



**MARKET FEED**  
**Capital Market (CM)**  
**(LEVEL – 1, LEVEL – 2, LEVEL – 3)**

**Version: 1.25**

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NSE DATA & ANALYTICS LIMITED  
EXCHANGE PLAZA,  
PLOT NO. C/1, G BLOCK,  
BANDRA-KURLA COMPLEX,  
BANDRA (E), MUMBAI 400 051.  
INDIA.

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### Revision History

| Name         | Description                                                                                                                                                                     | Date              |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Version 1.0  | New Specification Issued                                                                                                                                                        | 16 October 2012   |
| Version 1.1  | Correction in<br>ST_COMP_BATCH_HEADER Point no 3                                                                                                                                | 30 November 2012  |
| Version 1.2  | S&P is removed from the indices name<br>Point no 10                                                                                                                             | 12 February 2013  |
| Version 1.3  | New Index addition                                                                                                                                                              | 11 March 2014     |
| Version 1.4  | New Index addition                                                                                                                                                              | 28 May 2014       |
| Version 1.5  | Addition of 4 New Indices                                                                                                                                                       | 30 September 2014 |
| Version 1.6  | New Index addition                                                                                                                                                              | 12 June 2015      |
| Version 1.7  | Index Name Rebranding                                                                                                                                                           | 29 September 2015 |
| Version 1.8  | 10 New Indices Addition and Indices<br>Rename Change                                                                                                                            | 08 March 2016     |
| Version 1.9  | Correction in Broadcast Message                                                                                                                                                 | 09 January 2018   |
| Version 1.10 | Addition of 4 New Indices                                                                                                                                                       | 31 January 2018   |
| Version 1.11 | Index Rename Change                                                                                                                                                             | 19 March 2018     |
| Version 1.12 | Change in regular/market lot field size from<br>CHAR[5] to CHAR[6] in 2 structures 5.7 EOD –<br>Master Addition/ Modification/ Deletion and 5.10<br>EOD Corporate Action Update | 11 May 2018       |
| Version 1.13 | Index Rename Change                                                                                                                                                             | 03 July 2018      |
| Version 1.14 | Addition of 5 New Indices                                                                                                                                                       | 04 January 2019   |
| Version 1.15 | Index Segregation                                                                                                                                                               | 30 January 2020   |
| Version 1.16 | Addition of 2 New Indices                                                                                                                                                       | 06 August 2020    |
| Version 1.17 | Addition of 2 New Indices                                                                                                                                                       | 30 September 2020 |
| Version 1.18 | 1. Removed FAO L3 and FAO TBT description<br>2. Removed section 2.2 Online Requirements<br>3. Addition of 5 New Indices                                                         | 03 August 2021    |
| Version 1.19 | Removal of TCP/IP Session Initialization, Login<br>Request, Login Response                                                                                                      | 29 October 2021   |
| Version 1.20 | Added Settlement Cycle field in BOD Master<br>Information                                                                                                                       | 21 December 2021  |
| Version 1.21 | Addition of 7 new indices                                                                                                                                                       | 08 January 2022   |
| Version 1.22 | 1. Removal of section 4.3 Online Indices<br>Information (CX).<br>2. Removal of section 4.10 EOD – Index<br>Information (CI) and section 9 (Annexure 1).                         | 12 March 2024     |
| Version 1.23 | 1. Addition of T+0 Settlement Mechanism<br>2. Merger of Level 1, Level 2 & Level 3<br>documents.                                                                                | 20 March 2024     |
| Version 1.24 | FAQ added                                                                                                                                                                       | 04 June 2024      |
| Version 1.25 | Adding 6 new fields in BOD - Master Information                                                                                                                                 | 14 June 2024      |

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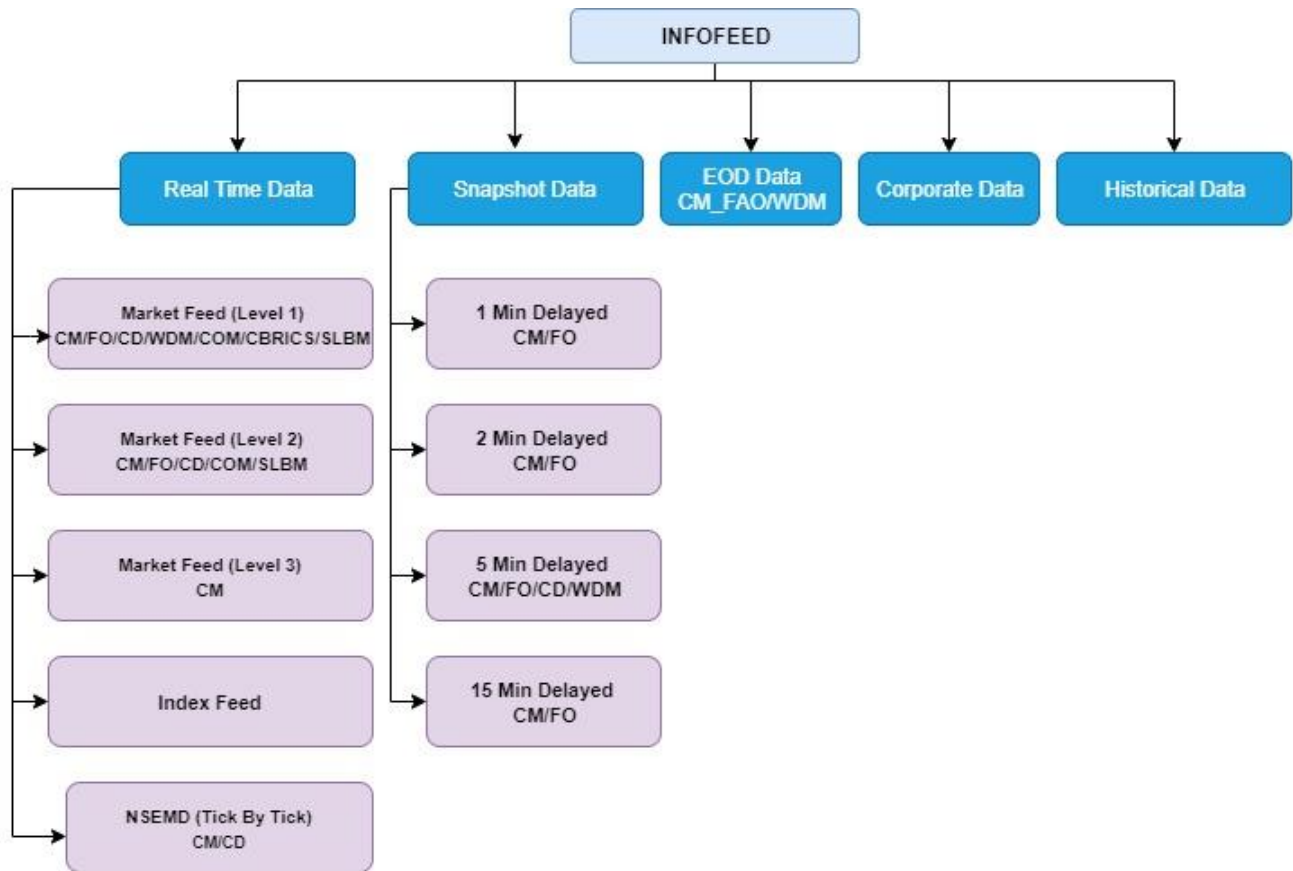
## Market Feed – Capital Market (Level 1, Level 2 & Level 3)

### 1 Introduction

NSE Data & Analytics Ltd. disseminates NSEIL's real time broadcast data to various information agencies. It provides 6 different types of data products viz.

1. Real Time Data
2. Snapshot Data
3. End of Day Data
4. Corporate Data
5. Historical Data
6. Analytical Products data

The real time data and corporate data is a packet broadcast available for dissemination through feed, whereas the snapshot data, end of day data and historical data is available in the form of files. All these data products come under in Infofeed application.



In Infofeed's Real Time Data product following sub-products are available

- a. Market Feed (CM/FO/CD/SLBM/WDM/CBRICS/COM Level 1)
- b. Market Feed (CM/FO/CD/SLBM/COM Level 2)
- c. Market Feed (CM Level 3)
- d. Index Feed
- e. NSEMD (CM/CD)

This document explains the NSE – Market Feed (CM Level 1, Level 2 & Level 3) products. Through this product on a real-time basis all the NSE's market update information is disseminated.

The information agencies connect to the Market Feed Server through Leased Lines. These leased lines are terminated on Infofeed Router and their data specific pneumatic calls are forwarded to Infofeed server.

