



Taklimakan
Network

Your compass in cryptocurrency world

TECHNICAL PAPER

Contents

1. Introduction.....	3
2. Analytics.....	3
3. Trading signals and strategies.....	5
4. Education services.....	6
5. Crowd predictions.....	7
6. Control and monitoring.....	7
7. General functionality.....	8
7.1 Registration and personal Information	
7.2 Subscription plans	
7.3 Security	
7.4 Communications	
7.5 Mobile vs. Web functionality	
8. Technical solution.....	9
8.1 Frontend	
8.2 Backend	
8.3 Blockchain contracts	
8.4 Cloud microservices	
8.5 Control center backend	
8.6 Internal payment system	
8.7 User accounts	
8.8 Calendar	
8.9 Published materials	
8.10 Trading tools	
8.11 ML / AI / NLP	
8.12 IM / Likes / Comments	
8.13 Control and monitoring	
9. Disclaimer.....	13

1. Introduction

Taklimakan platform is aimed to empower and attract amature investors by providing new tools and great knowledge base. Experienced traders and analysts will be encouraged to share their experience and help newcomers to become more efficient in personal fund management.

Some Taklimakan innovations will seem new and exciting even to the gurus of investment world because it aims to interconnect social networks, investments, and blockchain, and create unique and efficient fund management experience for everyone.

Platform shall consist of the following components:

1. Analytics
2. Trading signals and strategies
3. Internal payment system
4. Educational materials
5. Crowd predictions
6. General functionality

2. Analytics

Platform will support Analyst as a type of user. Analysts will research ICOs or major cryptocurrencies and produce their reports as a product of their research. Platform will have the capability to publish the reports on the platform web site. Reports will allow investors and traders to make their market decisions, so proper legal disclaimers should be included with the reports.

Reports usually describe mid-term to long-terms market effects and aim to predict price changes from one week to several months' time frame to facilitate low frequency trading. Therefore, platform functionality related to analytical reports will be designed with this time frame in mind.

Analytics section will contain analyst database and allow searching and filtering of analysts by certain attributes such as rating, their investment products / tools. Search result will be displayed as a list of analysts in a table, with filtering and sorting capability.

There will be free and paid reports:

- ▶ Whether report is paid or free, will be determined at the time of publishing by analyst. Free report cannot be converted to paid, but paid reports can be converted to free by the report publisher.
- ▶ Free reports' goal is to demonstrate analyst's knowledge and capabilities, so report rating functionality will be implemented for free reports. Report rating will be used to calculate cumulative Analyst rating along with Analyst rating by users.
- ▶ Investors and traders can search for Analysts with best reports as well as Analysts with best ratings, as well as for analysts with best aggregated rating (that includes both analyst rating and report rating).
- ▶ Free reports can contain references to paid reports that will allow to promote paid reports.

- ▶ Paid reports will allow to create a webinar for subscribers so that investors and traders can talk live with report publisher.
- ▶ Paid reports will have commenting and rating functionality so that users can discuss/rate the report. This will add value to both report publishers as they will receive feedback, as well as for report consumers as they will receive crowd opinion and be able to discuss.
- ▶ In case if report consumer needs a private communication with report publisher, “Ask expert” feature will allow users to contact report publisher personally within a pre-configured interval of time either by chat or by voice call.
- ▶ Because timing after publishing the report is important, scheduling feature will allow to schedule private conversations leaving time gaps for the Analyst for non-private communication as well as scheduling webinars.
- ▶ Platform will facilitate creation of legal disclaimers for free and paid analytics reports.

Subscription feature will facilitate user access to paid reports. In order to read a report that user has a subscription for, user will have to authenticate on the platform web site, navigate to the report and open it. Reports can only be read, copying will not be allowed by the DRM system.

Subscriptions to paid reports will have different subscription levels:

- ▶ Single report: The subscriber will have access to one report.
- ▶ Single analyst: The subscriber will have access to all reports published by one analyst for a limited period of time.
- ▶ Unlimited: The subscriber will have access to all reports produced by all analysts for a limited period of time.
- ▶ Single analyst and unlimited subscription plans will allow to pay for the subscription monthly or make a one-time payment for 6-month or 12-month subscription with appropriate volume discount.

