**HKEx Information Services Limited (“HKEx-IS”)**

**(A wholly-owned member of Hong Kong Exchanges and Clearing Limited Group)**

**PRICE REPORTING SYSTEM (PLUS) TRANSMISSION SPECIFICATION**

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**Amendment History**

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| **Version** | **Date** | **Remarks** |
| 1.0 | 21 January 2010 |  First version |
| 1.0.1 | 18 February 2011 |  New Section 4.7, Message format description for  Calculated Opening Price   Revise Note 2 in Section 4.9 Market/Commodity Status  Message |
| 1.0.2 | 11 March 2011 |  Appendix B, add instrument code 172 for Standard Combination series for Stock Options Market (SOM) – Synthetic Futures |

**Table of Contents**

**1 INTRODUCTION ........................................................................................................................................4**

1.1 Purpose 4

1.2 Reading Guide 4

**2 MESSAGE SYNTAX CONTROL ..............................................................................................................5**

2.1 Line Protocol 5

2.2 Message Header 5

2.3 Message Details 5

2.4 Message Trailer 5

2.5 Character Codes 5

2.6 Record 5

2.7 Message Mix 5

2.8 Message Types 5

**3 COMMUNICATION & RECOVERY .......................................................................................................6**

3.1 System Overview 6

3.1.1 System Sites 6

3.1.2 Scope of Information 6

3.1.3 Start of Day Transmission 6

3.1.4 Trading Hour Transmission 7

3.1.5 End of day Transmission 7

3.1.6 Scheduled Holiday 8

3.1.7 Typhoon and Black Rainstorm Arrangement 8

3.2 Connection Packages & Method 9

3.3 Line Connection Failure 13

3.4 Primary Trading System Failure 13

3.5 Connection failure detection and recovery mechanism 14

3.6 Technical Requirement for Direct Connection Vendors 14

**4 MESSAGE FORMATS ..............................................................................................................................15**

4.1 Trade Detail Message 16

4.2 Trade Statistic Message 17

4.3 Summary Statistics Message 18

4.4 Control/Freeform/Alert Message 20

4.5 Underlying Instrument Message 21

4.6 Quotation Message (5 levels) 22

4.7 Calculated Opening Price (COP) Message 23

4.8 Series Definition Message 24

4.9 Market/Commodity Status Message 26

4.10 Heartbeat Message 27

**5 DATA FIELD CHARACTERISTICS ......................................................................................................28**

5.1 Message Category/Code 28

5.2 Real-time Indicator 28

5.3 Time Stamp 28

5.4 Snapshot Image for Recovery 29

**6 MARKET MESSAGE SCHEDULE .........................................................................................................30**

6.1 Summary Statistics Broadcasting Time 30

**7 MARKET DATA RETRANSMISSION...................................................................................................31**

7.1 Data Retransmission Function 31

7.2 Data Recovery Period 33

7.3 Supported Message Type 33

7.4 Making a Download Request 33

7.5 Retransmission Limitation 35

**APPENDIX A: LIST OF COMMODITY CODE ............................................................................................36**

**APPENDIX B: LIST OF INSTRUMENT CODE............................................................................................37**

**APPENDIX C: LIST OF DEAL TYPE ............................................................................................................38**

**APPENDIX D: LIST OF MARKET ID ...........................................................................................................39**

**APPENDIX E: LIST OF STATUS CODE .......................................................................................................40**

**APPENDIX F: REMARKS ON TRADE MESSAGE .....................................................................................41**

**APPENDIX G: RECOVERY OPTION OF SERIES DEFINITION MESSAGE.........................................42**

**1 INTRODUCTION**

***1.1 Purpose***

This document describes the data transmission between Price Reporting System (Plus) [“PRS Plus”] and Information Vendors. It defines the real-time market data provided by the PRS Plus and the message records that contain the data. Also it suggests the error handling and recovery procedures for Information Vendors to recover from connection interruption.

The intended reader of this document is the technical personnel of the Information Vendors. This specification provides adequate information for Information Vendors to develop their own systems for receiving real time market data from the PRS Plus.

PRS Plus is built on the blueprint of Price Reporting System [“PRS”]. However, PRS Plus provides higher frequency of quotation update in the derivatives market than that of PRS.

***1.2 Reading Guide***

This document has been arranged so that a reader can easily find the information required. The chapters following this introduction are:

Chapter 2 : Message syntax

Chapter 3 : Communication & recovery

Chapter 4 : Message formats

Chapter 5 : Field definition and snapshot for recovery

Chapter 6 : Message broadcast schedule

Chapter 7 : Market data retransmission function

**2 MESSAGE SYNTAX CONTROL**

Control of the message syntax is accomplished by the following definitions:-

***2.1 Line Protocol***

Messages are transmitted in blocks and the size of the record varies. Each message is transmitted with a message header and a message trailer. The layout of a message is shown below:-

Message Message

Header Trailer

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ␁ | Header | ␂ | Message details | ␃ | ↵ | ␊ |

Fig. 1 Message Format

***2.2 Message Header***

Each message starts with a SOH character (see Fig. 1).

***2.3 Message Details***

This part of a message may carry various message contents, which may include PRS series ID, trade details, price quotation, market information and etc. Please refer to Section 4 in this document for details.

***2.4 Message Trailer***

Each message ends with ETX, carriage return and line feed characters.

***2.5 Character Codes***

All characters in the message body are transmitted in ASCII, except Start-of Header (SOH), Start-of- String (STX) and End-of-String (ETX) which are Hex codes. Each character is coded as eight-bit data with no parity.

***2.6 Record***

The record contains the message being transmitted. It can be a trade message, a quotation message, a summary statistics message, a control/freeform/alert message, an underlying instrument message, a series definition message, a market/commodity status message or a heartbeat message.

***2.7 Message Mix***

Different types of messages are disseminated on real time basis to reflect the prevailing market conditions as timely and accurately as possible and without undue delay. It is the responsibility of the Information Vendor to separate, identify, process and store the different kinds of messages based on the message header field group.

***2.8 Message Types***

There are ten types of broadcast messages: -

1. Trade detail message

2. Trade statistic message

3. Summary statistics message

4. Control/Freeform/Alert message

5. Underlying instrument message

6. Quotation message

7. Series definition message

8. Market/Commodity status message

9. Heartbeat message

Each type of message has also subdivided into categories. For detail of usage, please refer to the message definition in Section 4.

**3 COMMUNICATION & RECOVERY**

***3.1 System Overview***

3.1.1 System Sites

PRS Plus runs on two sites for resilience purpose. Both PRS Plus on primary and backup sites disseminate information in real time. Information Vendors are suggested to design with system auto fail-over function, which enable them to switch their connections to alternate PRS site wherever an interruption is occurred.

3.1.2 Scope of Information

PRS Plus provides real-time Derivatives trading information to Information Vendors. There are multiple markets/products in the Derivatives Market. For the latest information on the list of Derivatives products, please refer to the “Derivatives Market” under the “Trading Information” section on the HKEx website (www.hkex.com.hk).

Data Entitlement under different Vendor Agreements

Since the migration of Hong Kong Stock Options onto the HKATS trading platform on 6 August 2001, the Price Reporting System could technically transmit all Derivatives data products to information vendors. However, Information Vendors need to make sure that they have obtained the proper

approval from approval from HKEx-IS before they disseminate the relevant data.



|  |  |  |
| --- | --- | --- |
| **Derivatives Market Data for**  **PRS Plus** | **Derivatives Products covered** | **Product Names** |
| HKFE Data | 1. Interest Rate, Fixed Income  and Precious Metal  Products  2. Equity Index Products  3. Equity Products  3.1 Stock Futures |  HIBOR Futures/Strips   3-Year Exchange Fund  Notes Futures   Gold Futures   Hang Seng Index Futures & Options   Mini-Hang Seng Index  Futures & Options   H-shares Index Futures & Options   Mini H-shares Index Futures   Flexible Hang Seng Index  Options   Flexible H-shares Index  Options   HSI Dividend Point Index  Futures   HSCEI Dividend Point Index  Futures   Stock Futures |
| Stock Options Data | 3.2 Stock Options |  Stock Options on HKEx  Securities market  instruments |

Note:



HSI, HHI, DHS and DHH are Third Party Content and are compiled and maintained by Hang Seng Indexes Company Limited. The Exchange disseminates this information on an "as is" basis without any liability for any loss or damage arising from any

inaccuracies or omissions.

3.1.3 Start of Day Transmission

PRS Plus is ready for connection at 07:00 am on every business day.

At around 07:15 am, a control message (“CS”) is broadcasted indicating the start-of-day for a new business day. Series Definition messages (“DS”) are also disseminated for all series as available for quotation and trade in HKATS. Note that PRS Plus may disseminate “DS” whenever there is new tradable series introduced or a series is suspended / resumed for trade during the day.

Summary statistics of all non-combo series with the latest Open Interest (Gross & Participant Net OI) and Settlement Price are broadcasted at around 07:30am by transmitting Summary Statistics Message (“SS”). After the dissemination of Summary Statistic Message completed, the Market Status Message (“MM”/“MC”) will be followed to reflect the latest status of all markets.

