FIA Due Diligence Questionnaire for IT outsourcing and procurement: **APRIL 2017**

Under MIFID II, an investment firm shall remain fully responsible for its obligations under this regulation where it outsources or procures software or hardware used in algorithmic trading activities. The purpose of this document is to provide a standard form for firms to request information. The terms Algorithm and DEA are assumed to be as defined by MIFID below.

Algorithmic trading: trading in financial instruments where a computer algorithm automatically determines individual parameters of orders such as whether to initiate the order, the timing, price or quantity of the order or how to manage the order after its submission, with limited or no human intervention, and does not include any system that is only used for the purpose of routing orders to one or more trading venues or for the processing of orders involving no determination of any trading parameters or for the confirmation of orders or the post-trade processing of executed transactions.

Direct Electronic Access (DEA): an arrangement where a member or participant or client of a trading venue permits a person to use its trading code so the person can electronically transmit orders relating to a financial instrument directly to the trading venue and includes arrangements which involve the use by a person of the infrastructure of the member or participant or client, or any connecting system provided by the member or participant or client, to transmit the orders and arrangements where such an infrastructure is not used by a person.

Questionnaire

Vendor Name:

Trading Technologies International, Inc. (TT)

Name and contact details of the person completing the form:

Introduction and overview

1.1 Overview of activities of the vendor

TT is a global financial technology company, founded in Frankfurt in 1994 and headquartered in Chicago, with offices in New York, Houston, Sao Paulo, London, Geneva, Frankfurt, Pune, Hong Kong, Singapore, Tokyo and Sydney.

TT provides software and services to professional traders, proprietary trading firms, hedge funds, banks and FCMs, primarily in the form of two electronic trading platforms. X_TRADER is TT's original platform that has been in use for over 20 years. TT's newer trading platform is simply called TT. Both trading platforms consist of front-end user interfaces, exchange connections, market data, order execution capabilities and APIs.

1.2 Key financial information (for example but not limited to p&l, balance sheet) of the vendor

TT is privately owned and does not disclose its financial information.

1.3 Description of your services/products

TT provides two trading platforms -- X_TRADER and TT. Both platforms provide a broad range of functionality including market data, analytics, order execution, risk management, APIs and the ability to connect to over 40 exchanges.

TT offers X_TRADER in three different deployment models:

- Customers may license X_TRADER and deploy the platform on their own infrastructure. They are responsible for procuring their own exchange connectivity, for maintaining the infrastructure, for monitoring the platform, for upgrading to new versions of software and for managing software licenses.
- TT has a global, redundant, high-speed network called TTNET with datacenters around the world and connectivity to all supported exchanges. TT will host all of a customer's infrastructure in a dedicated environment in TTNET, manage all Telco connectivity from TTNET to customer locations, monitor and manage the environment and coordinate software upgrades with the customer. Customers are responsible for providing exchange credentials and for administering users, permissions and risk.
- TT offers an ASP deployment of X_TRADER. X_TRADER ASP is a single environment that leverages the TTNET infrastructure. In X_TRADER ASP, multiple Sell-side companies offer access to exchanges with their credentials and Buy-side customers can access one or more brokers from a single interface.

The TT platform is only offered via a Software as a Service (SaaS) deployment model.

1.4 Description of services provided to the customer

TT provides all of the services and products described in section 1.3 to its customers.

1.5 Provide a list of algorithms provided to the customer and explain how they work

TT provides the following algos on the X_TRADER and TT platforms:

ADL (X_TRADER and TT)
Users can develop their own custom logic using ADL, TT's visual programming language consisting of drag-and-drop building blocks, which generates code. If permissioned by an administrator users can deploy their custom algos to an Algo Server for execution. Investment firms have the option of registering ADL as a single algo, or they can register each custom algo built using ADL as separate algos.

Aggregator (X_TRADER and TT)
Aggregator provides users the ability to create synthetic instruments that combine the market of two or more instruments. Users can trade aggregated instruments that route orders to one or more exchange-listed instruments based on various parameters and rules as configured by the user.

Autospreader (X_TRADER and TT)
Autospreader automates the legging of spreads between two or more instruments. Users define a synthetic spread, and Autospreader quotes one or more legs of the spread based on the market in the other leg's). If a quote is filled, Autospreader sends hedge orders in an attempt to leg into a spread at the desired price.