News section will be displayed on the authenticated user's home page and will contain most recent changes that include:

- ▶ New free reports published by analysts
- ▶ New analysts and trading instrument providers who recently joined the platform
- ▶ General Platform news and performance
- ▶ Analysts will be able to publish announcements of their paid reports in the news section for additional fee
- ▶ Traders will be able to publish announcements of their new management offers in the news section for additional fee

3. Trading signals and strategies

Trading signals mostly consist of numerical information that is aimed to provide short term market prediction in the time frame less than 1 day, therefore facilitating intraday (high frequency) trading.

Trading signals can be evaluated for quality by several factors:

- ▶ Correlation with price. Signal needs to be correlated with price statistically significantly more than 50% of time or statistically significantly less than 50% of time.
- ▶ A sample strategy may be provided with trading signal. Sharpe ratio can be calculated for sample ratio.
- ▶ Platform will support publishing of trading signals, as well as links to external trading signal APIs.

Along with trading signals, trading instrument providers can publish trading strategies. A trading strategy instructs the investor whether they should make buy or sell decision. Trading strategies can have short term frequency or long term frequency. Even though strategies in modern financial markets include high frequency and ultra-high frequency trading, these require trading automation and are out of scope for Taklimakan platform. Taklimakan trading strategies will facilitate only medium and low frequency trading, i.e. with enter/exit cycle not shorter than 1 hour without any limitations on how long it can be.

Trading strategy include:

- ▶ Marketplace (exchange or multiple exchanges in the case of arbitrage trading)
- ▶ Trading instruments: cryptocurrencies, currency pairs, indices, derivatives
- ▶ Type, time, and amount of purchase (long, short)
- ▶ Risk management: the maximum amount of risk for a position and for a trading interval
- ▶ Performance indicators such as Sharpe ratio and/or Sortino ratio

Publishing trading signal will include:

- ▶ Publishing signal description. Signal provider may describe the method by which this signal is generated.
- ▶ *Publishing python code for sample strategy.
- ▶ Manual publishing of values of trading signal (for internal signal publishing).
- ▶ Chat feature will be available a certain period of time after signal value is published. Signal consumers will be able to get their questions answered in a timely manner by the signal publisher.
- ▶ While chat time window is active, another signal value can be published for the same signal.

- ▶ When chat with a user is initiated, the chat window indicates signal ID/Name and the value discussed.
- ▶ *Automated publishing of values of trading signal (API will be provided).

Platform will also provide:

- ▶ *Automated signal sharpe ratio calculation and signal search filtering by sharpe ratio.
- ▶ Signal commenting and rating features will allow users to provide feedback about signals and single signal values, as well as signal providers. Rating of signal providers will be an aggregate value of user ratings.
- ▶ Signal search and filtering by user signal ratio, product, provider ratio, signal quality, and sharpe ratio.

Publishing a trading strategy includes:

- ▶ Publishing description of strategy, signals, and algorithms used, as well as cryptocurrencies and assets that are used in the strategy and stock exchanges that strategy is designed for.
- ▶ Publishing stock exchange descriptions and registration terms and instructions to help users acquire individual accounts on the cryptocurrency stock exchanges needed.
- ▶ Every decision that investors and traders should make is published. The decision includes enter/exit conditions, specifies which cryptocurrency/asset should be used in transaction and specifies stock exchange(s) where the transaction should be made.
- ▶ Platform will analyze strategy for Exchanges used and will filter out users who are not allowed to have accounts of these Exchanges due to their citizenship: Such users will not be able to see this strategy in search results or the strategy will be marked as unusable for this user.

* Out of MVP scope

4. Education Services

Platform will facilitate user education for crypto assets and cryptocurrency investments. Experienced users may publish their education materials such as articles, lessons, or courses or organize webinars. Platform will facilitate course and webinar schedules. There will be free and paid educational materials. Paid materials will be available to subscribers similarly to analytics. Educators will be rewarded in TKLN tokens for every paid subscriber.

All useful materials will be collected into a well-organized knowledge base, which will provide free access to many articles. This knowledge base will be continuously supported and expanded by platform moderators, as well as educators. Educators will have capability to limit access to their articles to only paid subscribers.

5. Crowd Predictions

Platform will utilize crowd wisdom to predict prices of certain cryptocurrencies or ICO performance for its users.

In order to use this service, users may subscribe to it on monthly or annual basis. Subscription to crowd predictions will be paid in order to create bonus reserve for contributors.