The feed consists of series of sequenced and unsequenced variable length compressed messages. The compression algorithm used over here is LZO – Compression.



## 2 Packet Format

Server sends all the packets in following format.

```
typedef struct
{
    CHAR        cCompOrNot;
    SHORT       nDataSize;
    SHORT       iNoOfPackets;
}ST_COMP_BATCH_HEADER;

typedef struct
{
    SHORT       iCode;
    SHORT       iLen;
    LONG        lSeqNo;
} ST_INFO_HEADER;

typedef struct
{
    .
    .
}ST_DATA_INFO;

typedef struct
{
    SHORT       iChecksum;
    CHAR        cEOT;
} ST_INFO_TRAILER;

typedef struct
{
    ST_INFO_HEADER stInfoHdr;
    ST_DATA_INFO   stDataInfo;
    ST_INFO_TRAILER stInfoTrailer;
    .
}ST_DATA_PACKET;
```

All the packets received from server consist of compress batch header. Compress batch header gives the information about the data packet compressed or not, number of packets in the following data packet and the total size of data packet. Client needs to decompress the data packet using LZO decompression algorithm. After decompression each data packet consists of ST\_INFO\_HEADER, which has the iCode field to identify the type of the packet. Using iCode field, data info packet is mapped to the respective data packet.

## 2.1 Data Types

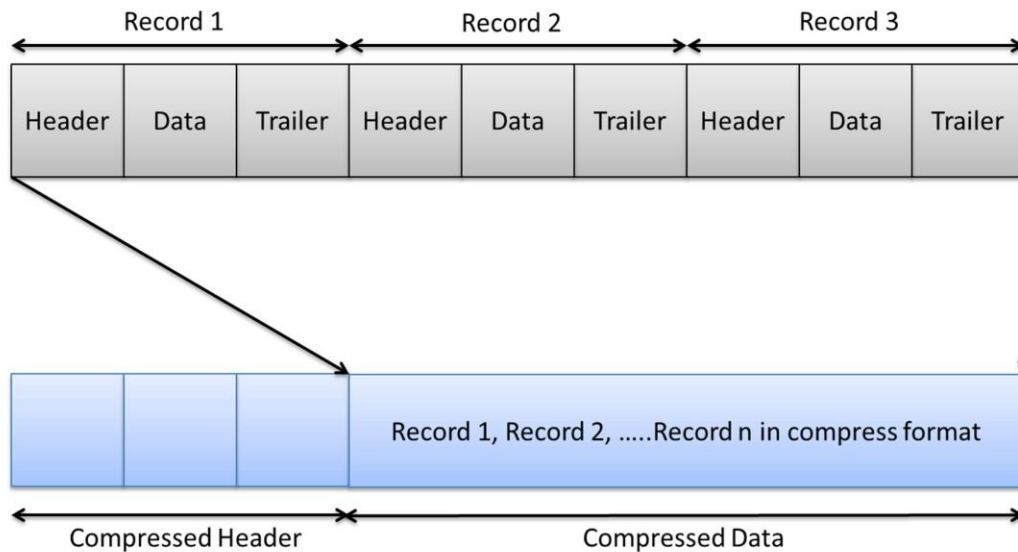
Data types used in feed:

| Data Type | Size In Bytes |
|-----------|---------------|
| CHAR      | 1             |
| SHORT     | 2             |
| INT       | 4             |
| LONG      | 4             |
| DOUBLE    | 8             |

Byte order - Big Endian



## 2.2 Diagrammatic Representation of Packet Format



### Compressed Header

1. Compressed/ Uncompressed = 0 then compressed/ 1 uncompressed
2. Number of packets = Number of records in compressed data
3. Data Size = Compressed data size

As the data packets are sent in compressed format there is a need to decompress them. The compression algorithm used is LZO.

### 3 Session Messages

#### 3.1 Heartbeat Message (Sent by server)

Heartbeat message will be sent every 2 seconds if data is not available.

| Field Name                   | Data Type | Value   | Remark                                                                                                         |
|------------------------------|-----------|---------|----------------------------------------------------------------------------------------------------------------|
| <b>INFO HEADER</b>           |           |         |                                                                                                                |
| Code                         | SHORT     | 'CH'    |                                                                                                                |
| Length                       | SHORT     | Numeric | Size of (INFO HEADER + INFO DATA + INFO TRAILER)                                                               |
| Sequence Number              | LONG      | Numeric | 0(Zero) for heartbeat message                                                                                  |
| <b>INFO DATA</b>             |           |         |                                                                                                                |
| Not associated with any data |           |         |                                                                                                                |
| <b>INFO TRAILER</b>          |           |         |                                                                                                                |
| Checksum                     | SHORT     | Numeric | Refer to section <a href="#">checksum calculation</a><br>Checksum is not calculated, so it is sent as 0 (Zero) |
| End Of Trailer               | CHAR [1]  | '\r'    | Carriage Return                                                                                                |

## 4 Sequenced Data Message (Sent by server)

Sequenced data messages will be sent by server and will contain the actual market data.

### 4.1 BOD - Master Information

These packets are sent at the beginning of each trading day before market open. This feed contains the information about the securities valid in the CM Market for trading.

| Field Name         | Data Type | Value     | Remark                                                                                  |
|--------------------|-----------|-----------|-----------------------------------------------------------------------------------------|
| <b>INFO HEADER</b> |           |           |                                                                                         |
| Code               | SHORT     | 'CT'      |                                                                                         |
| Length             | SHORT     | Numeric   | Size of (INFO HEADER + INFO DATA + INFO TRAILER)                                        |
| Sequence Number    | LONG      | Numeric   | Application sequence number                                                             |
| <b>INFO DATA</b>   |           |           |                                                                                         |
| Token Number       | CHAR [10] | Character | Unique identifier for the securities listed on NSE.                                     |
| Symbol             | CHAR [10] | Character | Security symbol                                                                         |
| Series             | CHAR [2]  | Character | Series                                                                                  |
| ISIN Number        | CHAR [12] | Character | An International Securities Identification Number (ISIN) uniquely identifies a security |
| Is Deleted         | CHAR [1]  | Character | 'Y' = Deleted<br>'N' = Not Deleted                                                      |
| Low Price Range    | CHAR [10] | Character | Minimum price at which order can be placed without causing a price freeze               |
| High Price range   | CHAR [10] | Character | Maximum price at which order can be placed without causing a price freeze               |

|                                 |                                        |           |                                                                                                                                                                                                                                                |
|---------------------------------|----------------------------------------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Security Eligibility Per Market | ST_SECURITY_ELIGIBILITY_PER_MARKET [6] | Structure | Refer the table given below<br><a href="#">ST_SECURITY_ELIGIBILITY_PER_MARKET</a> and <a href="#">FAQ</a>                                                                                                                                      |
| Settlement cycle                | SHORT                                  | Numeric   | Value can be 0 or 1<br>0 = T+0 will be the settlement Period for that security<br>1 = T+1 will be the settlement Period for that security                                                                                                      |
| Security Description            | CHAR [30]                              | Character | Security Name                                                                                                                                                                                                                                  |
| Regular Lot                     | CHAR [6]                               | Character | Lot Size                                                                                                                                                                                                                                       |
| Tick Size                       | CHAR [6]                               | Character | Security tick size                                                                                                                                                                                                                             |
| Face Value                      | CHAR [9]                               | Character | Security face value                                                                                                                                                                                                                            |
| Issue Capital                   | CHAR [12]                              | Character | Security issued capital                                                                                                                                                                                                                        |
| SSEC                            | SHORT                                  | Numeric   | This is used as identifier for different market securities.<br>1 - Normal Market security.<br>2 - IPO Session is being held security.<br>3 - Relist Session is being held security.<br>4 - Call Auction2 market security.<br>5 - SME security. |
| <b>INFO TRAILER</b>             |                                        |           |                                                                                                                                                                                                                                                |
| Checksum                        | SHORT                                  | Numeric   | Refer to section <a href="#">checksum calculation</a>                                                                                                                                                                                          |
| End Of Trailer                  | CHAR [1]                               | '\r'      | Carriage Return                                                                                                                                                                                                                                |

