

# Johannesburg Stock Exchange

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## Trading and Information Solution

### JSE Specification Document

### Volume 07 – Indices Feed (FAST – UDP)

|                        |                           |
|------------------------|---------------------------|
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# 1 DOCUMENT CONTROL

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## 1.2 Document Information

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|---------------------|--|
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## 1.3 Revision History

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| Date                              | Version              | Description   |
|-----------------------------------|----------------------|---|
| 22 July 2011                      | 1.00                 | Initial Draft   |
| 30 November 2011                  | 1.01                 | JSE Specifications Update   |
| 5 July 2013                       | 2.00                 | Minor document corrections.   |
| 30 July 2013                      | 2.01                 | Inclusions of sequence numbers on Heartbeat message   |
| 29 February 2016                  | 3.00                 | Integrated Trading and Clearing Project changes   |
| 19 October 2016                   | 3.01                 | Section 3.2 updated with expected behaviour when the Net change in index value                          |
| <a href="#">07 September 2020</a> | <a href="#">4.00</a> | <a href="#">6.3.1.2 FAST Template updated to reflect the changes to field encodings during Upgrade.</a> |

## 1.4 References

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[FAST 1.1 Session Control Protocol Specification](#)  
[FIX 5.0 \(Service Pack 2\) Specification](#)

## 1.5 Contact Details

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|   |   |
|---|---|
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## 1.6 Definitions, Acronyms and Abbreviations

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|                    |   |
|--------------------|---|
| <b>Client</b>      | A Recipient connected to the Replay channel of the indices feed. The replay channel is sufficient to recover missed messages on the real time channel.  |
| <b>FAST</b>        | The JSE implementation will be based on Version 1.1 of the Session Control Protocol of the FIX Adapted for STreaming Protocol specification.<br><br>FAST is a binary encoding method for message orientated data streams. The encoding method reduces the size of data streams by removing redundant data, thus leveraging data affinities of a stream. The remaining data in the stream is then sterilized with respect to a control structure (a template) through binary encoding in the template. |
| <b>FIX</b>         | Version 5.0 (Service Pack 2) of the Financial Information Exchange Protocol.  |
| <b>FIX Session</b> | A bi-directional stream of ordered messages between the client and server within a continuous sequence number series.   |
| <b>JSE</b>         | Johannesburg Stock Exchange   |
| <b>NSX</b>         | Namibian Stock Exchange   |
| <b>Recipient</b>   | A subscriber to the indices feed.   |
| <b>Server</b>      | The FAST indices gateway at the JSE for the JSE and NSX markets.  |

## 2 OVERVIEW

JSE market data will be published through various services each service disseminating many different types of market data.

One of such services will publish the FTSE / JSE Africa Index Series of indices together with their statuses to its participants.

The system will connect to the FTSE Real Time Index Service which provides indices of JSE and NSX and will disseminate indices on two separate output channels.

The indices service will be available via two FAST indices gateways per market catering for a Primary and Secondary feed.

Each feed is a multicast service based on the technology and industry standards UDP, IPv4, FAST and FIX. The application messages are defined using the FIX 5.0 (Service Pack 2) standard and comply with the best practices outlined by the FIX Market Data Working Group. The data feed is transmitted in the FAST v1.1 encoding method to minimize bandwidth and reduce latency and conforms to Level 1 of the FAST 1.1 specification.

The service will disseminate the following information for streaming and snapshot indices:

- Index Identifier
- Index Value
- Index Differential
- Index Status
- Time of Index Value – as published by FTSE
- Previous Closing Index Value
- Previous Close Index Date
- Currency
- Tick Count – as published by FTSE

In addition to the above the service will also disseminate the Total Return Values published by FTSE for streamed indices only. This will include:

- Total Return Value
- Total Return Differential

## 3 FAST GATEWAY SERVICE DESCRIPTION

### 3.1 System Architecture

Each FAST indices gateway includes a multicast Real-Time channel for the dissemination of real-time indices.

A TCP Replay channel will be available per each FAST gateway. A Recipient may connect to the Replay channel to recover from any data losses occurred. The Replay channel is sufficient to recover missed messages that were missed on the real time channel.

#### 3.1.1 Real-Time Channel

The Real-Time Channel is the primary means of disseminating index information. Real-time index updates supported by the feed are available on this multicast channel.

The Real-time channel will disseminate the indices via [Market Data Incremental Refresh](#) message.

The server will use the [Heartbeat](#) message to exercise the communication line during periods of inactivity. A [Heartbeat](#) will be sent every HB\_INTERVAL <2> seconds when the Real-Time channel is inactive.

Recipients have access to two identically sequenced Real-Time feeds; one from the main site (Feed A) and one from the backup feed (Feed B). It is recommended that Recipients process both feeds and arbitrate between them to minimise the probability of a data loss.