At around 7:45, before market open, Quotation Message (“QC/D”) of all series are disseminated to Information Vendors for the updates of outstanding order position in markets. Information Vendors should update the quotation position of all series on Derivatives market according to the latest broadcast.

For normal trading hours of individual derivatives products, please refer to the Trading Information of the Derivatives Market provided on the HKEx website.

3.1.4 Trading Hour Transmission

Except Summary Statistics (“SS”/ “SM”/ “SE”) and Next Day Series Definition (“DF”) messages, all types of PRS messages may be sent during the trading hours.

Series Definition (“DS”) message will be sent if a new series is created in HKATS during the trading hours or a series is suspended / resumed during trading hours. Real time trade information will then be sent upon Exchange Participant’s activities on the series.

3.1.5 End of day Transmission

Market Close Summary Statistics Message (“SM”) carrying the settlement price is disseminated as soon as the price information is determined after market close. The settlement price is the final settlement price of the series on the last trading day of that series. Please refer to Section 6 in this document for the transmission schedule.

Next Day Series Definition Message (“DF”) is broadcasted at around 20:00 under normal situation. It carries the tradable series definition of futures and options in the next business day, except for combo series. However, in the event of capital adjustment to stock futures and stock options contracts, DF messages will be available only after the completion of the capital adjustment activities which can be at any time after 21:15. In such cases, PRS Plus will not shut down at the normal time but after the transmission of all DF messages. Information vendors are advised to listen to the End of Day message (“CE”) for disconnection from the PRS Plus server if they need to receive all PRS Plus messages.

Summary statistics of all series with current day Open Interest (OI) and Settlement Price are broadcasted at around 21:30. Summary Statistics Message (“SE”) is disseminated.

A “Control/Freeform/Alert Message” - End-of-day message (‘CE’) is sent after all market messages have been disseminated. PRS Plus and Data Retransmission are scheduled to be shutdown at around

22:00 and 22:30 respectively. All Information Vendors’ connections would be terminated according to the corresponding shutdown time, unless special arrangement for shutdown is required. The same

system shutdown time would also apply to half day trading days. After system shut down, PRS Plus

services (include Data Retransmission) would not be available for Information Vendors till the next Trading day (i.e. 07:00). Information vendors (the Emergency Contact) would be notified by email in case special arrangement or extension of PRS Plus shutdown for the day is required.

3.1.6 Scheduled Holiday

PRS Plus operates on every business day when there is at least one market open for trading. If it is a scheduled holiday and there is no Derivatives market open for trading, PRS Plus will NOT be brought up at 07:00 for vendor connections.

For holiday schedule of the Derivatives market, information vendors should refer to the Derivatives

Market Trading Calendar under the Trading Information section of the HKEx website.

3.1.7 Typhoon and Black Rainstorm Arrangement

PRS Plus would normally be brought up on all trading days even if Typhoon Signal No. 8 (or above) is hoisted or Black Rainstorm warning is issued in Hong Kong. However, the availability of the trading information would be subject to the prevailing trading arrangement for the Derivatives Market during Typhoon or Black Rainstorm conditions.

Vendors can refer to the HKEx website for the standard trading arrangement for the Derivatives Market under different Typhoon and Black Rainstorm scenarios.

Vendors may also refer to the Trading News available on the HKEx website under the Securities Market area within Trading Information section for the latest Exchange News on the Typhoon/Black Rainstorm day.

***3.2 Connection Packages & Method***

3.2.1 LINE PROTOCOL

Mode of Transmission : IP-based Network Communication Line Speed : 5-6Mbps Communication Protocol : TCP

IP address on Client Side:

- One set of IP addresses is assigned to a client to access PRS Plus

- HKEx will assign a set of dedicated IP addresses to each Information Vendor

IP address on Server side:

- Access to the Primary & Secondary server IP addresses is granted for the client side (with pre- assigned IP address) to connecting to an assigned port number.

3.2.2 CONNECTION REQUIREMENT

It is required that information vendors should **have at least two SDNet lines or an even number of lines**

installed in their systems. Information Vendors should at all times ensure that all lines are ready so that in case of failure, the backup lines are ready to receive PRS Plus data.

There are two connection models. The two lines should be arranged to establish either one pair of lines with **Hot Standby Router Protocol (HSRP)** or two single live lines.

Information vendor should have an internal procedure for detecting and handling leased line failure. Also, Information vendor should well define their internal site failover procedure for service recovery.

3.2.2.1 Standard Connection Model (2 SDNet lines with 1 live connection)

Under this model, an information vendor subscribes one pair of SDNet data lines which are configured with Hot Standby Router Protocol (HSRP) to support auto recovery of line failure.

Each of the two lines is connected to PRS Plus production system either in the primary site (PRS Plus Primary Server) or the backup site (PRS Plus Secondary Server) and only one of them can receive live PRS Plus data transmission Without resetting the IP address of PRS Plus servers in vendor’s machine, the PRS Plus secondary server should be used for backup purpose. Under the normal circumstance, information vendors should always connect to the PRS Plus Primary Server.

One set (2 lines) of High Resilience 5-6Mbps circuits, running HSRP between the routers co-located in the same vendor site, are required. High resilience service on network connection is provided.

Network Diagram:

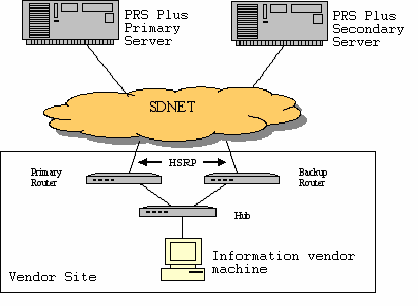


Diagram 1. Standard Connection Model (2 SDNet lines with 1 live connection and 1 back-up connection)

Connection Details:

|  |  |
| --- | --- |
| Connection – First Set of Connection | 1 |
| Number of SDNet line(s) | 2 |
| Number of SDNet router location(s) (i.e. vendor site) | 1 |
| Support auto line failover (ie. HSRP) | Yes |
| Number of live connection(s) | 1 |

Alternatively, information vendors can achieve even higher resilience by installing an additional pair of SDNet lines. Under this model, an information vendor will subscribe two sets of SDNet data lines which consists of four SDNet lines in total. Each set of SDNet data lines is configured with HSRP to support auto recovery of line failure. Information vendor can receive real time live market data from the two independent communication channels. Hence, this configuration model provides the utmost

uninterrupted service.

To further explain, under this enhanced connection model, an information vendor can establish one connection to the PRS Plus Primary Server and another one to the PRS Plus Secondary Server via the two

independent sets of SDNet lines. PRS Plus handshakes with the two communication channels separately and simultaneously.

Two pairs of SDNet lines with HSRP are required for this connection setup. Information vendors adopting this configuration MUST fulfil the obligation that each server in information vendor site(s) should establish only one live connection through individual leased line package either to the PRS Plus Primary server at primary site or the Secondary server at backup site but not both at the same time. The primary and secondary servers of the information vendor for receiving PRS Plus data feed concurrently through individual connection sets can be located at the same location or at different sites.

Network Diagram:

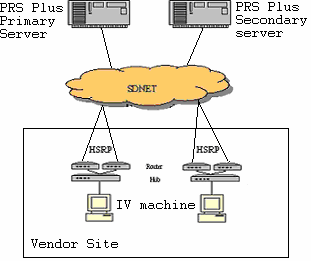


Diagram 2. Standard Connection with one additional set of connection Model

(4 SDNet lines with 2 live connections and 2 back-up connections)

Connection Details:

|  |  |
| --- | --- |
| Connection – First Set of Connection | 1 |
| Connection – Additional Set of Connection | 1 |
| Number of SDNet lines | 4 |
| Number of SDNet router location(s)\* (i.e. vendor site) | 1 - 2 |
| Support auto line failover (ie. HSRP) | Yes |
| Number of live connection(s) | 2 |

Note:

\* The pair of SDNet lines with HSRP must be co-located.

3.2.2.2 Two Live Connections without Backup Lines Model (2 SDNet lines with 2 live connections)

For information vendors who would like to receive real-time data via two live connections but want to install only one pair of lines, there is an option for them to give up the backup SDNet lines. Under this model, an information vendor subscribes one set of standard connection and one set of additional connection, both without backup SDNet lines (i.e. without HSRP). As a result, each network connection does not have resilient function when there is line failure and the information vendor will have to rely on the other live connection to continue the operation.

This connection configuration requires the vendor to establish connections to both the PRS Plus Primary Server and the PRS Plus Secondary Server, with one line connected to each of the PRS Plus Primary and Secondary Servers. PRS Plus operates the two communication channels separately and simultaneously.

The primary and backup servers of the information vendor for receiving PRS Plus data feed concurrently through individual links can be located at the same location or at different sites.