Autotrader (X_TRADER and TT)
Autotrader is a market making algo that automatically places orders for an instrument based on parameters, formulas and values linked from Excel and optionally manages positions accumulated while running the algo.

Auto-liquidate (TT only)
Auto-liquidate is an setting that a risk administrator can apply to an account. If applied to an account and the account's credit loss on the day exceeds a specified percentage of allowable daily credit, Auto-liquidate will cancel all working orders in the account and send orders to flatten all open positions.

Liquidate (X_TRADER and TT)
Liquidate is a feature in X_TRADER that allows a user, with a single action, to cancel all existing orders for an instrument then send an offsetting order for the same instrument to flatten an open position in that instrument.

Position Transfer (TT only)
Position Transfer prevents traders within a trading group or firm from trading with one another by canceling both orders that may otherwise cross, creating synthetic fills for each order as if they did match with one another and submitting new orders when one of the orders is only partially filled as the result of the Position Transfer

Sniper (X_TRADER and TT)
The Sniper algo allows you to hide your intent to buy / sell at a given price until there is quantity available at that price.

Synthetic Order Types (X_TRADER and TT)
TT provides a number of synthetic order types (e.g., OCO, Bracket, Timed, Time Sliced) that are configured by the user and managed on a server. Users specify an order quantity for an instrument and configure parameters for the parent synthetic order. The parameter values instruct the server how and when to send child orders into the market to fill the total quantity of the parent order. On X_TRADER, the synthetic order types are also known as SSE order types. On TT, they are called TT Order Types. These order types may be used separately or in conjunction with one another. As such, we consider the entire group of Synthetic Order Types a single algo that should be registered for MiFID II purposes.

1.6 Organisation chart

Senior management team

1.7 Description of your enquiry/complaint/order process escalation

TT provides 24-hour support when the markets are open. TT Support phone lines are staffed each week from 12:00 P.M. Sunday to 5:00 P.M. Friday Central time. Customers may report incidents or open tickets over the phone, through TT's Customer Portal or through the application itself. Once created, tickets go through the following process:

- Tickets are assigned to an agent on the customer support team who notifies the customer and performs an initial investigation.
- If the agent is able to solve the ticket, he or she communicates the resolution to the customer. If not, the ticket is escalated to Engineering or Product management, who provides an estimate for completion.
- The support agent notifies the customer of resolution and closes the ticket.

Email notifications are sent to the customer and available through the portal at each step above.

Questions regarding orders on an exchange should be directed to the appropriate FCM and/or exchange.

1.8 Up-to-date contact information for relevant personnel

https://www.tradingtechnologies.com/contact/

1.9 Description of changes to responses since last response

None

General Organisational Requirements

2.1 Explain the procedures you use to approve the development, deployment and subsequent update of trading algorithms [RT6, Article 1].

TT has two platforms, X_TRADER and TT, and we deploy the platforms as a whole in very different manners. For both platforms we production release software updates that have been thoroughly tested.

For X_TRADER, we also have different deployment models described in the response to Question 1.3. If a customer deploys X_TRADER in an environment that they manage themselves, updates to the platform are made at the discretion of each customer. If TT hosts an environment for a customer in TTNET or if a customer is in X_TRADER ASP, TT works with the customer to coordinate software upgrades.

For the TT platform, TT updates the platform for all customers at once. This may be in the form of a quarterly release, a point release or a hotfix.

TT has formed an Algo Oversight Council (AOC) to refine, monitor and communicate our efforts to support MiFID II compliance with respect to algos on both platforms. Comprised of leadership in the areas of Product Development, Engineering, Quality Assurance and Product Documentation, the AOC advises the operation and refinement of the following:

- Our product development processes and toolsets to assure MiFID II compliance in new algorithmic trading tools as well as the continued compliance of existing tools.
- Tools to monitor algorithmic trading within the TT platform to identify and resolve any problematic algo behavior.
- Business continuity measures intended to prevent disruptions to market stability.

Though TT makes algos available to investment firms, it is the responsibility of the investment firm to control access of these algos to its customers. Our customers have complete control over who may access specific algos on both the X_TRADER and TT platforms, including TT-supplied algos, bank algos and third-party algos as well as algos developed using ADL® and TT Algo SDK. On the X_TRADER platform, administrators use TT User Setup to control access to algos, and on the TT platform, administrators use the Setup application to control access.

