



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

Version: 1.28

Date: 24 September 2024

NSE DATA & ANALYTICS LIMITED
EXCHANGE PLAZA,
PLOT NO. C/1, G BLOCK,
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INDIA.

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Revision History

Name	Description	Date
Version 1.0	New Specification Issued	16 October 2012
Version 1.1	Correction in ST_COMP_BATCH_HEADER Point no 3	30 November 2012
Version 1.2	S&P is removed from the indices name 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 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 CHAR[5] to CHAR[6] in 2 structures 5.7 EOD – Master Addition/ Modification/ Deletion and 5.10 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 2. Removed section 2.2 Online Requirements 3. Addition of 5 New Indices	03 August 2021
Version 1.19	Removal of TCP/IP Session Initialization, Login Request, Login Response	29 October 2021
Version 1.20	Added Settlement Cycle field in BOD Master 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 Information (CX). 2. Removal of section 4.10 EOD – Index Information (CI) and section 9 (Annexure 1).	12 March 2024

Version 1.23	1. Addition of T+0 Settlement Mechanism 2. Merger of Level 1, Level 2 & Level 3 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
Version 1.26	1. Adding Lot Size Comment in BOD - Master Information and EOD - Master Addition /Modification/Deletion 2. Adding Tick Size FAQ in FAQ 3. Updated Brief Description for SSEC field in BOD - Master Information	20 August 2024
Version 1.27	Addition of Indicative Close Price Field in Online - Touchline Market Update and Online - 5 Depth Market Update	23 August 2024
Version 1.28	Update Brief Description for Lot Size field in BOD - Master Information and EOD - Master Addition /Modification/Deletion	24 September 2024

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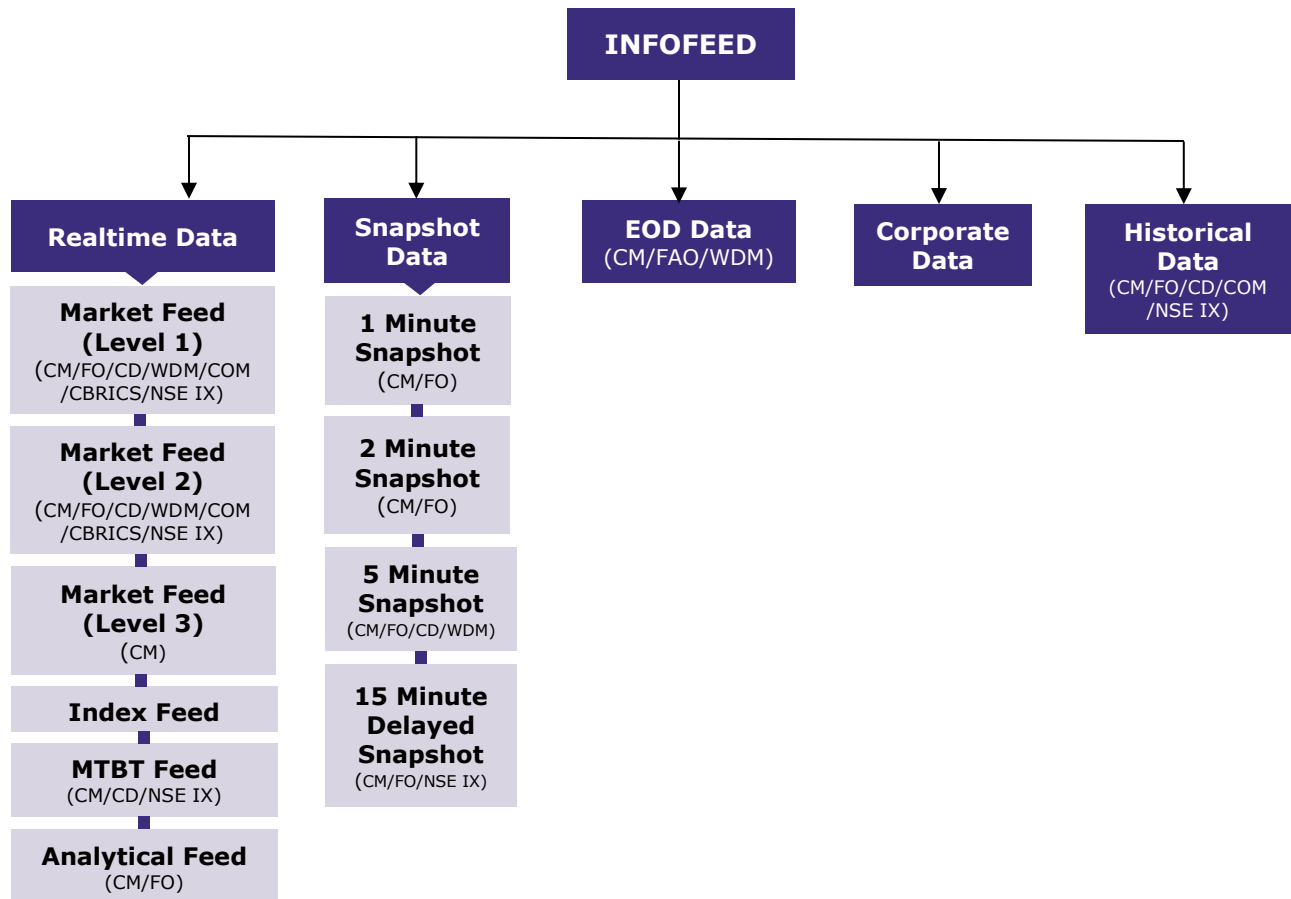
Market Feed – Capital Market (Level 1, Level 2 & Level 3)