Network Diagram:

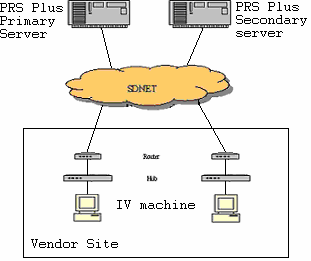


Diagram 3. Two Live Connections without Backup Lines Model

(2 SDNet lines with 2 live connections)

Connection requirement:

|  |  |
| --- | --- |
| Connection – First Set of Connection | 1 |
| Connection – Additional Set of Connection | 1 |
| Number of SDNet lines | 2 |
| Number of SDNet router location(s) (i.e. vendor site) | 1 - 2 |
| Support auto line failover (ie. HSRP) | No |
| Number of live connection(s) | 2 |

3.2.3 CONNECTION CONSTRAINT

Information vendors should always establish ONE connection to either the primary site or the backup site using either configuration.

For information vendor with dual live connections package, information vendor can establish two connections to PRS Plus servers. Both connections should not establish through the same SDNET network leased line. It is the obligation for information vendor to detect and fail over its system to its backup equipment if the primary leased line connection is out of service.

Both PRS Plus Primary and PRS Plus Secondary servers have a limitation of 10 re-connection attempts daily. Information vendor should not disconnect and connect to the PRS Plus servers over the limit. Data port will be closed temporary, and information vendor has to fill up an incident report before having the data port being re-activated.

Once a connection request is accepted, PRS Plus sends messages through the connected socket immediately. It is the responsibility of information vendor to check the socket buffer for available records and clear the buffer when overloaded.

3.2.4 RECOVERY MECHANISM

PRS Plus Primary and PRS Plus Secondary Servers are disseminating real time data at the same time. Information vendor should design in a round robin fashion to hunt for PRS Plus connection. A 5- second retry interval is suggested.

1. Primary PRS Plus server

2. Secondary PRS Plus server

3. Back to point #1

For vendors selected “Single Live Connection Model”, in all normal circumstance, vendor’s server should always connect to Primary PRS Plus server. In case of failure on Primary PRS Plus server, vendor’s program could failover to Secondary server for service recovery.

For vendors selected “Dual Live with High Resilience Connection Model” and “Dual Live without Resilience Connection Model”, in order to minimize the interruption of data service, vendor’s primary server should connect to Primary PRS Plus server and vendor’s secondary service should connect to Secondary PRS Plus server. In case of failure on Primary PRS Plus server or Network levels, vendor’s program could failover to alternate server for service recovery. This arrangement can minimize data loss and interruption during recovery.

***3.3 Line Connection Failure***

Under any of the above configuration package, the IP address of PRS Plus server is expected to be used for normal data transmission. For information vendor with dual live connections package, the IP address of PRS Plus Secondary server is expected for backup server of information vendor to use as normal data transmission. Service interruption will be minimized. Whenever there is a connection failure, Information vendors should reconnect to PRS Plus server by using the backup IP addresses mentioned in the previous pages.

***3.4 Primary Trading System Failure***

If a failure occurred in the primary trading system, trading system will failover to the backup site. The failover operation will take approximately 45 minutes. PRS Plus system will connect to the trading system on the backup site to operate continuously. No trading data will be available during the failover period.

If site failover is occurred in the Exchange’s primary site, all systems will be discontinued in the primary site. Information vendors will be required to switch their connections to the backup site.

***3.5 Connection failure detection and recovery mechanism***

Information vendors may receive Heartbeat (‘HB’) message once application connected to PRS Plus server. During communication idle time, PRS Plus broadcasts ‘HB’ message in every 15 seconds. However, the ‘HB’ broadcast interval would be longer when PRS Plus is busy disseminating large data volume. Information vendors are suggested to make use of the ‘HB’ message to determine the healthiness of their connections during idle time. If two or more consecutive ‘HB’ messages are missing (say > 30 seconds), information vendors should execute their own recovery plan immediately.

Once reconnected to PRS Plus, information vendor application would receive all series definition followed by a snapshot of the current market information. The latest snapshot quotation and trade information would be sent together with real time messages.

By default, the definition message “DS” of all existing series will be sent prior to any snapshot and real time market information upon reconnection to PRS Plus. However, information vendor can choose not to receive the “DS” messages when establishing the connection if the messages are not required. For the mechanism of this recovery option, please refer to APPENDIX G for details.

***3.6 Technical Requirement for Direct Connection Vendors***

Vendors who obtain derivatives market data directly from the HKEx must meet all the requirements as set out in this paragraph to ensure that their systems are capable of properly receiving our market data.

1. The system of direct connection vendors must meet all the requirements as set out in this PRS Plus

Transmission Specification.

2. Direct connection vendors should ensure that their systems have sufficient capacity to receive and process the Exchange’s market data with minimum latency so as not to impair the timeliness of the data.

3. Direct connection vendors must ensure that lines connecting to the Exchange’s PRS Plus system meet the minimum bandwidth requirement as set out by the Exchange from time to time. (The minimum bandwidth requirement is at present 2.)

4. Direct connection vendors who are providing real-time feeds to indirect connection vendors must have at least two live connections with the Exchange.

5. Direct connection vendors must be able to detect line failure automatically and reconnect within 1 minute. Such requirement will be included in the PRS Plus Certification Test for new direct connection vendors and will be tested twice a year in the market rehearsals arranged by the Exchange. The results of the market rehearsals will be published on the HKEx website for public reference.

6. Direct connection vendors with retransmission service are advised to download the missing data from the period of disconnection rather than download full day record so as to avoid adverse effect on their services. Vendors with dual live connections should utilize the alternate connection to recover the missing data from the period of disconnection.

7. Applicants choosing direct connection with the PRS Plus system must pass the PRS Plus Certification Test according to the requirements as set out in the PRS Plus Certification Test Procedures before they are approved to redistribute derivatives market data.

8. Other technical requirements mentioned in this transmission specification.

**4 MESSAGE FORMATS**

In general, a PRS Plus message comprises 3 parts – Header, PRS Series ID and Message Contents. The followings are generally applied to PRS Plus messages described in this Section:

Header (fixed length: 9 bytes)

- It is composed of the Message Category, Message Type, Real-time Indicator and Timestamp

- Please refer to Paragraph 5.1 for the complete list of Message Category and Message Type

- Real-time indicator shows “1” for real time message and “0” for snapshot message

- Timestamp is in HHMMSS format

PRS Series ID (fixed length: 19 bytes)

- It is composed of the Commodity Code, Instrument Code, Expiry Date and Strike Price

- Trailing blank is padded in the field of Commodity Code (Please refer to Appendix A)

- Leading zero is filled in the field of Instrument Code (Please refer to Appendix B)

- Leading zero is filled in the field of Strike Price (together with the field of Number of Decimal

Place(s) for Price Fields in the Message Contents, they present the actual strike price)

- It may not exist in some PRS message structures

Message Contents (variable length)

- Individual data fields in Message Contents may have variable field lengths

- Data fields are separated by backslash (‘\’) as the field delimiter

- A single zero (‘0’) is filled for any unused numeric field

- A single blank character is filled for any unused character or alphanumeric field

- Price fields in quotation message may contain (‘-’) sign for negative price value

***4.1 Trade Detail Message（*TT、TV*）***

|  |  |  |  |
| --- | --- | --- | --- |
| **Field group** | **Description** | **Length** | **Reference** |
| **SOH** | **SOH control character** | **1** | **Hex 01** |
| Header | Message Category | 1 | Character |
| Message Type | 1 | Character |
| Real-time Indicator | 1 | Numeric |
| Time Stamp | 6 | Numeric; **HHMMSS** |
| **STX** | **STX control character** | **1** | **Hex 02** |
| PRS Series  ID | Commodity Code | 5 | Please refer to Appendix A |
| Instrument Code | 3 | Please refer to Appendix B |
| Expiry Date | 4 | Numeric; **MMYY** |
| Strike Price | 7 | Numeric; *(Note 2)* |
| Contents | Field delimiter | 1 | “\” |
| Number of Decimal Place(s) for  Price fields | 1 | Numeric |
| Field delimiter | 1 | “\” |
| Cumulative Volume |  | Numeric |
| Field delimiter | 1 | “\” |
| Total Number of Deal |  | Numeric |
| Field delimiter | 1 | “\” |
| Deal Type |  | Numeric; *(Note 8)*  Please refer to Appendix C |
| Field delimiter | 1 | “\” |
| Last Trade Price |  | Numeric; *(Note 2 & 7)* |
| Field delimiter | 1 | “\” |
| Last Trade Volume |  | Numeric; *(Note 7)* |
| **ETX** | **ETX control character** | **1** | **Hex 03** |

Note:

1. Valid combinations of message category and message type are **TT** and **TV**.

2. The actual value is determined by applying the number of decimal place(s) for price fields provided.

3. TT message type provides information on trades concluded or reported in HKATS. A TT message may also be triggered by cancellation of trades or update on any data fields in Contents.

4. TV message type is triggered by the adjustment of Cumulative Volume in the market.

5. TV carries the information of Number of Decimal Place(s) for Price fields and Cumulative

Volume only in the Contents area.

6. The Contents always carries the latest values in the market. HKEx may disseminate the latest values at any time to update the market information.

7. The Last Trade price and Last trade volume for some of the deal types are not updated in TT.

Please refer to Appendix C for detail.

8. In case of trade cancellation resulting in no trades on the series, the value of Deal Type is “1” in the message which updates all transaction related fields, such as Cumulative Volume, Total

Number of Deal, Last Trade Price and Last Trade Volume to zero values.

