



MARKET FEED FAO LEVEL - 1

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Revision History

Name	Description	Date
Version 1.0	New Specification Issued	12 February, 2013
Version 1.1	Correction in FS message structure	25 April, 2013
Version 1.2	1. Removal of TCP/IP Session Initialization, Login Request, Login Response.	29 October, 2021
Version 1.3	Addition of following fields in BOD – Master information: Contract Name Regular Lot Tick Size Maturity Date	16 November, 2021
Version 1.4	Contract Name mapping example	06 December, 2021

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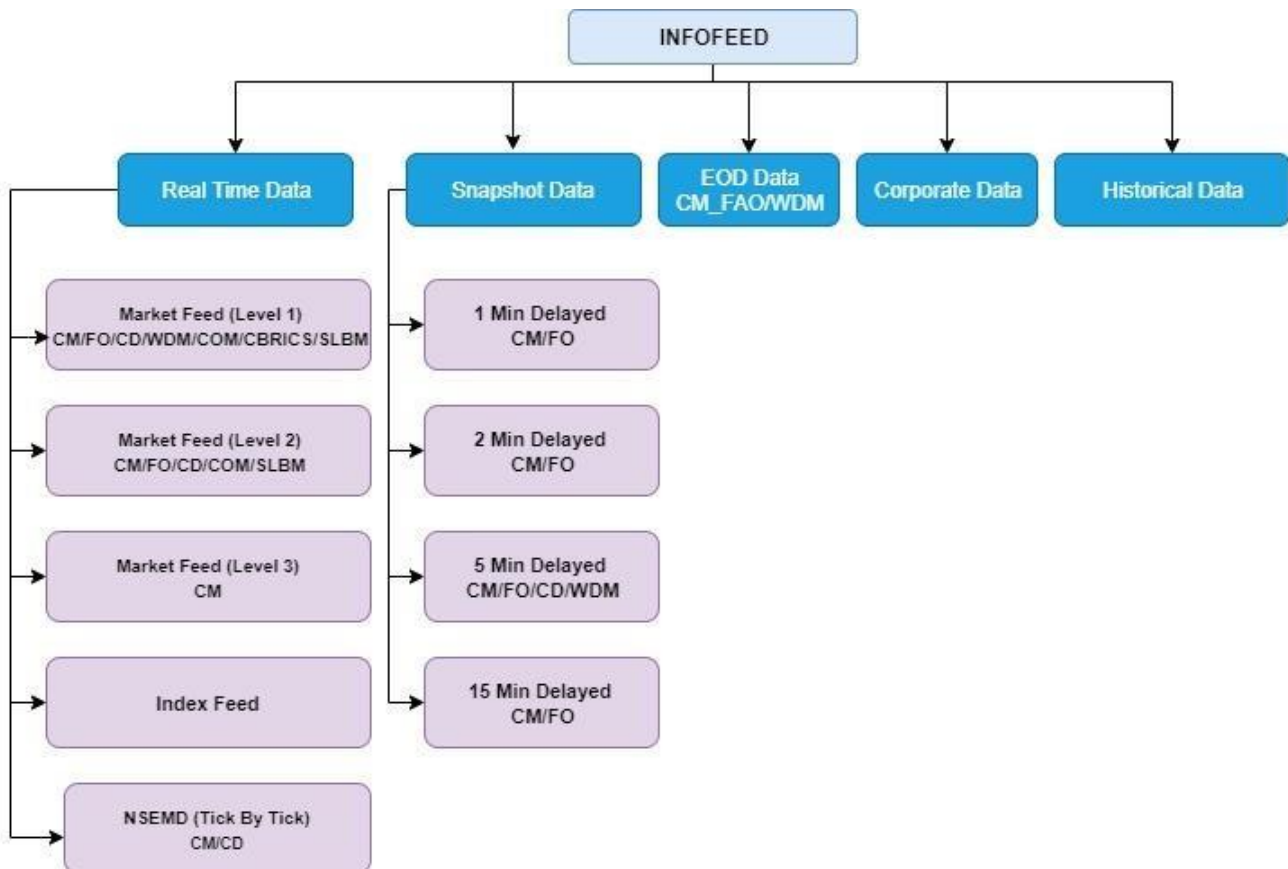
NSE – Market Feed (FO Level - 1)

1. Introduction

NSE Data & Analytics Ltd. disseminates NSEIL’s real time broadcast data to various information agencies. It provides the 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 through Multicast protocols, 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 about the NSE – Market Feed (FO Level 1) product. Through this product on 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 Infofeed server accepts these pneumatic calls and creates a socket connection.

