

TECHNICAL DOCUMENT

Market Data Platform – Real Time

SNAPSHOT DATA
Capital Market

(STANDARD PRODUCT)

Version 1.5

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**DOTEX INTERNATIONAL LIMITED
EXCHANGE PLAZA,
PLOT NO. C/1, G BLOCK,
BANDRA-KURLA COMPLEX,
BANDRA €, MUMBAI 400 051.
INDIA.**

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CAPITAL MARKET - SNAPSHOT DATA (STANDARD PRODUCT)

1. Introduction

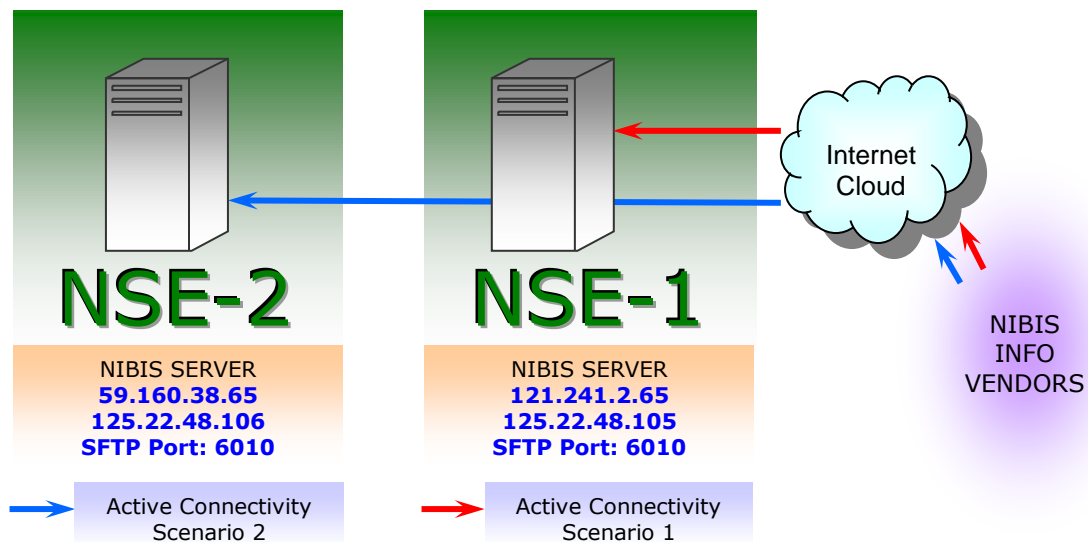
DotEx International Ltd. disseminates NSEIL's Real Time Broadcast data to various information agencies. It provides the 3 different types of data to Info Vendors, i.e. Real Time Data, Snapshot Data and End of Day Data. The Real Time Data is a packet broadcast available in TCP/IP packet format, whereas the Snapshot Data and End of day data are available in the form of files. Certain products based on the Real Time Data are also made available through files.

The NIBIS (NSE Internet Based Information System) server that caters the NIBIS Info Vendors is available through Internet. All NIBIS Info Vendors connect the server through internet and use SFTP protocol to download the files. The files on this server are generated on regular intervals. The Info Vendors are provided with credentials which are enabled for the agreement period.

2. Connection Details

The Info Vendors connect to NIBIS server over the Internet using SFTP protocol. In NSE premises two NIBIS Production Servers operate in an active-active configuration. Each server can be accessed using two IP addresses, for ISP-level redundancy, as shown in the Structural Diagram. In case a server becomes inaccessible through both its IP addresses, the Info Vendor software requires to fail-over to the other server.

2.1 Structural diagram



2.2 Platform notes

1. The SFTP service can be simultaneously accessed through both redundant IP addresses on each server. This is to enable Info Vendors to access the servers in case of link failure.
2. Info Vendors may use both IP addresses of a server during normal course of operations in order to put both available links to use.
3. There may be slight differences between the data disseminated by the two servers because of factors impacting sampling such as CPU clock skew, differences in routing of data, etc.
4. Time stamp on the files on the server is in 24-hour format.
5. Certain files are compressed using ZLIB (gzip). The files may be decompressed using the popular "gunzip" command on Unix/Linux systems. Tools to decompress these files are also freely available for Windows on the World Wide Web, Gzip for Windows and 7-Zip being popular examples.
6. The Exchange does not provide software or support for decompression, SFTP, etc.

