TERMS OF REFERENCE FOR UPGRADE/INSTALATION/DEVELOPMENT OF

MARKET SURVEILLANCE SUITE

1   PURPOSE OF THIS DOCUMENT

The objective of this document is to list down the user requirements pertaining to installation/development/ upgrade of the Surveillance Software to detect potential violations of Securities and Exchange Commission of Pakistan Act, 1997, Securities and Exchange Act 2015, Securities and Exchange Rules 1971, any Rules or Regulations issued under the Act, CDC Act 1997, CDC Regulations, Companies Ordinance, 1984, Clearing Houses (Registration & Regulation) Rules, 2005 and Regulations of Exchanges and directives issued by the Commission.

1.1   Background

Securities & Exchange Commission of Pakistan ("SECP") has been mandated with the responsibility of identification of market manipulative trading practices at the stock exchanges. For this purpose, need of surveillance software is of utmost importance, which could not only provide the Market Surveillance Officers ("MSOs") with complete and accurate data flow but should also be capable of generating the alerts and report highlighting any suspicious activity.

The IT department of SECP developed in-house surveillance system and is in use at the moment.

Keeping in mind the fact that the stock market is a dynamic market with ever changing dynamics, so there is an ongoing need for system upgrade to keep abreast with the changing market scenarios. At present, MSS is based on static results and considerable manual working is required on part of surveillance officers.

The new features can be of major benefit for analysis of complex trading patterns leading to efficient surveillance.

2   INTRODUCTION

Surveillance is the process of identifying and preventing aberrant trading behavior. Therefore, the roles/requirements for capital market surveillance is to define illegal market trading activities, spot them in the market and pursue appropriate remedial action.

The objective of surveillance is to maintain a well-regulated, transparent and orderly market; to promote fair trading practices; protect investor rights and privileges; and prevent illegal manipulation (e.g., insider trading). One of the main goals of market surveillance is to detect individuals or groups who attempt to control or manipulate the market and thereby cause prices to inaccurately reflect supply and demand.

2.1   Market surveillance Process

Market surveillance staff of SECP monitors trading by watching patterns emerge from inter-day and intra-day trading. They also compare volumes and price movements against historical patterns and information.

With the help of a complete news/information system, providing Market surveillance staff and the public with timely material information on listed companies, it is possible for market surveillance personnel to track past and current trading to detect unusual or abnormal trading behavior.

2.2   Identification of Potential Violations/ Prohibited Behavior

The Market surveillance staff is responsible for identifying prohibited behavior and the consequential penalties. The list of key market offenses are as follows:

Front Running: this is taking advantage of a client's order by trading ahead of it.

Insider or Tipped Trading: this is when non-public material information about the affairs of the underlying company is used to initiate trading activity.

Wash Trading: this is when fictitious trades are made with no beneficial change of ownership.

False/Misleading Activity: this is when orders are entered with the knowledge that another offsetting order will be entered. This creates a false or misleading appearance of activity.

Influencing the Market: this is done by making purchases of the security at successively higher prices (or sales at successively lower prices) for the purpose of improperly influencing the market price;

Taping Trades: this is the practice of processing a single trade in smaller parts in order to give the appearance of activity.

Circular Trading**, Pump** and Dump, Marking the Close, Piggy Backing, etc

3   EXISTING SYSTEM FEATURES

MSS is an in house surveillance system. The application has the capability to monitor on real time as well on historic basis all trading activities with a view to highlight price or volume fluctuations / movements exceeding the threshold / parameters set by the aforesaid application. The trading data is fetched from exchanges while UIN details are obtained from NCCPL which are merged together.

3.1   Key Features

Key features of MSS are mainly comprised of Alerts, Reports, Graphical Reports and Stock Market Replay Agent.

All the reports/alerts can be generated on various exchanges and various market segments. Furthermore, the reports/alerts can be generated on basis of multiple input parameters like UIN, member, scrips, client code, member code, counter client code, time slicing, Order number, Trade number etc.

Another added advantage for all the report/ alerts across MSS is that these are provided with following on screen features:

- Basic calculations like summation, average, count, etc.
- Data Filters
- Calculator
- Formula Column, etc

All the reports can be exported in MS Excel and PDF format.

3.1.1   Alerts Management System

At present the system Alerts Management System provides the Alert Browser, through which alerts can be generated for all above specified parameters. There are 21 active alerts in MSS. The alerts are generated on the basis of Price and Volume variation. It is pertinent to mention that price and volume based alerts are applicable on both Ready and Future Segment of the market

Following is the brief overview of the available alerts:

- Price Based Alerts:

  Price based alerts are triggered/ fired whenever the pre-defined benchmark/criteria is violated. There are various alerts which are generated on price fluctuation when compared to last trade, closing price, day's high/low price, specified variations in the price due N minutes interval, End of day price ramping etc.

- Volume Based Alerts

Volume based alerts are triggered when in trade/ order volume is varied as compared to benchmark. In this regard, comparison is done when large trade/ order is entered in the system, comparison of large orders whit free float or paid-up capital of the company.

- Concentration Based Alerts

Alerts are generated whenever concentration (Gross and Net) on both Buy side as well as sell side, of broker or a UIN crossed the benchmark.

- Index Based Alerts

These alerts highlight absolute/ percentage change in benchmark indices of the three exchanges,

3.1.2   Basic Reports

Basic Reports provide the user with complete data pertaining to following:

- All Orders and Trades which are queued/ executed at the trading system of the three stock exchanges.
- Complete details of all the erroneous trades through trade rectification system.
- Summaries indicating Most Active Members, Instruments, and Exchange Day Summary.

3.1.3   Graphical Reports

The graphical reports provides the graphical display of following

- Graphical Reports for top buyers/ sellers placing Orders and Trades, which can be grouped on the basis of UIN, Member, Scrip or/and client code. The report is generated on group various combinations on run time and generated graphs can be further drilled down generating required output.
- Graphical display of Index on inter-day and intraday basis.

