SMARTS Market Surveillance
Powering market integrity on a global stage.

In order to keep pace with sophisticated trading technology and manipulation techniques being used to gain a trading advantage, both regulatory authorities and trading venues alike need the same level of sophisticated tools as the participants in the market.

For exchanges and trading venues, the ability to maintain a fair, transparent and safe market is critical to attracting liquidity.

For regulators, the ability to keep markets safe and maintain integrity throughout their jurisdiction is imperative.

Proven in the world’s fastest and largest markets, SMARTS Market Surveillance is the industry standard for real-time and t+1 solutions for market surveillance, supervision and compliance.

Nasdaq’s SMARTS Market Surveillance leverages 20 years of expertise from working with a wide range of customer needs – from simple to complex – and operating surveillance across its own markets, to provide organizations with a robust platform to manage cross-market, cross-asset, multi-venue surveillance. Robust monitoring and analysis tools effectively and efficiently monitor billions of trading messages in real-time or historically. Powerful visualization tools simplify the monitoring process by distilling complex information into a single snapshot that provides clear guidance on where to focus an investigation. Groundbreaking cross-market and cross-asset capabilities provide a consolidated view of trading data across any number of markets and asset classes and help analysts to quickly detect potentially manipulative behavior and investigate before it becomes a pattern of abuse.

SMARTS Market Surveillance can be implemented on the customer’s infrastructure or delivered as a managed service, where Nasdaq operates and maintains the full solution at our secure data centers.

Leveraged by more than 50 trading venues and regulators, and even used to prove market abuse cases in court around the world, SMARTS Market Surveillance is the world’s leading market surveillance platform.

SMARTS Market Surveillance supports
- Exchanges
- Financial & Energy Regulators
- Inter-dealer Brokers
- Swap Execution Facilities
- Other Alternative Trading Venues

POWER YOUR SURVEILLANCE TEAM WITH SMARTS.
SMARTS Market Surveillance provides surveillance and market supervision analysts with the essential toolkit required to load and process billions of messages daily and to identify undesirable behavior via a suite of sophisticated alerts. A robust and flexible workflow is supported by market-leading analysis and visualization tools.

Key benefits include:

- **REAL-TIME CONTROL**
  The system alerts analysts to potential breaches of trading rules, unusual behaviour and market volatility in real-time, supported by an intuitive alert workflow management system.

- **AUTOMATED MARKET ABUSE DETECTION**
  Sophisticated algorithms detect patterns of market abuse, market manipulation and insider trading, enabling analysts to filter only events of interest. Developed from 20+ years of experience in detection of market abuse, SMARTS provides 60+ pre-configured alerts as well as the ability for users to tailor alerting algorithms to create their own alerts ad-hoc.

- **FLEXIBLE ALERTING LANGUAGE**
  Enables users to build their own alert algorithms, to quickly and easily adjust to rule changes, and provides the ability to perform quick, ad-hoc queries.

- **POWERFUL VISUALIZATIONS**
  Provides clear graphic support of market analysis, enabling analysts to quickly and easily compare potentially abusive scenarios to normal market behaviour and then drill down to the order book and replay any transaction for any security during any time period.

- **MULTI-ASSET SURVEILLANCE**
  Provides comprehensive coverage of all listed instruments on equity, futures and derivative markets.

- **PROVEN CROSS-MARKET CAPABILITY**
  Provides seamless consolidation of trading data from multiple venues, whether the data crosses asset classes or fragmented markets - a crucial requirement for cross-market surveillance and supervision.

- **RELIABLE, RESILIENT AND SCALABLE**
  SMARTS Market Surveillance is proven in a number of massive volume implementations, including those across Nasdaq markets, and is able to process over 3 billion orders and trades on a live system, with further scalability possible.

- **BEYOND SURVEILLANCE**
  SMARTS Market Surveillance enables teams outside of the surveillance function to leverage the solution to meet their needs. SMARTS can be utilized for market operations, market maker monitoring and a variety of other use cases.

- **EASE OF DATA ACCESS**
  SMARTS provides fast open access to all data stored within the SMARTS system, including transactional, reference and alerting data, via SQL. Access is provided both to the individual rows as well as to derived and aggregate data, such as top-of-book, open orders at a point-in-time and daily totals.