3. Overview

3.1 Products and "Product Root"

The files are productized as per the generation frequency and are generated under their designated Product Roots on the server.

Product Root is the name of the top-level directory under which files for a product are generated.

Snapshot Frequency	Generation Frequency	Product Root
1 Minute Snapshot Product	Every 1 Minute	/CM01
2 Minute Snapshot Product	Every 2 Minutes	/CM02
5 Minute Snapshot Product	Every 5 Minutes	/CM05
15 Minute Delayed Snapshot Product	Every 1 Minute, delayed by 15 Minutes	/CM30

The Product Roots may further contain subdirectories as specified in the relevant sections of this document.

Info Vendors may subscribe to product of their choice depending on their data snapshot frequency requirement.

Delayed data products are also available, wherein the files generated on regular 1 minute interval basis are delayed by the specified time.

3.2 Types of files generated

The files are generated in binary format on the servers inside the corresponding type-wise sub-directories as specified in this document and can be broadly classified as follows:

Description	Frequency
Market Information Files	At a specific interval
Call-Auction Market Information Files	At a specific interval
Security Information Files	Once a day (EOD)
Bhavcopy Information Files	Once a day (EOD)

For each trading day, files are generated in date-wise sub-directories prefixed with the full month name (MonthDDYYYY) as specified in the relevant sections of this document.

The files generated at fixed frequency are continuously numbered, starting from 1.

3.3 Compression

Certain files are compressed using ZLIB (gzip). The files may be decompressed using the popular "gunzip" command on Unix/Linux systems. Tools to decompress these files are also freely available for Windows on the World Wide Web, Gzip for Windows and 7-Zip being popular examples. It may be noted that the Exchange does not provide software or support for decompression.

4. Data Details

4.1 Market Information

The Market information data files (MBP and Index) are generated on the server at regular intervals.

4.1.1 Market Files

The *.mkt ("*" stands for a number) files contain market statistics and order information of the securities that are being traded during the last interval, including their open, high, low and close price. The file contains a single record for every security that is traded during that file interval. These files are generated during normal trading period i.e. 09:00 hrs. To 15:30 hrs and during Close Session i.e. 15:40 hrs to 16:00 hrs. These files are generated in incremental count number on a trading day starting from 1 (for example, 1.mkt, 2.mkt and so on).

4.1.2 Indices Files

The *.ind ("*" stands for a number) files contain NSEIL Indices information, including open, high, low and close index values. Each file contains data of all indices of Exchange. These files are generated at regular intervals. These files are generated during normal trading period i.e. 09:00 hrs. to 15:30 hrs and during Close Session i.e. 15:40 hrs to 16:00 hrs. and thereafter up to 18:00 hrs.

4.2 Call Auction Market Information

Two new market types Call Auction and Reserved (for future use) are introduced in the capital market trading system.

4.2.1 Call Auction Market

Multiple sessions of call auction market can be held in a trading day.

The call auction session shall consist of

- Order collection period (Order entry, modification and cancellation is allowed)
- Order matching period.

The computation of Indicative Opening Price (IOP) and matching logic shall be same as pre-open session for Cash Market segment. In call auction market, after matching period is over all the outstanding orders shall be cancelled.

The Call Auction Market information data files are generated on the server with the extension *.ca1.

The *.ca1 ("*" stands for a number) files contain market statistics and order information of the securities that are being traded in the call auction market in the last 1 minutes along with their open, high, low and close price. The file contains a single record for every security that is traded during that file interval. These files are generated during normal trading period i.e. 09:00 hrs. to 15:30 hrs. These files are

generated in incremental count number on a trading day starting from 1.ca1.

4.2.2 Call auction in pre-open session (IPO & Re-listed securities)

A new market for IPO & Re-listed securities is introduced by NSE. Reserved market type will be used to generate the data files for this market.