The feed consist 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.

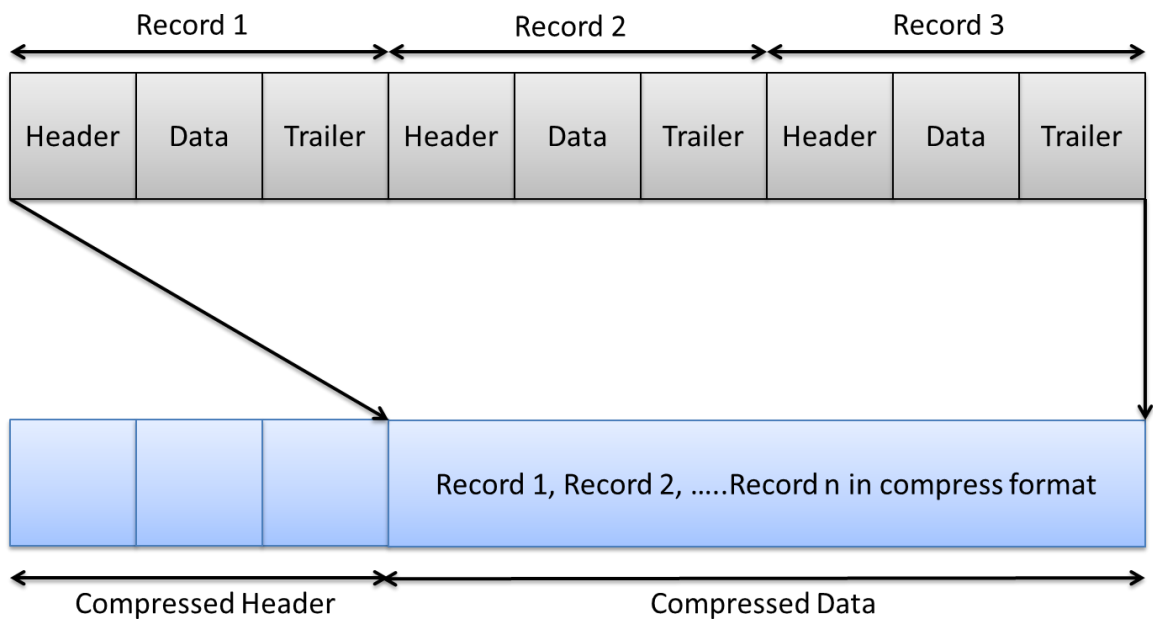
2.1 Data Types

Data types used in feed,

Data Type	Size In Bytes
CHAR	1
INT	4
LONG	4
DOUBLE	8

Byte order - Big Endean.

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 LZ0.

3. Session Messages

3.1 Heartbeat Message (Sent by server)

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

Field Name	Data Type	Value	Remark
INFO HEADER			
Code	SHORT	'FH'	
Length	SHORT	Numeric	Size of (INFO HEADER + INFO DATA + INFO TRAILER)
Sequence Number	LONG	Numeric	0(Zero) for heart beat message
INFO DATA			
Not associated with any data			
INFO TRAILER			
Check Sum	SHORT	Numeric	Refer point no. 7. Check sum is not calculated sent as 0 (Zero)
End Of Trailer	CHAR	'\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 and during the market timing also. This feed contains the information about the contracts valid in the FO Market for trading.

Field Name	Data Type	Value	Remark
INFO HEADER			
Code	SHORT	'FT'	
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 contracts listed on NSE.
Instrument Type	CHAR[6]	Character	Instrument Type
Symbol	CHAR[10]	Character	Security Symbol
Expiry Date	CHAR[11]	Character	Expiry Date
Strike Price	CHAR[10]	Character	Strike Price
Option Type	CHAR[2]	Character	Option Type
Category	CHAR	Character	'1' = Regular Market Hours '2' = Extended Market Hours
Delete Flag	CHAR	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

Contract Eligibility Per Market	ST_CONTRACT_ELIGIBILITY_PER_MARKET[4]	Structure	Refer the table given below ST_CONTRACT_ELIGIBILITY_PER_MARKET
Contract Name	CHAR[25]	Character	This field is provided for distinguishing the monthly and weekly contracts
Regular Lot	CHAR[10]	Character	Regular Lot
Tick Size	CHAR[10]	Character	Contract tick size
Maturity Date	CHAR[10]	Character	Issue Maturity Date (DD-MM-YYYY)
INFO TRAILER			
Check Sum	SHORT	Numeric	Refer point no. 7.
End Of Trailer	CHAR	'\r'	Carriage Return