#### 3.1.2 Replay Channel

The TCP Replay channel permits Recipients to request the retransmission of a limited number of messages already published on the Real-Time channel. This channel may be used by Recipients to recover from a small data loss.

The Replay channel supports the retransmission of the last CACHE\_SIZE <1020,000> messages published on the Real-Time channel. The channel does not support the retransmission of messages published from previous trading days.

All messages sent by the server are transfer encoded in terms of the FAST protocol. While the application messages (e.g. [Market Data Incremental Refresh](#)) sent by the server is field encoded, the administrative messages it sends (e.g. Logon, Heartbeat, etc.) are not. All messages (i.e. both administrative and application) initiated by the client should be transfer encoded but not field encoded.

While a Replay channel is available from the backup feed, it will only be activated in the unlikely event of an outage at the main site.

### 3.2 Overview of a Trading Day

Each update to an index or its status will be disseminated by the [Market Data Incremental Refresh](#) message. Index change will be broadcast with MDUpdateAction (279) of New (0) and MDEntryType (269) of Index Value (3). The index code and index value will be indicated in the Symbol (55) and MDEntryPx (270) fields. The currency of the index and the time at which the message was disseminated by FTSE will be denoted via the Currency (15) and MDEntryTime (273) fields.

Index status change will be broadcast with MDUpdateAction (279) of New (0) and MDEntryType (269) of Index Status (b). The index status will be indicated in the Text (58) field.

The previous closing index value will be broadcast with MDUpdateAction (279) or New (0) and MDEntryType (269) of Previous Close (f). The previous closing index value will be indicated in MDEntryPx (270).

The total return index value will be broadcast with MDUpdateAction (279) or New (0) and MDEntryType (269) of Total Return Value (y). The total return index value will be indicated in MDEntryPx (270).

N.B. At the start of the day if the difference between the present value of the quoted Index and its previous day's closing value (NetChgPrevDay) are equal, MDEntryPx (270) field will be disseminated as 0.0. This value will be updated immediately with the next index update.

## 4 CONNECTIVITY

### 4.1 Transmission Standards

#### 4.1.1 Multicast Channel

The Real-Time channel utilises IP version 4 (IPv4) over UDP and Ethernet standards. UDP header information will be as defined in the IETF RFC 791 (IPv4) and RFC 768 (UDP) transmission protocol standards. One or more FAST encoded FIX messages may be included in a single UDP packet.

#### 4.1.2 Point-to-Point Channel

The Replay channel utilises IP version 4 (IPv4) over TCP and Ethernet standards. TCP header information will be as defined in the IETF RFC 793 standard and IPv4 will be as defined in the RFC 791 standard.

### 4.2 Application IDs

#### 4.2.1 Server

The server ApplIDs for the Real-Time and Replay channels of different Indices Gateways are given below.

| Indices Gateway | Real-Time Channel |            | Replay Channel |            |
|-----------------|-------------------|------------|----------------|------------|
|                 | Primary           | Secondary  | Primary        | Secondary  |
| JSE Indices     | <JSEFTSEP>        | <JSEFTSES> | <JSEFTSEP>     | <JSEFTSES> |
| NSX Indices     | <NSXFTSEP>        | <NSXFTSES> | <NSXFTSEP>     | <NSXFTSES> |

#### 4.2.2 Clients

The CompID and IP address of each client wishing to connect to the Replay channel must be registered with JSE before communications can begin. An Interface User ID (CompID) may, at any particular time, only be logged into one TCP channel across all news gateways.

##### 4.2.2.1 Passwords

Each new Interface User ID (CompID) will be assigned a password on registration. Clients must change the password on first Logon to one of their choosing via the Logon message. The acceptance of a login request indicates that the new password has been accepted. The new password will, if accepted, be effective for subsequent logins.

In terms of the password policy of JSE, the password of each Interface User ID (CompID) should be changed at least every <30> days. If not, the password will expire and the client will be unable to login to the server. In such a case, the client should contact JSE to have its password reset. The SessionStatus (1409) of the server's Logon message will be Password Due to Expire (2) for the last <5> days of a password's validity period.



### **4.3 Production IP Addresses and Ports**

The production IP addresses and ports of the Real-Time and Replay channels for each Indices Gateways available in the system will be detailed in a consolidated JSE Production Market Facing Client document.

A separate JSE Client Connectivity document is available with information on the recommended bandwidth for the Real-Time and Replay channels of each Gateway.

## 5 RECOVERY

### 5.1 Recipient Failures

It is recommended that Recipients process both Real-Time feeds (i.e. Feed A and Feed B) to minimise the probability of a data loss.

