



DATx

Blockchain Empowered Revolutionary Digital Advertising Terminal

Decentralized Ad Ecosystem with User Participation



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promoting the research, design and development of, and advocacy for blockchain-based favourable unified protocols and operating mechanism for a revolutionary and innovative intelligent advertising ecosystem which integrates blockchain, artificial Intelligence and big data techniques in order to involve advertisement audiences in the value chain, ensure user data privacy and security, and maximize the economic benefits of the whole advertising ecosystem.

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DAT^x WHITEPAPER

(V1.1)

PREFIX-- The Revolution of the Digital Advertising Market

October 27, 1994: The First Banner Advertisements in the World

The world of advertising was forever transformed, when Wired Magazine flipped the switch on its first website, hotwired.com, with a small kitschy rainbow graphic bearing the presumptive words—“Have you ever clicked your mouse right HERE? → YOU WILL”.



The age of banner advertisements had officially begun, starting a revolution in web content and advertising that still reverberates today.

1996 - 2006: Search Engines, Paid Search and Pay-per-Click

As the number of sites on the Web increased, search engines started appearing to help people find information quickly. Moreover, new business models were developed to enable search engines to finance their services, including pay-per-click programmes offered by Open Text in 1996 and then Goto.com in 1998. Google also began to offer advertisements on search result pages in 2000 through the Google AdWords programme. By 2007, pay-per-click programmes proved to be primary money-makers for search engines.

2006: Social Publisher and Targeted Advertising

The success of search engines relies on matching the search query of a user with a relevant advertisement, which would turn into a successful advertisement click action. Extended to display advertising on publisher sites, the content networks of search engines semantically process the content of a page and retrieve advertisements that are relevant.

However, this complicated matching mechanism is no longer a problem for social publishing platforms such as Facebook and Twitter -- a new growing force of the Internet. They know their users significantly better than search engines could understand, through collecting detailed user information. Users willingly provide their personal information in a structured and detailed manner to create complete social profiles and enable better social network exposure and growth.

This lays the foundation for targeted advertising, where advertisers can use the information through Social Publisher Advertising Platforms to better understand and target their audience.

2010- Present: The Boom of Native Advertisements

Instead of relying on advertisements that disrupt the online experiences of their target audiences, native advertising allows marketers to create "in-feed" and inherently non-disruptive promotional content that supplements the online experience of a user, such as promoted tweets on Twitter, suggested posts on Facebook and sponsored content on BuzzFeed or Mashable.

Content marketers are increasingly turning to native advertising as it is understood to be better at building trust and engagement with prospective customers than traditional display advertisements.

The Future?

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DATx

A Blockchain Empowered Revolutionary Digital Advertising Terminal

DAT^x WHITEPAPER

Blockchain Empowered Revolutionary Digital Advertising Terminal.
Decentralized Ad Ecosystem with User Participation.

(V1.1)

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DATx MISSION

**CHALLENGES AND OPPORTUNITIES IN
DIGITAL ADVERTISING**

1. DATx MISSION -- CHALLENGES AND OPPORTUNITIES IN DIGITAL ADVERTISING

DATx is a revolution of the current advertising industry, aimed to build a brand-new intelligent advertising ecosystem, with decentralization as its foundation and Artificial Intelligence as its driving engine.

According to the forecast of ZenithOptimedia, since 2011, the global advertising market has steadily developed, with an overall growth rate of between 4% and 5%. In 2018, global advertising expenses would increase 4.4% and till the end of year, it would increase to \$592 billion. Among them, the market share of programmatic media buying and advertising would be above 50%.

The era of Mobile and Big Data has provided advantages for the development of programmatic advertising. Mobile devices connect with users more closely, which is convenient for programmatic advertisements to identify and locate users. Meanwhile, abundant mobile-based marketing approaches combined with programmatic advertising, boosts the marketing value of digital advertising in both accuracy and innovative capabilities.

Programmatic media buying is the purchase of advertisement placement traffic through automatic procedures involving Artificial Intelligence (AI) and Real-Time Bidding (RTB). When the targeted audience appears, the advertisements are delivered to the right groups in real time, with appropriate advertisement content, thus realizing precise marketing aimed at individual consumers.

On this background of programmatic marketing, the advertisers are no longer restricted to the few existing approaches to delivering and planning advertisements-- they have a much greater level of flexibility. However, alongside this advantage, programmatic marketing would also bring about “the Walled Garden” phenomenon in which everyone plays his/ her own game, thus posing a larger challenge to advertisers, media channels and platforms on their abilities of planning, coordination, optimization and data protection.

