
| 8        | 8          | 150               | 9680  |          |                   |            | 8    |
| 9        | 9          | 50                | 9670  |          |                   |            | 9    |
| 10       | 10         | 150               | 9660  | 9850     | 300               | 5          | 10   |

Price 9750 and quantity 250 is added according to the message.

Price 9650 and quantity 100 must be deleted by the client.

Price 9660 quantity must be reduced to 150 – PriceLevel 10 is used in the incoming message to reflect the new price level of the price 9660 after the addition of the price 9750.

#### Example 4 – Explicit Additions

If a match causes an order to be removed so that there are now less than 10 levels visible then the server will also automatically send the additional level(s) that are now revealed.

For example, if the bid order with price 9750 and quantity 250 is now removed from the book above and this reveals an 11<sup>th</sup> level which needs to be disseminated then it will cause the following message to be sent:

| Offset | Field Name   | Value |
|--------|--------------|-------|
| 0      | MsgSize      | 60    |
| 2      | MsgType      | 53    |
| 4      | SecurityCode | 1234  |
| 8      | Filler       | NULL  |

|    |                   |         |
|----|-------------------|---------|
| 11 | NoEntries         | 2       |
| 12 | AggregateQuantity | 250     |
| 20 | Price             | 9750    |
| 24 | NumberOfOrders    | 1       |
| 28 | Side              | 0 (Bid) |
| 30 | PriceLevel        | 1       |
| 31 | UpdateAction      | 2       |
| 32 | Filler            | NULL    |
| 36 | AggregateQuantity | 100     |
| 44 | Price             | 9650    |
| 48 | NumberOfOrders    | 1       |
| 52 | Side              | 0 (Bid) |
| 54 | PriceLevel        | 10      |
| 55 | UpdateAction      | 0       |
| 56 | Filler            | NULL    |

The resulting order book should now be;

| Bid Side |            |                   |       | Ask Side |                   |            |      |
|----------|------------|-------------------|-------|----------|-------------------|------------|------|
| Tick     | PriceLevel | AggregateQuantity | Price | Price    | AggregateQuantity | PriceLevel | Tick |
| 1        | 1          | 50                | 9740  | 9760     | 500               | 1          | 1    |
| 2        | 2          | 700               | 9730  | 9770     | 200               | 2          | 2    |
| 3        | 3          | 350               | 9720  | 9780     | 100               | 3          | 3    |
| 4        | 4          | 150               | 9710  | 9790     | 150               | 4          | 4    |
| 5        | 5          | 250               | 9700  |          |                   |            | 5    |
| 6        | 6          | 100               | 9690  |          |                   |            | 6    |
| 7        | 7          | 150               | 9680  |          |                   |            | 7    |
| 8        | 8          | 50                | 9670  |          |                   |            | 8    |
| 9        | 9          | 200               | 9660  |          |                   |            | 9    |
| 10       | 10         | 100               | 9650  | 9850     | 300               | 5          | 10   |

### Example 5 – Explicit Deletions

Suppose a new book entry causes the last tick entry (Tick 10 in the previous order book in Example 4) to be shifted out of the book, if the shifted out entry is within 10 price level, OMD will send an explicit deletion for the entry. If the shifted out entry is outside the 10 price level, OMD will not send further updates on that price and the client must delete the excess entry (please refer to Example 3 above for details) to ensure their order book will not keep out-dated information.

For example, if an ask order with price 9750 and quantity 300 is added to the order book above, it will cause the following message to be sent:

| Offset | Field Name        | Value     |
|--------|-------------------|-----------|
| 0      | MsgSize           | 60        |
| 2      | MsgType           | 53        |
| 4      | SecurityCode      | 1234      |
| 8      | Filler            | NULL      |
| 11     | NoEntries         | 2         |
| 12     | AggregateQuantity | 300       |
| 20     | Price             | 9750      |
| 24     | NumberOfOrders    | 1         |
| 28     | Side              | 1 (Offer) |

|    |                   |           |
|----|-------------------|-----------|
| 30 | PriceLevel        | 1         |
| 31 | UpdateAction      | 0         |
| 32 | Filler            | NULL      |
| 36 | AggregateQuantity | 300       |
| 44 | Price             | 9850      |
| 48 | NumberOfOrders    | 1         |
| 52 | Side              | 1 (Offer) |
| 54 | PriceLevel        | 6         |
| 55 | UpdateAction      | 2         |
| 56 | Filler            | NULL      |