2.2 Explain how information should be passed to/from your customers. In particular, information about releases to customers and information about issues from customers [Article 1].

TT provides information to its customers in various ways. In addition to online resources and email communications, TT has a Customer Success team that engages with its customers. Customer Success Managers (aka account managers) have regular communications with their accounts to keep them abreast of any product developments.

For X_TRADER, in addition to sending release notes for each release of its products, TT has numerous resources on its website, including:

- Documentation
- Training videos
- Community
- Advisories
- System Admin News & Updates

For the TT platform, TT provides release notes for all significant improvements and fixes to the platform. Additionally, TT provides documentation, training videos and a Community forum with information about the TT platform.

For both platforms, TT will communicate to customers any material changes to algos that it provides as follows:

- Post capacity testing and TT approval, the respective Algorithm Compliance Officer (ACO) at client investment firms will be notified of a pending release.
- The ACO will be provided both with a confirmation of TT testing for capacity and resilience (where applicable) and a segregated non-production live environment in which to test and satisfy their own MiFID II compliance.
- The Customer Success account manager will liaise directly with the ACO to notify of updates including ad hoc circulars and product documentation releases available by email, our website, training videos and application notifications on the GUI.

If issues arise that impact X_TRADER customers, TT sends email advisories to notify them of the issue and any subsequent updates on the issue. If issues arise on the TT platform, TT communicates with customers directly through the TT platform. TT also provides customers with a status page that displays real-time and historical status of TT services.

Customers may report incidents on either platform as described above in the response to Question 1.7 and track the status of their open tickets in an online portal.

2.3 How do you train staff in the compliance/regulatory obligations relevant to the system? [Article 3]

Internal training seminars, documentation, email notifications and Compliance group meetings, video and online tools.

2.4 Please list all material services for which you rely on third parties, consultants and/or outsourced providers (including data storage facilities for your records) which are relevant to the products and services you provide to the customer. [Article 4]

TT leverages multiple 3rd parties as an organization, but from the perspective of the regulated investment firm, TT is a single software provider that can be viewed as one closed system. The most relevant third party services used are third party colocation/hosting facilities, telecom providers and the exchanges themselves.

Resilience: Testing and Deploy

3.1 Explain your development and testing processes [Article 5.1]

TT has a formalized software development, testing and deployment process. The product development team consists of product managers, project managers and software engineers. Within the software engineering group at TT, there is a dedicated Software Quality Engineering (SQE) team that is focused entirely on the testing of all TT software.

For X_TRADER, TT maintains separate testing environments, one designed to mirror a typical customer deployment and one designed to mirror X_TRADER ASP.

For the TT platform, TT maintains numerous environments for various stages of the software development process. SQE conducts different tests in different environments depending on the nature of the tests.

With regards to algos provided by TT, the Algo Oversight Council (AOC) specifically approves the development of any new algos and any changes to existing algos. The AOC also oversees the testing approach and reviews the test plans for all algos. SQE conducts a battery of manual and automated tests.

- SQE conducts standard regression tests for all algos. Regression tests span all permutations of order submission, modification and deletion at various stages throughout an order's lifecycle.
- Specific tests include Cancel, Cancel/Replace, Change, Increase Quantity, Decrease Quantity, Increase price, Decrease Price, Delete Full order, Delete after partial fill and/or modification on order.
- Applicable tests are performed separately, targeting parent orders directly, then targeting child orders directly. We validate accuracy of order and price detail, Fill, P&L and Position data within these use cases.

In anticipation of the MiFID II regulation, we are going above and beyond our normal testing processes and procedures to provide an explicit interpretation of what the regulation requires, specific test scripts to assess our automated tools against those requirements, and a full definition of pass/fail criteria along with a final pass/fail status for each automated tool. While TT is not a regulated entity and does not have an obligation to perform these steps, we are making an effort to help our customers navigate the regulation.

3.2 Describe your authorisation process before a new release. Do you allow your customers to test releases and approve them before they implement them? [Article 5.2]

TT has a project management team that manages the software development and release process. Project management, product Management, software development and SQE all must approve a release before it is made available to customers.

As described in the answer to Question 3.1, the AOC approves the development of any new algos and any changes to existing algos. The AOC also approves the release of any algos before they are made available to customers.

Ultimately, customers control access to algos. Company administrators have granular control over which users have access to any of the algos.