3.1.4   Investigation Reports

These are Critical Reports Indicating Manipulation and offer advantage in detecting manipulation. These Reports can be effectively employed in garnering strong evidence against deemed suspects and can be generated on single day as well a specified time period. Various example of theses report are as follows:

- Report to identify the frequent order cancellation after amending/ changing the bids.

- Report highlighting the trades which are executed at specific % higher than previous trades.

- Instances where orders in an Instrument for buy and sell are matched with each other for similar Volume and price to highlight pre-arranged trades.

- Member Instrument concentration in a specified scrip., comparison with floating stock and net capital.

- Difference of spread between ready and future prices of particular scrip.

- Report presenting member-wise, client wise top buyers and sellers in scrips.

- Report presenting complete trail of Order to Trade.

- Reports facilitating detection of pre-arranged trades on UIN level as well as Member level.

- Reports for detection highlighting following:

  - Wash Trades
  - Short Selling
  - Circular Trades
  - Top Gainers/ Loser

3.1.5 Stock Market Replay Agent

The Stock Market Replay Agent replays the market on order basis and tick basis. All the Order (Bids and Asks) and trades for a specified scrip, Member, Client Code for a specific date is replayed in a chronological order drawing the graph. The statistics for any selected point/ area are displayed at the right side of the window simultaneously. The player is equipped with Zooming Function to view the micro view of any specific interval.

3.1.6 Off – Market Report

3.1.7 Top Financee and Financier position in MTS obtained from NCCPL.

3.1.8 Reports highlighting various positions of Beneficial Owners.

4   OVERVIEW OF GENERAL NEW REQUIREMENTS – Upgrade of Existing Market Surveillance Suite

Subsections 4.1, 4.2, 4.3, Section 5 and 6 and all subsections thereunder relates to the upgradation of existing MSS.

4.1   Summary of Required Customized Features

These customized features may be used to identify patterns or particular scenarios (e.g., front-running or layering). Specifically, the reports may be used to identify: potential insider trading, front running, anything unusual in relation to participants such as volumes or trading patterns, switching sides during and subsequently trading following an IPO or Book Building, Order book layering activity, linking erroneous orders with actual trades, manipulation of closing prices and auctions, synchronized trades, etc.

Following are the brief overview of new requirements;

i. Introduction of a Query Builder can help generation of customized reports and facilitate in detection of violation based on customized data;

ii. Generation of Reports of top Buyers and Sellers, UIN wise and Members wise.

iii. Alerts: Addition of new alerts in the Alerts Management System, e.g., previous trading history and circular stock movement, alerts comparing the off-market data and price with the ready price and volume. New Alerts Requirement is discussed in the later section of the document.

iv. Provision for Benchmark Input Module in MSS for Alerts Management System so that benchmarks can be changed periodically depending on the changing market scenario. Further, provision of changing or defining new alert logic should also be part of this module. Users should also be able to set priority for each alert.

v. Incorporation of "ALL" option in MSS Reports for data retrieval from multiple market segments and multiple exchanges.

vi. Drop down menus should be available in all the report to select any market segment, sector, scrip, exchange, member, etc.

vii. Grouping of one symbol trading across various market segments, e.g. Regular, Future, MTS, Off Market etc.

viii. Grouping of scrips on the bases of sectors.

ix. Definition of information access level for every user. (Segment/ sector based).

x. Customized Reports for Pre-open session to detect order based manipulation.

xi. Navigations option among different reports, i.e., switching from an alert to the subsequent trade etc.

xii. Database Profiling: The profiling will keep a complete historical record for UINs, symbols, brokers, etc. covering all the aspects of the related factors. The information contained in the database may include background information of the listed entity, its shareholders and directors, historical trading pattern and relevant news. Moreover, Enforcement actions taken against companies and individuals including warning letters may also be included in this database. Information contained in the database will help analyze potential irregularities in the market and facilitate the linking of the trades to possible market abusers. Further, profiling will also show which alerts were triggered for a specific individual/member during a specific period.

xiii. Configuration of Media News and Corporate Announcements (PUCARS) in the alerts.

xiv. A thorough Database which should be linked with the CRCS having data for directors, beneficial owners, employees of all the registered institutions along with the shareholders (for unlisted companies only). There should also be capability in this module to dump lists of beneficial owners from MS-Excel and manual entry capability in such beneficial owners' database.

xv. Connection with CDC to have information pertaining to the position of shareholders of the company.

xvi. Going forward, connection of surveillance system with other official databases e.g., NADRA database, telecom authority's database, FIA, SBP or any other database etc.

xvii. An Efficient Case Management System *which will enable the user to store information in folders as cases, and undertake a paperless investigation, share and electronically transfer information with other surveillance officers. Case Management is a vital workload management function of an ideal Surveillance solution as it facilitates a well-documented investigation management.* The system will track all activities related to a case covering all aspects of a case including its initiation, approval, linkage of various important news items, related reports, etc. The system should have management dashboard to give overview of the ongoing investigations and data access/controls for different users and supervisor. Further, users should have independent dashboards covering the ongoing cases/investigations, watch list items, defined sector/scrips specific statistics and overall market statistics

xviii. Watch list window should be incorporated in the proposed solution which would give the activity detail of scrips/traders/members tagged as "watch list" by the surveillance officers

xix. There should be a separate module for Book building in the system. Proposed module should have the capacity for data dumping of book building records and

have number of analytical features to detect price ramping and other possible manipulative aspects.

xx. The system should have provision to cater for commodity exchange trading data.

xxi. Editable knowledgebase which can be updated by the surveillance officers, highlighting subjective findings related to various market players/ scrips, etc.