**ST\_SECURITY\_ELIGIBILITY\_PER\_MARKET**

| Field Name                                | Data Type | Value     | Remark                                                                                                     |
|-------------------------------------------|-----------|-----------|------------------------------------------------------------------------------------------------------------|
| <b>ST_SECURITY_ELIGIBILITY_PER_MARKET</b> |           |           |                                                                                                            |
| Market Type                               | CHAR [1]  | Character | 'N' = Normal<br>'O' = Odd Lot<br>'S' = Spot<br>'A' = Auction<br>'C' = Call Auction<br>'G' = Call Auction 2 |
| Eligibility                               | CHAR [1]  | Character | '1' = Allowed to trade<br>'0' = Not allowed to trade                                                       |
| Security Status                           | CHAR [1]  | Character | '1' = Open<br>'0' = Suspended                                                                              |

## 4.2 Online - Market Status Message

This message is sent by the server, whenever the market status changes.

| Field Name          | Data Type | Value                                        | Remark                                                                                                                                                                                                                    |
|---------------------|-----------|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>INFO HEADER</b>  |           |                                              |                                                                                                                                                                                                                           |
| Code                | SHORT     | 'PO'<br>'PC'<br>'CO'<br>'CC'<br>'CK'<br>'CL' | 'PO' = Pre-open / Call Auction session start<br>'PC' = Pre-open / Call Auction session end<br>'CO' = Normal market open<br>'CC' = Normal market close<br>'CK' = Post close session start<br>'CL' = Post close session end |
| Length              | SHORT     | Numeric                                      | Size of (INFO HEADER + INFO DATA + INFO TRAILER)                                                                                                                                                                          |
| Sequence Number     | LONG      | Numeric                                      | Application sequence number                                                                                                                                                                                               |
| <b>INFO DATA</b>    |           |                                              |                                                                                                                                                                                                                           |
| Market Type         | CHAR [1]  | Character                                    | 'N' = Normal<br>'O' = Odd Lot<br>'S' = Spot<br>'A' = Auction<br>'C' = Call Auction<br>'G' = Call Auction 2                                                                                                                |
| <b>INFO TRAILER</b> |           |                                              |                                                                                                                                                                                                                           |
| Checksum            | SHORT     | Numeric                                      | Refer to section <a href="#">checksum calculation</a><br>Checksum is not calculated, so it is sent as 0(Zero)                                                                                                             |
| End Of Trailer      | CHAR [1]  | '\r'                                         | Carriage Return                                                                                                                                                                                                           |

### 4.3 Online – Touchline Market Update

NSE securities update information for pre-open and normal market is sent through this Message.

This market update is available only in level 1 feed.

| Field Name               | Data Type | Value        | Remark                                                          |
|--------------------------|-----------|--------------|-----------------------------------------------------------------|
| <b>INFO HEADER</b>       |           |              |                                                                 |
| Code                     | SHORT     | 'PN'<br>'CN' | 'PN' = Pre-open session updates<br>'CN' = Normal market Updates |
| Length                   | SHORT     | Numeric      | Size of (INFO HEADER + INFO DATA + INFO TRAILER)                |
| Sequence Number          | LONG      | Numeric      | Application sequence Number                                     |
| <b>INFO DATA</b>         |           |              |                                                                 |
| Symbol                   | CHAR [10] | Character    | Symbol of the security                                          |
| Series                   | CHAR [2]  | Character    | Series                                                          |
| Market Type              | CHAR [1]  | Character    | 'N' = Normal<br>'O' = Odd Lot<br>'S' = Spot<br>'A' = Auction    |
| Timestamp                | CHAR [11] | Character    | No. of seconds from 01-01-1970 00:00:00 (DD-MM-YYYY HH:MM:SS)   |
| Best Buy-Order price     | CHAR [10] | Character    | Best buy side's outstanding order price                         |
| Best Buy-Order Quantity  | CHAR [12] | Character    | Best buy side's outstanding order quantity                      |
| Best Sell-Order price    | CHAR [10] | Character    | Best Sell side's outstanding order price                        |
| Best Sell-Order quantity | CHAR [12] | Character    | Best Sell side's outstanding order quantity                     |

|                             |           |           |                                                                                                                                                                           |
|-----------------------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Last Traded Price (LTP)     | CHAR [10] | Character | Price of the last trade happened on the security if no trade has happened for the day, then previous day's trade price is taken or the base price is taken                |
| Total Traded Quantity (TTQ) | CHAR [12] | Character | Volume traded today                                                                                                                                                       |
| Security Status             | CHAR [1]  | Character | 'S' = Suspended<br>' ' = Non-suspended                                                                                                                                    |
| Opening Price               | CHAR [10] | Character | Open price of the security for the day.<br>In pre-open session the indicative open price is sent if security is available in pre- open session.                           |
| High Price                  | CHAR [10] | Character | High price of the security for the day                                                                                                                                    |
| Low Price                   | CHAR [10] | Character | Low price of the security for the day                                                                                                                                     |
| Close Price                 | CHAR [10] | Character | Close price of the security.<br>During the day previous day's close price is sent. After market close current day's close price is calculated and sent through this field |
| Average Trade Price         | CHAR [10] | Character | Weighted average price of the security<br>i.e. value / quantity                                                                                                           |
| Total Turnover              | CHAR [25] | Character | Security traded value<br>i.e. Average Trade Price * TTQ                                                                                                                   |
| Online Index                | CHAR [8]  | Character | NIFTY 50 index value                                                                                                                                                      |
| <b>INFO TRAILER</b>         |           |           |                                                                                                                                                                           |
| Checksum                    | SHORT     | Numeric   | Refer to section <a href="#">checksum calculation</a>                                                                                                                     |
| End Of Trailer              | CHAR [1]  | '\r'      | Carriage Return                                                                                                                                                           |

#### 4.4 Online – 5 Depth Market Update

NSE securities update information for pre-open and normal market is sent through this Message.

This 5 Depth market update is available in level 2 and level 3 feed.

| Field Name                 | Data Type                        | Value        | Remark                                                                      |
|----------------------------|----------------------------------|--------------|-----------------------------------------------------------------------------|
| <b>INFO HEADER</b>         |                                  |              |                                                                             |
| Code                       | SHORT                            | 'PN'<br>'CN' | 'PN' = Pre-open session updates<br>'CN' = Normal market updates             |
| Length                     | SHORT                            | Numeric      | Size of (INFO HEADER + INFO DATA + INFO TRAILER)                            |
| Sequence Number            | LONG                             | Numeric      | Application sequence number                                                 |
| <b>INFO DATA</b>           |                                  |              |                                                                             |
| Symbol                     | CHAR [10]                        | Character    | Symbol of the security                                                      |
| Series                     | CHAR [2]                         | Character    | Series                                                                      |
| Market Type                | CHAR [1]                         | Character    | 'N' = Normal<br>'O' = Odd Lot<br>'S' = Spot<br>'A' = Auction                |
| Timestamp                  | CHAR [11]                        | Character    | No. of seconds from 01-01-1970 00:00:00<br>(DD-MM-YYYY HH:MM:SS)            |
| 5 Depth Buy Order details  | MARKET_DEPTH_BUY_ORDER_INFO [5]  | Structure    | Refer the table given below<br><a href="#">MARKET_DEPTH_BUY_ORDER_INFO</a>  |
| 5 Depth Sell Order details | MARKET_DEPTH_SELL_ORDER_INFO [5] | Structure    | Refer the table given below<br><a href="#">MARKET_DEPTH_SELL_ORDER_INFO</a> |

|                             |           |           |                                                                                                                                                                 |
|-----------------------------|-----------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Last Traded Price (LTP)     | CHAR [10] | Character | Price of the last trade happened on the security.<br>If no trade has happened for the day, then previous day's trade price is taken or the base price is taken. |
| Last Traded Quantity        | CHAR [12] | Character | Quantity of the last trade happened on the security.<br>If no trade has happened for the day, then previous day's trade quantity is taken or zero is sent       |
| Total Traded Quantity (TTQ) | CHAR [12] | Character | Volume traded today                                                                                                                                             |
| Security Status             | CHAR [1]  | Character | 'S' = Suspended<br>'`' = Non-suspended                                                                                                                          |
| Opening Price               | CHAR [10] | Character | Open price of the security for the day.<br>In pre-open session the indicative open price is sent if security is available in pre- open session.                 |
| High Price                  | CHAR [10] | Character | High price of the security for the day                                                                                                                          |
| Low Price                   | CHAR [10] | Character | Low price of the security for the day                                                                                                                           |
| Close Price                 | CHAR [10] | Character | Close price of the security.<br>During the day previous day's close price is sent. After market close current day's close price is calculated                   |
| Average Trade Price         | CHAR [10] | Character | Weighted average price of the security<br>i.e. value / quantity                                                                                                 |

|                     |           |           |                                                                 |
|---------------------|-----------|-----------|-----------------------------------------------------------------|
| Total Buy Quantity  | CHAR [12] | Character | Total quantity of the outstanding orders available on buy side  |
| Total Sell Quantity | CHAR [12] | Character | Total quantity of the outstanding orders available on sell side |
| Total Turnover      | CHAR [25] | Character | Security traded value i.e. Average Trade Price * TTQ            |
| Online Index        | CHAR [8]  | Character | NIFTY 50 index value                                            |
| <b>INFO TRAILER</b> |           |           |                                                                 |
| Checksum            | SHORT     | Numeric   | Refer to section <a href="#">checksum calculation</a>           |
| End Of Trailer      | CHAR [1]  | '\r'      | Carriage Return                                                 |

## 4.5 Online – 20 Depth Market update

These packets contain the latest order and trade information of securities up to the order book depth of 20. These packets are sent during normal market hours. These packets would not be sent during the Pre-Open session.