The resulting order book should now be;

| Bid Side |            |                   |       | Ask Side |                   |            |      |
|----------|------------|-------------------|-------|----------|-------------------|------------|------|
| Tick     | PriceLevel | AggregateQuantity | Price | Price    | AggregateQuantity | PriceLevel | Tick |
| 1        | 1          | 50                | 9740  | 9750     | 300               | 1          | 1    |
| 2        | 2          | 700               | 9730  | 9760     | 500               | 2          | 2    |
| 3        | 3          | 350               | 9720  | 9770     | 200               | 3          | 3    |
| 4        | 4          | 150               | 9710  | 9780     | 100               | 4          | 4    |
| 5        | 5          | 250               | 9700  | 9790     | 150               | 5          | 5    |
| 6        | 6          | 100               | 9690  |          |                   |            | 6    |
| 7        | 7          | 150               | 9680  |          |                   |            | 7    |
| 8        | 8          | 50                | 9670  |          |                   |            | 8    |
| 9        | 9          | 200               | 9660  |          |                   |            | 9    |
| 10       | 10         | 100               | 9650  |          |                   |            | 10   |

### Explicit Deletions versus Implicit Deletions

Suppose initially bid orders are queued in 8 price levels in the aggregate order book and assume there is no order inputted at price 9770 & 9740. The aggregate order book will be as follows.

| Bid Side |            |                   |       |
|----------|------------|-------------------|-------|
| Tick     | PriceLevel | AggregateQuantity | Price |
| 1        | 1          | 700               | 9800  |
| 2        | 2          | 350               | 9790  |
| 3        | 3          | 150               | 9780  |
| 4        |            |                   |       |
| 5        | 4          | 250               | 9760  |
| 6        | 5          | 100               | 9750  |
| 7        |            |                   |       |
| 8        | 6          | 400               | 9730  |
| 9        | 7          | 200               | 9720  |
| 10       | 8          | 300               | 9710  |

When new bid orders at 3 different prices (9860, 9850 & 9840) arrived, the resulting book will be changed as follows:

| Bid Side |            |                   |       |
|----------|------------|-------------------|-------|
| Tick     | PriceLevel | AggregateQuantity | Price |
| 1        | 1          | 450               | 9860  |
| 2        | 2          | 550               | 9850  |
| 3        | 3          | 650               | 9840  |

← new order, Explicit Addition  
 ← new order, Explicit Addition  
 ← new order, Explicit Addition

|    |    |     |      |  |
|----|----|-----|------|--|
| 4  |    |     |      |  |
| 5  |    |     |      |  |
| 6  |    |     |      |  |
| 7  | 4  | 700 | 9800 | ← previous best bid, now at PriceLevel 4 (Tick 7), Implicit Level Adjustment                 |
| 8  | 5  | 350 | 9790 | ← previous 2 <sup>nd</sup> best bid, now at PriceLevel 5 (Tick 8), Implicit Level Adjustment |
| 9  | 6  | 150 | 9780 | ← previous 3 <sup>rd</sup> best bid, now at PriceLevel 6 (Tick 9), Implicit Level Adjustment |
| 10 |    |     |      |  |
| 11 | 7  | 250 | 9760 | ← orders exceed 10 Tick but within 10 PriceLevel, Explicit Deletion                          |
| 12 | 8  | 100 | 9750 | ← orders exceed 10 Tick but within 10 PriceLevel, Explicit Deletion                          |
| 13 |    |     |      |  |
| 14 | 9  | 400 | 9730 | ← orders exceed 10 Tick but within 10 PriceLevel, Explicit Deletion                          |
| 15 | 10 | 200 | 9720 | ← orders exceed 10 Tick but within 10 PriceLevel, Explicit Deletion                          |
| 16 | 11 | 300 | 9710 | ← orders exceed 10 Tick & exceed 10 PriceLevel, Implicit Deletion                            |

Orders in shaded area which were originally within the 10 tick levels offered in OMD now fall outside the 10 tick levels. OMD will send Explicit Delete for orders which fall outside 10 tick levels but are within 10 price levels (i.e. entries highlighted in blue). However OMD will not send Explicit Delete for orders which are outside 10 price levels (i.e. entries highlighted in pink) and the client must delete the excess entries (i.e. Implicit Delete by the client).