***4.2 Trade Statistic Message（*TS*）***

|  |  |  |  |
| --- | --- | --- | --- |
| **Field group** | **Description** | **Length** | **Reference** |
| **SOH** | **SOH control character** | **1** | **Hex 01** |
| Header | Message Category | 1 | Character |
| Message Type | 1 | Character |
| Real-time Indicator | 1 | Numeric |
| Time Stamp | 6 | Numeric; HHMMSS |
| **STX** | **STX control character** | **1** | **Hex 02** |
| PRS Series  ID | Commodity Code | 5 | Please refer to Appendix A |
| Instrument Code | 3 | Please refer to Appendix B |
| Expiry Date | 4 | Numeric; MMYY |
| Strike Price | 7 | Numeric; *(Note 2)* |
| Contents | Field delimiter | 1 | “\” |
| Number of Decimal Place(s) for  Price fields | 1 | Numeric |
| Field delimiter | 1 | “\” |
| Open Trade Price |  | Numeric; *(Note 2)* |
| Field delimiter | 1 | “\” |
| Highest Trade Price |  | Numeric; *(Note 2)* |
| Field delimiter | 1 | “\” |
| Lowest Trade Price |  | Numeric; *(Note 2)* |
| Field delimiter | 1 | “\” |
| Trade Report Volume |  | Numeric |
| **ETX** | **ETX control character** | **1** | **Hex 03** |

Note:

1. Valid combination of message category and message type is **TS**.

2. The actual value is determined by applying the number of decimal place(s) of price fields provided.

3. TS message type is triggered by booking of Block Trade or update on any data fields in Contents.

4. “Trade Report Volume” field contains the accumulated volume of contracts as traded by “Trade

Report” function in HKATS. “Trade Report” is also called as “Block Trade” in market.

5. The Contents always carries the latest values in the market. HKEx may disseminate the latest values at any time to update the market information.

***4.3 Summary Statistics Message（*SE、SS、SM*）***

|  |  |  |  |
| --- | --- | --- | --- |
| **Field group** | **Description** | **Length** | **Reference** |
| **SOH** | **SOH control character** | **1** | **HEX 01** |
| Header | Message Category | 1 | Character |
| Message Type | 1 | Character |
| Real-time Indicator | 1 | Numeric |
| Time Stamp | 6 | Numeric; HHMMSS |
| **STX** | **STX control character** | **1** | **HEX 02** |
| PRS Series  ID | Commodity Code | 5 | Please refer to Appendix A |
| Instrument Code | 3 | Please refer to Appendix B |
| Expiry Date | 4 | Numeric; MMYY |
| Strike Price | 7 | Numeric; *(Note 2)* |
| Contents | Field delimiter | 1 | “\” |
| Number of Decimal Place(s) for  Price fields | 1 | Numeric |
| Field delimiter | 1 | “\” |
| Open Buy Quote |  | Numeric; *(Note 2)* |
| Field delimiter | 1 | “\” |
| Open Sell Quote |  | Numeric; *(Note 2)* |
| Field delimiter | 1 | “\” |
| Open Trade Price |  | Numeric; *(Note 2)* |
| Field delimiter | 1 | “\” |
| Closing Buy Quote |  | Numeric; *(Note 2)* |
| Field delimiter | 1 | “\” |
| Closing Sell Quote |  | Numeric; *(Note 2)* |
| Field delimiter | 1 | “\” |
| Settlement Price |  | Numeric; *(Note 2-4)* |
| Field delimiter | 1 | “\” |
| Day Highest Price |  | Numeric; *(Note 2)* |
| Field delimiter | 1 | “\” |
| Day Lowest Price |  | Numeric; *(Note 2)* |
| Field delimiter | 1 | “\” |
| Cumulative Volume |  | Numeric |
| Field delimiter | 1 | “\” |
| Net Open Interest |  | Numeric |
| Field delimiter | 1 | “\” |
| Gross Open Interest |  | Numeric |
| **ETX** | **ETX control character** | **1** | **HEX 03** |

Note:

1. Valid combinations for message category and message type are SE, SM and SS only.

2. The actual value is determined by applying the number of decimal place(s) for price fields provided.

3. The Start-of-day Summary Statistics (type code ‘S’), which is disseminated before market open,

carries the settlement price, net and gross open interest of previous business day. Their values are zeroes for new series except adjusted series. In case of capital adjustment effective on the current day, the settlement price and the open interest information of the previous day will have been transferred to the newly created adjusted series from the original series before market open. There will not be Start-of-day Summary Statistics for the original series as they are no longer tradable.

4. The Market Close Summary Statistics (type code ‘M’), which is disseminated after market close, carries the current day settlement price.

5. The End-of-day Summary Statistics (type code ‘E’), which is disseminated after market close,

carries the current day Net and Gross open interest.

6. Please refer to Section 6.1 in this document for details.

7. The Contents always carries the latest values in the market. HKEx may disseminate the latest

values at any time to update the market information.

***4.4 Control/Freeform/Alert Message（*CE、CF、CS*）***

|  |  |  |  |
| --- | --- | --- | --- |
| **Field group** | **Description** | **Length** | **Reference** |
| **SOH** | **SOH control character** | **1** | **HEX 01** |
| Header | Message Category | 1 | Character |
| Message Type | 1 | Character |
| Real-time Indicator | 1 | Numeric |
| Time Stamp | 6 | Numeric; HHMMSS |
| **STX** | **STX control character** | **1** | **HEX 02** |
| Contents | Current Message Count | 1 – 2 | Numeric; Valid range: 1 .. 99;  *(Note 5)*  It indicates the current message number out of the “Total number of Messages” |
| Field delimiter | 1 | “\” |
| Total Number of Message(s) | 1 – 2 | Numeric; Valid range: 1 .. 99;  *(Note 5)*  It indicates the total number of messages as a group |
| Field delimiter | 1 | “\” |
| Message Text | 80 | Alphanumeric |
| **ETX** | **ETX control character** | **1** | **HEX 03** |

Note:

1. Valid combinations for message category and message type are CE, CF and CS only.

2. For message type ‘S’, start of day message (“Start of day”) is stored in the field of Message

Text, while end of day message (“End of day”) is stored for message type “E”.

3. For message type ‘F’, the freeform/alert message is presented in the field of Message Text.

The first message (i.e. the Current Message Count field = 1) is the subject of the freeform/alert message.

4. The “Message Text” field has a fixed length of 80 characters. Delimiter “\” may contain inside the Message Text.

5. Current Message Count and Total Number of Message(s) have variable field length. The minimum and maximum field length is 1 and 2 respectively. These fields contain no leading

zero or trailing blank and the valid values range from 1 to 99. The field value of Current

Message Count must be less than or equal to that of Total Number of Message(s).

***4.5 Underlying Instrument Message（*UH、UL、UT*）***

|  |  |  |  |
| --- | --- | --- | --- |
| **Field group** | **Description** | **Length** | **Reference** |
| **SOH** | **SOH control character** | **1** | **HEX 01** |
| Header | Message Category | 1 | Character |
| Message Type | 1 | Character |
| Real-time Indicator | 1 | Numeric |
| Time Stamp | 6 | Numeric; HHMMSS |
| **STX** | **STX control character** | **1** | **HEX 02** |
| Contents | Commodity Code | 5 | Please refer to Appendix A |
| Field delimiter | 1 | “\” |
| Number of Decimal Place(s) for  EAS value | 1 | Numeric |
| Field delimiter | 1 | “\” |
| EAS value of Commodity |  | Numeric; *(Note 2)* |
| Field delimiter | 1 | “\” |
| Number of Decimal Places(s)  for Commodity Index value | 1 | Numeric |
| Field delimiter | 1 | “\” |
| Commodity Index value |  | Numeric |
| Field delimiter | 1 | “\” |
| Reserved | 1 | Blank |
| **ETX** | **ETX control character** | **1** | **HEX 03** |

Note:

1. Valid combinations of message category and message type are UH, UL and UT only.

2. The actual value is determined by applying the number of decimal place(s) for EAS value provided.

3. UT message carries the latest EAS value for the underlying.

4. UH/UL message carries the adjustment of the highest & lowest figures for the commodity

Index value. (Commodity index value is not available for Hang Seng Family of Indices)

5. These message types are available to equity index (except mini products) and equity products.

6. The Contents always carries the latest values in the market. HKEx may disseminate the latest values at any time to update the market information.