The Online Index field in this packet indicates the value of the Nifty 50 when the trade occurs.

This 20 Depth Market Update is available only in level 3 feed.

| Field Name                 | Data Type                        | Value     | Remark                                                                     |
|----------------------------|----------------------------------|-----------|----------------------------------------------------------------------------|
| <b>INFO HEADER</b>         |                                  |           |                                                                            |
| Code                       | SHORT                            | 'CV'      |                                                                            |
| Length                     | SHORT                            | Numeric   | Size of (INFO HEADER + INFO DATA + INFO TRAILER)                           |
| Sequence Number            | LONG                             | Numeric   | Application sequence number                                                |
| <b>INFO DATA</b>           |                                  |           |                                                                            |
| Symbol                     | CHAR [10]                        | Character | Symbol of the security                                                     |
| Series                     | CHAR [2]                         | Character | Series                                                                     |
| Market Type                | CHAR [1]                         | Character | 'N' = Normal<br>'O' = Odd Lot<br>'S' = Spot<br>'A' = Auction               |
| Timestamp                  | CHAR [11]                        | Character | No. of seconds from 01-01-1970 00:00:00 (DD-MM-YYYY HH:MM:SS)              |
| 20 Depth Buy order details | MARKET_DEPTH_BUY_ORDER_INFO [20] | Structure | Refer the table given below<br><a href="#">MARKET_DEPTH_BUY_ORDER_INFO</a> |

|                             |                                   |           |                                                                                                                                                                |
|-----------------------------|-----------------------------------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 20 Depth Sell order details | MARKET_DEPTH_SELL_ORDER_INFO [20] | Structure | Refer the table given below<br><a href="#">MARKET_DEPTH_SELL_ORDER_INFO</a>                                                                                    |
| Last Traded Price (LTP)     | CHAR [10]                         | Character | Price of the last trade happened on the security.<br>If no trade has happened for the day, then previous day's trade price is taken or the base price is taken |
| Last Traded Quantity        | CHAR [12]                         | Character | The quantity of the last trade happened on the security.<br>If no trade has happened for the day, then previous day's trade quantity is taken or zero is sent  |
| Total Traded Quantity (TTQ) | CHAR [12]                         | Character | Volume traded today                                                                                                                                            |
| Security Status             | CHAR [1]                          | Character | 'S' = Suspended<br>' ' = Non-suspended                                                                                                                         |
| Opening Price               | CHAR [10]                         | Character | Open price of the security for the day.<br>In pre-open session the indicative open price is sent if security is available in pre-open session                  |
| High Price                  | CHAR [10]                         | Character | High price of the security for the day                                                                                                                         |
| Low Price                   | CHAR [10]                         | Character | Low price of the security for the day                                                                                                                          |

|                     |           |           |                                                                                                                                                                              |
|---------------------|-----------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Close Price         | CHAR [10] | Character | Close price of the security.<br>During the day previous day's close price is sent.<br>After market close current day's close price is calculated and sent through this field |
| Average Trade Price | CHAR [10] | Character | Weighted average price of the security.<br>i.e. value / quantity                                                                                                             |
| Total Buy Quantity  | CHAR [12] | Character | Total quantity of the outstanding orders available on buy side                                                                                                               |
| Total Sell Quantity | CHAR [12] | Character | Total quantity of the outstanding orders available on sell side                                                                                                              |
| Total Turnover      | CHAR [25] | Character | Security traded value<br>i.e. Average Trade Price * TTQ                                                                                                                      |
| Online Index        | CHAR [8]  | Character | NIFTY 50 index value                                                                                                                                                         |
| <b>INFO TRAILER</b> |           |           |                                                                                                                                                                              |
| Checksum            | SHORT     | Numeric   | Refer to section <a href="#">checksum calculation</a>                                                                                                                        |
| End Of Trailer      | CHAR [1]  | '\r'      | Carriage Return                                                                                                                                                              |

**MARKET\_DEPTH\_BUY\_ORDER\_INFO**

| Field Name                  | Data Type | Value     | Remark                                                                                                                                                                                      |
|-----------------------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MARKET_DEPTH_BUY_ORDER_INFO |           |           |                                                                                                                                                                                             |
| Best Buy-Order price        | CHAR [10] | Character | Best 5 or 20 buy side's outstanding orders price and quantity information<br><br>In the case of PN packets the best 4 buy side's outstanding orders price and quantity information is sent. |
| Best Buy-Order Quantity     | CHAR [12] | Character | In the 5 <sup>th</sup> price and quantity field buy side's ATO orders information is sent.                                                                                                  |

**MARKET\_DEPTH\_SELL\_ORDER\_INFO**

| Field Name                   | Data Type | Value     | Remark                                                                                                                                                                                    |
|------------------------------|-----------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MARKET_DEPTH_SELL_ORDER_INFO |           |           |                                                                                                                                                                                           |
| Best Sell-Order price        | CHAR [10] | Character | Best 5 or 20 sell side's outstanding orders price and quantity information<br><br>In the case of PN packets best 4 sell side's outstanding orders price and quantity information is sent. |
| Best Sell-Order quantity     | CHAR [12] | Character | In the 5 <sup>th</sup> price and quantity field sell side's ATO orders information is sent.                                                                                               |

## 4.6 Online - Call Auction Market Security Update

Two new market types, Call Auction and Reserved (for future use) are introduced in the capital market trading system. These markets securities update information is sent through these messages.

### 4.6.1 Call Auction Market (Call Auction 1)

SME (Small & Medium Enterprise) securities call auction session is conducted in this market type. For detailed explanation please refer to section [Call Auction 1](#).

### 4.6.2 Reserved Market (Call Auction 2)

IPO, Relisting & illiquid securities call auction session is conducted in this market type. For detailed explanation please refer to section [Call Auction 2](#).

### 4.6.3 Call Auction 1 & 2 (Touchline Market Update)

| Field Name              | Data Type | Value     | Remark                                                        |
|-------------------------|-----------|-----------|---------------------------------------------------------------|
| <b>INFO HEADER</b>      |           |           |                                                               |
| Code                    | SHORT     | 'SN'      |                                                               |
| Length                  | SHORT     | Numeric   | Size of (INFO HEADER + INFO DATA + INFO TRAILER)              |
| Sequence Number         | LONG      | Numeric   | Application sequence Number                                   |
| <b>INFO DATA</b>        |           |           |                                                               |
| Symbol                  | CHAR [10] | Character | Symbol of the security                                        |
| Series                  | CHAR [2]  | Character | Series                                                        |
| Market Type             | CHAR [1]  | Character | 'C' = Call Auction<br>'G' = Call Auction 2                    |
| Timestamp               | CHAR [11] | Character | No. of seconds from 01-01-1970 00:00:00 (DD-MM-YYYY HH:MM:SS) |
| Best Buy-Order price    | CHAR [10] | Character | Best buy side's outstanding order Price                       |
| Best Buy-Order Quantity | CHAR [12] | Character | Best buy side's outstanding order Quantity                    |
| Buy BBMM Flag           | CHAR [1]  | Character | Refer to section <a href="#">BBMM Flag</a>                    |