A message loss can be detected using the ApplSeqNum (1181) included in each message on the Real-Time channel. If a gap in sequence numbers is detected, the Recipient should assume that some or all of the indices maintained on its systems are incorrect and initiate the recovery process outlined below.

#### 5.1.1 Replay Channel

The TCP Replay channel should be used by Recipients to recover from a small-scale data loss. It permits Recipients to request the retransmission of a limited number of messages already published on the Real-Time channel. The channel supports the retransmission of the last CACHE\_SIZE <20,000> messages published on the Real-Time channel.

Each Interface User ID (CompID) may login to the Replay channel of a particular Indices Gateway up to LOGIN\_LIMIT <10> times each day. The total number of Application Message Requests that a client may send on the Replay channel of a particular Indices Gateway is also limited each day. The total number of Application Message Requests that a client may send on the Replay channel of a particular Indices Gateway is APP\_REQ\_LIMIT <100>.

Recipients may request JSE to reset its login and request counts. This feature is intended to help manage an emergency situation and should not be relied upon as a normal practice.

If a client submits multiple requests on the Replay channel, they will be processed serially (i.e. one at a time). Active requests of multiple clients will be served on a FIFO basis.

A client may cancel an outstanding request via the [Application Message Request](#) message. Such a message should include an ApplReqType (1347) of Cancel Retransmission (5) and the ApplReqID (1346) of the request to be cancelled. While the server will not confirm a successful cancellation, it will transmit a [Business Message Reject](#) if the request is rejected. A cancellation request submitted by a client will take priority over all the requests of the client being queued.

All messages sent by the server are transfer encoded in terms of the FAST protocol. While all application messages sent by the server (e.g. [Market Data Incremental Refresh](#)) are field encoded, the administrative messages it sends (e.g. Logon) are not. All messages (i.e. both administrative and application) initiated by the client should be transfer encoded but not field encoded.

##### 5.1.1.1 Establishing a Connection

The client should use the relevant IP address and port to establish a TCP/IP session with the Replay channel. The client should initiate a session by sending the [Logon](#) message. The client should identify itself specifying its Interface User ID (CompID) in the Username (553) field. The server will validate the Interface User ID (CompID), password and IP address of the client.

Once the client is authenticated, the server will respond with a [Logon](#) message. The SessionStatus (1409) of this message will be Session Active (0).

The client must wait for the server's Logon before sending additional messages. Messages received from the client before the exchange of Logon messages will be ignored.

If a logon attempt fails because of an invalid Interface User ID (CompID), invalid password or IP address, the server will break the TCP/IP connection with the client without sending a [Logout](#) message.

If a logon attempt fails because of an expired password, a locked Interface User ID (CompID) or if logins are not currently permitted, the server will send a [Logout](#) message and then break the TCP/IP connection with the client.

Each Interface User ID (CompID) may login to the Replay channel of a particular Indices Gateway up to a limited number of times each day. Once this limit is reached, the server will reject any additional logon attempt with a [Logout](#) and then break the TCP/IP connection with the client. The SessionStatus (1409) of such a [Logout](#) message will be Logons Not Allowed (7).

If a Logon message is not received within INACTIVITY\_TIME <5> seconds of the establishment of a TCP/IP connection, the server will break the TCP/IP connection with the client.

If an [Application Message Request](#) is not received within INACTIVITY\_TIME <5> seconds of a successful logon, the server will send a [Logout](#) message and then break the TCP/IP connection with the client. The Text (58) field of [Logout](#) will contain the value "c" (i.e. Logout Due to Inactivity).

Each user will inherit a maximum number of times the relevant Interface User ID (CompID) may log in to the Replay channel. Each time the TCP/IP connection is terminated, it will increment the counter of the maximum number of times each Interface User ID (CompID) has logged in to the Replay channel.

A second attempt to log in by an already logged in client will be reject via a [Business Message Reject](#).

#### 5.1.1.2 Heartbeats

The server will not send heartbeats on the Replay channel during periods of inactivity.

#### 5.1.1.3 Requesting Missed Messages

The client is expected to transmit an [Application Message Request](#) within INACTIVITY\_TIME <5> seconds of establishing the FIX connection.

The message should include the identifier of the Real-Time channel to which the retransmission request applies along with the list of messages to be resent. The ApplBegSeqNum (1182) and ApplEndSeqNum (1183) fields should be used to specify the ApplSeqNum (1181) of the first and last message in the range to be resent.

The [Application Message Request](#) can be used in four modes:

- (i) To request a single message. The ApplBegSeqNum (1182) and ApplEndSeqNum (1183) should both be the message sequence number of the missed message.
- (ii) To request a specific range of messages. The ApplBegSeqNum (1182) should be the message sequence number of the first message of the range and the ApplEndSeqNum (1183) should be that of the last message of the range.
- (iii) To request all messages after a particular message. The ApplBegSeqNum (1182) should be the message sequence number immediately after that of the last processed message and the ApplEndSeqNum (1183) should be zero (0).
- (iv) To request all messages available. The ApplBegSeqNum (1182) should be one (1) and the ApplEndSeqNum (1183) should be zero (0).