All users may choose to participate in crowd predictions. If they do so, they will be regularly asked questions about their subjective opinion on a cryptocurrency, an asset price or ICO performance. Users will be rewarded for correct answers if their answers are statistically significantly correct. In simple words, we will prevent guessing game using mathematical statistics and reward use of deeper market knowledge.

The examples of questions are:

- ▶ What will be the price of BTC in one week?
- ▶ Will the XYZ ICO reach their goal?

Paid subscribers will see aggregated answers to the questions, which will include average answer, standard deviation of answers, and prediction probability that is based on previous predictions of similar assets and ICOs. Subscribers will also be able to add their questions to crowd predictions pool of questions.

6. Control and monitoring

Centralized control and monitoring system is designed for supporting high uptime requirement and quick reaction to anomalies observed in system function.

Monitoring is done at four levels:

1. *System Level.* Data about using of system resources such as CPU, GPU, RAM, Network resources and channels is collected at this level. Monitoring is done by means of selected management solution for server administration or by means of 3rd party agents for metric collection;
2. *Infrastructure Application Level.* At this level Databases, message buses, and web servers are monitored. Data about health status, activity, and degraded performance is collected. Concrete metrics are defined for each subsystem individually and its purpose and use cases are taken into consideration. Monitoring is conducted with the purpose of reliability and timely service. 3rd party agent applications configured specifically to every object monitored are used to collect metrics.
3. *Application Level.* This level monitors results of application function: Output to DB, logs, direct transfers of data to monitoring system. Special modules are embedded into applications during development for this purpose. These modules collect information in unified manner. In case if metrics collection is possible by means of collecting application artifacts (created DB records, log files, etc.) specific agent applications will be used to send this collected data to monitoring system.

1. *Business Activity Monitoring Level.* Business processes are the object of monitoring on this level. This level is used for determining of correctness of system function on the highest level, as well as monitoring changes in user behavior. Based on the analysis of information collected, decisions are made about system development and deployment of new functionality.

Each level of monitoring has its own metrics and performance indicators defined.

7. General functionality

7.1 Registration and personal information

Every user will need to register on the platform in order to access most of its features. During the registration process users will be asked for their personal data such as full name, age, photograph, citizenship, passport number, tax identification, trader resume, etc. Users may choose to remain anonymous, but it will limit their ability to access some features directly related to trading like entrusting funds to traders for management. User's personal information will be stored off-chain on the secure Taklimakan Network servers.

Account page on the platform's web portal will allow users to view and modify some of their personal information, as well as setup external ETH, BTC, ERC-20, etc. wallets for funds input and output.

7.2 Subscription plans

Platform will provide several subscription plans that will allow different access levels to platform features.

- ▶ Premium plan will provide full access to educational knowledge base, advanced platform functionality (such as advanced search for experts, etc.
- ▶ Expert plan will allow traders and analysts to create mailing lists or publications, and includes tools for traders such as drawing graphs of market data, market indicators and financial accelerators. Also this plan will allow creating articles that include advanced media such as video and images, as well as provide trading tools such as trading signals and strategies. Also, expert plan includes all features of premium plan.
- ▶ Pro plan is aimed for managing traders (portfolio managers) and allows creation of investment offers. It also includes all features of premium and expert plans.

7.3 Security

User account will be protected by two factor authentication* with a strong password.

All users who choose not to be anonymous will have their identities verified.

*Two-factor authentication is out of scope for MVP.

7.4 Communications

Platform will have internal communication feature that will allow users to send messages to each other. Messages may have attributes that associate them with other users, platform objects, or events such as analytics report, signal value, trader, portfolio, etc. For example, a message can be "about" this trader.