|                             |           |           |                                                                                                                                                                |
|-----------------------------|-----------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Best Sell-Order price       | CHAR [10] | Character | Best Sell side's outstanding order Price                                                                                                                       |
| Best Sell-Order quantity    | CHAR [12] | Character | Best Sell side's outstanding order Quantity                                                                                                                    |
| Sell BBMM Flag              | CHAR [1]  | Character | Refer to section <a href="#">BBMM Flag</a>                                                                                                                     |
| Last Traded Price (LTP)     | CHAR [10] | Character | During order collection as well as during matching, it contains LTP of the security                                                                            |
| Total Traded Quantity (TTQ) | CHAR [12] | Character | This field contains the total quantity of a security traded on the current day                                                                                 |
| Indicative Traded Quantity  | CHAR [12] | Character | During order collection period this field will contain Indicative Equilibrium Quantity                                                                         |
| Security Status             | CHAR [1]  | Character | 'S' = Suspended<br>'`' = Non-suspended                                                                                                                         |
| Opening Price               | CHAR [10] | Character | This field contains the indicative opening price (IOP) of a security for order collection period session and Final Open Price of a security in matching period |
| High Price                  | CHAR [10] | Character | During order collection period it will always be zero. Once matching starts it will be updated                                                                 |
| Low Price                   | CHAR [10] | Character | During order collection period it will always be zero. Once matching starts it will be updated                                                                 |

|                     |           |           |                                                                                                                                                                                                                                                                          |
|---------------------|-----------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Close Price         | CHAR [10] | Character | This field contains the Closing price of a security                                                                                                                                                                                                                      |
| Average Trade Price | CHAR [10] | Character | Weighted average price of the security i.e. value / quantity<br>During order collection period it will always be zero. Once matching starts it will contain the Average Trade Price                                                                                      |
| First Open Price    | CHAR [10] | Character | During first call auction order collection period this field will be zero<br>Once matching starts it will contain the First Trade Price.<br>Once updated for all subsequent call auctions it will not change.<br>This field may remain zero till the first trade happens |
| Total Turnover      | CHAR [25] | Character | During the order collection period it will always be zero. Once matching starts it will be updated                                                                                                                                                                       |
| <b>INFO TRAILER</b> |           |           |                                                                                                                                                                                                                                                                          |
| Checksum            | SHORT     | Numeric   | Refer to section <a href="#">checksum calculation</a>                                                                                                                                                                                                                    |
| End Of Trailer      | CHAR [1]  | '\r'      | Carriage Return                                                                                                                                                                                                                                                          |

#### 4.6.4 Call Auction 1 & 2 (5 Depth Market Update)

This 5 Depth market update is available in level 2 and level 3 feed.

| Field Name                 | Data Type                        | Value     | Remark                                                                                 |
|----------------------------|----------------------------------|-----------|----------------------------------------------------------------------------------------|
| <b>INFO HEADER</b>         |                                  |           |                                                                                        |
| Code                       | SHORT                            | 'SN'      |                                                                                        |
| Length                     | SHORT                            | Numeric   | Size of (INFO HEADER + INFO DATA + INFO TRAILER)                                       |
| Sequence Number            | LONG                             | Numeric   | Application sequence number                                                            |
| <b>INFO DATA</b>           |                                  |           |                                                                                        |
| Symbol                     | CHAR [10]                        | Character | Symbol of the security                                                                 |
| Series                     | CHAR [2]                         | Character | Series                                                                                 |
| Market Type                | CHAR [1]                         | Character | 'C' = Call Auction<br>'G' = Call Auction 2                                             |
| Timestamp                  | CHAR [11]                        | Character | No. of seconds from 01-01-1970 00:00:00 (DD-MM-YYYY HH:MM:SS)                          |
| 5 Depth Buy order details  | MARKET_DEPTH_BUY_ORDER_INFO [5]  | Structure | Refer the table given below<br><a href="#">MARKET DEPTH AUCTION BUY ORDER INFO[5]</a>  |
| 5 Depth Sell order details | MARKET_DEPTH_SELL_ORDER_INFO [5] | Structure | Refer the table given below<br><a href="#">MARKET DEPTH AUCTION SELL ORDER INFO[5]</a> |
| Buy BBMM Order Exists      | CHAR [1]                         | Character | Refer to section <a href="#">BBMM Flag</a>                                             |
| Sell BBMM Order Exists     | CHAR [1]                         | Character | Refer to section <a href="#">BBMM Flag</a>                                             |
| Last Traded Price (LTP)    | CHAR [10]                        | Character | During order collection as well as during matching it contains LTP of the security     |

|                             |           |           |                                                                                                                                                                |
|-----------------------------|-----------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Last Traded Quantity        | CHAR [12] | Character | During order collection as well as during matching, it contains the quantity at which the last trade took place in a security                                  |
| Total Traded Quantity (TTQ) | CHAR [12] | Character | This field contains the total quantity of a security traded on the current day                                                                                 |
| Indicative Traded Quantity  | CHAR [12] | Character | During order collection period this field will contain Indicative Equilibrium Quantity                                                                         |
| Security Status             | CHAR [1]  | Character | 'S' = Suspended<br>' ' = Non-suspended                                                                                                                         |
| Opening Price               | CHAR [10] | Character | This field contains the indicative opening price (IOP) of a security for order collection period session and Final Open Price of a security in matching period |
| High Price                  | CHAR [10] | Character | During the order collection period it will always be zero. Once matching starts it will be updated                                                             |
| Low Price                   | CHAR [10] | Character | During the order collection period it will always be zero. Once matching starts it will be updated                                                             |
| Close Price                 | CHAR [10] | Character | This field contains the closing price of a security                                                                                                            |

|                     |           |           |                                                                                                                                                                                                                                                                            |
|---------------------|-----------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Average Trade Price | CHAR [10] | Character | Weighted average price of the security.<br>i.e. value / quantity<br><br>During the order collection period it will always be zero. Once matching starts it will contain the Average Trade Price                                                                            |
| First Open Price    | CHAR [10] | Character | During first call auction order collection period this field will be zero<br>Once matching starts it will contain the First Trade Price.<br>Once updated for all subsequent call auctions it will not change.<br>This field may contain zero until the first trade happens |
| Total Buy Quantity  | CHAR [12] | Character | This field contains the total quantity of buy orders in a security                                                                                                                                                                                                         |
| Total Sell Quantity | CHAR [12] | Character | This field contains the total quantity of sell orders in a security                                                                                                                                                                                                        |
| Total Turnover      | CHAR [25] | Character | During the order collection period it will always be zero. Once matching starts it will be updated                                                                                                                                                                         |
| <b>INFO TRAILER</b> |           |           |                                                                                                                                                                                                                                                                            |
| Checksum            | SHORT     | Numeric   | Refer to section <a href="#">checksum calculation</a>                                                                                                                                                                                                                      |
| End Of Trailer      | CHAR [1]  | '\r'      | Carriage Return                                                                                                                                                                                                                                                            |

**MARKET\_DEPTH\_AUCTION\_BUY\_ORDER\_INFO[5]**

| Field Name                              | Data Type | Value     | Remark                                                                                                                                                                                                                                          |
|-----------------------------------------|-----------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MARKET_DEPTH_AUCTION_SELL_ORDER_INFO[5] |           |           |                                                                                                                                                                                                                                                 |
| Best Buy-Order price                    | CHAR [10] | Character | Best 5 buy side's outstanding orders price, quantity & BBMM flag information.<br>Refer to section <a href="#">BBMM Flag</a><br>In case of Call Auction 1, best 4 buy side's outstanding orders price, quantity & BBMM flag information is sent. |
| Best Buy-Order Quantity                 | CHAR [12] | Character | In the 5 <sup>th</sup> price, quantity and BBMM flag fields buy side's ATO orders information is sent.                                                                                                                                          |
| Buy BBMM Flag                           | CHAR [1]  | Character | In case of Call auction 2, best 5 buy side's outstanding orders information is sent                                                                                                                                                             |

**MARKET\_DEPTH\_AUCTION\_SELL\_ORDER\_INFO[5]**

| Field Name                              | Data Type | Value     | Remark                                                                                                                                                                                                                                                |
|-----------------------------------------|-----------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MARKET_DEPTH_AUCTION_SELL_ORDER_INFO[5] |           |           |                                                                                                                                                                                                                                                       |
| Best Sell-Order price                   | CHAR [10] | Character | Best 5 sell side's outstanding orders price, quantity & BBMM flag information.<br>Refer to section <a href="#">BBMM Flag</a><br>In case of Call Auction 1, the best 4 sell side's outstanding orders price, quantity & BBMM flag information is sent. |
| Best Sell-Order Quantity                | CHAR [12] | Character | In the 5 <sup>th</sup> price, quantity and BBMM flag fields sell side's ATO orders information is sent.                                                                                                                                               |
| Sell BBMM Flag                          | CHAR [1]  | Character | In case of Call auction 2, best 5 sell side's outstanding orders information is sent                                                                                                                                                                  |