Field Name	Data Type	Value	Remark
ST_CONTRACT_ELIGIBILITY_PER_MARKET			
Market Type	CHAR	Character	'N'=Normal 'O'=Odd lot 'S'=Spot 'A'=Auction
Eligibility	CHAR	Character	'1'=Allowed to trade '0'=Not allowed to trade
Contract Status	CHAR	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	Remark
INFO HEADER			
Code	SHORT	'FO' 'FC'	'FO' = Normal market open 'FC' = Normal market close

Length	SHORT	Numeric	Size of (INFO HEADER + INFO DATA + INFO TRAILER)
Sequence Number	LONG	Numeric	Application sequence number
INFO DATA			
Market Type	CHAR	Character	'N'=Normal Market Session 'X'=Extended Market Session
INFO TRAILER			
Check Sum	SHORT	Numeric	Refer point no. 7. Check sum is not calculated sent as 0(Zero),
End Of Trailer	CHAR	'\r'	Carriage Return

4.3 ONLINE – Open Interest Information

This packet is sent during the trading hours and it indicates the Open Interest of the various contracts traded.

Field Name	Data Type	Value	Remark
INFO HEADER			
Code	SHORT	'FI'	
Length	SHORT	Numeric	Size of (INFO HEADER + INFO DATA + INFO TRAILER)
Sequence Number	LONG	Numeric	Application sequence number
INFO DATA			
Instrument Type	CHAR[6]	Character	Instrument Type
Symbol	CHAR[10]	Character	Symbol of the security
Expiry Date	CHAR[11]	Character	Expiry Date
Strike Price	CHAR[10]	Character	Strike Price
Option Type	CHAR[2]	Character	Option Type
Open Interest	CHAR[10]	Character	Open Interest of the contract

Market Type	CHAR	Character	'N'=Normal 'O'=Odd lot 'S'=Spot 'A'=Auction
Time Stamp	CHAR[11]	Character	No of seconds from 01-01-1970 00:00:00 (DD-MM-YYYY HH:MM:SS)
INFO TRAILER			
Check Sum	SHORT	Numeric	Refer point no. 7.
End Of Trailer	CHAR	'\r'	Carriage Return

4.4 ONLINE - Normal Market Contract Update Information

NSE contract update information for normal market is sent through this Message.

Field Name	Data Type	Value	Remark
INFO HEADER			
Code	SHORT	'FN'	FN = Normal market updates
Length	SHORT	Numeric	Size of (INFO HEADER + INFO DATA + INFO TRAILER)
Sequence Number	LONG	Numeric	Application sequence number
INFO DATA			
Instrument Type	CHAR[6]	Character	Instrument Type
Symbol	CHAR[10]	Character	Symbol of the security
Expiry Date	CHAR[11]	Character	Expiry Date
Strike Price	CHAR[10]	Character	Strike Price
Option Type	CHAR[2]	Character	Option Type
Market Type	CHAR	Character	'N'=Normal 'O'=Odd lot 'S'=Spot 'A'=Auction
Time Stamp	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 sides outstanding order price

Best Buy-Order Quantity	CHAR[12]	Character	Best buy sides outstanding order quantity
Best Sell-Order price	CHAR[10]	Character	Best Sell sides outstanding order price
Best Sell-Order quantity	CHAR[12]	Character	Best Sell sides outstanding order quantity
Last Traded Price (LTP)	CHAR[10]	Character	Price of the last trade happened on the contract. 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	Character	'S' = Suspended '`' = Non-suspended
Opening Price	CHAR[10]	Character	Open price of the contract for the day.
High Price	CHAR[10]	Character	High price of the contract for the day
Low Price	CHAR[10]	Character	Low price of the contract for the day
Close Price	CHAR[10]	Character	Close price of the contract. 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 contract. i.e. value / quantity
Total Turnover	CHAR[25]	Character	Contract traded value i.e. Average Trade Price * TTQ

INFO TRAILER			
Check Sum	SHORT	Numeric	Refer point no. 7.
End Of Trailer	CHAR	'\r'	Carriage Return

4.5 ONLINE - Spread Contract Update Information

NSE spread contract update information is sent through this Message.