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. Analytical Products data
6. Historical 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 Infocfeed application.



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

1. Market Feed (CM/FO/CD/WDM/COM/CBRICS/NSE IX Level 1)
2. Market Feed (CM/FO/CD/WDM/COM/CBRICS/NSE IX Level 2)
3. Market Feed (CM Level 3)
4. Index Feed
5. MTBT Feed (CM/CD/NSE IX)
6. Analytical Feed (CM/ FO)
7. Historical Data (CM/FO/CD/COM/NSE IX)

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 LZ0 – 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:

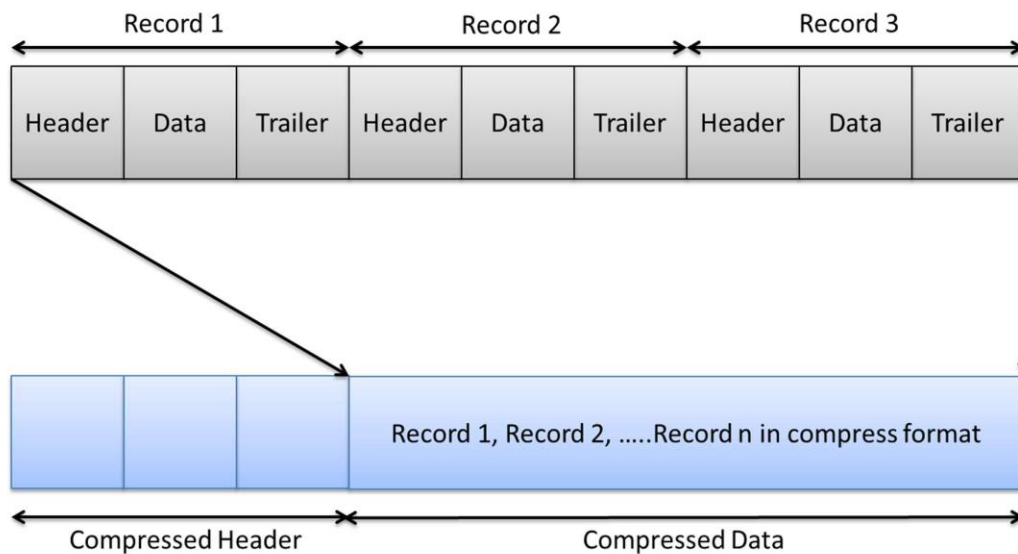
Data Type	Size In Bytes
CHAR	1
SHORT	2
LONG	4
DOUBLE	8

Byte order - Big Endian

All structures are pragma pack 1.



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	Brief Description
INFO HEADER			
Code	SHORT	'CH'	
Length	SHORT	Numeric	Size of (INFO HEADER + INFO DATA + INFO TRAILER)
Sequence Number	LONG	Numeric	0(Zero) for heartbeat message
INFO DATA			
Not associated with any data			
INFO TRAILER			
Checksum	SHORT	Numeric	Refer to section checksum calculation 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	Brief Description
INFO HEADER			
Code	SHORT	'CT'	
Length	SHORT	Numeric	Size of (INFO HEADER + INFO DATA + INFO TRAILER)
Sequence Number	LONG	Numeric	Application sequence number
INFO DATA			
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 '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 ST_SECURITY_ELIGIBILITY_PER_MARKET and FAQ
Settlement cycle	SHORT	Numeric	Value can be 0 or 1 0 = T+0 will be the settlement Period for that security 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. (The Lot size can be 999999 for the security with 'BL' and 'DL' series)
Tick Size	CHAR [6]	Character	Security tick size. (In paise. Divide by 100 for value in INR)
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. 0 - Not used. 1 - Normal Market security. 2 - IPO Session is being held security. 3 - Relist Session is being held security. 4 - Call Auction2 market security. 5 - SME security.
INFO TRAILER			
Checksum	SHORT	Numeric	Refer to section checksum calculation
End Of Trailer	CHAR [1]	'\r'	Carriage Return