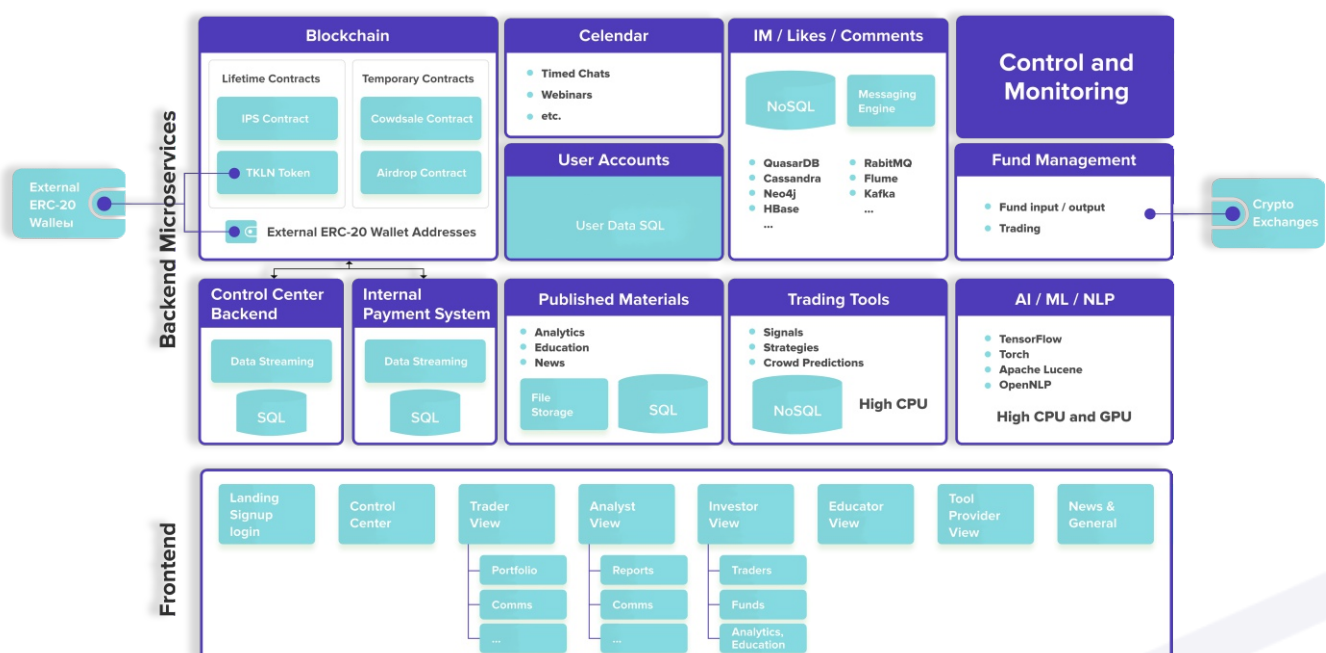
*Platform will also have integration with external instant messengers such as WeChat, WhatsApp, Telegram, Viber, etc., which will allow users to send messages outside the platform. Such messages may contain public information that is allowed to be shared with outside users such as free reports, prices, etc.

*Out of scope for MVP

7.5 Mobile vs. Web functionality

Platform will be available via web interface on desktop devices as well as on mobile browsers. For security and performance reasons mobile applications and web pages may have slightly different functionality.

8. Technical solution



8.1 Frontend

Taklimakan portal will be developed in JavaScript with use of AngularJS framework due to following reasons:

- ▶ Advanced databindings enable modern design patterns such as MVVM and MVP, which provides great flexibility and gives a good choice for architecture design.
- ▶ Great performance due to direct operation with DOM and bulk Model/View updates.
- ▶ Ability to create native cross-platform apps if needed.
- ▶ Extended features and support.

8.2 Backend

All Taklimakan Network backend components can be divided in two groups: Blockchain contracts and containerized cloud microservices.

Blockchain smart contracts are deployed to Ethereum blockchain and reside there during their lifecycle.

Containerized cloud microservices are deployed into a cloud infrastructure provided by a 3rd party as IaaS, utilize its services such as databases, and scale on demand. This decision is dictated by necessity to expand services on demand and deploy services in regions where most users are located. This will benefit access times and also enable Taklimakan Network compliance with national regulations for user data storage location.

Platform prototype will be developed with consideration of horizontal scaling requirement. Expected number of users is approximately 1,000,000 geographically distributed people. Besides scalability, this will also require balance loading. Capabilities of NGINX are sufficient for intermediate scale balance loading, and we may select Hadoop or OpenStack technology stack to enable automatic scaling, which is going to be determined after initial load testing of platform prototype.

8.3 Blockchain contracts

There will be four main smart contracts deployed to blockchain: TKLN Token Contract, Crowdsale Contract, Internal Payment System Contract, and Airdrop Contract.

Two of Taklimakan Network smart contracts (TKLN Token Contract and Crowdsale Contract) are developed for the purpose of ICO funding, but TKLN Token will be later used as platform currency for the whole platform lifetime. Airdrop contract will be used for initial promotion, and IPS (Internal Payment System) Contract will serve as a ledger to record token transactions when they are used as platform currency.