Field Name	Data Type	Value	Remark
INFO HEADER			
Code	SHORT	'FP'	
Length	SHORT	Numeric	Size of (INFO HEADER + INFO DATA + INFO TRAILER)
Sequence Number	LONG	Numeric	Application sequence Number
INFO DATA			
Instrument Type_1	CHAR[6]	Character	Instrument Type
Symbol_1	CHAR[10]	Character	Symbol of the security
Expiry Date_1	CHAR[11]	Character	Expiry Date
Strike Price_1	CHAR[10]	Character	Strike Price
Option Type_1	CHAR[2]	Character	Option Type
Instrument Type_2	CHAR[6]	Character	Instrument Type
Symbol_2	CHAR[10]	Character	Symbol of the security
Expiry Date_2	CHAR[11]	Character	Expiry Date
Strike Price_2	CHAR[10]	Character	Strike Price
Option Type_2	CHAR[2]	Character	Option Type
Time Stamp	CHAR[11]	Character	No of seconds from 01-01-1970 00:00:00 (DD-MM-YYYY HH:MM:SS)
Best Buy-Order price-1	CHAR[10]	Character	Best buy side's outstanding orders price & quantity information
Best Buy-Order Quantity-1	CHAR[12]	Character	
Best Sell-Order price-1	CHAR[10]	Character	Best sell side's outstanding orders price & quantity information
Best Sell-Order quantity-1	CHAR[12]	Character	

Last Traded Price Difference (LTP)	CHAR[10]	Character	This field will contain price difference of the latest spread-spread trade.
Total Traded Quantity (TTQ)	CHAR[12]	Character	This field contains the total quantity of a contract traded on the current day
Opening Price Difference	CHAR[10]	Character	This field will contain price difference of the first spread-spread trade of the day.
Day High Price Difference	CHAR[10]	Character	This field will contain maximum of the price difference of spread-spread trades during the day.
Day Low Price Difference	CHAR[10]	Character	This field will contain minimum of the price difference of spread-spread trades during the day.
INFO TRAILER			
Check Sum	SHORT	Numeric	Refer point no. 7.
End Of Trailer	CHAR	'\r'	Carriage Return

4.6 ONLINE - Broadcast Message

These packets consist of the messages broadcast during the Trading time containing important announcements in F&O market segment.

Field Name	Data Type	Value	Remark
INFO HEADER			
Code	SHORT	'FB'	
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			
Message Code	CHAR[3]	Character	NSE
Message Length	CHAR[3]	Character	Broadcast Message Length
Message String	CHAR [Message Length]	Character	Broadcast Message
INFO TRAILER			
Check Sum	SHORT	Numeric	Refer point no. 7.
End Of Trailer	CHAR	'\r'	Carriage Return

4.7 EOD – Master Addition/Modification/Deletion

This packet consists of information about added, deleted & regular contracts. After market close, this information is disseminated to client as the “End of Day” (EOD) feed.

Field Name	Data Type	Value	Remark
INFO HEADER			
Code	SHORT	'FA' 'FM' 'FD'	FA = Contract added FM = Regular Contract FD = Contract 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			
Instrument	CHAR[6]	Character	Instrument Type
Symbol	CHAR[10]	Character	Security symbol
Expiry Date	CHAR[11]	Character	Expiry Date
Strike Price	CHAR[10]	Character	Strike Price
Option Type	CHAR[2]	Character	Option Type
Contract Description	CHAR[30]	Character	Contract Name
Regular Lot	CHAR[6]	Character	Regular Lot

Market Type	CHAR	Character	'N'=Normal 'O'=Odd lot 'S'=Spot 'A'=Auction
Tick Size	CHAR[6]	Character	Security tick size
Maturity Date	CHAR[11]	Character	Contract Maturity Date (DD-MON-YYYY)
Last Update Date & Time	CHAR[20]	Character	Format: DD-MON-YYYY HH:MM:SS
INFO TRAILER			
Check Sum	SHORT	Numeric	Refer point no. 7.
End Of Trailer	CHAR	'\r'	Carriage Return

4.8 EOD – Market Status

The end of day status of the contracts 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
INFO HEADER			
Code	SHORT	'FS'	
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			
Instrument	CHAR[6]	Character	Instrument Type
Symbol	CHAR[10]	Character	Security symbol
Expiry Date	CHAR[11]	Character	Expiry Date
Strike Price	CHAR[10]	Character	Strike Price
Option Type	CHAR[2]	Character	Option Type
Market Type	CHAR	Character	'N'=Normal 'O'=Odd lot 'S'=Spot 'A'=Auction
Opening Price	CHAR[10]	Character	Contract open price for the day