ST_SECURITY_ELIGIBILITY_PER_MARKET

Field Name	Data Type	Value	Brief Description
ST_SECURITY_ELIGIBILITY_PER_MARKET			
Market Type	CHAR [1]	Character	`N` = Normal `O` = Odd Lot `S` = Spot `A` = Auction `C` = Call Auction `G` = Call Auction 2
Eligibility	CHAR [1]	Character	`1` = Allowed to trade `0` = Not allowed to trade
Security Status	CHAR [1]	Character	`1` = Open `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	Brief Description
INFO HEADER			
Code	SHORT	'PO' 'PC' 'CO' 'CC' 'CK' 'CL'	'PO' = Pre-open / Call Auction session start 'PC' = Pre-open / Call Auction session end 'CO' = Normal market open 'CC' = Normal market close 'CK' = Post close session start 'CL' = Post close session end
Length	SHORT	Numeric	Size of (INFO HEADER + INFO DATA + INFO TRAILER)
Sequence Number	LONG	Numeric	Application sequence number
INFO DATA			
Market Type	CHAR [1]	Character	'N' = Normal 'O' = Odd Lot 'S' = Spot 'A' = Auction 'C' = Call Auction 'G' = Call Auction 2
INFO TRAILER			
Checksum	SHORT	Numeric	Refer to section checksum calculation 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	Brief Description
INFO HEADER			
Code	SHORT	'PN' 'CN'	'PN' = Pre-open session updates 'CN' = Normal market updates
Length	SHORT	Numeric	Size of (INFO HEADER + INFO DATA + INFO TRAILER)
Sequence Number	LONG	Numeric	Application sequence Number
INFO DATA			
Symbol	CHAR [10]	Character	Symbol of the security
Series	CHAR [2]	Character	Series
Market Type	CHAR [1]	Character	'N' = Normal 'O' = Odd Lot 'S' = Spot '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 '`' = Non-suspended
Opening Price	CHAR [10]	Character	Open price of the security for the day. 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. 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 i.e. value / quantity
Total Turnover	CHAR [25]	Character	Security traded value i.e. Average Trade Price * TTQ
Online Index	CHAR [8]	Character	NIFTY 50 index value
Indicative Close Price	CHAR [10]	Character	This field contains indicative close price of a security. It will be sent in last 30 minutes of normal session. Until then this will be sent as 0
INFO TRAILER			
Checksum	SHORT	Numeric	Refer to section checksum calculation
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	Brief Description
INFO HEADER			
Code	SHORT	'PN' 'CN'	'PN' = Pre-open session updates 'CN' = Normal market updates
Length	SHORT	Numeric	Size of (INFO HEADER + INFO DATA + INFO TRAILER)
Sequence Number	LONG	Numeric	Application sequence number
INFO DATA			
Symbol	CHAR [10]	Character	Symbol of the security
Series	CHAR [2]	Character	Series
Market Type	CHAR [1]	Character	'N' = Normal 'O' = Odd Lot 'S' = Spot 'A' = Auction
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 MARKET_DEPTH_BUY_ORDER_INFO
5 Depth Sell Order details	MARKET_DEPTH_SELL_ORDER_INFO [5]	Structure	Refer the table given below MARKET_DEPTH_SELL_ORDER_INFO

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.
Last Traded Quantity	CHAR [12]	Character	Quantity of the last trade happened on the security. 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 '`' = Non-suspended
Opening Price	CHAR [10]	Character	Open price of the security for the day. 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. 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 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
Indicative Close Price	CHAR [10]	Character	This field contains indicative close price of a security. It will be sent in last 30 minutes of normal session. Until then this will be sent as 0
INFO TRAILER			
Checksum	SHORT	Numeric	Refer to section checksum calculation
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	Brief Description
INFO HEADER			
Code	SHORT	'CV'	
Length	SHORT	Numeric	Size of (INFO HEADER + INFO DATA + INFO TRAILER)
Sequence Number	LONG	Numeric	Application sequence number
INFO DATA			
Symbol	CHAR [10]	Character	Symbol of the security
Series	CHAR [2]	Character	Series
Market Type	CHAR [1]	Character	'N' = Normal 'O' = Odd Lot 'S' = Spot '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 MARKET_DEPTH_BUY_ORDER_INFO