xxii. Enhanced Graphical Features:

    a. Enhanced graphical features: Index Level (for Intra-day and inter-day) graphical representation time-wise and index level wise.

    b. Enhanced graphical features: scrip wise (Intra-day and inter-day) graphical representation time-wise and scrip price-wise.

    c. Ability to filter market movement and plot graphs for a specific Instrument/market/across instrument and market

    d. View of market movement vis-à-vis circuit filters or price bands and traded quantity

    e. The system will be capable of plotting scrip-wise and market-wise movement against historical movements for the same.

    f. Instrument Vs Sector Graph

    g. Graph for UIN trading in scrip.

    h. Following are the new MIS reports that are required to be designed in the system:

        ▪ Report generating Output for All Market Data for a UIN.
        ▪ Report generating Output for All Market Data for a Member.
        ▪ Report for Market Summary with indicating following:
        ▪ Date, Listed Capital, High, Low, Open, Close, Market Capitalization, Total turnover (Ready, Future, MTS, Off Market), Total Value (Ready, Future, MTS, Off Market).

xxiii. All the aforementioned reports should have export feature in excel as well as PDF.

xxiv. New solution should have adequate information security protocols, i.e. access controls/rights, data validation, error handling, authentication control, security management module consisting of complete logs, audit trail, data encryption and disaster recovery mechanism, etc.

xxv. A new report will be required, based on NCCPL data, which would cover comprehensively key statistics including investor type etc.

xxvi. Summary of number and ID of terminals assigned to members, trades/orders executed through specific terminal IDs

xxvii.   Sector level statistics report for volume, concentration and impact on index/indicies

xxviii.   Market replay should be equipped with a pop-up feature showing details of the transactions, announcements and other related events at the point of time.

xxix.   Proposed solution should have Configuration capability, wherein data fields could be modified, added, deleted, settings for date and time formats and other modifiable settings configuration could be done

xxx.   A Raw data screen should also be incorporated in proposed solution, which enables user to look at raw data being fed in the system.

xxxi.   A data screen should also be incorporated in proposed solution providing a data drawer (depicting complete data fields), enabling the user to generate different reports on the basis of data being fed in the system.

4.2   Data Accuracy and Completeness

Incorporation of built-in checks in the system to ensure completeness and accuracy of the data being received from the exchanges on a daily basis. The summary of the said checks and controls is presented as hereunder:

1. For data completion, checks to be implemented for monitoring whether complete records of Trades and Orders have been received.
2. Timing alerts in Alerts Report should roughly match with the Order and Trades Alerts.
3. Match Volume and Value in Quick View of scrip with Total Volume and Value appearing in Trades for particular scrip.
4. Check for any Empty Field against following entries in Trades and Order Report:
   a) UIN
   b) Name
   c) Member Name
   d) Member Code
   e) Rate
   f) Client Code
   g) Counter Clients UIN (for Trades Only)
   h) Counter Party Name (for Trades Only)
   i) Counter Member Name (For Trades only)
   j) Counter Member Code (For Trades Only)
   k) Check for any Empty Field for UIN, Name in Orders
5. Match total number of UINs in UIN database received from NCCPL with Member client combination received from the exchange.
6. For Trades, check for total bought quantity is equivalent to total sold quantity and also compare the same with the volume appearing in the Quick View in respect of each scrip.
7. Check for duplication of records:
   a) Check for duplicate record against a single scrip in Quick View.

b) Check for duplicate record in <u>Trades Report</u> against Trade Number. A Trade number should be appearing twice in the Trades Record.

c) Check for duplicate record in <u>Orders Report</u> against Order Number. Unique Order Number should appear in Orders sheet with Orders Action Status as "Queued".

4.3   Hardware and Software Details / Requirements

4.3.1   Anatomy of Existing System

Client Application:

OS:	MS Windows 7 and 10 professional	
Application Technology:	MS Windows Server 2008 Datacenter x64 Microsoft Dot Net Framework 4.5 Desktop application	

Database:

OS:	Redhat Linux 5.5 Enterprise	
DB Engine:	Oracle RAC 11g R2	
Hardware	The entire operating system Environment runs on VMware based virtual infrastructure, the proposed solution must support and run on it.	
Host Configuration	CPU:	Intel 2620V3, 12 Core, 2.6GHz, 6MB Cache
	RAM:	256GB DDR4

4.3.2   Available Technologies

Client Application:

OS:	MS Windows 7 and 10 professional
Application Technology:	MS Windows Server 2008/2012 Datacenter x64 Microsoft Dot Net Framework 4.5 Desktop application

Database:

OS:	Redhat Linux 5.5 Enterprise or MS Windows 2012 Datacenter x64
DB Engine:	Oracle Database 11g R2 or above or IBM DB2
Hardware	VMware based virtual infrastructure.

Source code will be the property of SECP and should comply with the above mentioned technical details.

If any additional hardware and software, other than the above, is required for the proposed solution, the vendor is required to provide complete justification for proposing along with details and breakup of estimated cost of the same.

4.4 Product delivery, training and documentation requirements

Product delivery

Vendor will be required to deliver the product in phased manner, so as testing, development and delivery of product could be executed simultaneously. Further, the vendor will deliver complete source code of the solution and it will become the property of SECP.

Product training

Vendor will be required to deliver complete training of proposed solution. At a minimum, vendor will be required to deliver four weeks comprehensive training. Two weeks training, at minimum, will be required to be imparted to surveillance officers, while two weeks training will be required to be imparted to the technical officers. Technical officers include SECP's personnel who are mandated to run, maintain and provide support of surveillance solution, which may include but is not limited to technical operations, designing, performance tuning, architecture, and code development of the proposed solution.