The retransmission request will be serviced from the server's cache of the last CACHE\_SIZE <10,000> messages published on the Real-Time channel. If the retransmission request includes one or more messages that are not in the server's cache, the entire request will be rejected and no messages will be retransmitted.

#### 5.1.1.4 Response to a Retransmission Request

The server will respond to the [Application Message Request](#) with an [Application Message Request Ack](#) to indicate whether the retransmission request is successful or not. If the request is unsuccessful, the reason will be specified in the field ApplResponseType (1348).

The total number of [Application Message Requests](#) that a client may send on the Replay channel of a particular indices gateway is limited each day. Once this limit is reached, the server will reject any additional request via a [Business Message Reject](#).

In the case of a successful retransmission request, the server will transmit the requested messages immediately after the [Application Message Request Ack](#). The message sequence number from the Real-Time channel will be included in the ApplSeqNum (1181) field of each retransmitted message. Once the last of these messages is sent, the server will indicate that the retransmission is complete via an [Application Message Report](#).

#### **5.1.1.5 Termination of the Connection**

If the client does not terminate the connection within INACTIVITY\_TIME <5> seconds of the transmission of the last missed message, the server will send a [Logout](#) message and then break the TCP/IP connection with the client. The Text (58) field of [Logout](#) will contain the value "d" (i.e. Retransmission Complete). The Text (58) field of logout will contain 'Log out due to inactivity'.

## **5.2 Failures at JSE**

### **5.2.1 Sequence Numbers**

If the indices feed is, due to the unlikely event of an outage of both the primary and secondary Indices Gateways, restarted during a trading day, the message sequence number of the Real-Time channel will continue incrementing from the last message that it has sent before the outage.

Upon restarting, the real-time channel will begin to disseminate up-to-date details (status, value, etc.) of the indices that are already available in the system via the [Market Data Incremental Refresh](#) (Index message). In such an event, Recipients must discard the current details maintained for the relevant indices and completely replace it with the new details.

## 6 MESSAGE FORMATS AND TEMPLATES

This section provides details on the three administrative messages and three application messages utilized by the indices feed.

All messages sent by the server are transfer encoded in terms of the FAST protocol. While all application messages sent by the server (e.g. [Market Data Incremental Refresh](#) etc.) are field encoded, the administrative messages it sends (e.g. Logon etc.) are not. All messages (i.e. both administrative and application) initiated by the client should be transfer encoded but not field encoded.

The FIX format of each is described along with the applicable FAST template.

### 6.1 Variations from the FIX Protocol

The indices feed conforms to the FIX protocol except as follows:

- (i) The Text (58) field in the [Market Data Incremental Refresh](#) message is used to indicate the status of an index.
- (ii) The field MDEntryType (269) of the [Market Data Incremental Refresh](#) message includes the custom values Previous Close (f), Index Status (x) and Total Return Value (y).

## 6.2 Administrative Messages

### 6.2.1 Logon

#### 6.2.1.1 FIX Message

| Tag   | Field Name             | Req | Description  |       |         |   |                |   |                        |
|-------|------------------------|-----|--|-------|---------|---|----------------|---|------------------------|
| 35    | MsgType                | Y   | A = Logon  |       |         |   |                |   |                        |
| 52    | SendingTime            | Y   | Time the message was transmitted specified in UTC and in the YYYYMMDD-HH:MM:SS.sss format.   |       |         |   |                |   |                        |
| 1180  | ApplID                 | N   | Identifier of the server sending the message. Required if the message is generated by the server.  |       |         |   |                |   |                        |
| 553   | Username               | N   | CompID of the client. Required if the message is generated by the client.  |       |         |   |                |   |                        |
| 554   | Password               | N   | Password assigned to the CompID. Required if the message is generated by the client.   |       |         |   |                |   |                        |
| 925   | NewPassword            | N   | New password for the CompID.   |       |         |   |                |   |                        |
| 1409  | SessionStatus          | N   | Status of FIX session. Required if message is generated by server.<br><br><table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Session Active</td> </tr> <tr> <td>2</td> <td>Password Due to Expire</td> </tr> </tbody> </table> | Value | Meaning | 0 | Session Active | 2 | Password Due to Expire |
| Value | Meaning                |     |  |       |         |   |                |   |                        |
| 0     | Session Active         |     |  |       |         |   |                |   |                        |
| 2     | Password Due to Expire |     |  |       |         |   |                |   |                        |