The following message will be sent:

| Offset | Field Name        | Value   |
|--------|-------------------|---------|
| 0      | MsgSize           | 180     |
| 2      | MsgType           | 53      |
| 4      | SecurityCode      | 1234    |
| 8      | Filler            | NULL    |
| 11     | NoEntries         | 7       |
| 12     | AggregateQuantity | 450     |
| 20     | Price             | 9860    |
| 24     | NumberOfOrders    | 1       |
| 28     | Side              | 0 (Bid) |
| 30     | PriceLevel        | 1       |
| 31     | UpdateAction      | 0       |
| 32     | Filler            | NULL    |
| 36     | AggregateQuantity | 550     |
| 44     | Price             | 9850    |
| 48     | NumberOfOrders    | 1       |
| 52     | Side              | 0 (Bid) |
| 54     | PriceLevel        | 2       |
| 55     | UpdateAction      | 0       |
| 56     | Filler            | NULL    |
| 60     | AggregateQuantity | 650     |
| 68     | Price             | 9840    |
| 72     | NumberOfOrders    | 1       |
| 76     | Side              | 0 (Bid) |
| 78     | PriceLevel        | 3       |
| 79     | UpdateAction      | 0       |
| 80     | Filler            | NULL    |
| 84     | AggregateQuantity | 250     |
| 92     | Price             | 9760    |
| 96     | NumberOfOrders    | 1       |
| 100    | Side              | 0 (Bid) |

|     |                   |         |
|-----|-------------------|---------|
| 102 | PriceLevel        | 7       |
| 103 | UpdateAction      | 2       |
| 104 | Filler            | NULL    |
| 108 | AggregateQuantity | 100     |
| 116 | Price             | 9750    |
| 120 | NumberOfOrders    | 1       |
| 124 | Side              | 0 (Bid) |
| 126 | PriceLevel        | 7       |
| 127 | UpdateAction      | 2       |
| 128 | Filler            | NULL    |
| 132 | AggregateQuantity | 400     |
| 140 | Price             | 9730    |
| 144 | NumberOfOrders    | 1       |
| 148 | Side              | 0 (Bid) |
| 150 | PriceLevel        | 7       |
| 151 | UpdateAction      | 2       |
| 152 | Filler            | NULL    |
| 156 | AggregateQuantity | 200     |
| 164 | Price             | 9720    |
| 168 | NumberOfOrders    | 1       |
| 172 | Side              | 0 (Bid) |
| 174 | PriceLevel        | 7       |
| 175 | UpdateAction      | 2       |
| 176 | Filler            | NULL    |

#### Example 6 – Orderbook Clear

In certain failure scenarios the system may send an 'Orderbook Clear' message at which point clients should clear both Bid and Ask side orderbooks for the specified security. An example message is shown below.

Following an 'Orderbook Clear' message any existing orders for the security will be resent as normal to rebuild the current image.

| Offset | Field Name        | Value |
|--------|-------------------|-------|
| 0      | MsgSize           | 36    |
| 2      | MsgType           | 53    |
| 4      | SecurityCode      | 1234  |
| 8      | Filler            | NULL  |
| 11     | NoEntries         | 1     |
| 12     | AggregateQuantity | 0     |
| 20     | Price             | 0     |
| 24     | NumberOfOrders    | 0     |
| 28     | Side              | 0     |
| 30     | PriceLevel        | 0     |
| 31     | UpdateAction      | 74    |
| 32     | Filler            | NULL  |

## APPENDIX A – LIST OF INDICES AND MARKET INFORMATION UNDER OMD INDEX

The information supplied in this appendix applies to OMD Index only.