"SECP" requires training of following user groups:

S. No	User Groups
1.	Business Users (Concerned department users)
2.	**Technical Administrators/Support** Technical maintenance, systems support, other product administrator tasks like database set up, performance tuning , release deployment etc
3.	**Developers** Code architecture, API understanding guides, design guidelines, integration with other components, SOA integration, Incase other commercial or open source components are being used a detailed document /training by the principal.
4.	**Database Administrators**

	Technologies and Features/components used for databases and performance measuring detailed documentation /training by the principal.
5.	Testers
6.	Trainer (to train external users and Business users) training
7.	Video walkthrough Guides
8.	Computer Based Training (CBT) or Audio/Video training modules/materials
9.	List any other customer specific (tailored to operations set up) training options

In addition to providing a cost based on SECP's needs, proposers are encouraged to provide any new ideas on how training can be best presented. However, this must address all the requirements set by SECP.

The Training walkthroughs after final cutover to users mentioned above shell be provided by the proposer. And if required subsequent Training sessions will be arranged especially when new versions/updates are released.

SECP may utilize train the trainer concept for subsequent business /Technical users training.

The following information (and associated costs) should be included proposal:

• The type, number, duration and cost of each training module that needs to be provided for all technical and Business Users.

SECP's training room may be utilized. If proposers intend to use the SECP's training room, please indicate in the proposal.

If there are other training topics, not covered in this section but required under your training plan, please include description and pricing in your proposal.

Training plan should include the plan and method on how the vendor will perform the knowledge and skill transfer for the professional service work to SECP.

Product documentation

Vendor will be required to provide complete documentation of the proposed solution which includes comprehensive manuals for the surveillance and technical staff, along with detailed specifications. Technical documentation will include complete process flow of each and every component of the solution, as well as requirement specification document, technical design document, architecture document, performance tuning guide, test plans, test cases, etc.

Complete project lifecycle methodology, including details of all technical deliverables along with their templates to be submitted with proposal.

Template of the technical and Functional documentation manual should be made part of the proposal.

Deliverables from the project and who is responsible for the deliverable;

At a minimum, the following deliverables will be required as a part of the ensuing contract.

SNO	Category	Deliverable
1.	**Scope of the Work**	• Business Requirement Documents • Report Specifications Documents for each Implementation of Business Processes
2.	**Source Code**	• Framework design documentation • Code Review Checklists for every component mentioned below • Development Guides (for setting up the

		environment)
3.	Source Code - Toolkits Development & Implementations Guides	• UI(based on process designer) • Reporting • Any other
	Source Code - Integrations Development & Implementations Guides	
	Architectural/Infrastructure/Design Documents	• Detailed System Architecture Documents • User Guides for business users • Developers Guides for Development team • Code Review Checklist • Coding Guidelines for each component/integration • Deployment Guides • Performance Tuning Guides for each Component • Systems Logs/Data cleanup guides
	User Acceptance	• Users Test Plan Documents • Test strategy (Load, Stress, Functional, Integration, etc) • Functional Test Plan • Unit Test Plan • UAT Test Plan

| | | | • Test Reports |
| | | | • Metrics Indicators/Reports showing the improvements in business processes |

Project Resources

Identify All Resources.The plan must clearly identify all offeror and "SECP" resources required to successfully complete the project. The offeror must provide job descriptions and the number of personnel to be assigned to the development, installation, testing, and implementation of the project. Resumes of Proposer's project team must be included with the proposal.

Project Change/Bug/Problem Management

Describe the process for problem management including: problem logging, problem resolution, tracking of unresolved problems, problem escalation procedures, and problem closeout and reporting practices.

Project Handover Plan

Describe the handover plan after the successful user acceptance in details and enablement of SECP teams for taking handover for future process implementation and maintenance activities.

5 SPECIFIC REQUIREMENTS

An alert is used to highlight an exceptional circumstance, which may warrant closer monitoring, investigation or review. Alert are triggered by trades and orders which cross alert thresholds.

A comprehensive alerts management system is envisaged to provide solution catering alerts manager, alerts assignment, alerts complete log/trail, i.e. from alert generation, assignment and status/resolution.

Alerts are activated when a parameter setting is violated. Alert parameters are needed to be adjusted continually to take into account changes in market trends to avoid 'false positives'. Monitoring and configuring the trigger parameters for alerts is a process of gradual and constant refinement. Parameters can be changed during the day,

Although surveillance system should be capable to handle user define alerts however, may support following pre-defined alerts:

Alerts to identify complex schemes of market abusive practices:

The proposed system should have functionality of the intelligent alerts which are able to identify the patterns and possible offenses. Alerts should be assigned and closed within the system.

5.1 DYNAMIC ALERTS

The alerts will be generated dynamically on the basis of customized requirements rather being statistics. Mainly alerts for following market abuses should be generated:

5.1.1 Market News Alert:

Market news alert or material news alert should be added to the alerts being generated by the MSS software as it will increase the effectiveness of our surveillance team and reduce the time lag between market manipulation, insider trading and detection.

Alert's Criteria

For each sector allocated to the personnel in the surveillance team, at an average 15 – 20 notices / announcements are sent on a daily basis. There are following factors to be analyzed:
   o The Materiality of the news;
   o Industry and General Market Trends;

- o Price and Volume Trend in the scrip;
- o Usual Intraday change;
- o Historical Performance; and
- o New Reaction.

The Alerts should also consider the following statistics of the scrip to determine the instances of Insider Trading:

- o Whether the previous unusually HIGH/LOW volume in the script was due to the news and whether there was any previous unusually HIGH/LOW volume in the script (Insider Trading); and
- o Whether there is irrational HIGH/LOW trading volume in the script after the release of the news (Market Manipulation).

Alerts Outcome
The Market news alert if added to the list of alerts being generated by the system will create opportunity for the Surveillance Officer to detect any Insider trading or Market Manipulation in the script.