Customers have the ability to test new releases of algos prior to authorizing access by their users. In X_TRADER, customers may test in simulation. For the TT platform, we deploy new features in a UAT environment prior to deploying to production. Customers may also test new algos in simulation.

3.3 What records are kept of evidence that the design, development, testing and release processes have been followed? How long are they kept for? [Article 5.3]

TT uses an issue management system to document requirements and design and track changes to our software. The issues are directly linked to the source code providing traceability between requirements and changes. The details of how each change was tested is also included here.

TT uses a change management system to facilitate the change approval process for all normal and emergency changes to our customer facing environments.

TT keeps test repositories which retain historical test results for automated and manual test suites. These results are kept for at least two years, but often longer.

3.4 How do you ensure that the products and services you provide comply with the rules of trading venues and other relevant regulation? [Article 5.5]

We run thorough conformance tests against every exchange and with every major exchange API update to ensure that our messaging adheres to the exchange specs. Many of these tests are automated such that they can easily be run again and again.

Also, many exchanges have rules for message rates. We provide our customers tools that allow them to control message rates.

3.5 How do you ensure that the products and services you provide will not contribute to disorderly trading and will continue to function in stressed market conditions? [Article 5.4]

As part of MiFID testing we are constructing a suite of automated tests that will run against algos that we provide on both the X_TRADER and TT platforms. The tests are designed to ensure stability of the platform(s) when the market is enduring high message and high volume conditions.

The SQE team runs a simulator that produces substantial load (high message and trade volumes) on the test environment and then we run and execute our algos within these conditions. Tests are validated to make sure the following failures do not occur:

- Sending more orders than intended.
- Changing or Cancel/Replacing orders unnecessarily.
- Exceeding “normal” message traffic.

- Abnormal price changes

We provide professional trading tools that can be used in numerous ways. When we provide tools for our customers to build their own trading mechanisms, even for our own trading algorithms, we expect them to be used in a professional manner. In addition, we provide our customers with a series of checks (eg. risk checks, order checks, credit checks, orders per second checks, etc.) to prevent algorithmic orders from contributing to a disorderly market.

Ultimately, the FCM has the ability to set risk controls etc. A guarantee cannot be made against the actions of a customer consequently causing a disorderly market. Nevertheless, by implementing a series of preventative tests against disorderly markets, TT takes the matter of our software very seriously. Ultimately, we test to make sure our software acts as documented. We can provide tools to our end users to help prevent such undesired outcomes.

3.6 How do you support customers in testing to trading venues? How is this also applied for changes to algorithmic trading products and services? [Article 5.4]

For the X_TRADER platform, we provide an environment (DDE) that connects to exchange certification environments. This is primarily used for developers to certify their API and FIX applications against the exchange matching engines. Customers who host our software can connect directly to exchange cert environments on their own.

In TT we have a UAT environment which also connects to exchange certification. TT deploys all new features and algos and updates to algos in the UAT environment before deploying to production. Customers can test these features and updates in the UAT environment.

3.7 Explain how and for how long you retain records for material changes, specifically covering when the change was made, the person that made it, the person that approved it and the nature of the change. [Article 5.7]

We store these records indefinitely in both platforms. However, we are not contractually obligated to. So, while we don't take on the liability of ensuring storage forever, our protocol is to store data forever.

3.8 Under what circumstances do you carry out conformance testing with an exchange? How do you do this? How do you define a "material change"? [Article 6]

We have professionals who assess the risk of any upgrade based on their review of the specifications and the advice of the exchange. In general, we run conformance tests each time a change to the exchange interface is made with which we integrate. This will include MiFID II exchange modifications.

3.9 (If you run a separate production environment) How do you separate production and testing environments? Do you ever test a product or service in a production environment? [Article 7]

TT maintains multiple environments for development and testing on both the X_TRADER and TT platforms. Those environments are completely separate from our production environments. We do not conduct tests in the production environments.

3.10 What facilities do you provide to allow your customers to restrict use of a product or service when it is deployed?

Our customers have administrative tools to control the use of our products, features, algos and market access per user and account. By default, no user or account is enabled to do anything, and an administrator must specifically enable users and accounts to trade. Additionally, administrators must permission users and accounts to use algos.