The business functionality for this market type is same as the Call Auction Market (i.e. Order Collection and Order Matching period).

Following is the only difference for this market.

The Buy back and market maker concept is also not there in this market so the 'BBMM Flag' for buy and sell side will be sent as '0' (zero).

This Market information data files are generated on the server with the extension *.ca2

The *.ca2 ("*" stands for a number) files contain market statistics and order information of the securities that are being traded in the SML market in the last 1 minutes along with their open, high, low and close price. The file contains a single record for every security that is traded during that file interval. These files are generated during normal trading period. These files are generated in incremental count number on a trading day starting from 1.ca2.

4.3 Security Information

The Securities.dat file is the master file that contains the updated information of all securities traded on the Exchange. The Info Vendors need to download this file and decode it to resolve the "token number" of required security. The Token number of each security is unique.

4.4 Bhavcopy Information

The bhavcopy information file is generated at around 17:00 hrs on each trading day. The file name is CMBHAVCOPY_DDMMYYYY.TXT. This file contains the End of the Day values of the securities that are traded on that trading day.

5. Data Structure Details

5.1 Market Information

Directory Path	/<Product Root>/DATA/<MonthDDYYYY>
File Name	*.mkt
Compression	Compressed (.gz)
Generation Frequency	At fixed intervals

HEADER

Field	Data Type	Length
Transcode	Short	2 Bytes
Timestamp	Long	4 Bytes
Message Length	Short	2 Bytes
Total Length		8 Bytes

DATA

Field	Data Type	Length
Security Token	Short	2 Bytes
Last Traded Price	Long	4 Bytes
Best Buy Quantity	Long	4 Bytes
Best Buy Price	Long	4 Bytes
Best Sell Quantity	Long	4 Bytes
Best Sell Price	Long	4 Bytes
Total Traded Quantity	Long	4 Bytes
Average Traded Price	Long	4 Bytes
Open Price	Long	4 Bytes
High Price	Long	4 Bytes
Low Price	Long	4 Bytes
Close Price	Long	4 Bytes
Interval High Price	Long	4 Bytes
Interval Low Price	Long	4 Bytes
Interval Open Price	Long	4 Bytes
Interval Close Price	Long	4 Bytes
Interval Total Traded Quantity	Long	4 Bytes
Filler	Long	4 Bytes (Blank)
Total Length		70 Bytes

5.2 Indices Information

Directory Path	/<Product Root>/DATA/<MonthDDYYYY>
File Name	*.ind
Compression	Compressed (.gz)
Generation Frequency	At fixed intervals

HEADER

Field	Data Type	Length
Transcode	Short	2 Bytes
Timestamp	Long	4 Bytes
Message Length	Short	2 Bytes
Total Length		8 Bytes

DATA

Field	Data Type	Length
Index Token	Short	2 Bytes
Index Open Value	Long	4 Bytes
Current Index Value	Long	4 Bytes
High Index Value	Long	4 Bytes
Low Index Value	Long	4 Bytes
Percentage Change in Index	Long	4 Bytes
Interval High Index Value	Long	4 Bytes
Interval Low Index Value	Long	4 Bytes
Interval Open Index Value	Long	4 Bytes
Interval Close Index Value	Long	4 Bytes
Filler	Long	4 Bytes (Blank)
Total Length		42 Bytes

5.3 Security Information

Directory Path	/<Product Root>/SECURITY/<MonthDDYYYY>
File Name	Securities.DAT
Compression	Not compressed
Generation Frequency	Once (EOD)

HEADER

Field	Data Type	Length
Transcode	Short	2 Bytes
Timestamp	Long	4 Bytes
Message Length	Short	2 Bytes
Total Length		8 Bytes

DATA

Field	Data Type	Length
Token Number	Short	2 Bytes
Symbol	Char	10 Bytes
Series	Char	2 Bytes
Issued Capital	Double	8 Bytes
Warning Percent	Short	2 Bytes
Freeze Percent	Short	2 Bytes
Credit Rating	Char	12 Bytes
Issue Rate	Short	2 Bytes
Issue Start Date	Long	4 Bytes
Issue Pdate	Long	4 Bytes