Trade High Price	CHAR[10]	Character	Contract high price for the day
Trade Low Price	CHAR[10]	Character	Contract low price for the day
Closing Price	CHAR[10]	Character	Contract close price for the day
Last Traded Price	CHAR[10]	Character	Contract last traded price for the day
Previous Close Price	CHAR[10]	Character	Contract previous day's close price
Settlement Price	CHAR[10]	Character	Contract settlement price for the day
Total Traded Quantity	CHAR[12]	Character	Volume traded today for the contract
Total Traded Value	CHAR[25]	Character	Total traded value for the contract
Open Interest	CHAR[10]	Character	Contract open interest
Change In Open Interest	CHAR[10]	Character	Contract change in open interest
INFO TRAILER			
Check Sum	SHORT	Numeric	Refer point no. 7.
End Of Trailer	CHAR	'\r'	Carriage Return

4.9 BOD & EOD Check Sum 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 sent.)

Field Name	Data Type	Value	Remark
INFO HEADER			
Code	SHORT	'FZ'	
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	FT/FA/FM/FD/FS	Message code for which the count is sent
Messages Count	CHAR[10]	Character	Message count for the Data Code.
INFO TRAILER			
Check Sum	SHORT	Numeric	Refer point no. 7. Check sum is not calculated sent as 0(Zero),
End Of Trailer	CHAR	'\r'	Carriage Return

4.10 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
INFO HEADER			
Code	SHORT	'FE'	
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			
Check Sum	SHORT	Numeric	Refer point no. 7. Check sum is not calculated sent as 0(Zero),
End Of Trailer	CHAR	'\r'	Carriage Return

5. Steps for Decompressing the Data Packets

5.1 LZO Algorithm Details

LZO is a data compression library which is suitable for data de-/compression 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.

LZO implements a number of algorithms with the following feature

- 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.
- Algorithm is thread safe.
- Algorithm is 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 not compresses?

The second field is the number of packet 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 the 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_INFO_HEADER *) cOutputBuf switch
(pstInfoHeader->iCode)
  {
      case FI: //Open Interest Information {
ST_OPEN_INT_DATA *stIndexData = (ST_OPEN_INT_DATA *)cOutputBuf;
      .
      .
      cOutputBuf = cOutputBuf + sizeof(ST_OPEN_INT_DATA); }
  }
}

```

6. Checksum Calculation Algorithm

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

```
// Following are 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

Contract Descriptor comprises Instrument Name, Symbol, Expiry Date, Strike Price & Option Type. Symbol indicates the index on which the FUTURES or OPTIONS contract is based (viz. CNX NIFTY) in case of Index Futures or Index Options or any stock (like ACC) in case of Future / Options on Individual stocks.

8. Contract Name mapping example

In FT messages four new fields are added and one of the fields is **“Contract Name”**

Examples of weekly & monthly options contracts will reflect in the contract name field as follows

Options monthly and weekly contracts examples

Contract Name	Tenor	Logic for contract Name					
FINNIFTY22JAN15900PE	Monthly	Symbol	YY	MON	Strike Price	Option Type	
NIFTY22JAN19450CE	Monthly	Symbol	YY	MON	Strike Price	Option Type	
FINNIFTY21D2122200PE	Weekly	Symbol	YY	M	DD	Strike Price	Option Type
NIFTY21D2316700CE	Weekly	Symbol	YY	M	DD	Strike Price	Option Type

Futures monthly and weekly contracts examples

Contract Name	Tenor	Logic for contract Name				
FINNIFTY22JANFUT	Monthly	Symbol	YY	MON	Instrument Type	
NIFTY22JANFUT	Monthly	Symbol	YY	MON	Instrument Type	
FINNIFTY21D21FUT	Weekly	Symbol	YY	M	DD	Instrument Type

Where YY – Year, MON – Month, M – Month, DD - Date

Below is the Table of codes for months ‘M’ in weekly options contracts

Sr. No.	Month ‘M’	Code
1	January	1
2	February	2
3	March	3
4	April	4
5	May	5
6	June	6
7	July	7
8	August	8
9	September	9
10	October	O
11	November	N
12	December	D

9. Support Information

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

10. Annexure 1**10.1 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	Whole Sale & Debt Market