***4.6 Quotation Message (5 levels)（*QC、QD*）***

|  |  |  |  |
| --- | --- | --- | --- |
| **Field group** | **Description** | **Length** | **Reference** |
| **SOH** | **SOH control character** | **1** | **HEX 01** |
| Header | Message Category | 1 | Character |
| Message Type | 1 | Character |
| Real-time Indicator | 1 | Numeric |
| Time Stamp | 6 | Numeric; HHMMSS |
| **STX** | **STX control character** | **1** | **HEX 02** |
| PRS Series  ID | Commodity Code | 5 | Please refer to Appendix A |
| Instrument Code | 3 | Please refer to Appendix B |
| Expiry Date | 4 | Numeric; MMYY |
| Strike Price | 7 | Numeric; *(Note 2)* |
| Contents | Field delimiter | 1 | “\” |
| Number of Decimal Place(s) for  Quote fields | 1 | Numeric |
| Field delimiter | 1 | “\” |
| 1st Best Bid/Ask Quote |  | Numeric; *(Note 2 & 3)* |
| Field delimiter | 1 | “\” |
| 1st Best Demand |  | Numeric |
| Field delimiter | 1 | “\” |
| 2nd Best Bid/Ask Quote |  | Numeric; *(Note 2 & 3)* |
| Field delimiter | 1 | “\” |
| 2nd Best Demand |  | Numeric |
| Field delimiter | 1 | “\” |
| 3rd Best Bid/Ask Quote |  | Numeric; *(Note 2 & 3)* |
| Field delimiter | 1 | “\” |
| 3rd Best Demand |  | Numeric |
| Field delimiter | 1 | “\” |
| 4th Best Bid/Ask Quote |  | Numeric; *(Note 2 & 3)* |
| Field delimiter | 1 | “\” |
| 4th Best Demand |  | Numeric |
| Field delimiter | 1 | “\” |
| 5th Best Bid/Ask Quote |  | Numeric; *(Note 2 & 3)* |
| Field delimiter | 1 | “\” |
| 5th Best Demand |  | Numeric |
| **ETX** | **ETX control character** | **1** | **HEX 03** |

Note:

1. Valid combinations of message category and message type are QC and QD only.

2. The actual value is determined by applying the number of decimal place(s) for quote fields provided.

3. The price field may contain (-) sign to imply as negative price value.

4. QC message type is triggered by any best ask price and demand update on 5 levels.

5. QD message type is triggered by any best bid price and demand update on 5 levels.

6. QE message type is triggered by the update of COP(Calculated Opening Price) on the series.

7. These message types are only available to information vendors subscribing package with price depth.

8. For series with auction order (A.O), when there is auction quotation input into the market, the 1st

best bid and 1st best ask quotes will be defined as “9999999”. In HKATS, the auction quotation

(i.e. “9999999”) may be updated into 2nd level when the best price is recalculated during auction session. All price levels will be updated immediately in the next second.

9. The Contents always carries the latest values in the market. HKEx may disseminate the latest

values at any time to update the market information.

***4.7 Calculated Opening Price (COP) Message（*QE*）***

|  |  |  |  |
| --- | --- | --- | --- |
| **Field group** | **Description** | **Length** | **Reference** |
| **SOH** | **SOH control character** | **1** | **HEX 01** |
| Header | Message Category | 1 | Character |
| Message Type | 1 | Character |
| Real-time Indicator | 1 | Numeric |
| Time Stamp | 6 | Numeric; HHMMSS |
| **STX** | **STX control character** | **1** | **HEX 02** |
| PRS Series  ID | Commodity Code | 5 | Please refer to Appendix A |
| Instrument Code | 3 | Please refer to Appendix B |
| Expiry Date | 4 | Numeric; MMYY |
| Strike Price | 7 | Numeric; *(Note 2)* |
| Contents | Field delimiter | 1 | “\” |
| Number of Decimal Place(s) for  Price field | 1 | Numeric |
| Field delimiter | 1 | “\” |
| COP |  | Numeric; *(Note 2)* |
| Field delimiter | 1 | “\” |
| Reserved |  | Numeric |
| **ETX** | **ETX control character** | **1** | **HEX 03** |

Note:

1. Valid combination of message category and message type is QE only.

2. The actual value is determined by applying the number of decimal place(s) for price field provided.

3. QE message type is triggered by the update of COP(Calculated Opening Price) on the series.

4. The Contents always carries the latest values in the market. HKEx may disseminate the latest values at any time to update the market information.

***4.8 Series Definition Message（*DS、DF*）***

|  |  |  |  |
| --- | --- | --- | --- |
| **Field group** | **Description** | **Length** | **Reference** |
| **SOH** | **SOH control character** | **1** | **HEX 01** |
| Header | Message Category | 1 | Character |
| Message Type | 1 | Character |
| Real-time Indicator | 1 | Numeric |
| Time Stamp | 6 | Numeric; HHMMSS |
| **STX** | **STX control character** | **1** | **HEX 02** |
| PRS Series  ID | Commodity Code | 5 | Please refer to Appendix A |
| Instrument Code | 3 | Please refer to Appendix B |
| Expiry Date | 4 | Numeric; MMYY |
| Strike Price | 7 | Numeric; *(Note 2)* |
| Contents | Field delimiter | 1 | “\” |
| Series Name in HKATS | 40 | Alphanumeric; (*Note 7*) |
| Field delimiter | 1 | “\” |
| Number of Decimal Place(s) for  Price fields | 1 | Numeric |
| Field delimiter | 1 | “\” |
| Market ID |  | Numeric;  Please refer to Appendix D |
| Field delimiter | 1 | “\” |
| Last Trade Date | 8 | Numeric; YYYYMMDD |
| Field delimiter | 1 | “\” |
| Trading Status | 1 | Numeric; Values(1, 2) *(Note 8)* |
| Field delimiter | 1 | “\” |
| Trading Currency | 3 | Alphanumeric |
| Field delimiter | 1 | “\” |
| Number of Reference Series | 1 | Numeric; Values(0, 2 .. 4) |
| *The occurrence of the following field group depends on the value of “Number of Reference Series” (if > 0)* | | | |
| 1st Reference  PRS Series  ID (if Number of Reference Series => 1) | Field delimiter | 1 | “\” |
| Commodity Code | 5 | Please refer to Appendix A |
| Instrument Code | 3 | Please refer to Appendix B |
| Expiry Date | 4 | Numeric, MMYY |
| Strike Price | 7 | Numeric; *(Note 2)* |
| :  : | | | |
| 4th Reference  PRS Series ID (if Number of Reference Series = 4) | Field delimiter | 1 | “\” |
| Commodity Code | 5 | Please refer to Appendix A |
| Instrument Code | 3 | Please refer to Appendix B |
| Expiry Date | 4 | Numeric, MMYY |
| Strike Price | 7 | Numeric; *(Note 2)* |
| *End of variable field group* | | | |
| **ETX** | **ETX control character** | **1** | **HEX 03** |

Note:

1. Valid combinations of message category and message type are DS and DF only.

2. The actual value is determined by applying the number of decimal place(s) for price fields provided.

3. The Series Definition (type code ‘S’), which is disseminated before market open, carries the details of the tradable series on the business day. PRS Plus may send this kind of message for a newly created series during trading hours to reflect the trading activities in the derivatives market, or PRS Plus may resend this message for an existing series during trading hour for the update of trading status of the series.

4. The Next Day Series Definition (type code ‘F’), which is disseminated after market close, carries the definition of tradable standard series on the next business day. All Combo series are excluded.

5. Valid values of Number of Reference Series field are 0, 2 - 4.

For standard HKATS series, the number of reference series is 0.

For standard combo/spread series, the current number of reference series is 2.

6. The reference series are the baits of a combo series.

7. The field “Series Name in HKATS” may contain the same character of Field Delimiter “\”. The field is fixed length and padded with trailing space(s) to form a fixed 40-character string.

8. Valid values of Trading Status field are 1 and 2 only.

1 = Suspended

2 = Not Suspended

Example 1) Normal series

˥DS1080001 HSI00401090000000\HSIF9\

0\34\20090129\2\HKD\0L

˥DF1200001 HSI00401090000000\HSIF9\

0\34\20090129\1\HKD\0L

Example 2) Combo series

˥DS1080002 HSI17101090014600\HSI146A9/142M9\

0\34\20090129\2\HKD\2\HSI02201090014600\HSI02301090014200L

Note: ‘’ is a space character in data feed.

***4.9 Market/Commodity Status Message（*MC、MM*）***

|  |  |  |  |
| --- | --- | --- | --- |
| **Field group** | **Description** | **Length** | **Reference** |
| **SOH** | **SOH control character** | **1** | **HEX 01** |
| Header | Message Category | 1 | Character |
| Message Type | 1 | Character |
| Real-time Indicator | 1 | Numeric |
| Time Stamp | 6 | Numeric; HHMMSS |
| **STX** | **STX control character** | **1** | **HEX 02** |
| Contents | Market ID / Commodity Code | 5 | Alphanumeric;  Please refer to Appendix D / A |
| Field delimiter | 1 | “\” |
| Instrument Code | 3 | Numeric;  Filled with zero if not applicable; Please refer to Appendix B |
| Field delimiter | 1 | “\” |
| Status Code |  | Numeric;  Please refer to Appendix E |
| **ETX** | **ETX control character** | **1** | **HEX 03** |

Note:

1. Valid combinations of message category and message type are MC and MM.

2. Message type ‘C’ declares the status of a commodity code across multiple markets. If instrument code is provided, the status declaration is applied to that particular product only.

3. Message type ‘M’ declares the status of a market/instrument. MM contains “Market ID” and/or

“Instrument Code”.

4. The message arrival sequence is totally reflecting the market information in HKATS. MC/MM

and trade/quotation messages may be interlaced broadcasting during the change of market state.

5. The Contents always carries the latest values in the market. HKEx may disseminate the latest values at any time to update the market information.