- o On the basis of the above, the alerts should be able to analyze the pattern of the individuals UINs whose trading pattern was indicative of insider trading or of possible price manipulation.
- o Profit/Loss Pattern of the particular UIN in that particular scrip and generally in all the scrips.
- o The Market News Alert can be generated by creating a benchmark by regressing past Material news of the script with the change in the past average trading volume of the script for a defined period before and after the news announcement so that both periods can capture, Insider Trading and Market Manipulation, and identifying a reasonable value / benchmark of the percentage change in the past trading volume before and after the Material News was announced. Further, this alert should have the capability to calculate gain/loss of the individuals who have traded before and after the dissemination of announcement/news. Time window should be definable upto a minute precision for the purpose of position and gain/loss calculation.
- o An alert be generated after 10 days of the date of the market news depicting the position of individuals/UIN against whom above alert was generated
- o The alert would then get generated in the next step when the average volume of the script moves up or down by a certain (assumed) percentage above or below that of the benchmark percentage / value.

5.1.2 Priori trading history Alert:

Priori Trading History Alert will generate when a trade in a script is placed in the market after a pre-specified time frame. This alert is important as manipulating the price of the script with a high average traded volume is fairly easy and for a script that has not been traded for a long period of time, even a small trade in that script can lead to a change in its price.

5.1.3 Circular Stock Movement:
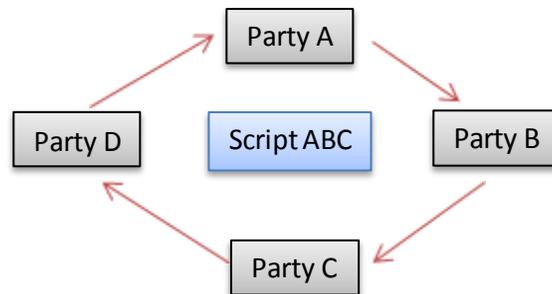
Circular Stock Movement Alert should consist of an Alert being generated to the Surveillance Officer when a script is being bought and sold between "n" number of parties in a circular movement. For instance, if party A bought script ABC and then sold to party B and party B sold those shares to party C followed by party C selling the shares to party A. Here we see that, party A ends up buying the shares from party C which it sold to party B. This movement of the shares can artificially inflate the volume of shares traded of the script and can lead to artificially inflated price of the script which the investors can at a later stage use it to gain profits at the expense of the investors at large.

This alert can be generated by comparing the buyer's name and the counterparty name in the 'All Trades Summary Report' and the chain link can be established between the parties. Then the system can generate the 'Circular Stock Movement Alert'.

Circular trading alert should have the capability to calculate profit generated by parties involved..

5.1.4 Spoofing/ Layering:

Identify the pattern on UIN basis group with historical pattern. Alerts should be generated to identify the orders pattern of the UIN, which placed on successive increasing rates followed by smaller sell orders.

5.1.5 Alerts to identify the scheme of Front Running:

Front Running is an extension of Insider Trading whereas an illegal activity in which a trader or someone takes a position in an equity in advance of an action which he/she knows his/her brokerage or someone will take that will move the equity's price.

5.1.6 **Alerts/ indicators to detect/assess the default of any broker/intermediary:**

Following are the some indications of Broker default:-
1. Large part of trading will be made in Proprietary account.
2. Increase MTS activity of any Brokerage House.

5.1.7 Alert for Short/ Blank Sale Hit, (offline)

5.1.8 Alerts for Trades executed by Board of Directors UINs, Executive Management and Employee of companies/ brokers.

5.1.9 Trade executed by N foreign clients, (online)

5.1.10 Alert on Order Matching/ synchronized trading, (online)

5.1.11 Alert on Order placed in the name of any director in its own scrip, (online)

5.1.12 Alert for a UIN trading in any scrip for short/ specified span of time which resulted in unusual profit.

5.1.13 Visual benchmarking, a tool that would help in benchmarking by visually demonstrating historic behavior of members and scrips. This feature should have a GUI based benchmark tuning, benchmark exploration (historic patterns), prospective alert flood insight etc.

5.1.14 System generated benchmarking, a tool that would statistically generate benchmarks using historic transactions.

5.2   STATIC ALERTS

5.2.1 Equity Alerts

5.2.1.1 Price Alerts
1. Alert for Price difference of greater than "x" of an Instrument as compared to 4 weeks(on the basis of Moving Averages)
2. Alert for Price difference lesser than "x" of an Instrument as compared to 4 weeks (on the basis of Moving Averages)
3. Trade Price comparison with Negotiated Trade Price (maximum and minimum NDM price) of the particular day.
4. Last Trade Price comparison with explicit cross trade price.

5. Negotiated Deal Price to Average Ready Price
6. Cross Deal Price to Average Ready Price

5.2.1.2 Volume Alerts

1. Negotiated Deal Volume to Average Ready Volume
2. Cross Deal Volume to Average Ready Volume

5.2.1.3 Trade/ Order Alerts

1. Large Institutional Traded Quantity in particular scrip
2. Large Institutional Order Quantity in particular scrip
3. Latest Order Price to last trade price
4. Frequent Order Cancellations (for symbol and member-level) (offline) (total no. of cancel orders / total orders), frequent cancellations after a particular time.
5. Alert on UIN level for placing consecutive buy orders at followed by sell order(s) and vice versa in a particular scrip(Spoofing).
6. Alerts on UIN – level for placing buy orders at increasing rate, which are simultaneously deleted and vice versa in a particular scrip.

