MARKET FEED
Index Feed

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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 2	30 November 2012
Version 1.2	S&P is removed from the indices name Point no 7	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	Addition of 4 New Indices	31 January 2018
Version 1.10	Index Rename Change	19 March 2018
Version 1.11	Index Rename Change	03 July 2018
Version 1.12	Addition of 5 New Indices	04 January 2019
Version 1.13	EOD – Index Information	30 January 2020
Version 1.14	ONLINE – Market Status Message	13 May 2020
Version 1.15	Addition of 2 New Indices	06 August 2020
Version 1.16	Addition of 2 New Indices	30 September 2020
Version 1.17	Addition of 5 New Indices	3 August 2021
Version 1.18	Addition of 2 Dummy Indices	22 December 2023
Version 1.19	Addition of 2 New Indices	12 January 2024
Version 1.20	Addition of 4 New Indices	28 March 2024
Version 1.21	1. Addition of Data Types section 2. Change in size of Index name in Indices Information and EOD – Index Information 3. Addition of Indicative Indices Information 4. Addition of FAQs Section	06 August 2024
Version 1.22	Addition of 12 New Indices	08 November 2024

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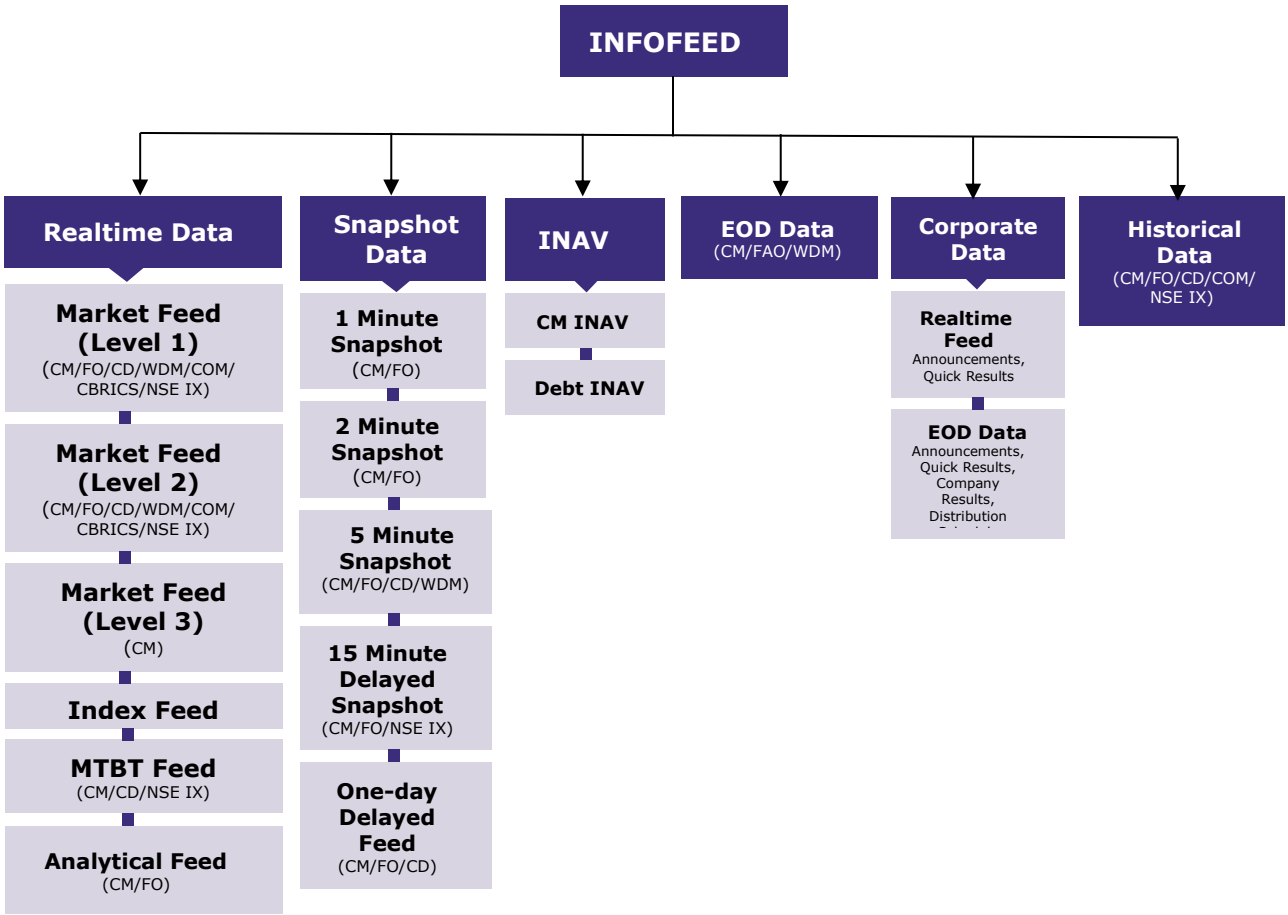
Market Feed – Index Feed

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. 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 Infofeed 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 about the NSE – Index Feed products. Through this product on real time basis all the NSE's market update information is disseminated.