#### 6.2.1.2 FAST Template

| Tag  | Field Name    | Field Type       | Field Encoding | Description |
|------|---------------|------------------|----------------|-------------|
| 35   | MsgType       | ASCII String     | None           |             |
| 52   | SendingTime   | ASCII String     | None           |             |
| 1180 | ApplID        | ASCII String     | None           |             |
| 553  | Username      | ASCII String     | None           |             |
| 554  | Password      | ASCII String     | None           |             |
| 925  | NewPassword   | ASCII String     | None           |             |
| 1409 | SessionStatus | Unsigned Integer | None           |             |

## 6.2.2 Logout

### 6.2.2.1 FIX Message

| Tag   | Field Name              | Req | Description  |       |         |   |                         |   |                |   |                    |   |                  |     |       |
|-------|-------------------------|-----|--|-------|---------|---|-------------------------|---|----------------|---|--------------------|---|------------------|-----|-------|
| 35    | MsgType                 | Y   | 5 = Logout   |       |         |   |                         |   |                |   |                    |   |                  |     |       |
| 52    | SendingTime             | Y   | Time the message was transmitted specified in UTC and in the YYYYMMDD-HH:MM:SS.sss format.   |       |         |   |                         |   |                |   |                    |   |                  |     |       |
| 1180  | ApplID                  | N   | Identifier of the server sending the message. Required if the message is generated by the server   |       |         |   |                         |   |                |   |                    |   |                  |     |       |
| 1409  | SessionStatus           | N   | <p>Status of the FIX session. Required if the message is generated by the server.</p> <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>4</td> <td>Session Logout Complete</td> </tr> <tr> <td>6</td> <td>Account Locked</td> </tr> <tr> <td>7</td> <td>Logons Not Allowed</td> </tr> <tr> <td>8</td> <td>Password Expired</td> </tr> <tr> <td>100</td> <td>Other</td> </tr> </tbody> </table> | Value | Meaning | 4 | Session Logout Complete | 6 | Account Locked | 7 | Logons Not Allowed | 8 | Password Expired | 100 | Other |
| Value | Meaning                 |     |  |       |         |   |                         |   |                |   |                    |   |                  |     |       |
| 4     | Session Logout Complete |     |  |       |         |   |                         |   |                |   |                    |   |                  |     |       |
| 6     | Account Locked          |     |  |       |         |   |                         |   |                |   |                    |   |                  |     |       |
| 7     | Logons Not Allowed      |     |  |       |         |   |                         |   |                |   |                    |   |                  |     |       |
| 8     | Password Expired        |     |  |       |         |   |                         |   |                |   |                    |   |                  |     |       |
| 100   | Other                   |     |  |       |         |   |                         |   |                |   |                    |   |                  |     |       |
| 58    | Text                    | N   | <p>Reason for the logout.</p> <p><b>For E.g. Value Meaning</b></p> <ul style="list-style-type: none"> <li>a. Logout Requested by Client</li> <li>b. Forced Logout by Service Desk</li> <li>c. Logout Due to Inactivity</li> <li>d. Retransmission Complete</li> </ul>  |       |         |   |                         |   |                |   |                    |   |                  |     |       |

### 6.2.2.2 FAST Template

| Tag  | Field Name    | Field Type       | Field Encoding | Description |
|------|---------------|------------------|----------------|-------------|
| 35   | MsgType       | ASCII String     | None           |             |
| 52   | SendingTime   | ASCII String     | None           |             |
| 1180 | ApplID        | ASCII String     | None           |             |
| 1409 | SessionStatus | Unsigned Integer | None           |             |
| 58   | Text          | ASCII String     | None           |             |

### 6.2.3 Heartbeat

#### 6.2.3.1 FIX Message

| Tag  | Field Name    | Req | Description   |
|------|---------------|-----|---|
| 35   | MsgType       | Y   | 0 = Heartbeat   |
| 52   | SendingTime   | Y   | Time the message was transmitted specified in UTC and in the YYYYMMDD-HH:MM:SS.sss format.          |
| 1180 | ApplID        | Y   | Identifier of the server sending the message.   |
| 1399 | ApplNewSeqNum | Y   | Will contain the next application sequence (i.e. ApplSeqNum (1181) of the next application message) |

#### 6.2.3.2 FAST Template

| Tag  | Field Name    | Field Type       | Field Encoding | Description |
|------|---------------|------------------|----------------|-------------|
| 35   | MsgType       | ASCII String     | None           |             |
| 52   | SendingTime   | ASCII String     | None           |             |
| 1180 | ApplID        | ASCII String     | None           |             |
| 1399 | ApplNewSeqNum | Unsigned Integer | None           |             |