5.2.1.4 Instrument Alerts

1. Thinly Traded Instruments Volume Change X weeks
2. Volume Change Negotiated X weeks
3. Volume Change Cross X Weeks
4. Post-Close session Alert

5.2.1.5 Broker Alerts

1. Punching Wrong Client Code and modifying at End of Day.

5.2.1.6 Client Alerts

1. Client Trading with more than 'X' number of Brokers if number of traded shares will cross 'Y'
2. Client Instrument Concentration on Gross Buy
3. Client Instrument Concentration on Gross Sell

5.2.1.7 Index Alerts

1. Alert when our Index Moving against Global Indices more than 'X' days and change above 'Y'%.

5.2.1.8 Offline Alerts

1. Short Term Price Fluctuation
2. Volume Variance
3. Identification of Instruments Hitting the Daily bands (circuit filters)
4. List of Instruments Showing Progressive Rise/Fall Without Violating bands
5. Spurt in Trading Volume compared to last 1, 2 or 3 months
6. Concentration of turnover of Top N trading members
7. Correlation of Trading pattern with Announcement of Corporate Action

8. Instruments Performing Against Market Index
9. Instruments Trading after 'n' Trading days.
10. Front Running Report
11. Instrument hitting the daily upper band and then traded negatively
12. Instrument hitting the daily Lower band and then traded positively

5.2.2 Derivatives Alerts

1. Difference in Price between Cash Instrument and Derivative Instrument (absolute and %age).
2. Difference in Volume traded between Cash Instrument and Derivative Instrument.
3. Alert when Daily Turnover comes down below the prescribed Turnover
4. Alert when the Instrument (which is in Derivative segment) in normal market not traded for more than 'n' days.
5. Alert when top 'n' members crosses beyond a particular percentage in Futures vis-a-vis the whole market.
6. Alert when top 'n' members crosses beyond a particular percentage in Futures of a Instrument vis-a-vis the whole market of that Instrument.
7. Alert when Total pending buy or sell order qty in the market is greater than X quantity.
8. Alert when difference of total pending buy qty and total pending sell qty is greater than X value.
9. Alert when spread is more than X value .
10. Alert when Market Price / EPS of an Instrument is greater than that of Industry Average.
11. Alert when X Derivate price and Y Derivative of same month has Y %age difference.

5.2.3 Debt Market Alert

5.2.3.1 Price Based Alerts -Online

1. Inter Bid Price Variance (best 5 Bids): Compares the average interval between the bid prices and generate an alert when the variance exceeds a specified percentage.
2. Inter Ask Price Variance (best 5 Ask's): Compares the average interval between the ask prices and generate an alert when the variance exceeds a specified percentage.
3. Bid - Ask Price Variance: Compare the bid ask variation and generate an alert when the variance exceeds a specified percentage.
4. % Change in Trade Price: Alert will be generated if trade price is greater/less than previous trade price beyond % specified.
5. % Change over previous day closing price: Alert will be generated if trade price is greater/less than % over previous trading day's closing price.

5.2.3.2 *Volume based Alerts Online*

1. Trade quantity to Benchmark quantity: Alert will be generated if traded quantity is greater than % over benchmark quantity, alert will be generated.
2. Specific T Bill volume to overall T Bills volume: Alert will be generated if volume of any Treasury Bill is greater than % to overall Treasury Bill volume.
3. Specific Govt Security (G-Sec) volume to overall G-Sec volume: Alert will be generated if volume of any G-Sec is greater than % overall G-Sec volume.
4. Specific Commercial Paper (CP) volume to overall CP volume: Alert will be generated if volume of any CP is greater than % overall CP volume.

5.2.3.3 *Instrument Based Alerts Online*

1. Instrument Trading after 'N' trading days: Alert will be generated if Instrument is traded after 'N' trading days.

5.2.3.4 *Price based alerts Offline*

1. High/Low difference in the Price of an Instrument for a period
2. Increase/Decrease in the Price of an Instrument for a period
3. Alert new 52 week high and low Price
4. Open and close Price difference of an Instrument for a period

5.2.3.5 *Yield based alerts Offline*

1. High/Low difference in the yield of an Instrument for a period
2. Increase/Decrease in the yield of an Instrument for a period
3. Alert new 52 week high and low yield
4. Open and close yield difference of an Instrument for a period
5. % Variance in yield- Alert generated when % Variance in yield is more than benchmark % variance. The formula for calculation of % variance is mentioned above.

5.2.4 Beneficial ownership alerts

- Change in beneficial ownership

Alert has to be triggered whenever there is change in beneficial ownership. Beneficial owners UIN are reported to BO wing, which can be used to generate alerts based on trading data feed being received from PSX.

- Beneficial ownership gain

Alert has to be triggered whenever gain is made through trading of beneficial owner and whenever the holding period is less than or equal to six months.

5.2.5 Takeover alerts

- Acquisition of 10% shares of total outstanding capital/paid-up capital

Alert has to be triggered whenever a certain person/company's holding in a company reaches 10% threshold. To determine shareholding, CDC balance position and physical shareholding data has to be linked up with the module.

- Acquisition of 30% shares of total outstanding capital/paid-up capital

Alert has to be triggered whenever a certain person/company's holding in a company reaches 30% threshold. To determine shareholding, CDC balance position and physical shareholding data has to be linked up with the module.

<u>Alerts Management System</u>

The aforementioned alerts would be managed through an Alerts Management System which should have following key features:

a. Alerts Assignment,
b. Alerts Management,
c. Alerts Manager,
d. Alerts Prioritization,
e. Alerts Resolution,
f. Alerts Log,
g. Alerts Statistics Reports

6 REPORTS

6.1 New Reports

Please find below the concepts of the new requirements for reports for various dynamic reports.

1. Reports to summarize Order level data for particular UINs in various scrips. i.e., Bought Order, Sold Order, Cancelled Order, Deleted Orders, Changed Orders, etc.
2. UIN price mover: The UINs which moved the price of any particular scrip.
3. Member Price Mover: The member whose trading moved the price of any particular scrip.
4. Net Outstanding Position of Broker
5. Gross Outstanding Position of Broker
6. Report linking the trades of a broker with its erroneous trades.
7. Report for UIN Price Movers for their trading in scrip which contributed to Index.