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

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

2 Packet Format

Server sends all the packets in following format

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

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

typedef struct
{
        .
        .
}ST_DATA_INFO;

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

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

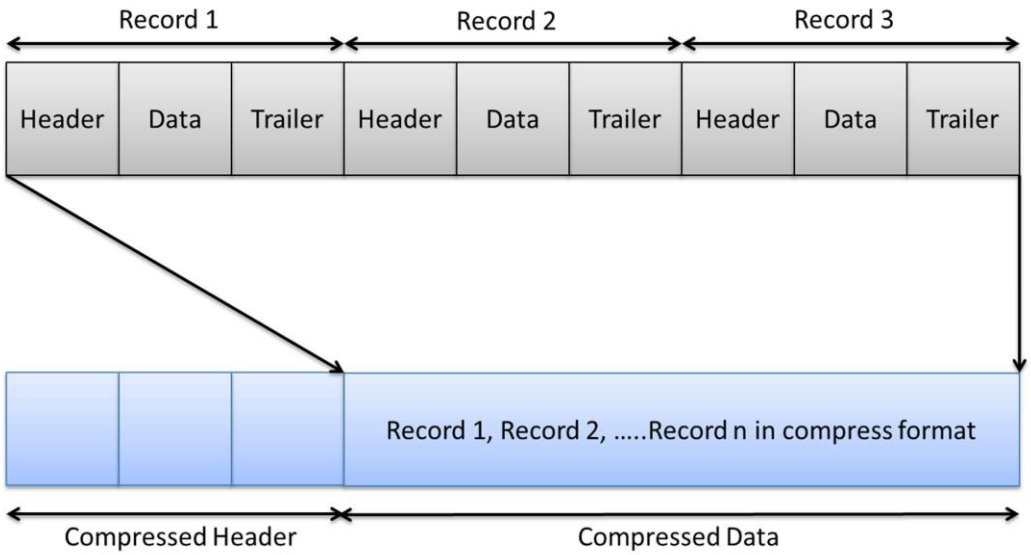
All the packets received from server consist of compress batch header. Compress batch header gives the information about the data packet compressed or not, number of packets in the following data packet and the total size of data packet. Client needs to decompress the data packet using LZO decompression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

2.1 Data Types

Data Type	Size In Bytes
CHAR	1
SHORT	2
LONG	4

Byte order - Little 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 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 'S' = Spot 'O' = Odd Lot 'A' = Auction 'C' = Call Auction 'G' = Reserved Market
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

4.2 Online – Indices Information

NSE-online indices information is sent through this message. For the list of the indices please refer the Annexure -1.

Field Name	Data Type	Value	Brief Description
INFO HEADER			
Code	SHORT	'CX'	
Length	SHORT	Numeric	Size of (INFO HEADER + INFO DATA + INFO TRAILER)
Sequence Number	LONG	Numeric	Application sequence Number
INFO DATA			
Index Name	CHAR [21]	Character	Name of the Index
Current Index Value	CHAR [8]	Character	Current value of the Index. During pre-open session (i.e. between PO & PC msg with market type 'N') indicative index value is disseminated.
Open Index Value	CHAR [8]	Character	Current dates Opening value
Close Index Value	CHAR [8]	Character	Closing value of the Index. Before market close previous trading day's close value is sent.
High Index Value	CHAR [8]	Character	Current days high value of the index
Low Index Value	CHAR [8]	Character	Current days low value of the index
Percentage Change	CHAR [8]	Character	Percentage change in the index value
Yearly High Index Value	CHAR [8]	Character	Last 52-week high index value
Yearly Low Index Value	CHAR [8]	Character	Last 52-week low index value

Net Change Indicator	CHAR [1]	Character	This field contains one of the following values. • '+' - if the current index is greater than previous index. • '-' - if the current index is less than previous index. • ' ' - if the current index is equal to previous index.
INFO TRAILER			
Checksum	SHORT	Numeric	Refer to section checksum calculation
End Of Trailer	CHAR [1]	'\r'	Carriage Return

4.3 Online – Indicative Indices Information

The Indicative Index messages will start arriving half an hour before the market close. The indicative index structure is as follows.

Field Name	Data Type	Value	Brief Description
INFO HEADER			
Code	SHORT	'CF'	
Length	SHORT	Numeric	Size of (INFO HEADER + INFO DATA + INFO TRAILER)
Sequence Number	LONG	Numeric	Application sequence Number
INFO DATA			
Index Name	CHAR [21]	Character	This field contains Name of the indicative index
Indicative Close Value	CHAR [8]	Character	This field contains the indicative index close value
Closing Index	CHAR [8]	Character	If market is open, this field it is set to zero. After completion of day's batch processing, this field value shows closing value of the index.
Percentage Change	CHAR [8]	Character	This field contains the difference between the Indicative closing value and previous day's closing value of the index in percentage format.
Change	CHAR [8]	Character	This field contains the absolute difference between the Indicative closing value and previous day's closing value of the index