1.1 DATA PRIVACY AND SECURITY

In the Big Data era of advertising, once advertisers or media initiate their marketing campaigns, they would collect user behavioural and private data from a diversity of channels. All data generated by users would be stored on data platforms built by each of these advertisers and media but none of the proprietary or tenured rights will belong to users at all. No matter what campaigns are carried

out, users have no idea about how their data is being utilized and further monetised.

However, arguably, the data proprietorship of users should be their own. Regarding this matter, it should be optional for users to choose individualized advertising services given their interests and preferences, or hide their own data, or provide part of their data that was authorized to advertisers or media.

Besides, due to enormous amounts of private data of users stored, the enterprises and institutions having the data are exposed to risks of user information leaking caused by existing security vulnerabilities. This issue not only imperils the business health, branding and reputation of the companies with the data; it may also cause them to bear severe legal consequences.

1.2 DATA ISOLATION

Data is essential for precision advertising. This technical innovation utterly altered the traditional methods of using data in advertising. Nowadays, advertising platforms have to improve their products and services through data machine learning effects. For instance, YouTube can track the click behaviour of each user, amend and complete the algorithm according to the acquired data, thus attracting more users. Based on big data personas, companies can also provide customized products; setting individual prices adjusted to consumer affordability and price-sensitivity. Moreover, companies can reuse the data and develop new business opportunities.

Simultaneously, each data aggregating medium and advertising platform will build its own respective advertisement exchange market and delivery system, alongside major public advertisement exchange markets, forming the situation of a fragmented world and data isolation.

Data isolation exists among all systems that require data for sharing and exchange. According to the application of big data techniques, different advertising platforms and media can neither share or jointly manage data information, nor communicate on production data. When data comes apart, there is data isolation; this brings difficulties such as information redundancy, spam and inability to ensure consistency in information exchanged.

Media and advertising platforms utilize user information in their own data centres and provide advertisers with “audience targeting” services, whereas the advertisers would process the user data to deliver retargeted advertising. In this case, the collected user data that is stored on various servers of each advertiser and medium in a disconnected manner, forms data isolation, leading to failure in accurately portraying user personas and resulting in extremely low efficiency of

advertising delivery.

1.3 ADVERTISING -- UNIFORM, OR VARIETY?

Advertisements on traditional media such as television and newspaper are always uniform, barely taking advertising audience into consideration. All audiences view the same advertisement and are not entitled to choose. Though the online media has started to push advertising that users may have interests in, the users can still only passively accept. Even the advertisement content is unappealing, the users are left with nowhere to express their opinions and would have awful experiences.

For advertisers, massive advertising content cannot reach targeted audiences, thus it is not precisely delivered. These advertisements, which cost advertisers plenty of marketing expenses, actually perform poorly on return on investment (ROI).

Up to now, advertising has come to an era of personalised recommendations. It should generate user personas according to their various preferences, provide varied customized push content; help advertisers effectively increase click-through rate (CTR), conversion and user viscosity, consequently improving the operating performance of clients tremendously.

1.4 MISSING USERS ON ADVERTISING VALUE CHAIN

On the advertising value chain, advertisers deliver advertisements through media and acquire customers, while media would make profits from the advertisers with their user traffic. The anomaly here is that although advertisement audiences are a significant part on the value chain of the advertising industry, they cannot participate in the advertising value chain or obtain any share of advertisement revenue.

In addition, if the advertisement content is not appealing at all, the audiences will blame the pushed advertisements for occupying them from viewing other content and develop negative attitudes towards these advertisements.