Blockchain smart contracts are developed in a recent version of Solidity language, the version is fixed to prevent incompatibilities. Unit testing is done in NodeJS using Truffle framework. The main reasoning behind the test framework choice was to prevent copy+paste when writing unit tests, as well as avoid limitations of test sizes.

8.4 Cloud microservices

Microservices will be containerised in order to achieve necessary separation and performance. In order to achieve close to bare metal performance LXD or Docker containers will be selected.

Primary choices for Cloud Apps development language will be Java, C#, or Python mainly for flexibility, wide usage, support, and good integration capabilities with both SQL and NoSQL databases.

Custom configurations of concrete microservices will be described below.

8.5 Control center backend

Control Center is used to interact with blockchain smart contracts.

Control center backend consists of several components: Ethereum node, ethereum client, and control application. Ethereum community pretty much dictates technology choice due to extensive support of GETH - Go Ethereum Client, and Web3.JS Ethereum JavaScript API, so control application will be developed in JavaScript.

Also, Control Center will play a role of a link between blockchain and off-chain databases. If any immutable data is read from blockchain, it will be cached in the microservice database to prevent additional fees.

Event monitors will be running in this microservice in order to record events emitted by blockchain smart contracts that are relevant to the functionality of the platform. Events will be recorded in an SQL database. Also, events will be communicated to other microservices that will be able to subscribe to these events via streaming modules such as RabbitMQ, Flume, or Kafka.

8.6 Internal Payment System

IPS is used to facilitate inter-platform payments made in TKLN tokens between users and platform.

For the reasons of scalability, data integrity, and transaction support, best DataBase choice for this microservice is one of relational DBs such as PostgreSQL, MySQL, or MS SQL. This microservice will have average to high load due to number of transactions, and requires good scaling capabilities. For this reason we will utilize data sharding, slicing, and denormalization when we design and configure the DB. Also, SQL based solution is chosen due to reporting capabilities requirement and requirement to integrate with analytical tools.

Internal Payment System will utilize IPS smart contract as a blockchain transaction ledger. Smart contract will record off-chain receipt ID with off-chain transaction data hash. We will use strongest hash algorithms such as salted MD5 or SHA-512. This will guarantee data integrity of transactional data stored in off-chain database.

IPS will also allow recurring payments in the platform to enable miscellaneous service subscriptions. Recurring transactions will be initiated by the microservice on the payment date and time.

8.7 User Accounts

This microservice stores and operates information about user accounts and user data.

User data is considered to be sensitive information and will be handled appropriately. The encryption and data integrity capabilities will be driving factors in defining technology. For this reason, we will consider relational databases for storage of user data.

8.8 Calendar

Calendar keeps and operates scheduling information of all platform users and events.

Certain smart scheduling features such as required gapping between events or event dependencies require custom implementation of calendar in opposite to using existing solutions from Google or Microsoft.

Transaction support and data integrity is not highly prioritized, so the priority is put on performance. For storage purposes NoSQL databases will be selected such as Cassandra, Tarantool, or Neo4j, and application will be custom developed in C# or Python to satisfy high load requirements. Additional reasoning towards NoSQL based solution is more flexible schemas, which allow creation of events of different structures and provide data access of adequate performance for the calendar application needs.

8.9 Published Materials

Published Materials stores and operates materials such as analyst reports or knowledge base articles.

This microservice includes both database for document storage and file storage. NoSQL DB such as MongoDB or, as a general solution, Cassandra, may be used for document storage. OpenStack Manila shared file storage or Hadoop File System (HDFS) may be used to implement a scalable and distributed file storage depending on the technology stack preferred at the time of implementation.

8.10 Trading Tools

This microservice facilitates publishing, managing, and generating of trading tools such as trading signals and trading strategies.

Trading Tools require high data integrity and high computational performance. This microservice will require high CPU and RAM capacity, as well as SQL database for data storage. The load on the microservice is considered to be high, so the application will be developed in C# or Python with certain high performance modules developed in unmanaged C++, possibly with use of GPU computing power.

8.11 ML / AI / NLP

Certain Machine Learning and Artificial Intelligence modules (such as TensorFlow or Torch) and Natural Language Processing libraries (such as Apache Lucene, OpenNLP, etc.) may be deployed within this microservice to empower signal providers to create state of the art trading signals and strategies.