6.2 Price Based Report

S/No.	Report Title	Comments
1	Close Price Rates Comparisons	To monitor the price variation in terms of the closing price

6.3 Turnover / Volume Based Reports

S/No.	Report Title	Comments
1.	Average Daily Turnover during the Month	Monitoring scrip-wise average volume for given month.
2.	Volume Fluctuation in scrip in last 30 minutes	For monitoring of any abnormal change in volume on closing for a given day or period by comparing average volume of the day with average volume of last 30 minutes. Report can be further customized to compare the average last 30 mins volume over a period of time for a certain scrip.

6.4 Scrip/Sector Based Reports

S/No.	Report Title	Comments
1	Daily Breakup of Scrip.	To analyze the volume and value of MTS with actual trading in particular scrip.
2	Scrip Price History for Spot	To monitor trading behavior of scrip during the Spot trading after corporate announcements.

3	**Scrips Contributed to Index**	This report shall compare the trading of particular scrip to trading volume of companies in Index along with the points it contributed to the index.
4	**Sector Detail Any Day**	This Report should be based on different Sectors instead of Different Scrips and will provide the statistics of the scrips in that particular sector covering the entire segment Regular, Future, MTS, Erroneous Trade, Off Market, Cross Trades Volume. etc
5	**Scrips Fluctuation in Volumes**	This report shall compare the trading volumes in scrip to its historical average volume.
6	**Scrips Touching Price Bands**	The Report shall indicate the scrips touching high circuit breaker and low circuit breakers during the day over a certain time period.

6.5 Member Based Reports

S/No.	Report Title	Comments
1	**Complete Member Information**	This report will help to take overview of members of certain exchange on one page, such as Name Exchange, Total Buy Volume, total Sell Volume, Proprietary Trading Volume, Clients' Trading Volume MTS Volume, Net Capital Balance etc, Status: Active/ Inactive
2	**Members to Member Trade Comparison for a period in any Scrip(s)**	To identify the percentage of matched trading with a specific counter member in certain scrip over a period of time. The report should also highlight concentration of initiating member in that particular scrip.
3	**Member Scrip-wise Concentration Details**	Report for detailing member's concentration within a scrip based on trading and holding positions and compare the same with free float of the scrip.
4	**Members Positions in Ready Market (Scrip wise as well as consolidated)**	Brief summary for scrip-wise net outstanding as well as Gross Buy and Sell Volumes for all members
5	**Order Matching (Member-wise, Scrip Wise)**	Report to gauge if a few members or a group has acted in concert. Already available in system but needs improvement.

6.6 Client Based Reports

S/No.	Report Title	Comments
1	**Client Scrip-wise Concentration Details**	Report for detailing UIN concentration within a scrip based on trading and holding positions and compare the same with free float of the scrip. The report shall compare % volume of the client to the total volume of the scrip.

6.7 End of Day Summary

S/No.	Report Title	Comments
1	**Spot Transactions**	Monitoring Scrip-wise member / client level trading behavior during SPOT

6.8 MTS Reports

S/No.	Report Title	Comments
1	**Basic MTS Report – Market wide report**	Scrip-wise MTS Summary
2	**Member-wise and UIN – wise MTS Details Report**	Member-wise and UIN wise complete details for MTS in any scrip or all scrip on a given date

6.9 Market Information Reports

S/No.	Report Title	Comments
1	**Scrip Master Details Report**	Master information table containing following: Scrip Code, Scrip Name, Action, Date, Scrip Group, Exchange, ISIN, Status, CDC Eligibility, Suspension from and to, paid-up capital, free-float, par value, VaR%, EPS, Marketable Lot, yearend, year of listing, Remarks, Board of Directors, Executive Management, UIN of BOD, UIN of Executive Management

6.10 Case Management / Issue Tracking Reports

S/No.	Report Title	Comments
1	**Alert log report**	Details of alert pertaining to Users.
2	**Report Manager**	Relevant Details of report manager and their title
3	**Settlements Master**	Master table for keeping settlement schedule

6.11 Other Reports

S/No.	Report Title	Comments
1	**Initiated Trades**	
2	**Price Run up**	Available in MSS, but logic needs to be improved
3	**Market Surveillance Report – Daily Trading Activity in Illiquid Scrip**	Scrip-wise trading statistics for scrips generalized as illiquid

7   Development of a New Market Surveillance Suite

7.1   Summary of Required Customized Features

In case an entire new solution is being proposed, it is expected that it shall encompass all the existing features available in the MSS (already deployed) and detailed requirements as laid down in Sections 3, 4, 5 and 6 above.

Complete scope of work document including the complete details of features of the existing MSS that will be developed to become a part of the new proposed solution.

The Statement of Work (SOW) and all functional and technical documents should cover the complete set of features including the features of the existing MSS that will be developed as a part of the new proposed system.

Additionally it is also expected that the proposal formally addresses the data migration to the new proposed solution, including planning related to all historic data migration to the new system, pre and post migration tasks, data cleanup, data conversion techniques, migration utilities, and cross-check data verification methods, and data validation. The system should be capable of generating all the proposed reports on the complete historical data available with SECP. A complete plan as to the data migration should be made part of the proposal.

8   Maintenance and Training

8.1   Maintenance

Vendor needs to provide one year Support/Maintenance after the deployment of the system in Production. Maintenance and Support contract clearly describes remedy of defects, mode of support (Tele/email/In person) , disruption in performance and delays , changes and payments , severability ,disputes, exclusions ,limitations and recurring cost of maintenance/support after one year. Also, confidentiality and data integrity needs to be ensured during the support period.

8.2   Scope

The scope of this support agreement covers annual Support and Maintenance contract of MSS.