3.11 Does your system have self-match protection? Explain how it works?

Yes, a set of accounts can be granularly enabled for self-match protection. Three modes are provided to customers:

- Reject the incoming aggressive order.
- Cancel the resting order.
- Cancel or change the resting order whilst creating synthetic fills in our system for each side and administered on a price in our system (TT only).

Resilience: Post-deployment management

4.1 With what frequency do you review your development process? Explain how the review is carried out and the output reviewed/actioned. [Article 9]

TT regularly evaluates and adjusts our development process to ensure we deliver high quality software and service to our customers. There are monthly management meetings with development leads to evaluate current operations and discuss if and how they can be improved. The outcomes of those meetings are recorded in our issue management system and tracked through to completion. After every major quarterly software release and select minor releases there is also a post mortem meeting to discuss what went well and what issues were encountered. The issues identified are then prioritized and managed through to implementation.

4.2 What stress testing do you carry out on your product? How do you define the volume that you use to stress the products and services? [Article 10]

We have a series of different test scenarios designed to find the breaking point of each specific application. The actual test scenario often varies based on the application we are testing. The load in these scenarios are many factors greater than what we see on a typical day in our production environment and depending on where things break we will try to optimize as much as possible to increase the breaking point. Along with that we are constantly looking at trading statistics in both X_TRADER and TT to make sure we are testing at a minimum double the volume levels we see on any typical day.

Resilience: Means to ensure Resilience

5.1 What "Kill Functionality" do you provide to assist customers to cancel any or all unexecuted orders submitted to any or all trading venues? [Article 12]

Both the X_TRADER and TT platforms provide the ability for a company administrator with the proper permissions to quickly disable trading for any or all of their users or accounts. In addition to disabling trading, administrators may cancel any or all unexecuted orders that have been submitted to an exchange or trading venue. These capabilities are made available via screen-based application and various APIs.

TT does not cancel orders on behalf of our customers.

5.2 How can a customer identify which trading algorithm and which trader is responsible for an order? [Article 12.3]

Administrators can use the Order Book to see all working orders. Additionally, the Audit Trail contains all order activity. Both the Order Book and Audit Trail contain columns that provide information about each order including:

- User
- Current User
- AlgoName
- ParentID

Administrators can filter the Order Book and Audit Trail on any of the values in any of the columns. The audit trail is also being enhanced to display the registered short execution decision, investment decision, and client ids that have been registered and configured for MiFID II.

5.3 What functionality do you provide to assist with monitoring of trading and automated surveillance? [Article 13]

Administrators can view all order activity and monitor P&L in real-time with X_RISK on the X_TRADER platform and Monitor on the TT platform. Additionally, the administrators can filter their views to specifically monitor specific users, accounts and algos.

In addition to the monitoring tools provided by TT, customers may build their own using APIs and or FIX Drop Copy.

5.4 (If providing a service) Describe your business continuity arrangements. In particular, the governance framework, an overview of the relocation procedures, staff training, arrangements for shutting down the products or services and any alternative arrangements. [Article 14]

TT has designed and built its trading platforms for high availability and multi-region disaster recovery in the event any one data center or exchange is unavailable due to a systemic outage. It is up to our customers and users to implement a suitable plan that works in conjunction with the HA and DR schemes provided by TT. DR capabilities include:

- Connectivity to offered trading venues and exchanges in at least two geographically dispersed regions, including connectivity to exchange DR systems.
- Global connectivity to the trading platform via at least two data centers across three global regions: EMEA, NA and APAC.
- Ability to reach all markets via one of multiple entry point into the global platform.
- Global replication of users trade data and execution states, orders and fills.
- Global support by TT Operations, with primary offices in EMEA, NA and APAC providing continuous coverage for both trading platforms even in event of pandemic or other catastrophic impact to one of TT's offices.

TT provides global access to our platforms that allows users to connect from anywhere in the world to any of our endpoints and trade globally. Customer and user data is replicated globally and stored in at least three or more geographically separated environments. These features of the platform allow firms to architect alternative "disaster recovery" locations for housing employees that support trading operations. Trading algorithms can be redeployed and restarted to execute from backup (DR) locations. Customer trading algorithms (as well as their execution state) are stored and replicated globally.

Generally, investment firms are responsible for ensuring they have alternative means to manage the order and positions outside TT trading platforms (e.g., via the FCM or Exchange support platforms).

TT has the ability to stop specific algorithmic trading activity and disable user trading on behalf of the user or FCM.