Issue Maturity Date	Long	4 Bytes
Board Lot Quantity	Long	4 Bytes
Tick Size	Long	4 Bytes
Name of Company	Char	25 Bytes
Record Date	Long	4 Bytes
Expiry Date	Long	4 Bytes
No Delivery Start Date	Long	4 Bytes
No Delivery End Date	Long	4 Bytes
Book Closure Start Date	Long	4 Bytes
Book Closure End Date	Long	4 Bytes
Total Length		109 Bytes

5.4 Bhavcopy Information

This data file does not contain the Header field.

Directory Path	/<Product Root>/BHAVCOPY/<MonthDDYYYY>
File Name	CMBhavcopy_DDMMYYYY.txt
Compression	Not compressed
Generation Frequency	Once (EOD)

DATA

Field	Data Type	Length
Symbol	Char	10 Bytes
Series	Char	2 Bytes
Trade High Price	Char	10 Bytes
Trade Low Price	Char	10 Bytes
Opening Price	Char	10 Bytes
Closing Price	Char	10 Bytes
Previous Close Price	Char	10 Bytes
Total Traded Quantity	Char	12 Bytes
Total Traded Value	Char	25 Bytes
Carriage Return/ Line Feed	Char	2 Bytes
Total Length		101 Bytes

5.5 Call Auction Market Information

Directory Path	/<Product Root>/DATA/<MonthDDYYYY>
File Name	*.ca1: Call Auction Market *.ca2: Reserved Market (IPO & Re-listed securities)
Compression	These files are compressed (.gz)
Generation Frequency	At fixed intervals

HEADER

Field	Data Type	Length
Transcode	Short	2 Bytes
Timestamp	Long	4 Bytes
Message Length	Short	2 Bytes

Total Length	8 Bytes
--------------	---------

DATA

The format of the data sent is as follows:

Field	Data Type	Length	Remarks
Security Token	Short	2 Bytes	Security Token
Last Traded Price	Long	4 Bytes	During order collection as well as during matching, it contains LTP of the security
Best Buy Quantity	Long	4 Bytes	Best buy side limit order, price and quantity information. For BBMM flag refer point no. 8.3
Best Buy Price	Long	4 Bytes	
Buy BBMM Flag	Char	1 Byte	
Best Sell Quantity	Long	4 Bytes	Best sell side limit order, price and quantity information. For BBMM flag refer point no. 8.3
Best Sell Price	Long	4 Bytes	
Sell BBMM Flag	Char	1 Byte	
Total Traded Quantity	Long	4 Bytes	This field contains the total quantity of a security traded on the current day
Indicative Traded Quantity	Long	4 Bytes	During order collection period this field will contain Indicative Equilibrium Quantity
Average Traded Price	Long	4 Bytes	During order collection period it will always be zero. Once matching starts it will contain the Average Trade Price.
First Open Price	Long	4 Bytes	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
Open Price	Long	4 Bytes	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	Long	4 Bytes	During order collection period it will always be zero. Once matching starts it will be updated.
Low Price	Long	4 Bytes	During order collection period it

			will always be zero. Once matching starts it will be updated.
Close Price	Long	4 Bytes	This field contains the closing price of a security.
Filler	Long	4 Bytes	Blank
Total Length		60 Bytes	

6. File Transcode List

Details	Transcode number
MARKET PRE-OPEN INFORMATION	3
MARKET STATISTICS INFORMATION	5
BROADCAST MESSAGE INFORMATION	6
NEW SECURITY INFORMATION	7
MARKET INDICES INFORMATION	8
CALL AUCTION MARKET INFORMATION	9

7. Index Token Numbers List

The Indices generated during the trading cycle are identified by Index names. The feed shall not bear these names. Instead, a unique Index token shall identify each index. The Info Vendors need to decode the index files by providing following combinations of the Index Token number and Index Name.