- **CONTINUOUS INVESTMENT IN R&D AND UNDERLYING TECHNOLOGY**
  As the inventor of the electronic exchange, passion for technology is in Nasdaq's DNA. There is continuous investment into SMARTS technology infrastructure and software to ensure that it is efficient and up-to-date with latest technology advancements.

- **UNPARALLELED DOMAIN EXPERTISE**
  Nasdaq's dedicated teams leverage 20 years of practical experience and combined market surveillance software development acumen with strong academic collaborations and customer partnerships to facilitate continuous innovation and best practices in surveillance technology. Additionally, owning and operating 20+ venues enables Nasdaq to provide customers truly unique surveillance advisory to set up systems, processes and strategies to best meet each venues' distinct surveillance needs.

Nasdaq's Nordic Markets have been successfully running cross-border market surveillance since 2003.

12 Regulators and 40+ Exchanges in 50 Countries

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Beyond alerting to suspicious market activity, SMARTS Market Surveillance is delivered with a sophisticated suite of modules, which include robust tools for:

- Alert/incident management
- Alert/scenario maintenance
- Broker/trader activity queries
- Custom report generation and automatic reporting
- Data mining
- Graphical displays of trading activity

- Order book replay
- Market operations
- Market maker monitoring
- Market overview and statistical evaluation
- Market replay

**FEATURES**

**SPREAD View** shows a full cross-market, cross-asset view of trading.

**Market REPLAY** enables replay of exact market conditions per a particular time period.
SMARTS Market Surveillance runs on SMARTS Real-time Market Event Storage (RMES), a patent-pending surveillance infrastructure purpose-built for market event storage. The culmination of 15+ years of research and practical experience in implementing market data processing systems, RMES provides a cost-effective, high performance storage and processing infrastructure that is able to manage billions of market data events on a daily basis and the detailed market data analysis required on every order entry, order amendment and trade. Additionally, to prevent loss of information and accurate sequencing of these events in the order book, RMES seamlessly integrates with SMARTS Market Surveillance CEP engine, supporting the calculations of the order book state after every market event.

SMARTS Market Surveillance RMES solves the following challenges:

- Most traditional data storage systems lack the functionality to meet market data requirements.
- Relational databases often have difficulty processing enormous volumes and their table-based schema approach is problematic for time-series event data with different schemas for each event type.
- Distributed storage systems, such as HADOOP, cope well with the high volume and varied event schemas, but still struggle with streaming data in time order. Their processing is generally geared towards parallel aggregation.

### RMES Features

- Standardized market event schema with extensible fields and tags on all transaction events
- Time series data with schema specific to each event
- Support for fast real-time processing using an integrated CEP
- Fast access to arbitrary point-in-time snapshots of the order book
- Real-time processing scalable by “adding CPUs”
- Historic data capacity scalable purely by “adding disk”
- Support for indexing, derived and filtered streams and aggregates
- SQL Accessible

### RMES Benefits

- **SCALABILITY ACROSS BILLIONS OF TRANSACTIONS**
  Scalable solution enables processing speed to be scaled up via parallelization and storage of enormous historical data volumes without performance degradation.

- **REDUCED OPERATIONAL INVESTMENT**
  RMES does not require additional licenses and can be tuned to reach the most effective trade-off of CPU versus disk using compression. In most configurations, RMES requires significantly less, up to 5 to 10 times less, disk space as through compression. Additionally, storage on the disk is file-based, simplifying backup and also eliminating licensing costs for specialized backup agent software.

- **IMPROVED SURVEILLANCE PERFORMANCE**
  RMES operates real-time surveillance in markets with more than 3 billion transactions per day and supports write speeds in excess of 300 KTPS per core and order book replay in excess of 1 MTPS per core on commodity hardware. In addition, due to configurable compression levels, RMES has the ability to trade-off CPU and Disk IO.

- **ENHANCED SPEED AND POINT-IN-TIME ACCESS**
  Built in order book snapshots enable order book reconstruction at any point in time, which is generally not possible with traditional storage methods due to query cost and effort.