The indices supplied under the OMD Index are described in the table below, as it may be amended from time to time by HKEX-IS pursuant to clause 2.2 of the Licence Agreement. The mark [●] specifies if an index disseminated under the OMD Index is Third Party Content under the Licence Agreement. Licensee shall refer to clause 10.6 of the Market Data Vendor Licence Agreement and notices issued by HKEX-IS from time to time for redistribution of Third Party Content.

The Index Source and Index Code in the table below include the source and code for market information.

| Index Source <sup>1</sup> | Index Code | Name of the Index and market information disseminated under the OMD Index | Third Party Content under the Licence Agreement | Third Party Index Ownership |
|---------------------------|------------|---|---|-----------------------------|
| C <sup>2</sup>            | CES120     | CES China 120 Index   | ●   | CES                         |
| C                         | CESA80     | CES China A80 Index   | ●   | CES                         |
| C                         | CESHKM     | CES China HK Mainland Index   | ●   | CES                         |
| C                         | CES280     | CES China 280 Index   | ●   | CES                         |
| C                         | CESG10     | CES Gaming Top 10 Index   | ●   | CES                         |
| C                         | CES300     | CES Stock Connect 300 Index   | ●   | CES                         |
| C                         | CES100     | CES Stock Connect Hong Kong Select 100 Index                              | ●   | CES                         |
| C                         | CESHKB     | CES HK Biotechnology Index  | ●   | CES                         |
| C                         | CESP50     | CES Stock Connect Hong Kong Premier 50 Index                              | ●   | CES                         |
| C                         | CESCSC     | CES China Semiconductor Index   | ●   | CES                         |
| C                         | CSI300     | CSI 300 Index   | ●   | CSI                         |
| C                         | 000942     | CSI China Mainland Consumer Index   | ●   | CSI                         |
| C                         | H11123     | CSI HK Mainland Enterprises 50 Index                                      | ●   | CSI                         |
| C                         | H11100     | CSI Hong Kong 100 Index   | ●   | CSI                         |
| C                         | H11140     | CSI Hong Kong Dividend Index  | ●   | CSI                         |
| C                         | H11144     | CSI Hong Kong Listed Tradable Mainland Consumption Index                  | ●   | CSI                         |
| C                         | H11143     | CSI Hong Kong Listed Tradable Mainland Real Estate Index                  | ●   | CSI                         |
| C                         | H11120     | CSI Hong Kong Middle Cap Select Index                                     | ●   | CSI                         |
| C                         | H11152     | CSI Hong Kong Private-owned Mainland Enterprises Index                    | ●   | CSI                         |
| C                         | H11153     | CSI Hong Kong State-owned Mainland Enterprises Index                      | ●   | CSI                         |
| C                         | H11110     | CSI RAFI Hong Kong 50 Index   | ●   | CSI                         |
| C                         | 000016     | SSE 50 Index  | ●   | SSE                         |
| C                         | 000021     | SSE 180 Governance Index  | ●   | SSE                         |
| C                         | 000010     | SSE 180 Index   | ●   | SSE                         |
| C                         | 000009     | SSE 380 Index   | ●   | SSE                         |
| C                         | 000066     | SSE Commodity Equity Index  | ●   | SSE                         |
| C                         | 000001     | SSE Composite Index   | ●   | SSE                         |
| C                         | 000015     | SSE Dividend Index  | ●   | SSE                         |
| C                         | 000043     | SSE Mega-cap Index  | ●   | SSE                         |
| C                         | 000044     | SSE Mid Cap Index   | ●   | SSE                         |
| C                         | 000065     | SSE Industry Top Index  | ●   | SSE                         |
| H                         | 0001500    | Hang Seng China Affiliated Corporations Index                             | ●   | HSDS                        |
| H                         | 0001400    | Hang Seng China Enterprises Index   | ●   | HSDS                        |