Index Name	Index Token Number
Nifty 50	0
Nifty IT	1
Nifty Next 50	2
Nifty50 USD	3
Nifty Bank	4
Nifty MID100 Free	5
Nifty 500	6
Nifty 100	7
Nifty Midcap 50	8
Nifty Realty	9
Nifty Infra	10
INDIA VIX	11
Nifty Energy	12
Nifty FMCG	13
Nifty MNC	14
Nifty Pharma	15
Nifty PSE	16
Nifty PSU Bank	17
Nifty Serv Sector	18
Nifty SML100 Free	19
Nifty 200	20
Nifty Auto	21
Nifty Media	22
Nifty Metal	23

Nifty Div Opps 50	24
Nifty Commodities	25
Nifty Consumption	26
Nifty Fin Service	27
Nifty50 Div Point	28
Nifty100 Liq 15	29
Nifty CPSE	30
Nifty GrowSect 15	31
Nifty50 TR 2x Lev	32
Nifty50 PR 2x Lev	33
Nifty50 TR 1x Inv	34
Nifty50 PR 1x Inv	35
Nifty50 Value 20	36
Nifty Quality 30	37
Nifty Mid Liq 15	38
Nifty Pvt Bank	39
Nifty GS 8 13Yr	40
Nifty GS 10Yr	41
Nifty GS 10Yr Cln	42
Nifty GS 4 8Yr	43
Nifty GS 11 15Yr	44
Nifty GS 15YrPlus	45
Nifty GS Compsite	46
NIFTY50 EQL Wgt	47
NIFTY100 EQL Wgt	48
NIFTY100 LowVol30	49
NIFTY Alpha 50	50

8. Data Field Details

8.1 Security Token Number

The Security Token numbers uniquely identify each security listed on the National Stock Exchange of India Ltd. The token number, Symbol and Series identify a single and unique security. The Info Vendor will be provided with a binary file i.e. securities.dat giving the combinations of all securities traded on the Exchange. Any further additions, modifications and deletions will be updated in securities.dat file as part of the feed in /<Product Root>/Security directory.

8.2 Time Stamp

The time stamp is the number of seconds elapsed from midnight Jan 1, 1970.

9. Notes

9.1 All prices are in Paisa

All price fields are multiplied by 100 and this implies that the prices received by the Info Vendors have to be divided by 100.

For India VIX index, the index value is of four decimal precision. Hence, the values received by the Info Vendors for the India VIX index have to be divided by 10000.

9.2 Call Auction Market and Reserved Market

Two new market types have been added in Capital Market segment. The first market has been added to support Call Auctions and the other market type has been added for future use. It has been termed as reserved market.

9.3 Market Maker & Buy Back Flag (MMBB Flag)

For the probable values of BBMM flag refer the table given below

1. **Sell BBMM Flag:** Buy Back or Market Maker order at that price point.
2. **Buy BBMM Flag:** Buy Back or Market Maker order at that price point.

Buy_Back_Order Exists	Market_Maker_Order Exists	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'.

10. About SFTP (Secure File Transfer Protocol)

The file transfer takes place over SFTP (Secure FTP) protocol over the Internet.

The Info Vendor requires to provide the Exchange with the SSH RSA Public Key of their machine for receiving login details form the Exchange.

The following details will be provided once the request is processed by the Exchange:

- Server IP
- SSH Service Port
- User ID
- File Path

General information on SFTP has been provided in the following sections for popular OS platforms.

10.1 SFTP on Linux platform

The OpenSSH suite, which comes pre-installed in most Linux distributions, can be used for transferring files securely using SFTP.

The SSH key-pair is generally generated in the “.ssh” directory in the user’s home directory.

It is highly recommended that you consult your systems administrator to generate/locate the key-pair and set up SFTP for you.

Continue reading for information on how to generate the key-pair.

10.1.1 Generation of the SSH RSA key-pair on Linux

- Generate the new key-pair with following command:
`ssh-keygen -t rsa -C "user@host"`

- You will receive the following prompt:
`Generating public/private rsa key pair.
"Enter file in which to save the key".`
Press the Enter to continue with the defaults.

