



MARKET FEED CD LEVEL - 1

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Revision History

| Name | Description | Date |
|-------------|--|-------------------|
| Version 1.0 | New Specification Issued | 12 February, 2013 |
| Version 1.1 | Addition of following fields in contract master information: Contract Name Regular Lot Tick Size Maturity Date | 21 December, 2018 |
| Version 1.2 | Contract Name mapping example in section 8 | 20 February, 2019 |
| Version 1.3 | 1. Removal of TCP/IP Session Initialization, Login Request, Login Response, Online Requirements. | 29 October, 2021 |

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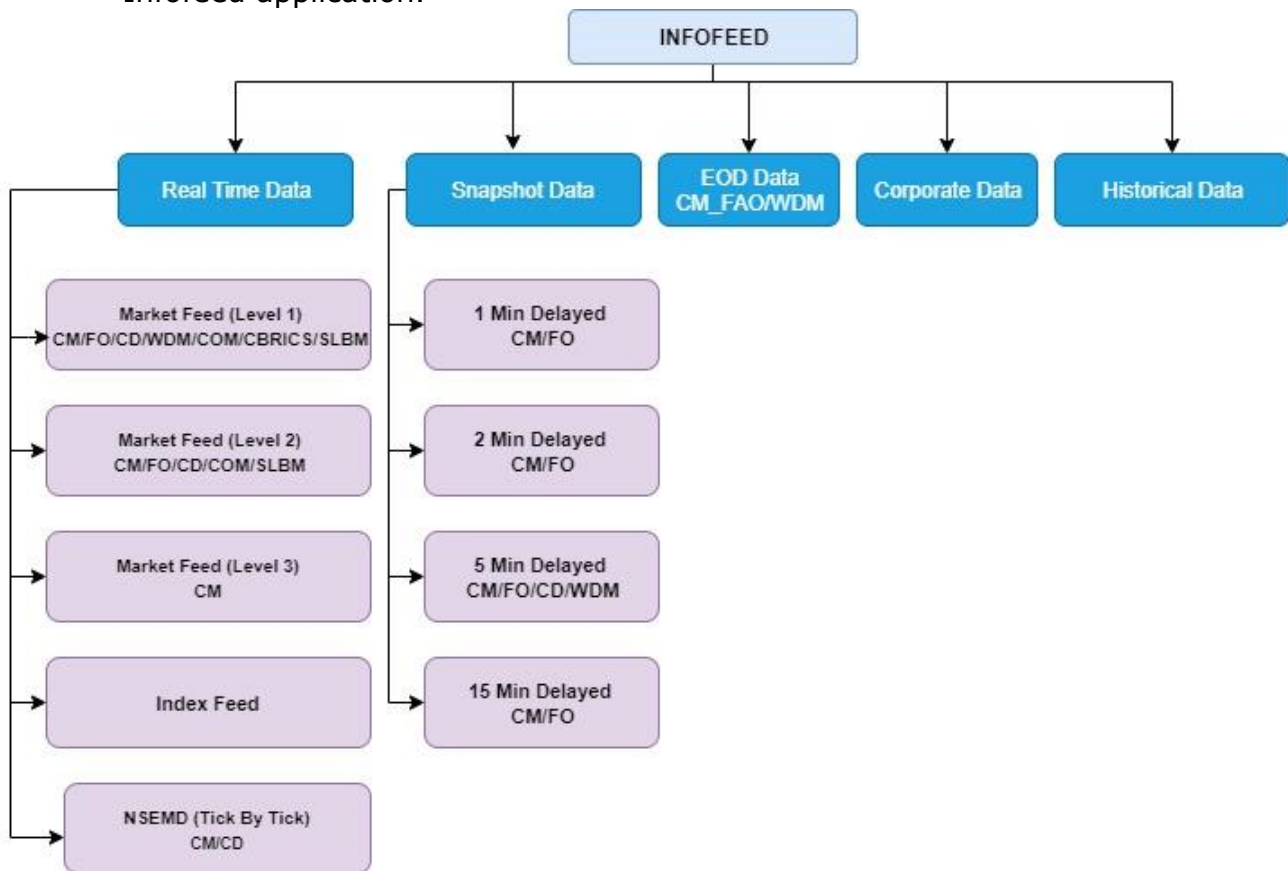
NSE – Market Feed (CD Level - 1)

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 protocol, 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 (CD 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.