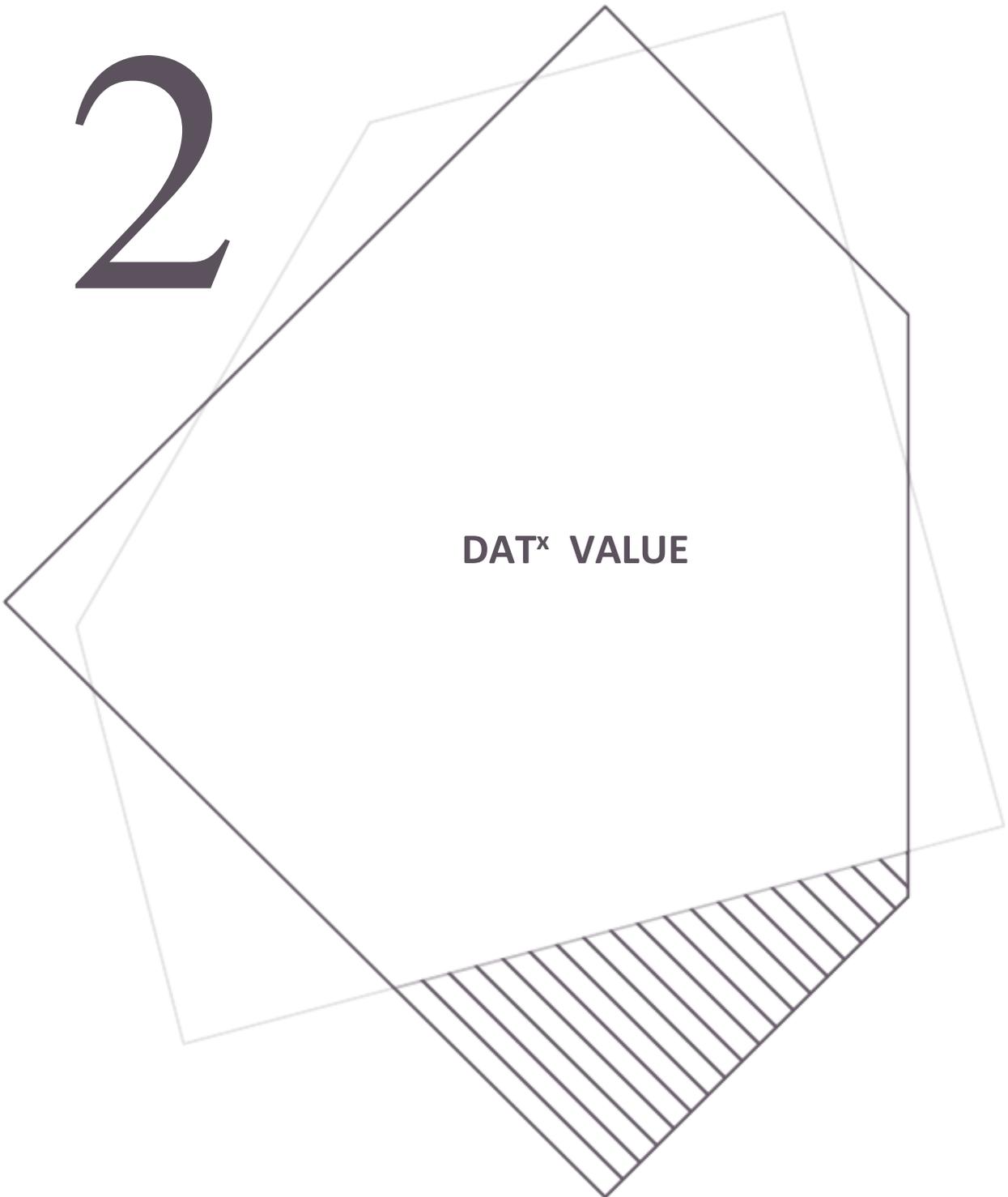
Only by involving advertisement audiences in the value chain entirely, as well as ensuring user data privacy and security, can one maximize the economic benefits of the whole advertising ecosystem and develop the advertising ecosystem in a benign direction.

DATx is dedicated to developing blockchain-based favourable unified protocols and operating mechanisms for the entire advertising ecosystem, to forming an effective, secure,

benign and benefit-maximized advertising ecosystem.

DATx is committed to integration of blockchain techniques combining Artificial Intelligence and big data techniques, to build a revolutionary and innovative intelligent advertising ecosystem.

2



DAT^x VALUE

2. DATx VALUE

Aristotle defined justice as the following, “if any action is well performed, it is performed in accordance with the appropriate principle; if this is the case, human good turns out to be activity of the soul in accordance with virtue”. In his opinion, the disciplines derived from justice can be accounted for the judgement of right and wrong; justice is exactly the foundation of forming social orders.

Under the guarantee of “irreversibility”, “justice”, “transparency” and “auditability”, DATx ecosystem is intended to transmit impeccable “truth of information”. The Foundation acknowledges that the “true” is the “good”. Through this pattern of value transmission formed of machine trust, DATx aims to definitely bring a brand-new “good” and “wise” interaction between one and another. Media, advertising platforms and advertisers make data collection transparent to users; users are willing to share their data. It becomes easier to create positive incentives between individuals and human culture will certainly develop to a further level towards harmony and goodness.