## 4.7 Online - Broadcast Message

These packets consist of the messages broadcast during the Trading time containing information such as changes in the price bands of particular script and market-related information.

| Field Name          | Data Type  | Value     | Remark                                                |
|---------------------|------------|-----------|-------------------------------------------------------|
| <b>INFO HEADER</b>  |            |           |                                                       |
| Code                | SHORT      | 'CB'      |                                                       |
| Length              | SHORT      | Numeric   | Size of (INFO HEADER + INFO DATA + INFO TRAILER)      |
| Sequence Number     | LONG       | Numeric   | Application sequence number                           |
| <b>INFO DATA</b>    |            |           |                                                       |
| Message Code        | CHAR [3]   | Character | 'NSE'                                                 |
| Message Length      | CHAR [3]   | Character | Broadcast Message Length                              |
| Message String      | CHAR [239] | Character | Broadcast Message                                     |
| <b>INFO TRAILER</b> |            |           |                                                       |
| Checksum            | SHORT      | Numeric   | Refer to section <a href="#">checksum calculation</a> |
| End Of Trailer      | CHAR [1]   | '\r'      | Carriage Return                                       |

## 4.8 EOD – Market Statistics (Bhavcopy)

The end of day status of the securities is sent through these messages. After market close, this information is disseminated to client as the “End of Day” (EOD) feed.

| Field Name            | Data Type | Value     | Remark                                                                                                                        |
|-----------------------|-----------|-----------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>INFO HEADER</b>    |           |           |                                                                                                                               |
| Code                  | SHORT     | 'CS'      |                                                                                                                               |
| Length                | SHORT     | Numeric   | Size of (INFO HEADER + INFO DATA + INFO TRAILER) (Variable length depending upon Message Length field of INFO DATA structure) |
| Sequence Number       | LONG      | Numeric   | Application sequence number                                                                                                   |
| <b>INFO DATA</b>      |           |           |                                                                                                                               |
| Symbol                | CHAR [10] | Character | Security symbol                                                                                                               |
| Series                | CHAR [2]  | Character | Series                                                                                                                        |
| Market Type           | CHAR [1]  | Character | 'N'=Normal<br>'O'=Odd Lot<br>'S'= Spot<br>'A'=Auction<br>'C'=Call Auction<br>'G'=Call Auction 2                               |
| Trade High Price      | CHAR [10] | Character | Security high price for the day                                                                                               |
| Trade Low Price       | CHAR [10] | Character | Security low price for the day                                                                                                |
| Opening Price         | CHAR [10] | Character | Security open price for the day                                                                                               |
| Closing Price         | CHAR [10] | Character | Security close price for the day                                                                                              |
| Last Traded Price     | CHAR [10] | Character | Security last traded price for the day                                                                                        |
| Previous Close Price  | CHAR [10] | Character | Security previous day's close price                                                                                           |
| Total Traded Quantity | CHAR [12] | Character | Volume traded today for the security                                                                                          |
| Total Traded Value    | CHAR [25] | Character | Total traded value for the security                                                                                           |
| <b>INFO TRAILER</b>   |           |           |                                                                                                                               |
| Checksum              | SHORT     | Numeric   | Refer to section <a href="#">checksum calculation</a>                                                                         |
| End Of Trailer        | CHAR [1]  | '\r'      | Carriage Return                                                                                                               |

## 4.9 EOD – Master Addition/Modification/Deletion

This packet consists of information about addition, modification, or deletion any of the securities. After market close, this information is disseminated to client as the “End of Day” (EOD) feed.

| Field Name                 | Data Type | Value                | Remark                                                                                                                        |
|----------------------------|-----------|----------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>INFO HEADER</b>         |           |                      |                                                                                                                               |
| Code                       | SHORT     | `CA`<br>`CM`<br>`CD` | `CA` = Security added<br>`CM` = Security modified<br>`CD` = Security deleted                                                  |
| Length                     | SHORT     | Numeric              | Size of (INFO HEADER + INFO DATA + INFO TRAILER) (Variable length depending upon Message Length field of INFO DATA structure) |
| Sequence Number            | LONG      | Numeric              | Application sequence number                                                                                                   |
| <b>INFO DATA</b>           |           |                      |                                                                                                                               |
| Symbol                     | CHAR [10] | Character            | Security symbol                                                                                                               |
| Series                     | CHAR [2]  | Character            | Series                                                                                                                        |
| Security Description       | CHAR [30] | Character            | Security Name                                                                                                                 |
| Regular Lot                | CHAR [6]  | Character            | Regular Lot                                                                                                                   |
| Market Type                | CHAR [1]  | Character            | `N` = Normal<br>`O` = Odd Lot<br>`S` = Spot<br>`A` = Auction<br>`C` = Call Auction<br>`G` = Call Auction 2                    |
| Tick Size                  | CHAR [6]  | Character            | Security tick size                                                                                                            |
| Face Value                 | CHAR [9]  | Character            | Security face value                                                                                                           |
| Issue Capital              | CHAR [12] | Character            | Security issued capital                                                                                                       |
| Market Index Participation | CHAR [1]  | Character            | `Y` = Yes<br>`N` = No                                                                                                         |
| Last Update Date & Time    | CHAR [20] | Character            | Format:<br>DD-MON-YYYY<br>HH:MM:SS                                                                                            |
| <b>INFO TRAILER</b>        |           |                      |                                                                                                                               |
| Checksum                   | SHORT     | Numeric              | Refer to section <a href="#">checksum calculation</a>                                                                         |
| End Of Trailer             | CHAR [1]  | `\r`                 | Carriage Return                                                                                                               |

#### 4.10 EOD – Corporate Action Update

After market close, this information is disseminated to client as the “End of Day” (EOD) feed.

| Field Name              | Data Type | Value     | Remark                                                                                                                        |
|-------------------------|-----------|-----------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>INFO HEADER</b>      |           |           |                                                                                                                               |
| Code                    | SHORT     | 'CU'      |                                                                                                                               |
| Length                  | SHORT     | Numeric   | Size of (INFO HEADER + INFO DATA + INFO TRAILER) (Variable length depending upon Message Length field of INFO DATA structure) |
| Sequence Number         | LONG      | Numeric   | Application sequence number                                                                                                   |
| <b>INFO DATA</b>        |           |           |                                                                                                                               |
| Symbol                  | CHAR [10] | Character | Security symbol                                                                                                               |
| Series                  | CHAR [2]  | Character | Series                                                                                                                        |
| Instrument Type         | CHAR [1]  | Character | '0' = Equities<br>'1' = Preference Shares<br>'2' = Debentures<br>'3' = Warrants<br>'4' = Miscellaneous<br>'5' = Others        |
| Issue Capital           | CHAR [12] | Character | Security Issue Capital                                                                                                        |
| Face Value              | CHAR [9]  | Character | Security Face value                                                                                                           |
| Market Lot              | CHAR [6]  | Character | Security market lot                                                                                                           |
| Dividend/Interest Rate  | CHAR [6]  | Character | Dividend/Interest Rate                                                                                                        |
| Record Date             | CHAR [10] | Character | Format:<br>YYYY-MM-DD                                                                                                         |
| Book Closure Start Date | CHAR [10] | Character | Format:<br>YYYY-MM-DD                                                                                                         |
| Book Closure End Date   | CHAR [10] | Character | Format:<br>YYYY-MM-DD                                                                                                         |
| Ex-Date                 | CHAR [10] | Character | Format:<br>YYYY-MM-DD                                                                                                         |
| No Delivery Start Date  | CHAR [10] | Character | Format:<br>YYYY-MM-DD                                                                                                         |
| No Delivery End Date    | CHAR [10] | Character | Format:<br>YYYY-MM-DD                                                                                                         |
| Dividend                | CHAR [1]  | Character | 'D' or Blank                                                                                                                  |

|                         |           |           |                                                       |
|-------------------------|-----------|-----------|-------------------------------------------------------|
| Rights Flag             | CHAR [1]  | Character | 'R' or Blank                                          |
| Bonus Flag              | CHAR [1]  | Character | 'B' or Blank                                          |
| Interest Flag           | CHAR [1]  | Character | 'I' or Blank                                          |
| AGM Flag                | CHAR [1]  | Character | 'A' or Blank                                          |
| EGM Flag                | CHAR [1]  | Character | 'E' or Blank                                          |
| Others Flag             | CHAR [1]  | Character | 'O' or Blank                                          |
| Corp Data Type          | CHAR [1]  | Character | 'B' =Book Closure<br>'R'=Record Date,<br>'N'=None     |
| Corp Action Description | CHAR [25] | Character | Corp Action Description                               |
| <b>INFO TRAILER</b>     |           |           |                                                       |
| Checksum                | SHORT     | Numeric   | Refer to section <a href="#">checksum calculation</a> |
| End Of Trailer          | CHAR [1]  | '\r'      | Carriage Return                                       |