In the future this microservice will be extended with administration module and automated re-training of artificial intelligence algorithms to enable constant improvement of prediction quality.

Machine Learning algorithms place additional requirements to storage and computational performance, which may be achieved by using respectively distributed scalable solutions such as Hadoop and Spark and GPU hardware.

8.12 IM / Likes / Comments

Facilitates inter-platform communications between users, likes, comments, and communications with non-platform external users via external messengers.

This microservice requires mainly two components: Data Storage and Messaging Engine.

Engine that powers messaging can either utilize functionality of RabbitMQ as one of the most direct solutions or be implemented on top of data streaming technologies such as Apache Flume or Kafka.

Integration with external messengers such as WeChat, Telegram, WhatsApp, and Viber will be implemented using corresponding services APIs. Also, in order to enable broadcast messaging, integration with social networks such as Facebook and Twitter will be implemented.

8.13 Control and monitoring

Control and Monitoring system will be implemented with use of Elastic stack applications and services:

- ▶ Logstash. Logstash is a dynamic data collection pipeline with an extensible plugin ecosystem and strong Elasticsearch synergy.
- ▶ Elastic search. Elasticsearch is a distributed, JSON-based search and analytics engine designed for horizontal scalability, maximum reliability, and easy management.

Kibana. Kibana gives shape to your data and is the extensible user interface for configuring and managing all aspects of the Elastic Stack.

9. Disclaimer

THE INFORMATION PROVIDED IN THIS TECHNICAL PAPER IS NOT INTENDED FOR DISTRIBUTION TO, OR USE BY, ANY PERSON OR ENTITY IN THE UNITED STATES OR THE REPUBLIC OF SINGAPORE, OR IN ANY JURISDICTION OR COUNTRY WHERE SUCH DISTRIBUTION OR USE WOULD BE CONTRARY TO ANY LAW OR REGULATION, OR WHICH WOULD SUBJECT TAKLIMAKAN NETWORK PTE. LTD. (THE COMPANY) AND/OR ENTITY CREATING THE TKLN TOKENS (INCLUDING THEIR AFFILIATES) OR ANY OF THEIR PRODUCTS OR SERVICES TO ANY REGISTRATION, LICENSING OR OTHER AUTHORIZATION REQUIREMENT WITHIN SUCH JURISDICTION OR COUNTRY.

THIS TECHNICAL PAPER IS FOR INFORMATIONAL PURPOSES ONLY AND DOES NOT CONSTITUTE AN OFFER OR SOLICITATION TO SELL SHARES OR SECURITIES OR ANY OTHER INVESTMENT INSTRUMENT IN TAKLIMAKAN NETWORK OR ANY AFFILIATED COMPANY IN ANY JURISDICTION. TKLN TOKENS DISCUSSED IN THIS TECHNICAL PAPER ARE NOT INTENDED TO RESEMBLE A SECURITY (DEBT OR EQUITY) IN ANY FORM IN ANY JURISDICTION. POTENTIAL BUYERS OF TKLN TOKENS SHOULD CONSULT THEIR PERSONAL LEGAL, TAX, FINANCIAL AND OTHER PROFESSIONAL ADVISORS AS TO THE IMPLICATIONS OF BUYING TKLN TOKENS.

TAKLIMAKAN NETWORK EXPRESSLY DISCLAIMS ANY AND ALL RESPONSIBILITY FOR ANY DIRECT OR CONSEQUENTIAL LOSS OR DAMAGE OF ANY KIND WHATSOEVER ARISING DIRECTLY OR INDIRECTLY FROM: (I) RELIANCE ON ANY INFORMATION CONTAINED IN THIS DOCUMENT, (II) ANY ERROR, OMISSION OR INACCURACY IN ANY SUCH INFORMATION OR (III) ANY ACTION RESULTING THEREFROM.

NO REGULATORY AGENCY IN ANY COUNTRY OR JURISDICTION HAS EXAMINED OR APPROVED THE INFORMATION SET OUT IN THIS TECHNICAL PAPER. THE PUBLICATION AND DISTRIBUTION OF THIS DOCUMENT DOES NOT IMPLY THAT THE APPLICABLE LAWS, RULES OR REGULATORY REQUIREMENTS IN ANY JURISDICTION HAVE BEEN COMPLIED WITH.