You will receive the following prompt:
`Enter file in which to save the key
(/host/users/user/.ssh/id_rsa):`

Press the Enter to continue with the defaults.

- If a file already exists with the same name, then you will receive the following prompt:
`/host/users/user/.ssh/id_rsa already exists.
Overwrite (y/n)?`

Type "y" and press Enter to overwrite.

- You will be prompted to enter a passphrase as follows:
`Enter passphrase (empty for no passphrase):`
Press Enter to continue without a passphrase.

You will be prompted to re-enter the passphrase:

`Enter same passphrase again:`

Press Enter again to continue without a passphrase.

- After you enter a passphrase, you will be presented with the "Fingerprint" (or ID) of your SSH key.

It will look something like this:

`Your identification has been saved in
/host/users/user/.ssh/id_rsa.`

`Your public key has been saved in
/host/users/user/.ssh/id_rsa.pub.`

`The key fingerprint is:
87:c4:85:90:91:16:39:de:c2:26:49:4a:b3:38:80:97
user@host`

After generating public key, user needs to share the Public Key file with exchange for requesting the credentials.

NOTE: In above steps the words "host" and "user" are used to represent the host name and user name of the machine. This is used for demo purpose only. The same will differ as per your server and user names.

10.1.2 SFTP Login

Login to the Exchange Server over SFTP using the following command:

```
sftp -o PORT=6010 remote_user@remote_host
```

Where remote_user is the User ID provided to you by the Exchange upon sharing your Public Key and remote_host is the Exchange Server IP.

You should get the SFTP prompt as below, upon successful login:

```
Connecting to [redacted]...  
"NOTICE TO USERS"  
  
"The system is to be used for AUTHORIZED business purpose only.  
All activities on this system are being monitored. Unauthorized access  
to this system may be subject to legal action, and/or prosecution"  
  
sftp> █
```

10.1.3 Fetching files over SFTP

The SFTP "get" command may be used at the SFTP prompt for fetching the files while logged into the host over SFTP.

10.1.4 Ending the SFTP session

The SFTP "bye" command may be used for terminating the session

10.1.5 SFTP commands help

Help may be obtained with SFTP commands by typing the "help" command at the SFTP prompt.