20 Depth Sell order details	MARKET_DEPTH_SELL_ORDER_INFO [20]	Structure	Refer the table given below MARKET_DEPTH_SELL_ORDER_INFO
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
Last Traded Quantity	CHAR [12]	Character	The quantity of the last trade happened on the security. 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 '`' = Non-suspended
Opening Price	CHAR [10]	Character	Open price of the security for the day. 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. 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. 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
INFO TRAILER			
Checksum	SHORT	Numeric	Refer to section checksum calculation
End Of Trailer	CHAR [1]	'\r'	Carriage Return

MARKET_DEPTH_BUY_ORDER_INFO

Field Name	Data Type	Value	Brief Description
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
Best Buy-Order Quantity	CHAR [12]	Character	In the case of PN packets the best 4 buy side's outstanding orders price and quantity information is sent. In the 5 th price and quantity field buy side's ATO orders information is sent.

MARKET_DEPTH_SELL_ORDER_INFO

Field Name	Data Type	Value	Brief Description
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
Best Sell-Order quantity	CHAR [12]	Character	In the case of PN packets best 4 sell side's outstanding orders price and quantity information is sent. In the 5 th 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	Brief Description
INFO HEADER			
Code	SHORT	'SN'	
Length	SHORT	Numeric	Size of (INFO HEADER + INFO DATA + INFO TRAILER)
Sequence Number	LONG	Numeric	Application sequence Number
INFO DATA			
Symbol	CHAR [10]	Character	Symbol of the security
Series	CHAR [2]	Character	Series
Market Type	CHAR [1]	Character	'C' = Call Auction '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 BBMM Flag

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 BBMM Flag
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 '`' = 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 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 Once matching starts it will contain the First Trade Price. Once updated for all subsequent call auctions it will not change. 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
INFO TRAILER			
Checksum	SHORT	Numeric	Refer to section checksum calculation
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	Brief Description
INFO HEADER			
Code	SHORT	'SN'	
Length	SHORT	Numeric	Size of (INFO HEADER + INFO DATA + INFO TRAILER)
Sequence Number	LONG	Numeric	Application sequence number
INFO DATA			
Symbol	CHAR [10]	Character	Symbol of the security
Series	CHAR [2]	Character	Series
Market Type	CHAR [1]	Character	'C' = Call Auction '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 MARKET_DEPTH AUCTION BUY ORDER INFO[5]
5 Depth Sell order details	MARKET_DEPTH_SELL_ORDER_INFO [5]	Structure	Refer the table given below MARKET_DEPTH AUCTION SELL ORDER INFO[5]
Buy BBMM Order Exists	CHAR [1]	Character	Refer to section BBMM Flag
Sell BBMM Order Exists	CHAR [1]	Character	Refer to section BBMM Flag
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 '`' = 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. i.e. value / quantity 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 Once matching starts it will contain the First Trade Price. Once updated for all subsequent call auctions it will not change. 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
INFO TRAILER			
Checksum	SHORT	Numeric	Refer to section checksum calculation
End Of Trailer	CHAR [1]	'\r'	Carriage Return

MARKET_DEPTH_AUCTION_BUY_ORDER_INFO[5]

Field Name	Data Type	Value	Brief Description
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. Refer to section BBMM Flag In case of Call Auction 1, best 4 buy side's outstanding orders price, quantity & BBMM flag information is sent. In the 5 th price, quantity and BBMM flag fields buy side's ATO orders information is sent. In case of Call auction 2, best 5 buy side's outstanding orders information is sent
Best Buy-Order Quantity	CHAR [12]	Character	
Buy BBMM Flag	CHAR [1]	Character	

MARKET_DEPTH_AUCTION_SELL_ORDER_INFO[5]

Field Name	Data Type	Value	Brief Description
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. Refer to section BBMM Flag In case of Call Auction 1, the best 4 sell side's outstanding orders price, quantity & BBMM flag information is sent. In the 5 th price, quantity and BBMM flag fields sell side's ATO orders information is sent. In case of Call auction 2, best 5 sell side's outstanding orders information is sent
Best Sell-Order Quantity	CHAR [12]	Character	
Sell BBMM Flag	CHAR [1]	Character	