## 6.3 Application Messages (Client-Initiated)

### 6.3.1 Application Message Request

#### 6.3.1.1 FIX Message

| Tag  | Field Name                 | Req           | Description  |  |                            |   |                       |
|------|----------------------------|---------------|--|--|----------------------------|---|-----------------------|
| 35   | MsgType                    | Y             | BW = Application Message Request   |  |                            |   |                       |
| 52   | SendingTime                | Y             | Time the message was transmitted specified in UTC and in the YYYYMMDD-HH:MM:SS.sss format.   |  |                            |   |                       |
| 1346 | ApplReqID                  | Y             | Client specified unique identifier of the request.   |  |                            |   |                       |
| 1347 | ApplReqType                | Y             | Type of request.<br><b>Value Meaning</b><br><hr/> <table border="0"> <tr> <td>0</td> <td>Retransmission of Messages</td> </tr> <tr> <td>5</td> <td>Cancel Retransmission</td> </tr> </table> <hr/> | 0  | Retransmission of Messages | 5 | Cancel Retransmission |
| 0    | Retransmission of Messages |               |  |  |                            |   |                       |
| 5    | Cancel Retransmission      |               |  |  |                            |   |                       |
| 1351 | NoApplIDs                  | N             | If specified, the value in this field should always be "1". Required if ApplReqType (1347) is Retransmission of Messages (0).  |  |                            |   |                       |
| ➔    | 1355                       | RefApplID     | N  | ApplID of the Real-Time channel for which the retransmission is requested. Please refer to Section 4.2.1 for the list of valid ApplIDs. Required if NoApplIDs (1351) is specified. |                            |   |                       |
| ➔    | 1182                       | ApplBegSeqNum | N  | ApplSeqNum (1181) of the first message in the range to be resent from the Real-Time channel. Required if NoApplIDs (1351) is specified.  |                            |   |                       |
| ➔    | 1183                       | ApplEndSeqNum | N  | ApplSeqNum (1181) of the last message in the range to be resent from the Real-Time channel. Required if NoApplIDs (1351) is specified.   |                            |   |                       |

#### 6.3.1.2 FAST Template

| Tag  | Field Name    | Field Type       | Field Encoding           | Description |
|------|---------------|------------------|--------------------------|-------------|
| 35   | MsgType       | ASCII String     | None                     |             |
| 52   | SendingTime   | ASCII String     | None                     |             |
| 1346 | ApplReqID     | ASCII String     | None                     |             |
| 1347 | ApplReqType   | Unsigned Integer | None                     |             |
| 1351 | NoApplIDs     | Unsigned Integer | None                     |             |
| 1355 | RefApplID     | ASCII String     | <a href="#">CopyNone</a> |             |
| 1182 | ApplBegSeqNum | Unsigned Integer | <a href="#">CopyNone</a> |             |
| 1183 | ApplEndSeqNum | Unsigned Integer | <a href="#">CopyNone</a> |             |

## 6.4 Application Messages (Server-Initiated)

### 6.4.1 Market Data Incremental Refresh (Index Message)

#### 6.4.1.1 FIX Message

| Tag  | Field Name       |                | Req | Description  |
|------|------------------|----------------|-----|--|
| 35   | MsgType          |                | Y   | X = Market Data - Incremental Refresh  |
| 52   | SendingTime      |                | Y   | Time the message was transmitted specified in UTC and in the YYYYMMDD-HH:MM:SS.sss format.   |
| 1180 | ApplID           |                | Y   | Identifier of the server sending the message.  |
| 1181 | ApplSeqNum       |                | N   | Sequence number of the message on the Real-Time channel. Required if the message is disseminated via the Real-Time or Replay channel.  |
| 912  | LastRptRequested |                | N   | Indicates the last message sent in response to a retransmission request.<br><br><b>Value Meaning</b><br>Y Last Message   |
| 268  | NoMDEntries      |                | Y   | Number of index entries in the message.  |
| ➔    | 279              | MUpdate Action | Y   | Indicates the update type.<br><br><b>Value Meaning</b><br>0 New  |
| ➔    | 55               | Symbol         | Y   | Index Code   |
| ➔    | 269              | MEntryType     | Y   | Indicates the type of index related market data being published.<br><br><b>Value Meaning</b><br>3 Index Value<br>f Previous Close<br>x Index Status<br>y Total Return Value  |
| ➔    | 270              | MEntryPx       | N   | Required if MEntryType (269) is Index Value (3), Total Return Value (y) or Previous Close (f). Value of the index being published if MEntryType (269) is Index Value (3). Total Return Value of the index being published if MEntryType (269) is Total Return Value (y). Previous Closing value of the index being published if MEntryType (269) if Previous Close (f) |
| ➔    | 451              | NetChgPrevDay  | N   | Required if MEntryType (269) is Index Value (3) or Total Return Value (y).   |