TT participates in exchange and industry sponsored mock trading sessions. In addition, TT Operations tests HA and DR functionality on an ongoing basis. TT Operations runs DR tests for a subset of TT platform components every weekend except for the weekends when there is a new code quarterly deployment in our production environment.

5.5 What pre-trade controls do your products and services apply to flow classified as DEA by your customers? In particular price controls, max order values/volumes, message limits and position controls. [Article 15]

TT provides a series of long standing pre-trade risk controls. These include: price controls, max order size, message limits, position controls, loss limits and margin limits.

5.6 What controls are applied by the products or services to algorithms? In particular price controls, max order values/volumes, message limits, position controls and the number of times an algorithm has been applied? [Article 15]

All of the pre-trade controls listed in response to Question 5.5 also apply to orders generated by algos. By allowing algos only to be run on certain accounts customers can further restrict the limits.

5.7 What facilities do your products or services provide for real time monitoring of algorithmic trading? How can this be permissioned for an independent risk function that should not have trading access? [Article 16]

Administrators can view all order activity and monitor P&L in real-time with X_RISK on the X_TRADER platform and Monitor on the TT platform. Additionally, the administrators can filter their views to specifically monitor specific users, accounts and algos. Administrators may have view-only access, but may also be granted permissions to cancel orders and to stop and cancel algos.

In addition to the monitoring tools provided by TT, customers may build their own using APIs and or FIX Drop Copy.

5.8 What facilities do you offer to help customers with continuous assessment of market and credit risk? [Article 17]

TT provides a configurable position window which allows quick access to viewing positions, P&L, all working orders, worst case net position, and margin-based credit assessment based on worst-case net position. This also includes the ability to drill down to specific instruments or exchanges.

5.9 How do you reconcile open orders in the system with open orders in the market in real time? [Article 17.3]

TT maintains an updated book via exchange sequence number details dependent upon specific exchange APIs, but ultimately, maintains states based on the capability of the exchange API. Typically this is by leveraging sequence numbers to ensure we have accurate real time data.

5.10 Explain how your max long/short and overall strategy positions are managed. [Article 17.4]

TT provides several position controls that ultimately apply to positions in underlying instruments; this is conducted on a worst case basis, i.e. taking into consideration currently filled positions as well as working orders and evaluating a specific new order for approval or rejection.

5.11 Outline your security policy and how it is implemented in your organisation. [Article 18]

TT has a security policy which is modelled on ISO27k, maintained by TT's Security Team with oversight by our Security and Business Continuity Board. The security policy is available for review and discussion with our customers.

5.12 In the event security measures are compromised, explain how you will know and how you will communicate this. [Article 18.3]
TT has multiple monitoring systems in place, including a behavioral IDS platform and a managed SIEM system. Incidents are communicated through the Message Center in the TT Platform, which users can optionally configure to receive email notifications.

5.13 Explain how penetration tests and vulnerability scans are carried out and give the frequency with which you carry out this testing. [Article 18.4]

TT's SDLC includes regular static and dynamic vulnerability scans as part of the continuous build process. Additionally, TT contracts with external, reputable security vendors to perform an annual manual ethical hack of the TT Platform.

5.14 How do your products or services control persons who have critical access rights? How is this monitored? Include in the answer those with system administration rights and data administration rights. [Article 18.5]

All system access control is federated to TT's Corporate Active Directory. Request for privilege group access performed and logged through an approval workflow. Additionally, TT's IT Department performs periodic audits of the Corporate Active Directory.

5.15 Who in your company or at external companies providing services/products has access to data entered by customers? What steps do you take to protect customer confidentiality? [Article 18.5]

All access control is managed in accordance with the segregation of duties and the concept of least privilege. The allocation of privilege rights (e.g., root, administrator, etc.) is restricted and controlled and not provided by default. Authorization for the use of such accounts is provided explicitly, upon electronic request from a senior manager, and documented by the change management process.

- Access to confidential data is restricted to only those that need such access to carry out their job functions.
- Users should understand the confidentiality of the data and treat it accordingly. Even if technical security mechanisms fail or are absent, users should still attempt to maintain the security of data commensurate to their confidentiality.
- For TT personnel and TT’s third-party contractors, change controls must be used to request, change, or delete existing access privileges to systems that contain confidential information.
- TT personnel and TT’s third-party contractor user privileges are periodically audited to ensure access is commensurate with user’s current responsibilities.