DATx strives to build a just, transparent and open advertising ecosystem; it will bring innovation on the following:

Complementary advantages of AI and blockchain

Precision advertising and high ROI

Decentralized trustworthy system with lowered operating costs

Openness and Scalability

Stronger reliability, anonymity, independence and compliance

Optimized incentive mechanism

Fairer benefit distribution, higher intra-system matching efficiency

Connection between digital world and real world

3

A large, irregular polygonal shape with a dark outline and a light gray fill. The bottom-right corner of the polygon is filled with diagonal hatching lines. The text "MARKET STATUS" is centered within the polygon.

MARKET STATUS

3. MARKET STATUS

Since May 2017, a number of Initial Coin Offering (ICO) projects have been implemented to incise in the advertising industry.

The founder of JavaScript initiated the BAT project. The project primarily built Brave-- a fast, open and privacy-oriented browser able to screen third-party advertisements and tracking. It also constructed a record system able to award users and advertising publishers according to the attention measurement of users; which merely acts against web advertising systems and is restricted to audiences in the Brave browser, therefore the user base is limited.

AdEx is another blockchain-based P2P advertisement exchange platform, aimed at renovating current advertising patterns and resolving important matters such as advertising fraud, the privacy issue and malicious sponsorship advertising exposure. Advertisers can bid for advertising assets like impressions, clicks and conversions; they can set the ADX token prices for the assets. Once a publisher accepts a bid, the token used for that transaction will be frozen until the publisher certifies that the goal has been achieved. When this is proven, the token will be transferred to the account of the publisher. A core characteristic of AdEx is AdEx Profile. This is a customized page designed to help each of the end users understand and control the advertisements delivered to them. For advertisers, allowing users to have more control rights would be more beneficial, as the users are in actual fact, proactively informing the advertisers of the consumption preferences, behaviours, habits and will, etc. of the former. This means that AdEx Profile can help advertisers realize advertisement targeting of “surgical precision”, to acquire higher advertising ROI. The problem with the project is that P2P is too costly for the platform and too difficult to support massive advertisement impressions, hence the expandability of the project turns out to be a great trouble.

Similar to AdEx, other P2P advertisement exchange platforms such as AdChain and AdShares are also confronted with same issue, besides, these most recent developments are still vastly restricted to the overly small participation user bases of the platforms.

In a nutshell, all the above solutions may have set the wrong starting points, hence in addition to the trivial user bases, it would be a tremendously difficult to break into the advertising industry.

4

A large, light gray geometric graphic consisting of two overlapping, irregular polygons. The bottom-right corner of the inner polygon is filled with diagonal hatching lines.

**DAT^x MULTI-WIN
DECENTRALIZED ADVERTISING
ECOSYSTEM**

4. DATx -- WIN-WIN DECENTRALIZED ADVERTISING ECOSYSTEM

The mission of **DATx** is to build a win-win revolutionary decentralized advertising ecosystem, so that all users can actively participate in the ecosystem built.

Users can know that their actions will help the advertising platforms better deliver suitable advertisements and they can also get the corresponding incentives under the mechanism of this ecosystem.

Similarly, the advertising platforms in this ecosystem can better utilize the data to improve their user targeting algorithms and deliver advertisements that are more acceptable to users.

Advertisers can spend less to target users more accurately and avoid some ineffective advertisement deliveries.

Publishers can reduce the inconvenience and discomfort caused to users by providing higher quality advertising. At the same time, publishers are willing to provide better traffic and advertisement placements due to the corresponding incentive mechanism.

Furthermore, DATx blockchain technology can solve the transparency issue of profit distribution in the advertising industry. Based on the decentralization protocol, a transparent and multi-stakeholder advertising ecosystem is built through blockchain technology and distributed storage. The incentive mechanism encourages users to participate, thus promoting spontaneous interactions among users, publishers and advertisers in the ecosystem. Finally, the feature of blockchain decentralization and data transparency is used to balance advertising user experience and commercialization, thus forming a reliable data flow closed-loop.

All data snapshots can be kept on the blockchain so that the data can never be tampered with; users will also be able to view data based on their corresponding permission levels. The DATx protocol involves all participants in the ecosystem, and introduces a more convenient payment system (DATx Token can be distributed quickly via smart contracts, which can be used to purchase services in the advertising ecosystem).

Developers can integrate DATx Ad Software Development Kit (**SDK**), which will not only enable them to generate digital advertising revenue but also receive DATx Tokens as incentives from the ecosystem based on the capability of each developer to generate quality traffic and user acquisition. The Foundation aims to incentivize advertisers to use **DATx** Tokens when placing

advertisements on its advertising platforms and will offer extra incentives at the early stage of the ecosystem development.