|   |     |             |   |  |
|---|-----|-------------|---|--|
|   |     |             |   | <p>Difference between the present value of the quoted index and its previous day's closing value if MDEntryType (.269) is Index Value (3).</p> <p>Difference between the present Total Return Value of index and its previous day's closing value if MDEntryType (.269) is Total Return Value (y).</p> |
| ➔ | 58  | Text        | N | <p>The status of the index. The possible statuses are available in Section 7.1 Index status codes. Required if MDEntryType (269) is Index Status (x).</p>  |
| ➔ | 273 | MDEntryTime | N | <p>The time at which the index was disseminated by FTSE.</p> <p>The time will be specified in UTC and in the HH:MM:SS.sss format.</p>  |
| ➔ | 272 | MDEntryDate | N | <p>The date of the previous closing index as disseminated by FTSE.</p> <p>The date will be specified in the YYYYMMDD format.</p>   |
| ➔ | 15  | Currency    | N | <p>Currency of the Index as specified in the FTSE message.</p>   |
| ➔ | 83  | RptSeq      | N | <p>The 'Tick Count' value for an index as published by FTSE.</p>   |

### 6.4.1.2 FAST Template

| Tag  | Field Name       | Field Type                         | Field Encoding | Description                   |
|------|------------------|------------------------------------|----------------|-------------------------------|
| 35   | MsgType          | ASCII String                       | None           |                               |
| 52   | SendingTime      | ASCII String                       | None           |                               |
| 1180 | AppIID           | ASCII String                       | None           | Please refer to Section 4.2.1 |
| 1181 | AppISeqNum       | Unsigned Integer with NULL support | None           |                               |
| 912  | LastRptRequested | ASCII String                       | Copy           |                               |
| 268  | NoMDEntries      | Unsigned Integer                   | Default        | 1                             |
| 279  | MDUpdateAction   | Unsigned Integer                   | Copy           |                               |
| 55   | Symbol           | ASCII String                       | Copy           |                               |
| 269  | MDEntryType      | ASCII String                       | Copy           |                               |
| 270  | MDEntryPx        | Scaled Number                      | Copy           |                               |
| 451  | NetChgPrevDay    | Scaled Number                      | Copy           |                               |
| 58   | Text             | ASCII String                       | Copy           |                               |
| 273  | MDEntryTime      | ASCII String                       | Tail           |                               |
| 272  | MDEntryDate      | ASCII String                       | Tail           |                               |
| 15   | Currency         | ASCII String                       | Copy           |                               |
| 83   | RptSeq           | Unsigned Integer with NULL support | Copy           |                               |

## 6.4.2 Application Message Request Ack

### 6.4.2.1 FIX Message

| Tag   | Field Name                 | Req | Description  |       |         |   |                            |   |                       |   |                        |
|-------|----------------------------|-----|--|-------|---------|---|----------------------------|---|-----------------------|---|------------------------|
| 35    | MsgType                    | Y   | BX = Application Message Request Ack   |       |         |   |                            |   |                       |   |                        |
| 52    | SendingTime                | Y   | Time the message was transmitted specified in UTC and in the YYYYMMDD-HH:MM:SS.sss format.   |       |         |   |                            |   |                       |   |                        |
| 1353  | ApplResponseID             | Y   | Server specified identifier of the acknowledgement.  |       |         |   |                            |   |                       |   |                        |
| 1346  | ApplReqID                  | Y   | Identifier of the request being acknowledged.  |       |         |   |                            |   |                       |   |                        |
| 1347  | ApplReqType                | Y   | Type of request being acknowledged.<br><table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Retransmission of Messages</td> </tr> <tr> <td>5</td> <td>Cancel Retransmission</td> </tr> </tbody> </table>   | Value | Meaning | 0 | Retransmission of Messages | 5 | Cancel Retransmission |   |                        |
| Value | Meaning                    |     |  |       |         |   |                            |   |                       |   |                        |
| 0     | Retransmission of Messages |     |  |       |         |   |                            |   |                       |   |                        |
| 5     | Cancel Retransmission      |     |  |       |         |   |                            |   |                       |   |                        |
| 1348  | ApplResponse Type          | Y   | Whether the retransmission request was successful.<br><table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Request Successful</td> </tr> <tr> <td>1</td> <td>Unknown ApplID</td> </tr> <tr> <td>2</td> <td>Messages Not Available</td> </tr> </tbody> </table> | Value | Meaning | 0 | Request Successful         | 1 | Unknown ApplID        | 2 | Messages Not Available |
| Value | Meaning                    |     |  |       |         |   |                            |   |                       |   |                        |
| 0     | Request Successful         |     |  |       |         |   |                            |   |                       |   |                        |
| 1     | Unknown ApplID             |     |  |       |         |   |                            |   |                       |   |                        |
| 2     | Messages Not Available     |     |  |       |         |   |                            |   |                       |   |                        |