#### 4.11 BOD & EOD Checksum Information

This message gives the information about the number of messages (i.e. count) sent for each BOD & EOD message. This message will be sent multiple times in a day. (i.e. After complete dissemination of any BOD/ EOD messages this message will be sent.)

| Field Name          | Data Type | Value                         | Remark                                                                                                                        |
|---------------------|-----------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>INFO HEADER</b>  |           |                               |                                                                                                                               |
| Code                | SHORT     | 'CZ'                          |                                                                                                                               |
| Length              | SHORT     | Numeric                       | Size of (INFO HEADER + INFO DATA + INFO TRAILER) (Variable length depending upon Message Length field of INFO DATA structure) |
| Sequence Number     | LONG      | Numeric                       | Application sequence number                                                                                                   |
| <b>INFO DATA</b>    |           |                               |                                                                                                                               |
| Data Code           | SHORT     | 'CT'/'CA'/'CM'/'CD'/'CS'/'CU' | Message code for which the count is sent                                                                                      |
| Messages Count      | CHAR [10] | Character                     | Message count for the Data Code                                                                                               |
| <b>INFO TRAILER</b> |           |                               |                                                                                                                               |

|                |          |         |                                                                                                               |
|----------------|----------|---------|---------------------------------------------------------------------------------------------------------------|
| Checksum       | SHORT    | Numeric | Refer to section <a href="#">checksum calculation</a><br>Checksum is not calculated, so it is sent as 0(Zero) |
| End Of Trailer | CHAR [1] | '\r'    | Carriage Return                                                                                               |

#### 4.12 EOD – End of Feed Information

This end of the packet indicates that all the parts of EOD feed have been completed. Only once this message is sent through the Feed. After receiving this message clients can stop their application i.e. no new update information will be disseminated from the server.

| Field Name                   | Data Type | Value   | Remark                                                                                                                        |
|------------------------------|-----------|---------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>INFO HEADER</b>           |           |         |                                                                                                                               |
| Code                         | SHORT     | 'CE'    |                                                                                                                               |
| Length                       | SHORT     | Numeric | Size of (INFO HEADER + INFO DATA + INFO TRAILER) (Variable length depending upon Message Length field of INFO DATA structure) |
| Sequence Number              | LONG      | Numeric | Application sequence number                                                                                                   |
| <b>INFO DATA</b>             |           |         |                                                                                                                               |
| Not associated with any data |           |         |                                                                                                                               |
| <b>INFO TRAILER</b>          |           |         |                                                                                                                               |
| Checksum                     | SHORT     | Numeric | Refer to section <a href="#">checksum calculation</a><br>Checksum is not calculated, so it is sent as 0 (Zero)                |
| End Of Trailer               | CHAR [1]  | '\r'    | Carriage Return                                                                                                               |

## 5 Steps for Decompressing the Data Packets

### 5.1 LZO Algorithm Details

The LZO stands for Lempel Ziv Oberhaumer. It is a data compression library which is suitable for data Decompression in real-time. This means it favors speed over compression ratio.

LZO is written in ANSI C. Both the source code and the compressed data format are designed to be portable across platforms. This algorithm is freely available on the internet (URL: <https://www.oberhumer.com/opensource/lzo/>). It is made available by free software foundation. The algorithm is tested on various operating systems like UNIX and Red Hat Linux.

LZO implements several algorithms with the following features.

- Decompression is simple and *\*very\** fast.
- Requires no memory for decompression.
- Requires 64 KB of memory for compression.
- Allows you to dial up extra compression at a speed cost in the compressor.
- The speed of the decompression is not reduced.
- Includes compression levels for generating pre-compressed data which achieve a quite competitive compression ratio.
- There is also a compression level which needs only 8 KB for Compression.
- The algorithm is thread safe.
- Algorithms are lossless.
- LZO supports overlapping compression and in-place decompression.

### 5.2 Files required for LZO algorithm

- Include files, source files (src) provided by LZO.
- LZO.lib
- LZO library version used is 1.0.7.

### 5.3 Decompression steps

Receive the packet in the temporary buffer i.e. array of characters.

The first field is compressed or decompressed.

The second field is the number of packets in the following data packet.

The third field is data packet length.

Use the following function of LZO to Decompress.

```
r = lzo1z_decompress ((lzo_byte*)cInputBuf, ipLength,  
                      (lzo_byte*)cOutputBuf, (lzo_uint*)&opLength, NULL);
```

**lzo1z\_decompress:** Function which decompresses the data packet received.

**cInputBuf:** Input buffer in which compressed data is received.

**ipLength:** The length of the packet which application has received using Receive ().

**cOutputBuf:** The uncompressed output data which is result of decompression.

**opLength:** Length of uncompressed data

After decompression data will be available in Output Buffer.

Each output data packet contains the INFO HEADER, after mapping the output decompressed buffer to INFO HEADER find out the data packet and according to it map the output buffer to respective data packet.

### Algorithm:

```
ST_NIFO_HEADER *pstInfoHeader;
```

```
for (i=0; i < iNoOfPackets; i++)          // iNoOfPackets received in
                                           // compressed data header
```

```
{
```

```
    pstInfoHeader = (ST_NIFO_HEADER *) cOutputBuf
```

```
    switch (pstInfoHeader->iCode)
```

```
    {
```

```
        case CB:          //Broadcast Message
```

```
        {
```

```
            ST_INDEX_DATA *stIndexData = (ST_INDEX_DATA *)cOutputBuf;
```

```
            .
```

```
            .
```

```
            cOutputBuf = cOutputBuf +
            sizeof(ST_INDEX_DATA); break;
```

```
        }
```

```
    }
```

```
}
```

## 6 Checksum Calculation Algorithm

The Checksum routine followed for Info Vendor Feed is as follows:

// Following is the defines for checksum calculation

```
#define DC1      17
#define DC3      19
#define CR       13
#define LF       10
#define POLY    0x1021
```

// End of defines

```
unsigned check_sum (cData, iLength)
char *cData ;
int iLength;
{
    unsigned uAccum = 0;
    unsigned uData;
    unsigned char ucChk[2];
    int i,j;
    for (i=0;i<iLength;i++)
    {
        uData = *(cData+i);
        uData <<= 8;
        for(j=8; j>0 ;j--)
        {
            if((uData^uAccum)&0x8000)
                uAccum=(uAccum<<1)^POLY;
            /* SHIFT AND SUBTRACT POLY */
            else
                uAccum<<=1;
            uData<<=1;
        }
    }

    ucChk[0] = uAccum>>8;
    if (ucChk[0] == DC1 || ucChk[0] == DC3 || ucChk[0] == CR || ucChk[0] == LF )
        ucChk[0] -= 1;
    ucChk[1] = uAccum&0xFF;
    if (ucChk[1] == DC1 || ucChk[1] == DC3 || ucChk[1] == CR || ucChk[1] == LF )
        ucChk[1] -= 1;
    uAccum = ucChk[1];
    uAccum = (uAccum<<8) + ucChk[0];

    return(uAccum);
}
```

## 7 Notes

### 7.1 Normal Market Session

All orders which are of regular lot size or multiples thereof are traded in the Normal Market. Normal market consists of various book types of wherein orders are segregated as Regular lot orders, Special Term orders, Negotiated Trade Orders and Stop Loss orders depending on their order attributes.

### 7.2 Auction Market Session

In the Auction Market, auctions are initiated by the Exchange on behalf of trading members for settlement related reasons. There are 3 participants in this market.

- Initiator - the party who initiates the auction process is called an initiator.
- Competitor - the party who enters orders on the same side as the initiator.
- Solicitor - the party who enters orders on the opposite side as of the initiator.

In the auction market the Open price and the Last Traded Price would be zero till the auction ends and the auction price is calculated by the system. Since Auction in any scrip is done at a fixed price the High Price, Low Price, Closing Price and Index values is zero for all scrips traded in the Auction Market.