Example of HHI market (instrument level) pre-open session

˥MM1091500 38\004\4L

Example of HSI market (market level) open session

˥MM1091500 34\000\3L

Example of HKB (commodity level) suspend for trading

˥MC1091500 HKB\000\90L

Note: ‘’ is a space character in data feed.

***4.10 Heartbeat Message（*HB*）***

|  |  |  |  |
| --- | --- | --- | --- |
| **Field group** | **Description** | **Length** | **Reference** |
| **SOH** | **SOH control character** | **1** | **HEX 01** |
| Header | Message Category | 1 | Character |
| Message Type | 1 | Character |
| Real-time Indicator | 1 | Numeric |
| Time Stamp | 6 | Numeric; HHMMSS |
| **STX** | **STX control character** | **1** | **HEX 02** |
| Contents | Reserved (for internal use) | 1 | Blank |
| **ETX** | **ETX control character** | **1** | **HEX 03** |

Note:

1. Valid combination of message category and message type is HB.

2. Heartbeat message is sent every 15 seconds (approx.).

3. Real-time indicator is defined as “1”.

***Sample message:***

Time stamp

˥HB1110117 L

Real-time indicator

Note: ‘’ is a space character in data feed.

***Purpose of the Message:***

This message indicates the connection is alive between PRS Plus and information vendor’s system.

***How to use:***

This message is broadcast every 15 seconds when the communication line is idle. Information vendor can make use of the heartbeat messages and fail over to the alternate PRS Plus server if **2 or more**

heartbeat messages are lost.

**5 DATA FIELD CHARACTERISTICS**

***5.1 Message Category/Code***

|  |  |  |
| --- | --- | --- |
| **Message**  **Category** | **Message**  **Type** | **Description** |
| T | T | Trade Detail |
| T | V | Trade Volume Adjustment |
| T | S | Trade Statistic |
|  |  |  |
| Q | C | Ask (Sell) Price Quotation with 5 levels |
| Q | D | Bid (Buy) Price Quotation with 5 levels |
| Q | E | Calculated Opening Price (COP) |
|  |  |  |
| C | S | Start of Day Message |
| C | E | End of Day Message |
| C | F | Control/Freeform/Alert Message |
|  |  |  |
| S | S | Start of Day Summary Statistics |
| S | M | HSI Futures Settlement Price Summary Statistics |
|  |  | Market Close Summary Statistics |
| S | E | End of Day Summary Statistics |
|  |  |  |
| U | T | EAS and/or Cash of Underlying |
| U | H | Underlying High Price Correction |
| U | L | Underlying Low Price Correction |
|  |  |  |
| H | B | Heartbeat |
|  |  |  |
| D | S | Series Definition |
| D | F | Next Day Series Definition |
|  |  |  |
| M | C | Commodity Status |
| M | M | Market Status |

***5.2 Real-time Indicator***

This indicator shows whether the downloaded PRS Plus message is real-time data. A value of ‘1’ means it is a real-time message, while ‘0’ for snapshot or market data retransmission.

***5.3 Time Stamp***

This time stamp field indicates the transmission time in HHMMSS format where HH=hour, MM=minutes and SS=second.

***5.4 Snapshot Image for Recovery***

Once an information vendor connects to PRS Plus, snapshot image is automatically downloaded at a predefined transmission rate and has a lower sending priority than a real time message.

***Example 1:***

˥QC0115834 HSI02209030013400\0\2080\125\2082\39\2085\15\2087\5\2091\1L

˥**QC0115834 HSI****02309030013600\0\2105\65\2118\9\2122\15\2125\5\0\0**L

˥QC0115834 HSI02309030013800\0\2550\1\2580\1\0\0\0\0\0\0L

˥QC0115834 HSI02209030014000\0\2850\1\0\0\0\0\0\0\0\0L

˥**QC1115908 HSI****02309030013600\0\2104\5\2105\85\2118\10\2122\6\2125\1**L

˥QC0115834 HSI02209030014200\0\3180\1\0\0\0\0\0\0\0\0L

˥QC0115834 HSI00409030000000\0\3600\1\0\0\0\0\0\0\0\0L

***Example 2:***

˥UT1120032 HSI\0\13259\0\0\L

˥UT0115945 HKB\2\7668\0\0\L

˥UT0115946 HSI\0\13288\0\0\L

Time of message would be earlier than the last image if there is no update. Note: ‘’ is a space character in data feed.

***Purpose of the function:***

Information vendors receive snapshot image automatically after established a PRS Plus connection. Only the recent snapshot image is downloaded. Information vendors are required to sort the messages

according to their associated timestamp for the latest market information.

***How to use:***

Information vendors receive the latest snapshot image of the INSTRUMENT after established a connection to PRS Plus. To minimize the delay of delivering real time message, PRS Plus downloads

snapshot image at a predefined rate with priority lower than the real time message.

As demonstrated in Example 1, during the delivery of snapshot messages, if there is an update of a particular series, real time message would be sent at once.

Also demonstrated in Example 2, real time message is sent during the download of snapshot image. Information vendors should compare the timestamp in the message with the last update of the same series. If the timestamp on snapshot message is earlier than that of the real time message, information vendors should ignore the snapshot image.

***Scope of message recovery:***

 Message “DS”/”DF” (by default; refer Appendix G) followed by “TS”, “TV”, “TT”, “QC” and

“QD” would be delivered as snapshot messages once a connection is established.

 To minimize the impact on real-time data from PRS Plus system, snapshot image would be disseminated at a predefined rate per second.

**6 MARKET MESSAGE SCHEDULE**

***6.1 Summary Statistics Broadcasting Time***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Commodity code / Product type** | **Description and Message type** | | | |
| **Start-of-day Summary Statistics**  **SS** | **Settlement Price of HSI Futures Summary Statistics**  **SM** | **Market Close Summary Statistics**  **SM** | **End-of-day Summary Statistics**  **SE** |
| HSI Futures | 7:45 | 17:30# | \*  18:30 – 20:30 | ^  20:30 – 22:00 |
| EF3 | N/A |
| HSI Options, MHI, HHI, MCH |
| HB1, HB3 |
| GLD |
| LSF |
| LSO | 19:00 – 20:30& |

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Message Type** | **Statistic fields** | **Market** |
|  | SS | [Gross & Net OI before market open] [Settlement before  market open] | All markets |
| # | SM  (Settlement price) | [Open – Buy/Sell/Trade] [Close – Buy/Sell] [Day High/Low]  [Settlement] [Cumulative Volume] [Gross & Net OI before market open] | HSI Futures  only |
| \* | SM  (Market close) | [Open – Buy/Sell/Trade] [Close – Buy/Sell] [Day High/Low]  [Settlement] [Cumulative Volume] [Gross & Net OI before market open] | All markets  (except LSO) |
| & | SM  (Market close) | [Open – Buy/Sell/Trade] [Close – Buy/Sell] [Day High/Low]  [Settlement] [Cumulative Volume] [Gross & Net OI] | LSO only |
| ^ | SE | [Open – Buy/Sell/Trade] [Close – Buy/Sell] [Day High/Low]  [Settlement] [Cumulative Volume] [Gross & Net OI] | All markets |

Remarks:

N/A - Not Applicable

Note:

1. On half-day trading day,

# \* & : The broadcasting time of SM (HSI Futures settlement price and market close) messages would be shifted 3 hours (approx.) earlier than specified in the timetable.

^ : The broadcasting time of SE messages would be earlier than that specified in the above table.

2. The actual broadcasting time may vary due to operation issue.

**7 MARKET DATA RETRANSMISSION**

***7.1 Data Retransmission Function***

DESCRIPTION

PRS Plus Data Retransmission function provides an application interface for information vendors to retrieve missing market data from PRS Plus for the purpose of data recovery. PRS Plus listens to any request submitted by information vendor applications for downloading market data from the first lost message detected just before disconnection (for recoverable gaps) or from a complete database download (for gaps too large to recover). When an information vendor connection is accepted, PRS Plus will download the requested market data according to the requester’s parameters. Upon completion of the download process, PRS Plus would terminate the information vendor connection immediately.

The data format is conformed to **Section 4** of this document. NETWORK INFRASTRUCTURE

The existing network infrastructure with all information vendors is shared for data retransmission.

A **new host IP address and a new port number** are provided to information vendors for submitting data download request. Once the requester’s status and input parameters are validated, the intra-day data will be disseminated to the information vendor according to its request.

For network infrastructure information, please refer to **Section 3.2** in this document. PERFORMANCE

Blocked socket mode is used between PRS Plus Data Retransmission Server and Information Vendor application to ensure the reliability of data transfer. If the data download channel is suddenly disconnected, information vendor is required to re-establish the connection with PRS Plus, and downloads data from the last received message.

RECOVERY MECHANISM

PRS Plus Data Retransmission Server is running in TMH site (HKFE Secondary Data Centre) as active mode and running in the CES site (HKFE Primary Data Centre) as backup mode. In case of failure, the backup PRS Plus Data Retransmission Server will be enabled in the CES site. Information vendors, whose have subscribed the PRS Plus Data Retransmission function, would be notified to change the connecting IP address for data download.

PROCESS FLOW DIAGRAM

Start

Connect to DR

Connected No

?