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	Brief Description
INFO HEADER			
Code	SHORT	'CB'	
Length	SHORT	Numeric	Size of (INFO HEADER + INFO DATA + INFO TRAILER)
Sequence Number	LONG	Numeric	Application sequence number
INFO DATA			
Message Code	CHAR [3]	Character	'NSE'
Message Length	CHAR [3]	Character	Broadcast Message Length
Message String	CHAR [239]	Character	Broadcast Message
INFO TRAILER			
Checksum	SHORT	Numeric	Refer to section checksum calculation
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	Brief Description
INFO HEADER			
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
INFO DATA			
Symbol	CHAR [10]	Character	Security symbol
Series	CHAR [2]	Character	Series
Market Type	CHAR [1]	Character	'N'=Normal 'O'=Odd Lot 'S'= Spot 'A'=Auction 'C'=Call Auction '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
INFO TRAILER			
Checksum	SHORT	Numeric	Refer to section checksum calculation
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	Brief Description
INFO HEADER			
Code	SHORT	'CA' 'CM' 'CD'	'CA' = Security added 'CM' = Security modified '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
INFO DATA			
Symbol	CHAR [10]	Character	Security symbol
Series	CHAR [2]	Character	Series
Security Description	CHAR [30]	Character	Security Name
Regular Lot	CHAR [6]	Character	Lot Size
Market Type	CHAR [1]	Character	'N' = Normal 'O' = Odd Lot 'S' = Spot 'A' = Auction 'C' = Call Auction 'G' = Call Auction 2
Tick Size	CHAR [6]	Character	Security tick size (In INR)
Face Value	CHAR [9]	Character	Security face value

Issue Capital	CHAR [12]	Character	Security issued capital
Market Index Participation	CHAR [1]	Character	'Y' = Yes 'N' = No
Last Update Date & Time	CHAR [20]	Character	Format: DD-MON-YYYY HH:MM:SS
INFO TRAILER			
Checksum	SHORT	Numeric	Refer to section checksum calculation
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	Brief Description
INFO HEADER			
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
INFO DATA			
Symbol	CHAR [10]	Character	Security symbol
Series	CHAR [2]	Character	Series
Instrument Type	CHAR [1]	Character	'0' = Equities '1' = Preference Shares '2' = Debentures '3' = Warrants '4' = Miscellaneous '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: YYYY-MM-DD
Book Closure Start Date	CHAR [10]	Character	Format: YYYY-MM-DD
Book Closure End Date	CHAR [10]	Character	Format: YYYY-MM-DD
Ex-Date	CHAR [10]	Character	Format: YYYY-MM-DD
No Delivery Start Date	CHAR [10]	Character	Format: YYYY-MM-DD
No Delivery End Date	CHAR [10]	Character	Format: 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 'R'= Record Date 'N'= None
Corp Action Description	CHAR [25]	Character	Corp Action Description
INFO TRAILER			
Checksum	SHORT	Numeric	Refer to section checksum calculation
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	Brief Description
INFO HEADER			
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
INFO DATA			
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
INFO TRAILER			
Checksum	SHORT	Numeric	Refer to section checksum calculation 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	Brief Description
INFO HEADER			
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
INFO DATA			
Not associated with any data			
INFO TRAILER			
Checksum	SHORT	Numeric	Refer to section checksum calculation 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/ SellBBMMOrderExists/ Sell BBMM Flag/ 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
WDM	Wholesale & Debt Market
COM	Commodity Market
CBRICS	Corporate Bond Reporting and Integrated Clearing System
NSE IX	NSE International Exchange
MTBT	Multicast Tick By Tick
LTP	Last Traded Price



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
3.1 Heartbeat Message	✓	✓	✓
4.1 BOD - Master Information	✓	✓	✓
4.2 Online - Market Status Message	✓	✓	✓
4.3 Online - Touchline Market Update	✓	-	-
4.4 Online - 5 Depth Market Update	-	✓	✓
4.5 Online - 20 Depth Market update	-	-	✓
4.6.3 Call Auction 1 & 2 (Touchline Market Update)	✓	-	-
4.6.4 Call Auction 1 & 2 (5 Depth Market Update)	-	✓	✓
4.7 Online - Broadcast Message	✓	✓	✓
4.8 EOD - Master Addition/Modification/Deletion	✓	✓	✓
4.9 EOD - Market Statistics (Bhavcopy)	✓	✓	✓
4.10 EOD - Corporate Action Update	✓	✓	✓
4.11 BOD & EOD Checksum Information	✓	✓	✓
4.12 EOD - End of Feed Information	✓	✓	✓

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

7) How is Security Tick Size to be interpreted?

In Real Time CT (BOD – Master Information) packet, Tick Size is in paise.
While in EOD – Master Addition/Modification/Deletion, Tick Size is in INR.



10 Support Information

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