### 7.3 Pre-Open Session

Pre-open session will be conducted for the Normal Market segment. The session will be conducted before the normal market start time. Exchange may decide to allow all or selective securities in pre-open session. During the Pre-open session, only order entry, orders modification and order cancellation will be allowed. Once the pre-open session ends, no order activity will be allowed and the final open price (i.e. equilibrium price based on accumulated buy and sell orders) will be computed. Pre-open orders will be matched at this final open price resulting in trade execution. Pre-open orders that could not participate in the pre-open matching for reasons such as a demand-supply gap, order price worse than the equilibrium price etc. shall be carried forward to the normal market. The time priority of such orders shall be retained.

In the above context NSE – Market Feed (Level 1, Level 2 & Level 3) product sends messages in the following sequence.

1. Pre-open session start (PO) – market type 'N'
2. Security Update Information (PN) – Indicative open price in open price field
3. Pre-open session end (PC) - market type 'N'

4. Security Update Information (PN) – Derived final open price in open price field and current security information
5. Normal Market open (CO) - market type 'N'
6. Security Update Information (CN) – With current security
7. Normal Market Close (CC) - market type 'N'

#### **7.4 Call Auction Session 1**

SME (small and medium enterprises) securities call auction is done through this session. It is similar to the pre-open session. Multiple sessions of this can be held on a trading day. Market type for this session is 'C'

In the above context NSE – Market Feed (Level 1, Level 2 & Level 3) product sends messages in the following sequence in one call auction session.

1. Pre-open session start (PO) – market type 'C'
2. Call Auction Security Update Information (SN) – Indicative open price in open price field.
3. Pre-open session end (PC) - market type 'C'
4. Security Update Information (SN) – Derived final open price in open price field and current security information

#### **7.5 Call Auction Session 2**

IPO, Relisting, and illiquid securities call auction is done through this session. It is similar to the pre-open session. Multiple sessions of this can be held in a trading day. The market type for this session is 'G'. IPO/Relisted securities get transferred to normal market session after deriving the open.

In the above context NSE – Market Feed (Level 1, Level 2 & Level 3) product sends messages in the following sequence in one call auction session.

1. Pre-open session start (PO) – market type 'G'
- Call Auction Security Update Information (SN) – Indicative open price in open price field.
2. Pre-open session end (PC) - market type 'G'
- Security Update Information (SN) – Derived final open price in open price field and current security information

#### **7.6 Buy Back Flag & Market Maker (BBMM Flag)**

In call auction session 1 & 2 the buy back and market maker orders are allowed. To identify the buy back or market maker orders BBMM flag is sent in



the SN messages. For the probable values of BBMM flag refer the table given below

1. BuyBBMMOrderExists: Buy Back or Market Maker order exists at buy side but not in top five price points.
2. SellBBMMOrderExists: Buy Back or Market Maker order exist at sell side but not in top five price points.
3. Sell BBMM Flag: Buy Back or Market Maker order at that price point.
4. Buy BBMM Flag: Buy Back or Market Maker order at that price point.

| Buy Back Order Exists | Market Maker Order Exists | BuyBBMMOrderExists/<br>SellBBMMOrderExists/<br>Sell BBMM Flag/<br>Buy BBMM Flag |
|-----------------------|---------------------------|---------------------------------------------------------------------------------|
| No                    | No                        | '0'                                                                             |
| Yes                   | No                        | '1'                                                                             |
| No                    | Yes                       | '2'                                                                             |
| Yes                   | Yes                       | '3'                                                                             |

E.g. If Buy Back and Market Maker orders exist at particular price point then the above fields will contain '3'.

## 8 Acronyms Used

|        |                                       |
|--------|---------------------------------------|
| BOD    | Begin Of Day Information              |
| EOD    | End Of Day Information                |
| ONLINE | Information Sent During Market Timing |
| CM     | Cash Market                           |
| F&O    | Future & Options Market               |
| CD     | Currency Derivatives Market           |
| SLBM   | Securities Lending & Borrowing Market |
| WDM    | Wholesale & Debt Market               |

## 9 FAQs

- 1) For Sequenced Data Messages, why do fields contain datatype as short, but contain value is specified as character?

Data sent by server contains number, which is the ASCII value of the field and at client's end it needs to be converted from ASCII value into character.

- 2) How to differentiate between numeric and non-numeric values?

Numeric values are always right aligned and non-numeric values are left aligned. For instance, even though LTP has a datatype as character, it is distinguished by the alignment as numeric value is always right aligned.

- 3) How to decompress a packet and extract data from it?

Follow the steps mentioned below.

- Receive a packet from the feed, and check ST\_COMP\_BATCH\_HEADER's cCompOrNot to see if the data is compressed or not.
- if the cCompOrNot flag is '0' then the data is compressed so use LZO Decompress to extract the data. The position of data would be the difference in position between the received bytes and the ST\_COMP\_BATCH\_HEADER size.
- if the cCompOrNot flag not '0' then the data is not compressed so just copy the bytes after the header to get the data.
- Type cast the data above data to ST\_INFO\_HEADER and get iCode from it. iCode can be used to identify the type of packet.
- Based on iCode, map the data section into the required structure.
- After the data section, map the trailer ST\_INFO\_TRAILER to get the iChecksum i.e checksum (Refer to section checksum calculation)

- 4) What is Level 1, Level 2 and Level 3 Data?

The list of market depth is organized by price levels, and it is updated in real-time to reflect current activity where:

- Level 1 provides the best Bid and best Ask price.
- Level 2 offers up to the best 5 Bids and Asks prices.
- Level 3 market depth offers a view of the best 20 Bids and Asks prices.

5) What structures are available for level 1, level 2 and level 3 feeds?

| Packets Sent                                                           | Level 1 | Level 2 | Level 3 |
|------------------------------------------------------------------------|---------|---------|---------|
| <a href="#">3.1 Heartbeat Message</a>                                  | ✓       | ✓       | ✓       |
| <a href="#">4.1 BOD - Master Information</a>                           | ✓       | ✓       | ✓       |
| <a href="#">4.2 Online - Market Status Message</a>                     | ✓       | ✓       | ✓       |
| <a href="#">4.3 Online – Touchline Market Update</a>                   | ✓       | –       | –       |
| <a href="#">4.4 Online – 5 Depth Market Update</a>                     | –       | ✓       | ✓       |
| <a href="#">4.5 Online – 20 Depth Market update</a>                    | –       | –       | ✓       |
| <a href="#">4.6.3 Call Auction 1 &amp; 2 (Touchline Market Update)</a> | ✓       | –       | –       |
| <a href="#">4.6.4 Call Auction 1 &amp; 2 (5 Depth Market Update)</a>   | –       | ✓       | ✓       |
| <a href="#">4.7 Online - Broadcast Message</a>                         | ✓       | ✓       | ✓       |
| <a href="#">4.8 EOD – Master Addition/Modification/Deletion</a>        | ✓       | ✓       | ✓       |
| <a href="#">4.9 EOD – Market Statistics (Bhavcopy)</a>                 | ✓       | ✓       | ✓       |
| <a href="#">4.10 EOD – Corporate Action Update</a>                     | ✓       | ✓       | ✓       |
| <a href="#">4.11 BOD &amp; EOD Checksum Information</a>                | ✓       | ✓       | ✓       |
| <a href="#">4.12 EOD – End of Feed Information</a>                     | ✓       | ✓       | ✓       |

6) How do we interpret [Security Eligibility per Market](#) in CT message type and Master Data security.txt file?

The security.txt file does not populate the market type. It contains 12 fields as depicted below:

|6|1|2|0|2|0|2|1|1|0|1|0|

There are 12 consecutive fields which indicate Security status and Eligibility for 6 Markets.

In these 12 fields the set of the first 2 fields represents the **Normal market** and the set of next 2 fields represent the **odd lot market** and so on.

The market types are in below orders:

1. **Normal Market**
2. **Odd lot Market**
3. **Spot Market**
4. **Auction Market**
5. **Call Auction1**
6. **Call Auction2**

In Real Time feed CT packet, we populate Market type separately.

For e.g. **N**,0,1, **O**,0,1, **S**,0,1, **A**,0,1, **C**,0,1, **G**,1,1,

**N**: Market type, 0: Eligibility, 1: Security status

Here 1 security status belongs to N market type.

**O**: Market type, 0: Eligibility, 1: Security status

**S**: Market type, 0: Eligibility, 1: Security status

**A**: Market type, 0: Eligibility, 1: Security status

**C**: Market type, 0: Eligibility, 1: Security status

**G**: Market type, 1: Eligibility, 1: Security status

## 10 Support Information

| Name                         | Email                | Contact Number  |
|------------------------------|----------------------|-----------------|
| Business & Technical Support | marketdata@nse.co.in | +91-22-26598385 |