Check host & IP

address

Yes

Send download request to DR

Is DR

accepted?

No DR sends negative download

acknowledgement

(DN) to Vendor

Yes

DR sends positive download acknowledgement (DA) to Vendor

Look up for the reject reason as described in Section 7.4

Wait

No

Is DA

received?

Is system busy?

Yes

Yes No

DR retransmits the market data to Information Vendor, followed by a download completion message (DC)

Receive and process messages

Wait

No

Is message received?

Yes

Continue to receive the requested data

No

Is DC

received?

Yes

End

***7.2 Data Recovery Period***

The PRS Plus Data Retransmission Server provides a channel for information vendors to request retransmitting missing market data from the PRS Plus in current day for data recovery purpose. The sequence of market messages disseminated from PRS Plus Data Retransmission Server may not be in the exact sequence as received through the real time data channel. The purpose of the data retransmission is mainly for the recovery of missing price movement during a specific period of time or for the recovery of whole day data after day end.

***7.3 Supported Message Type***

All the existing message types specified in Section 5.1 are supported. If there is new message type to be inserted, it will be included in the PRS Plus automatically.

Note: Retransmission does not contain “Heartbeat message type”.

***7.4 Making a Download Request***

The Information Vendor application sends a download request (DR) to PRS Plus Data Retransmission Server with the following parameters: (Please note that the system allows the retrieval of current day data only.)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **Mandatory** | **Length** | **Data Type/ Format** | **Example** |
| Start Time | Yes | 6 | Numeric, HHMMSS | 102000 |
| End Time | No | 6 | Numeric, HHMMSS | 105530 |
| *Reserved* | *-* | *8* | *00000000* | *00000000* |
| Transfer Rate | No | 3 | Numeric, N(3) | 100 |

 End Time

If the End Time is not specified, it will be set to the time when the download request is submitted by the Information Vendor. If an invalid request is received from the information vendor, an error

code will be returned.

 Transfer Rate

Transfer rate defines the number of messages to be downloaded from the server per second. If the transfer rate is not specified or is over the pre-defined maximum transfer rate in the system, the maximum system transfer rate will be used.

The following is an example of a download request (DR):

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| DR | 102000 | 105530 | 00000000 | 100 | ␃ |

Note: *All fields in a download request are fixed length and padded with leading zero. Optional fields are filled with zeros if they are not used.*

Upon receipt of download request from information vendor, DR responses with either positive download acknowledge (DA) or negative download acknowledge (DN) with the following fields:

 Download request respond time (e.g. ‘123500’)

 Start time (e.g. ‘102000’)

 End time (e.g. ‘105530’)

 Today’s date (e.g. ‘20030616’)

 Transfer rate (e.g. ‘100’. Show ‘999’ when system default is used.)

 2-digit error code [for DN only] (e.g. ‘03’)

The following is an example of a positive download acknowledge (DA) message:

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ␁ | DA | 0 | 123500 | ␂ | 102000 | 105530 | 20030616 | 100 | ␃ | ↵ | ␊ |

The following is an example of a negative download acknowledge (DN) with error code 03:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ␁ | DN | 0 | 123500 | ␂ | 102000 | 105530 | 20030616 | 100 | **03** | ␃ | ↵ | ␊ |

The following are possible error codes:

|  |  |
| --- | --- |
| **Error Code** | **Explanation** |
| 01 | Unauthorized access of an information vendor. The IP address of the information  vendor is not authorized. |
| 02 | DR is busy since the maximum number of concurrent connection is encountered.  When PRS Plus/DR reaches this limit, all new coming information vendor connections are held for a configurable timer and then disconnected with this error code. |
| 03 | Information vendor specific daily download limit is exceeded. For example, if an  information vendor is allowed to connect for 5 times daily (only those with successful download counts), this error code will be issued if the Information Vendor attempts to connect at 6th time, with regardless of which instance (primary, or secondary, etc) of/DR the information vendor attempts to connect to. |
| 04 | Information vendor specific maximum concurrent connection limit is exceeded. For  example, if an information vendor is allowed for 2 concurrent connections, this error code will be issued if the information vendor attempts to make the 3rd concurrent connection. |
| 10 | Start-time specified in the download request is invalid |
| 11 | End-time specified in the download request is invalid |
| 13 | Transfer rate specified in the download request is invalid |
| 14 | Start time later than End-time, download reject |
| 17 | End-time beyond the request time |
| 20 | Invalid message type |
| 21 | Timeout before reading download request from information vendor |
| 91 | Unable to determine record length from market data file |
| 92 | Unable to open market data file |
| 93 | Unable to read a record from market data file |
| 94 | Unable to create thread to handle new information vendor connection |

Note:

For some errors due to system constraints or limitations, the negative download acknowledges (DN)

may have the following values:

 Start time is blank

 End time is equal to the download request respond time

 Transfer rate is reset to the default system setting

If a negative download acknowledge is sent to information vendor, the socket is then closed.

If a positive download acknowledge is sent to information vendor, retransmission of the market data would be downloaded in the same format as in real-time market data. The real-time indicator is set to

‘0’.

After the requested market data is retransmitted to information vendor, a download completion (DC) message would be sent to information vendor before DR closes the socket. The download completion message contains (with reference to STX) the following information for reconciliation:

- the first two fields (i.e. Start-time, End-Time) are extracted directly from download request

- the third field indicates the date of the download

- the fourth field shows the transfer rate

- the fifth field specifies the downloaded line count

The following is an example of a download completion (DC) message:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ␁ | DC | 0 | 123500 | ␂ | 102000 | 105530 | 20030616 | 100 | 000012545 | ␃ | ↵ | ␊ |

***7.5 Retransmission Limitation***

CONCURRENT CONNECTIONS

Each information vendor can only establish ONE connection through one set of leased lines at any one time. Excessive connections would be rejected by the PRS Plus Data Retransmission Server.

ATTEMPT PER BUSINESS DAY

Each information vendor is limited to connect the PRS Plus Data Retransmission server for a maximum of 10 times a day. Excessive attempts would be rejected.

Note:

If an information vendor connection is accepted by the PRS Plus Data Retransmission server, information vendor should submit a download request within the next 30 seconds. Otherwise, a DN with error code

‘21’ would be sent to the information vendor and the connection would be terminated by the server

automatically. However, this connection attempt is not being counted.

AUTHORIZED CONNECTION

In the same manner of receiving real time data from PRS Plus, each information vendor should be assigned an authorized IP address to connect the PRS Plus Data Retransmission Server. All connections other than the assigned IP address will be rejected.

BANDWIDTH LIMITATION

Since information vendors are using the same network / server to receive both real time data and data recovery from PRS Plus, they must try to prevent this activity during the trading hour. Real time data disseminated from PRS Plus is sending in blocking mode, and data lost may occur if the bandwidth is over consumed by retrieving a large volume of data during a volatile market.

AVAILABLE BUSINESS DAY

Only current business day data is available for download from the PRS Plus Data Retransmission server. All connections would be terminated after disseminated the End-of-day control message (‘CE’) through the real-time data channel. The historical data will then be removed after the execution of PRS Plus end- of-day process.

TRANSMISSION SPECIFICATION List of Commodity Code

**APPENDIX A: LIST OF COMMODITY CODE**

**Exchange Fund Note Futures: Code Description**

EF3 Three-Year Exchange Fund Note Futures

**Index Futures and Options: Code Description**

HSI Hang Seng Index Futures / Options

MHI Mini Hang Seng Index Futures / Options

HHI H-shares Index Futures / Options (underlying index: Hang Seng China Enterprises Index) MCH Mini H-shares Index Futures

XHS Flexible Hang Seng Index Options XHH Flexible H-shares Index Options DHS HSI Dividend Point Index Futures

DHH HSCEI Dividend Point Index Futures

**Hong Kong Interbank Offered Rate (HIBOR) Futures: Code Description**

HB1 One-Month Hong Kong Interbank Offered Rate Futures

HB3 Three-Month Hong Kong Interbank Offered Rate Futures

**Hong Kong Interbank Offered Rate (HIBOR) Contracts: Code Description**

H1S 1-Month HIBOR Strip Contracts

H3S 3-Month HIBOR Strip Contracts

Note:

- For the composition of HIBOR Strips, please refer to HKEx website under the HIBOR Futures of

Derivatives Products in the Products and Services Section.

**Commodity Futures: Code Description**

GLD Gold Futures

**Local Stock Futures (LSF) & Options (LSO):**

Please refer to the List of Stock Futures and the List of Stock Option Classes provided on the HKEx website under the Derivatives Products in the Products and Services Section.

Note:

- HKEx notice will be sent out for any updates on the List of Stock Futures and the List of Stock Option

Classes.