8.3   Service Level Agreement (SLA)

An SLA shall be effective for Support & Maintenance of MSS for the defined Period. The scope of the services to be provided includes providing all possible software support that is professionally acceptable in order to resolve any issue reported by the SECP staff in the production environment.

At least the following are to be covered under this section

- Vendor is to provide SLA Template

- Vendor should clearly bifurcate and provide the details of the items that are included in the scope of support services and change management.

- Response time and maximum times required to restore normal operating condition.

- Issue Escalation Process.

- Vendor should provide Issue Management and bugs registering Web Portal.

- Pricing model and Payment Terms

- Project Managers

- Obligations of Vendor & 'SECP"

- Terms and conditions

- SLA Authorized Start and End Date

In addition to this, Vendor will be expected to provide the following services.

- Vendor team will run vulnerability scanning of New Surveillance System on monthly basis and share the report with "SECP" team.

- Vendor will deploy the security related patches related to Surveillance Suite

- Vendor team will also inform the vulnerabilities related to Internal/ External services and Environment and will suggest mitigation to improve and secure platform.

9   Other specifications

9.1   Detailed break-up of cost of the proposed solution, should be added with the proposal

9.2   In cases, a new hardware, storage, software is required (other than the specifications mentioned in point 4.3 above), a summary of cost-benefit analysis in terms of impact, due to addition of such hardware, storage, software, on performance should be added with the proposal.

9.3   Third party hardware and software requirements would be clearly identified in the proposal along with all cost including license fee and license renewal fee.

9.4   In case the bidder is proposing both the upgrade of the existing MSS and development of new MSS, separate cost breakup should be provided

9.5   Cost of after sale service along with complete description of the service to be provided.

9.6   Separate Specification requirement document for each alert, report and feature type shall be prepared.

9.7   Detailed Implementation plan shall be provided, which should be in a logical sequence and should provide phase-wise detail of alerts, features etc. to be covered in each phase.

9.8   **Performance Matrix Indicator**, as per international standards, is to be provided for the features, reports and alerts, specified in the TORs.

The Performance matrix indicator should clearly mention the following:

What to Measure
-    Performance measurement categories
-    Define objective, outcome
-    Metrix Details

How to Measure
-    Automated Tool or program registering the performance based on the defined categories

How to use what is measured.

9.9   **Complete architecture plan**:
Architecture plan document should consist of the following:
-    Solution architecture overview diagram.
-    Transition Planning (As the project involves migrating from current system architecture to the proposed/new architecture provide a description of the high-level transition plans).

Architecture Goals and Constraints:
-    Identify all software and hardware technologies that are to be used in the solution.
-    Describe any architectural patterns that apply to the solution architecture.
-    Specify any existing common services to be used by the solution architecture and any new common services that will be developed for the solution.
-    Specify any reusable common components to be reused as part of the solution.

- Portability.
- Scalability (Attributes necessary to accommodate forecasted growth in terms of system function transactions and volume indicated by the solution requirements)

Application Architecture
- Application Layer
- Component Relationship Diagrams.
- Component Interaction Diagrams.
- Walk through models
- Data Architecture (E.g. logical /conceptual data models, data dictionary etc.)

Security architecture model (description of the security architecture, how the security architecture meets the solution's security requirements).

Infrastructure architecture overview diagram.

9.10   Bid should specify the following:

- That the deployment of the solution shall be at SECP's Head office Data Centre.
- Deployment Model & Methodology:
        Describe how the application architecture is deployed into one or more physical network (hardware) configurations. Provide a high level diagram with the details of a required specification and guidance. Mapping application architecture deployment models to hardware and software infrastructure specifications including memory and central processing unit specifications required to meet volume and performance requirements.

9.11   In case the bidder is proposing a new solution instead of upgrading the existing solution deployed at the SECP detailed reasoning of such proposal should be added with the proposal.

9.12   Proposed solution should have the capability of partial deployment at exchange or other location. Comprehensive project plan is critical to the success of the project. A comprehensive project plan (definition, implementation, timeline, team, maintenance and support plan) needs to be submitted with the proposal. The plan should clearly define roles and responsibilities of supplier and SECP.

9.13   MSS deployment and roll out of features should be in phases. Exact details of phases will be agreed upon by the time of contract signing.

9.14   SECP Technical and functional department staff at any time during the course of project development should be able to have exact details of performance made till that time. The bid should detail the co-ordination mechanism in the context.

9.15   A comprehensive project plan and approach. The plan must clearly show the
        following:

        •

        Project Management Implementation Plan
        • Activities
        • Duration of each activity
        • Stages
        • Milestones
        • Deliverables
        • Reports & meetings
        In addition it should also should at least contain the following details

        • Project Plan with milestones
        • Project Governance Plan
        • Project Risks and Mitigations Plan
        • Change Management Plan
        • Quality Assurance Plan
        • Project Status Reporting Plan
        • Any other
9.16 System Integration & External Service Model

10 Documents to be submitted along with the Technical Proposal

The bidder shall furnish the following documents, if the same have not been submitted earlier or in case there is any change in the status:

10.1   Certificate of Incorporation issued by SECP.
10.2   Audited copies of financial statements – 2013-14.
10.3   Bidder's profile.
10.4   Evidence of executing similar projects.
10.5   Affidavit
10.6   Detailed plan of onsite comprehensive training sessions for end users and technical resources be provided in the Technical Proposal.
10.7   A comprehensive project plan and approach (definition, implementation, timeline, team, maintenance and support plan) needs to be submitted with the proposal. The plan should clearly define roles and responsibilities.
10.8   Comprehensive, appropriate and well-structured end user and technical documentation manual.
10.9   Software lifecycle methodology be made part of the proposal with complete documentation details
10.10   Curriculum vitae of all the resources of the bidder intended to be allocated to the project