### 6.4.2.2 FAST Template

| Tag  | Field Name        | Field Type       | Field Encoding | Description |
|------|-------------------|------------------|----------------|-------------|
| 35   | MsgType           | ASCII String     | None           |             |
| 52   | SendingTime       | ASCII String     | None           |             |
| 1353 | ApplResponseID    | ASCII String     | None           |             |
| 1346 | ApplReqID         | ASCII String     | None           |             |
| 1347 | ApplReqType       | Unsigned Integer | None           |             |
| 1348 | ApplResponse Type | Unsigned Integer | None           |             |

## 6.4.3 Application Message Report

### 6.4.3.1 FIX Message

| Tag   | Field Name               | Req | Description  |       |         |   |                          |
|-------|--------------------------|-----|--|-------|---------|---|--------------------------|
| 35    | MsgType                  | Y   | BY =Application Message Report   |       |         |   |                          |
| 52    | SendingTime              | Y   | Time the message was transmitted specified in UTC and in the YYYYMMDD-HH:MM:SS.sss format.   |       |         |   |                          |
| 1356  | ApplReportID             | Y   | Server specified identifier of the report.   |       |         |   |                          |
| 1346  | ApplReqID                | Y   | Identifier of the Application Message Request the report relates to.   |       |         |   |                          |
| 1426  | ApplReportType           | Y   | <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>Retransmission Completed</td> </tr> </tbody> </table> | Value | Meaning | 3 | Retransmission Completed |
| Value | Meaning                  |     |  |       |         |   |                          |
| 3     | Retransmission Completed |     |  |       |         |   |                          |

### 6.4.3.2 FAST Template

| Tag  | Field Name     | Field Type       | Field Encoding | Description |
|------|----------------|------------------|----------------|-------------|
| 35   | MsgType        | ASCII String     | None           |             |
| 52   | SendingTime    | ASCII String     | None           |             |
| 1356 | ApplReportID   | ASCII String     | None           |             |
| 1346 | ApplReqID      | ASCII String     | None           |             |
| 1426 | ApplReportType | Unsigned Integer | None           |             |

## 6.4.4 Business Message Reject

### 6.4.4.1 FIX Message

| Tag | Field Name            | Req | Description  |
|-----|-----------------------|-----|--|
| 35  | MsgType               | Y   | j = Business Message Reject  |
| 52  | SendingTime           | Y   | Time the message was transmitted specified in UTC and in the YYYYMMDD-HH:MM:SS.sss format.         |
| 379 | BusinessReject RefID  | N   | ApplReqID (1346) of the rejected message.  |
| 371 | RefTagID              | N   | If a message is rejected due to an issue with a particular field its tag number will be indicated. |
| 372 | RefMsgType            | Y   | MsgType (35) of the rejected message.  |
| 380 | BusinessReject Reason | Y   | Code specifying the reason for the reject. Please refer to Section 8 for a list of reject codes.   |
| 58  | Text                  | N   | JSE specific code specifying the reason for the reject.  |

### 6.4.4.2 FAST Template

| Tag | Field Name            | Field Type                         | Field Encoding | Description |
|-----|-----------------------|------------------------------------|----------------|-------------|
| 35  | MsgType               | ASCII String                       | None           |             |
| 52  | SendingTime           | ASCII String                       | None           |             |
| 379 | BusinessReject RefID  | ASCII String                       | None           |             |
| 371 | RefTagID              | Unsigned Integer with NULL support | None           |             |
| 372 | RefMsgType            | ASCII String                       | None           |             |
| 380 | BusinessReject Reason | Unsigned Integer with NULL support | None           |             |
| 58  | Text                  | ASCII String                       | None           |             |

## 7 INDEX STATUS CODES

### 7.1 Index Status Codes

| Status     | Description   |
|------------|---|
| PRE_MQP    | Before Mandatory Quote Period, quotes not firm                        |
| LIVE       | Market is live, index is normal                                       |
| PART       | Part calculated value i.e. part of the constituent market is not live |
| INDICATIVE | Index is indicative   |
| HELD       | A data link has failed or index has exceeded parameters               |
| POST_MQP   | After Mandatory Quote Period  |
| CLOSE      | Official closing index  |

## 8 REJECT CODES

### 8.1 Business Message Reject

| Business Reject Reason | Text | Reason                               |
|------------------------|------|--------------------------------------|
| 0                      | 400  | Other                                |
| 0                      | 403  | Incorrect data format for this tag   |
| 0                      | 404  | Value is invalid for this tag        |
| 0                      | 405  | Required Tag missing                 |
| 0                      | 450  | Request limit for day reached        |
| 1                      | -    | Unknown ID                           |
| 5                      | -    | Conditionally required field missing |