**APPENDIX B: LIST OF INSTRUMENT CODE**

|  |  |
| --- | --- |
| **Instrument Code** | **Description** |
| 004 | Futures |
| 006 | Call (American style) |
| 007 | Put (American style) |
| 022 | Call (European style) |
| 023 | Put (European style) |
| 119 | Time Spread (level=1) |
| 120 | Time Spread (level=2) |
| 121 | Time Spread (level=3) |
| 122 | Time Spread (level=4) |
| 149 | Time Spread (level=5) |
| 150 | Time Spread (level=6) |
| 151 | Time Spread (level=7) |
| 152 | Time Spread (level=8) |
| 165 | Time Spread (level=9) |
| 170 | Options Straddle |
| 171 | Options Strangle |
| 172 | Standard Combination series for Stock Options Market  (SOM) – Synthetic Futures |
| 255 | Payment Currency |

Note:

Instrument codes 004, 006, 007, 022 and 023 are for normal series whereas the remaining are for combo series.

**APPENDIX C: LIST OF DEAL TYPE**

|  |  |  |
| --- | --- | --- |
| **Deal**  **Type** | **Description** | **Last traded price &**  **volume** |
| 1 | Matched by system, automatically. | Current trades |
| 2 | Matched by system, manually. | Current trades |
| 3 | Matched outside exchange, different brokers. | Previous trade |
| 4 | Matched outside exchange, different brokers, reg. by exchange. | Previous trade |
| 5 | Matched outside exchange, one broker. | Previous trade |
| 6 | Matched outside exchange, one broker, reg. by exchange. | Previous trade |
| 7 | Combination order matched against another combination order when  matched by the Exchange, electronically. | Previous trade |
| 20 | Deal made at the end of an auction. | Current trades |
| 32 | Trade from Bulletin Board. | Previous trade |
| 33 | Trade from Bulletin Board, standard combo. | Previous trade |
| 34 | Trade from Bulletin Board, non-standard combo. | Previous trade |
| 35 | Trade from Bulletin Board, non-standard combo. | Previous trade |

Note:

The Last Trade price and Last trade volume for some of the deal types are not updated.

**APPENDIX D: LIST OF MARKET ID**

|  |  |
| --- | --- |
| **Market ID** | **Description** |
| 2 | Stock Futures |
| 3 | Three-Year Exchange Fund Note Futures |
| 8 | Gold Futures |
| 16 | Mini Hang Seng Index Futures / Options |
| 20 | Stock Options |
| 24 | HIBOR |
| 27 | HSI Dividend Point Index Futures  HSCEI Dividend Point Index Futures |
| 34 | Hang Seng Index Futures / Options |
| 35 | Flexible Hang Seng Index Options |
| 37 | Flexible H-shares Index Options |
| 38 | H-shares Index Futures / Options |

PRICE REPORTING SYSTEM (PLUS) Appendix E TRANSMISSION SPECIFICATION List of Status Code

**APPENDIX E: LIST OF STATUS CODE**

|  |  |
| --- | --- |
| **Status Code** | **Description** |
| 1 | OPEN ALLOCATION SESSION  (Part of pre-opening phase, used for COP calculation) |
| 2 | MARKET CLOSED |
| 3 | MARKET OPEN |
| 4 | PREOPEN SESSION |
| 5 | PREOPEN ALLOCATION SESSION  (Part of pre-opening phase, used for auction order input only) |
| 6 | MARKET PAUSE  Note: Trade matching for pre-opening or lunch break |
| 7 | PRE-MARKET ACTIVITIES  (It is applicable to markets without PREOPEN SESSION arrangement) |
| 8 | CLEARING SESSION START  (Clearing activities can be started) |
| 9 | CLEARING SESSION CLOSED  (Clearing activities are ended) |
| 90 | COMMODITY SUSPENDED |
| 91 | COMMODITY RESUME TRADING |

**APPENDIX F: REMARKS ON TRADE MESSAGE**

Definition of TT message type

TT message is defined as the trade information provided from HKATS. TT message contains the traded volume, last trade price and the cumulative volume for series. For pure display purpose, it would synchronize with the values display in HKATS (trade information) window.

Trading in HKATS

After a deal is matched in HKATS, PRS Plus would provide a TT message for updates. The latest cumulative volume is accumulated from previous cumulative volume and current trade volume of the

series. The trade price and trade volume are also provided in the latest TT message.

Cancelled trade and Rectified trade in DCASS

Cancelled trade performed during trading hour would cause the cumulative volume decrease from the previous value. A rectified trade would contain the broadcast of a cancelled trade and a new trade. The last trade price, trade volume and cumulative volume would be updated after a cancelled trade.

Example:

Normal trade

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Message | Series | Price | Volume | Cumulative  Volume |
| TT | HSIZ4 | 12300 | 11 | 17745 |
| TT | HSIZ4 | 12400 | 10 | 17755 |
| TT | HSIZ4 | 12200 | 11 | 17766 |
| **TT** | **HSIZ4** | **12200** | **11** | **17755** |
| **TT** | **HSIZ4** | **12300** | **2** | **17757** |

Normal trade

Normal trade

**Cancelled trade**

**Rectified trade**

**Question & Answer**

1) **Question:** In the cancel trade activity, what will be the trade price and trade volume for the extra TT

message?

**Answer:** The broadcast would contain the latest trade price, **the latest trade volume** and the new cumulative volume in TT message.

2) **Question:** Will the corresponding TV (Trade Volume Correction) message be sent after Trade

Cancellation?

**Answer:** After market close for the morning session or for the day, market operation would send a TV message to update the cumulative volume. During trading hour, TV would not be sent by market operation.

3) **Question:** We have found that the sum of volume for all TT does not equal to the Cumulative Volume, our clients may ask whether the total number of ticks is complete or not.

**Answer:** Please note that TT message is used to provide the latest image of trade information in HKATS. Summation of trade volume in TT messages does not always come up with the same figure as the latest cumulative volume since the last trade volume of some deal types are not provided in TT

message (Appendix C). Vendors are recommended to use the Cumulative Volume provided for market total.

4) **Question:** There is a message TV (Estimated contracts traded correction) with zero price but with cumulative volume increases. How can the price be determined for these transactions?

**Answer:** Cancel trade and Rectify trade would not trigger a TV message.

TV message is used to correct the cumulative volume when HKFE Market Operation considers that there is a need to correct the cumulative volume in market (usually end of day adjustment).

Derivatives Market Data Transmission Spec (PRS Plus) Version 1.02.doc 41 / 43

**APPENDIX G: RECOVERY OPTION OF SERIES DEFINITION MESSAGE**

Description

Series Definition message (‘DS’) carrying the definition of all series in HKATS is disseminated at the start of a business day at around 7:30am. If information vendor connects after “DS” is disseminated, “DS” message will still be sent to vendor’s connection as default before other message types. There is an option flag for information vendor to choose skipping the download of “DS” message during connection failover activities. Information vendor can instruct PRS Plus to skip the dissemination of “DS” message, and proceed to receive snapshot and real-time market messages immediately after reconnection.

Similarly, PRS Plus disseminates the Next Day Series Definition message (“DF”) after market close at around

8pm. The same option flag mentioned earlier also applies to the choice of downloading “DF” message.

Performance

When an information vendor submits a valid option flag within 3 seconds after connected to PRS Plus, PRS Plus would skip sending series definition message to the connected channel and disseminate snapshot and real-time data immediately.

“DS” message carries the definition and mapping of series information traded in HKATS on the current business day. Therefore, most of the vendor application system may handle ‘DS’ message for a fresh start up. Under failover scenario, information vendor may not require “DS” when re-establishing connection to PRS Plus. For fast recovery after disconnection, vendor application is suggested to have an intelligent to determine the necessity of downloading “DS” message.

The length of ‘DS’ message is around 120 bytes. PRS Plus can disseminate in full strength around 4000 series per second on 5-6Mbps bandwidth. The overall time finish the dissemination of “DS” depends on vendor’s processing speed and the volume of series in the market.

For next day effective series (except combo series), PRS Plus disseminates such information through “DF” message after market close. Since it does not affect the transmission of real-time market data, performance concern during the recovery of series definition message will not be discussed here.

Download

PRS Plus would broadcast the first round of series definition message to all connected information vendors before market open. The option flag has no effect if information vendor connects to PRS Plus before the first round of “DS” is being broadcasted. It also has no effect to the download of “DF” before its scheduled broadcast timetable.

Information vendor, who is late connecting to PRS Plus or intends to skip the series definition message, needs to provide an input parameter when establishing a new PRS Plus connection. The format of input string contains 3 characters:

|  |  |  |  |
| --- | --- | --- | --- |
| **Field group** | **Description** | **Length** | **Reference** |
| **SOH** | **SOH control character** | **1** | **HEX 01** |
| Option Flag | “1” - *Skip the downloading of*  *series definition messages*  Others - Ignore | 1 | Alphanumeric |
| **ETX** | **ETX control character** | **1** | **HEX 03** |

PRS Plus would validate the string and option flag from information vendor to ensure that the request is valid. If the syntax matches with the above specification, PRS Plus will skip the dissemination of series definition message immediately.

Missing or invalid syntax will be ignored and series definition messages (if present) will be sent as default.

Operation Flow Diagram

Start

Attempt to connect

PRS Plus

Connected No

?

Yes

Yes

Option flag sent <= 3 sec?

Check host & IP

address

No

Valid flag?

No Download Series

Definition messages if

present

Yes

Receive and process real-time and snapshot messages

End

Download Request Limitation

The limitation of the series definition download attempt is controlled by the daily connection constraint as described in **Section 3.2.3 Connection Constraint**.