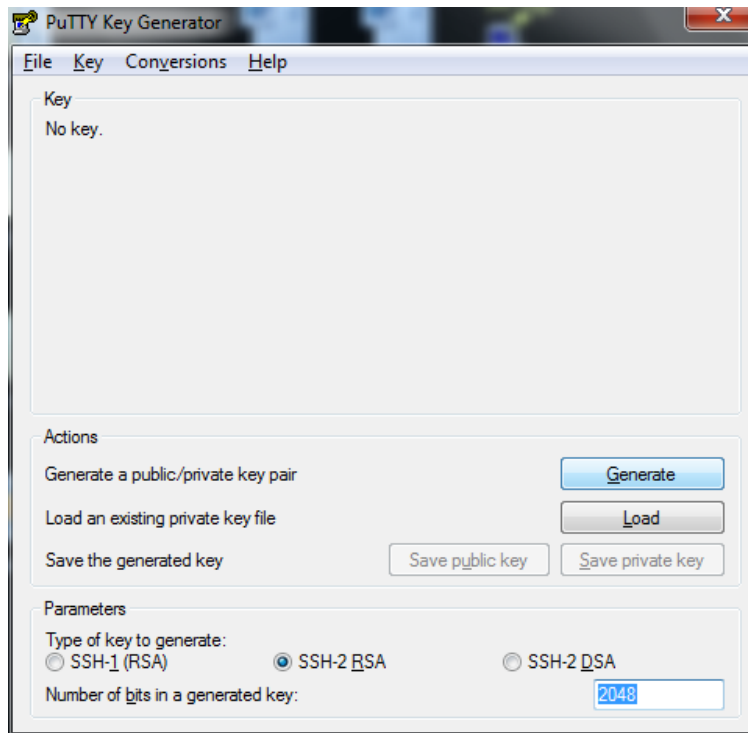
10.2 SFTP on Windows platform

10.2.1 Generation of the SSH RSA key-pair on Windows

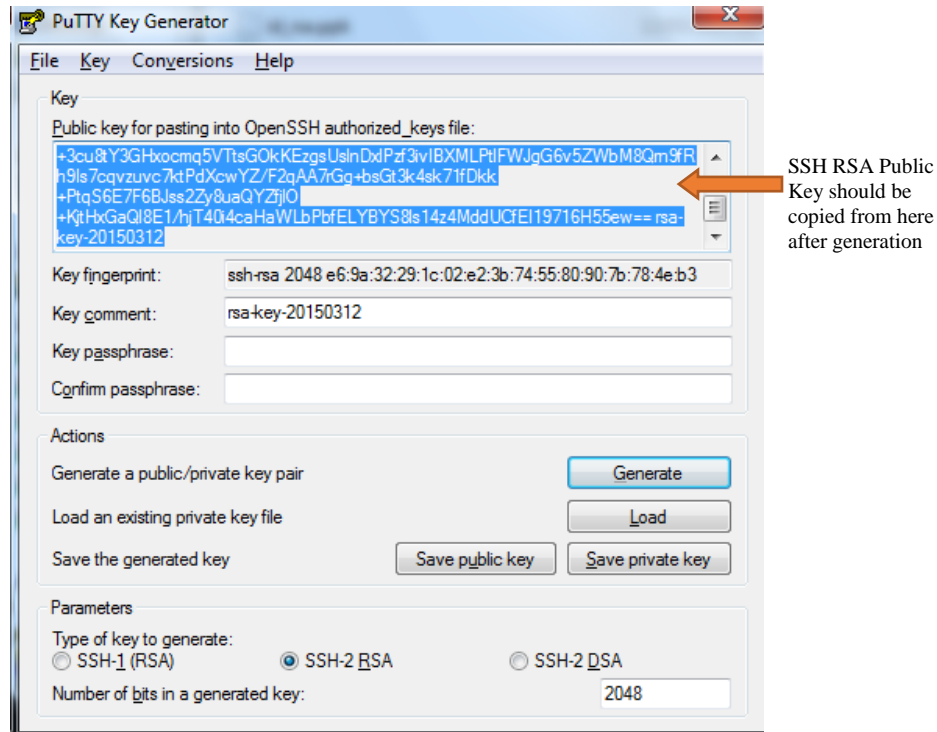
This guide explains how to generate the SSH RSA key-pair using the PuttyGen application.

Download the PuttyGen application (freely available on the Internet). Then follow these steps to generate the key-pair:

- Start the PuttyGen application.
You will be presented with a dialog which looks something like this:



- Select "SSH2RSA" with 2048 bit size or greater.
- Press the "Generate" button.
- After generating the key, you will be shown the screen below. Keep the "Key passphrase" and "Confirm passphrase" as blank.



- Create a blank file with the name "id_rsa.pub". This will be the public key file which will be populated with your Public Key and shared with the Exchange.
- Copy the public key content as presented on the screen (selected area in the below screenshot) and paste into newly created public key file (id_rsa.pub) and save the file.
- Share this Public Key File (id_rsa.pub) with the Exchange when requesting for SFTP credentials.

10.2.2 SFTP Client Software on Windows

There are multiple SFTP Client Programs (paid for and free) available for transferring files over SFTP.

One such software is WinSCP, available for free from the WinSCP website. This program is intuitive, user friendly and can be used in interactive mode (GUI) as well as from the command line (for automation/batch processing).

Information on using WinSCP can be found on the WinSCP website.

10.3 Further support

Apart from the above guide, many of the online resources can be referred on the World Wide Web for more information on how to set up and use SFTP at the Client's site on various OS platforms.

Note:

This "About SFTP" section is intended as a guide used to understand and become familiarized with this transfer protocol.

It may be noted that the Exchange does not provide SFTP software or support for configuring and using SFTP at Client site.

11. Contact Information

Name	Email	Contact Number
DOTEX Business	dotex@nse.co.in	91-22-26598385
Technical Support	infofeed_support@nse.co.in	91-22-26598270