|   |         |  |   |      |
|---|---------|--|---|------|
| H | 0000100 | Hang Seng Index  | ● | HSDS |
| H | 0000101 | HSI Sub Indices – Finance  | ● | HSDS |
| H | 0000102 | HSI Sub Indices – Utilities  | ● | HSDS |
| H | 0000103 | HSI Sub Indices – Property   | ● | HSDS |
| H | 0000104 | HSI Sub Indices – Commerce & Industry                                    | ● | HSDS |
| H | 0105000 | HSI Volatility Index (VHSI)  | ● | HSDS |
| H | 0200700 | Hang Seng Mainland Banks Index   | ● | HSDS |
| H | 0200800 | Hang Seng Mainland Properties Index                                      | ● | HSDS |
| H | 0200900 | Hang Seng Mainland Healthcare Index                                      | ● | HSDS |
| H | 0201000 | Hang Seng Mainland Oil and Gas Index                                     | ● | HSDS |
| H | 0201100 | Hang Seng IT Hardware Index  | ● | HSDS |
| H | 0201200 | Hang Seng Software & Services Index                                      | ● | HSDS |
| H | 1006800 | Hang Seng Index (Gross Total Return Index)                               | ● | HSDS |
| H | 1006801 | Hang Seng Finance Sub-Index (Gross Total Return Index)                   | ● | HSDS |
| H | 1006802 | Hang Seng Utilities Sub-Index (Gross Total Return Index)                 | ● | HSDS |
| H | 1006803 | Hang Seng Properties Sub-Index (Gross Total Return Index)                | ● | HSDS |
| H | 1006804 | Hang Seng Index Commerce & Industry Sub-Index (Gross Total Return Index) | ● | HSDS |
| H | 1007200 | Hang Seng China Enterprises Index (Gross Total Return Index)             | ● | HSDS |
| H | 2006800 | Hang Seng Index (Net Total Return Index)                                 | ● | HSDS |
| H | 2006801 | Hang Seng Finance Sub-Index (Net Total Return Index)                     | ● | HSDS |
| H | 2006802 | Hang Seng Utilities Sub-Index (Net Total Return Index)                   | ● | HSDS |
| H | 2006803 | Hang Seng Properties Sub-Index (Net Total Return Index)                  | ● | HSDS |
| H | 2006804 | Hang Seng Index Commerce & Industry Sub-Index (Net Total Return Index)   | ● | HSDS |
| H | 2007200 | Hang Seng China Enterprises Index (Net Total Return Index)               | ● | HSDS |
| S | SPHKL   | S&P/HKEX LargeCap Index  |   | N/A  |
| S | SPHKG   | S&P/HKEX GEM Index   |   | N/A  |
| T | RXYH    | TR/HKEX RXY Global CNH   | ● | TR   |
| T | RXYC    | TR/HKEX RXY Global CNY   | ● | TR   |
| T | RXYRH   | TR/HKEX RXY Reference CNH  | ● | TR   |
| T | RXYRY   | TR/HKEX RXY Reference CNY  | ● | TR   |
| T | HKGDUER | HKEX USD Gold Futures – Excess Return Index                              |   | N/A  |
| T | HKGDUTR | HKEX USD Gold Futures – Total Return Index                               |   | N/A  |
| T | HKGDUSP | HKEX USD Gold Futures – Spot Price Index                                 |   | N/A  |
| T | HKGDREX | HKEX CNH Gold Futures – Excess Return Index                              |   | N/A  |
| T | HKGDRTX | HKEX CNH Gold Futures – Total Return Index                               |   | N/A  |
| T | HKGDSPX | HKEX CNH Gold Futures – Spot Price Index                                 |   | N/A  |

Note 1: The stop time of repetitive index channels can refer to [Section 2.2.2 Normal Transmission](#).

Note 2: For indices with the index source = C, in the event there is service outage in the HKEX primary data center and restart of OMD-C at the secondary data center, real-time dissemination of CSI and CES index data will be suspended until service resumption of the HKEX primary data center.

#### Abbreviation:

|      |   |  |
|------|---|--|
| CES  | = | China Exchanges Services Company Limited |
| CSI  | = | China Securities Index Company Limited   |
| HSDS | = | Hang Seng Data Services Limited          |
| HSI  | = | Hang Seng Indexes Company Limited        |
| S&P  | = | S&P Dow Jones Indices                    |
| TR   | = | Thomson Reuters                          |