Net Change Indicator	CHAR [1]	Character	This field contains one of the following values. • '+' - if the current index is greater than previous indicative close index. • '-' - if the current index is less than previous indicative close index. • ' ' - if the current index is equal to previous indicative close index
INFO TRAILER			
Checksum	SHORT	Numeric	Refer to section checksum calculation
End Of Trailer	CHAR [1]	'\r'	Carriage Return

4.4 EOD – Index Information

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	'CI'	
Length	SHORT	Numeric	Size of (INFO HEADER + INFO DATA + INFO TRAILER)
Sequence Number	LONG	Numeric	Application sequence number
INFO DATA			
Date	CHAR [11]	Character	Format: DD-MON-YYYY
Index Name	CHAR [21]	Character	Name of the Index
Opening Index Value	CHAR [8]	Character	Current day's Opening value of the index
Closing Index Value	CHAR [8]	Character	Current day's Closing value of the index.
High Index Value	CHAR [8]	Character	Current day's high value of the index
Low Index Value	CHAR [8]	Character	Current day's low value of the index
Previous Closing Index	CHAR [8]	Character	Previous day's closing value of the index
INFO TRAILER			
Checksum	SHORT	Numeric	Refer to section checksum calculation
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 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 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 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_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 Annexure 1

List of indices available in NSE-Index Feed

Index Token	Index Name
1	NIFTY 50
2	NIFTY IT
3	NIFTY NEXT 50
4	NIFTY BANK
5	NIFTY MIDCAP 100
6	NIFTY 500
7	NIFTY 100
8	NIFTY MIDCAP 50
9	NIFTY REALTY
10	NIFTY INFRA
11	INDIA VIX
12	NIFTY ENERGY
13	NIFTY FMCG
14	NIFTY MNC
15	NIFTY PHARMA
16	NIFTY PSE
17	NIFTY PSU BANK
18	NIFTY SERV SECTOR
19	NIFTY AUTO
20	NIFTY MEDIA
21	NIFTY METAL
22	NIFTY SMLCAP 100
23	NIFTY 200
24	NIFTY DIV OPPS 50
25	NIFTY COMMODITIES
26	NIFTY CONSUMPTION
27	NIFTY FIN SERVICE
28	NIFTY50 DIV POINT
29	NIFTY100 LIQ 15
30	NIFTY CPSE
31	NIFTY GROWSECT 15

32	NIFTY50 TR 2X LEV
33	NIFTY50 PR 2X LEV
34	NIFTY50 TR 1X INV
35	NIFTY50 PR 1X INV
36	NIFTY50 VALUE 20
37	NIFTY100 QUALTY30
38	NIFTY MID LIQ 15
39	NIFTY PVT BANK
40	NIFTY GS 8 13YR
41	NIFTY GS 10YR
42	NIFTY GS 10YR CLN
43	NIFTY GS 4 8YR
44	NIFTY GS 11 15YR
45	NIFTY GS 15YRPLUS
46	NIFTY GS COMPSITE
47	NIFTY50 EQL WGT
48	NIFTY100 EQL WGT
49	NIFTY100 LOWVOL30
50	NIFTY ALPHA 50
51	NIFTY MIDCAP 150
52	NIFTY SMLCAP 50
53	NIFTY SMLCAP 250
54	NIFTY MIDSML 400
55	NIFTY200 QUALTY30
56	NIFTY FINSRV25 50
57	NIFTY ALPHALOWVOL
58	NIFTY200MOMENTM30
59	NIFTY100ESGSECLDR
60	NIFTY HEALTHCARE
61	NIFTY CONSR DURBL
62	NIFTY OIL AND GAS
63	NIFTY500 MULTICAP
64	NIFTY LARGEMID250

65	NIFTY MID SELECT
66	NIFTY TOTAL MKT
67	NIFTY MICROCAP250
68	NIFTY IND DIGITAL
69	NIFTY100 ESG
70	NIFTY M150 QLTY50
71	NIFTY INDIA MFG
74	NIFTY200 ALPHA 30
75	NIFTYM150MOMNTM50
76	NIFTY TATA 25 CAP
77	NIFTY MIDSML HLTH
78	NIFTY MULTI MFG
79	NIFTY MULTI INFRA
80	BHARATBOND-APR25
81	BHARATBOND-APR30
82	BHARATBOND-APR31
83	BHARATBOND-APR32
84	BHARATBOND-APR33
85	Nifty Ind Defence
86	Nifty Ind Tourism
87	Nifty Capital Mkt
88	Nifty500Momentm50
89	NiftyMS400 MQ 100
90	NiftySml250MQ 100
91	Nifty Top 10 EW

List of Dummy indices:

Index Token	Index Name
72	INDEX1 NSETEST
73	INDEX2 NSETEST

8 FAQs

1) Why is there a discrepancy between the "change" field received in the CF packet and value obtained using manual computation?

   Change field contains the absolute difference between the "Indicative Close Value" and "Previous Close Price". The Indicative Close Value field and Previous Close Price contains the value is rounded off to multiple of 5. This leads to the minor discrepancy observed in manual computation.

2) Can we use lzo versions 2.03/2.09/2.10 for decompressing the packets received from NDAL?

   Yes, lzo is backward compatible. Above versions of lzo can be used for decompressing the compressed packets disseminated from NDAL.

9 Support Information

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