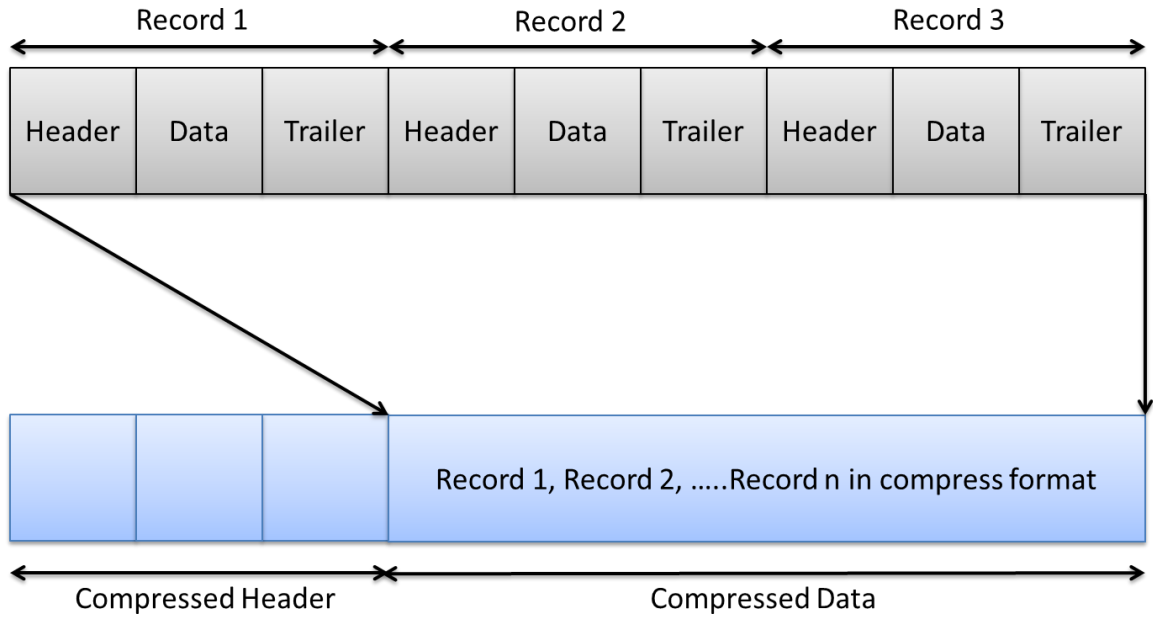
2.1 Data Types

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 LZO.

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 | 'DH' | |
| 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 Contract Master Information

These packets are sent at the beginning of the each trading day before market open and during the market timing also. This feed contains the information about the contracts valid in the CD Market for trading.

| Field Name | Data Type | Value | Remark |
|---------------------|-----------|-----------|--|
| INFO HEADER | | | |
| Code | SHORT | 'DT' | |
| 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 |
| Delete Flag | CHAR | Character | 'Y' = Deleted 'N' = Not Deleted |
| Contract Name | CHAR[26] | Character | Contract Description |
| Regular Lot | CHAR[5] | Character | Regular Lot |
| Tick Size | CHAR[6] | Character | Security tick size |
| Maturity Date | CHAR[11] | Character | Contract Maturity Date (DD-MON-YYYY) |
| INFO TRAILER | | | |
| Check Sum | SHORT | Numeric | Refer point no. 7. |
| End Of Trailer | CHAR | '\r' | Carriage Return |

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 | 'DO' 'DC' | 'DO' = Normal market open 'DC' = 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 |
| 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 |
| 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 - Market Update Information

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

| Field Name | Data Type | Value | Remark |
|-------------------------|-----------|-----------|--|
| INFO HEADER | | | |
| Code | SHORT | 'DN' | 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 |
| Best Buy-Order price | CHAR[17] | 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[17] | 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[17] | 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[17] | Character | Open price of the contract for the day. |
| High Price | CHAR[17] | Character | High price of the contract for the day |
| Low Price | CHAR[17] | Character | Low price of the contract for the day |
| Close Price | CHAR[17] | 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[17] | 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 | 'DP' | |
| 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 |
| Best Buy-Order price-1 | CHAR[17] | Character | Best buy side's outstanding orders price & quantity information |
| Best Buy-Order Quantity-1 | CHAR[12] | Character | |
| Best Sell-Order price-1 | CHAR[17] | Character | Best sell side's outstanding orders price & quantity information |
| Best Sell-Order quantity-1 | CHAR[12] | Character | |
| Last Traded Price Difference (LTP) | CHAR[17] | Character | This field will contain price difference of the latest spread-spread trade. |
| Total Traded | CHAR[12] | Character | This field contains the |

| | | | |
|---------------------------|----------|-----------|---|
| Quantity (TTQ) | | | total quantity of a contract traded on the current day |
| Opening Price Difference | CHAR[17] | Character | This field will contain price difference of the first spread-spread trade of the day. |
| Day High Price Difference | CHAR[17] | Character | This field will contain maximum of the price difference of spread-spread trades during the day. |
| Day Low Price Difference | CHAR[17] | 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 | 'DB' | |
| 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 | Character | Broadcast Message |

| | | | |
|---------------------|------------------|---------|--------------------|
| | [Message Length] | | |
| 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 | 'DA' 'DM' 'DD' | DA = Contract added DM = Regular Contract DD = 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[5] | Character | Regular Lot |
| Market Type | CHAR | Character | 'N'=Normal |
| 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 | 'DS' | |
| 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 |
| Opening Price | CHAR[17] | Character | Contract open price for the day |
| Trade High Price | CHAR[17] | Character | Contract high price for the day |
| Trade Low Price | CHAR[17] | Character | Contract low price for the day |
| Closing Price | CHAR[17] | Character | Contract close price for the day |
| Last Traded Price | CHAR[17] | Character | Contract last traded price for the day |
| Previous Close Price | CHAR[17] | Character | Contract previous day's close price |
| Settlement Price | CHAR[17] | 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 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 | 'DE' | |
| 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 = lzoz_decompress ((lzo_byte*)cInputBuf, ipLength,
(lzo_byte*)cOutputBuf, (lzo_uint*)&opLength, NULL);
```

lzoz_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. Contract Name mapping example

In DT messages four new fields are added and one of the field is "**Contract Name**"

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

| Contract Name | Tenor | Logic for contract Name | | | | | | |
|--------------------|---------|-------------------------|----|-----|--------------|--------------|-------------|--|
| | | Symbol | YY | MON | Strike Price | Option Type | | |
| USDINR18DEC72.75CE | Monthly | Symbol | YY | MON | Strike Price | Option Type | | |
| USDINR18DEC72.75PE | Monthly | Symbol | YY | MON | Strike Price | Option Type | | |
| USDINR18D1472.5CE | Weekly | Symbol | YY | M | DD | Strike Price | Option Type | |
| USDINR18D1472.5PE | Weekly | Symbol | YY | M | DD | Strike Price | Option Type | |

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 | 0 |
| 11 | November | N |
| 12 | December | D |

8. Support Information

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

9. Annexure 1

9.1 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 |