Additionally, TT utilizes technologies such as encryption and tokenization to protect customer data stored in the TT Platform.

Order Record Keeping:

6.1 Will you provide data extracts covering a superset of the general order record keeping requirements under MiFID II and the ones for investment firm that engages in a high-frequency algorithmic trading technique, regardless of how the vendors customers are categorised? [RTS6, annex]

Many customers use FIX for their compliance solutions, and we have added new message types and all of the necessary tags to FIX Drop Copy on both platforms. We have added ISIN codes via the FIX security definition downloads and execution reports for any exchange that provides them on their feed.

Both platforms generate audit files that contain records of order activity specific to each exchange. We are enhancing the existing files to include the new data. Customers that host their own X_TRADER platform can collect their own Gateway Audit Files. For TTNET and X_TRADER ASP customers, we will make the Audit Files available on an EFT site. For TT platform customers, we will make Exchange Compliance Records available on an EFT site.

6.2 What means are available within your services and products to manage the ratio of unexecuted orders to transactions?

X_RISK has a Trans/Fills column in the Position Window to help in monitoring order-to-fill ratios. In addition, all order/fill messages are captured and can be delivered in real-time (e.g., via FIX drop copy or another API) to systems doing more complex order/fill ratio analysis.

6.3 What measures are in place to ensure privacy of client, order and trade data? [Article 2.3]

TT takes privacy of customer data very seriously and has implemented numerous policies, practices and technical solutions. See TT's Privacy Policy and TT SECURITY PRACTICES for more information.

Our commitment to privacy is reinforced by our implementation of MiFID II, whereby client, investment decision, and execution decision short-codes/ids are stored in our software, rather than actual names of users or firms, etc.

6.4 Certain fields are sent by the trading venue when confirming an execution. Examples include: Waiver Flag, Routing Strategy, Liquidity Indicator. How do you intend to handle these values?

We are adding the necessary fields across all relevant components of both the X_TRADER and TT platforms and making changes to support the tagging of several message types to comply with MiFID II.

These fields sent by trading venues will be included in the audit files and on FIX execution reports.

6.5 Describe your clock synchronisation solution (RTS25).

For all TTNET and X_TRADER ASP customers, we have implemented a solution in our London and Frankfurt data centers to provide microsecond-level timestamps that are synchronized to global GPS.

Specifically, our Windows Gateway Servers are time synced via PTP (IEEE 1588). Our application obtains its high precision timestamp from this protocol. They are MIFID II compliant.

In addition, we have monitoring in place to help ensure that our clock syncing adheres to the maximum divergence of 100 microseconds from UTC.

We are documenting the solution such that customers who host their own X_TRADER platform may implement the same solution.

The TT platform also utilizes PTP to provide microsecond-level precision for its timestamps.

Best Execution

MIFIDII expects Investment Firms to deliver Best Execution by having Best Execution policies, following them and monitoring their utility. Outsourcing processes and services to vendors means outsourcing some of the ways that Best Execution is achieved but does not negate the need of Investment Firms to monitor.

7.1 How do you ensure Best Execution within your services and systems?

TT only offers access to products that are listed on a single exchange or trading venue in the EMEU. Therefore, there is no functionality to ensure Best Execution, and it is up to the investment firms that use our software to do the best job for their customers.

TT does provide real-time market data and numerous execution tools and algos that enable investment firms to service customers according to their instructions.

7.2 Explain how you monitor and review this? What evidence do you retain?

As described in Question 6.1, TT provides data extracts to its customers through log files. Customers can also use FIX Drop Copy to receive all order activity on both platforms. It is up to the customer to store, monitor and review their own data.

7.3 What framework do you have for monitoring service quality / software issues with your customers?

For hosted X_TRADER environments, X_TRADER ASP and the TT platform, TT has monitoring in place to identify any software or network outages, and we notify customers of any such outage.

With regards to Best Execution, TT does not natively provide a framework for measuring or quantifying execution quality. However, TT exposes APIs allowing customers/third-parties to implement this functionality on top of the platforms provided by TT.

7.4 What functionality do you provide that help your customers monitor execution quality?

TT provides real time market data, real time order and fill status, time and sales and an audit trail. All order and fill data is also available through FIX Drop Copy and through various APIs.