The Foundation expects that this incentive mechanism will bring in a positive loop of traffic growth (because developers can gain extra benefits in the ecosystem), with more and more developers joining the ecosystem; the increased traffic volume can attract more advertisers to place their advertisements here and empower the platform to achieve a more accurate recommendation algorithm. The law of Metcalfe points out that the value of a telecommunication network is proportional to the square of online user number in the system (n^2). The more participants in the network, the greater the value of the platform will be.

4.1 THE ROLES IN DATx ECOSYSTEM

The DATx ecosystem is composed of four important roles.

4.1.1 THE END USER

The end user is the audience that views the advertisement. In the DATx ecosystem, users no longer passively receive advertisements but will be more involved in the process to optimize the advertising service through feedback mechanisms, such as clicking on "like" or "not interested"; other key measures such as viewing time, click through actions and conversion etc. As long as their behaviour and interactions contribute to the construction of the whole ecosystem, they should be incentivised with DATx Tokens.

In addition, the advertising SDK will be integrated into various D-APPS. DATx intends to design a proper and effective user acquisition system to balance user growth and advertising effectiveness. Potential DATx users will be identified, acquired and required to fill out their profile information to enable DATx to identify them in the system and provide better targeting advertisement. Active users also need to provide timely feedback on the advertisements content from the DATx advertising platform: including likes and dislikes, etc.

Acquisition of active users can be achieved through, but not limited to:

- 1) The DATx' advertising platform
- 2) Promote through D-APP developers. Users and D-APPS will both receive incentives for their

contribution to the ecosystem

3) DATx native advertising

4.1.2 ADVERTISERS

Advertisers purchase DATx Tokens as advertising budgets, create different advertising requests and raise the advertising rankings by bidding to get more attention from users. Advertisers deliver the matching advertisements to the target users through their personalized recommendation algorithms and the feedback of the users to each advertisement will affect the ordering of the advertisement. Ultimately, the advertisement ranks among the users who are interested in it; is ranked low among or even hidden from the users who are not interested in it, so that the advertising budget can be spent effectively and the ROI is enhanced.

Advertisers would get more detailed user data and more efficient access to the real users they want, after placing ads on the DATx platform. In addition, the cost per thousand (CPM) advertisements on the DATx platform are billed based on their effectiveness, excluding advertisement interactions from users who are not interested in the advertisement, which can reasonably save advertising budget.

4.1.3 PUBLISHER

Publishers integrate **DATx** SDK to participate in the whole ecosystem. Publishers will automatically get a wallet to receive payment and incentives in the ecosystem (DATx Token), which will enhance the loyalty of the publishers. Users can even incentivise publishers for providing quality content and the publishers can gain additional incentives by providing better targeted advertisement services.

4.1.4 ADVERTISING PLATFORM

The DATx advertising platform is used to manage advertisement delivery and advertising data.

Advertisement delivery is based on user data. On the premise that the user agrees, blockchain records the real user data profile in an encrypted matter, so that it better utilizes big data to continuously optimize the advertisement targeting algorithm. The advertisers or advertising agencies integrated to the ecosystem through DATx Protocol, can have access to the database of the DATx Ecosystem, so that their advertisements can be more accurately targeted to users.

A digital advertising platform is a typical multi-sided marketplace. The main players include advertisers, publisher, advertising platforms and Internet users.

DSP is a system and an online advertising platform. It helps advertisers to deliver advertisements on PC or mobile. DSP provides advertisers with one unified access interface to manage multiple Ad Exchange accounts.

1) United launch platform and integrated multi-source traffic

It provides an intuitive, handy and comprehensive operating platform for advertisers, so that they can easily manage multiple advertisements through multiple media on a united platform. It can simplify the process of media buying and is able to integrate and manage different media traffic sources, avoiding the waste of resources as in traditional and complicated media buying.

2) Audience purchase-oriented

Except for subverting the traditional media buying mode, DATx has also upended the traditional advertising logic and clearly defined the purchase mode with an audience orientation. Advertisers are not buying the media but leveraging users underlying the media. The advertising platform extracts user features through big data analyses for advertisement delivery; the typical features include interest (e.g. auto website/ App, English articles, a certain brand) and behaviour (advertising engagements, even recent clicks on current advertisers' own advertisements). The feature tags will be increasingly abundant when it develops with advertising demand and data mining. Advertisers can even explore their own interests of user behaviour in the open, anonymous blockchain distributed databases; precisely deliver advertisements to their interest groups of users, hence achieving extraordinary advertising performance. These groups of users are more likely to be interested in the advertisements (even if not, this will be reflected on their engagements with the advertisements).

3) Real-time optimization algorithm based on AI

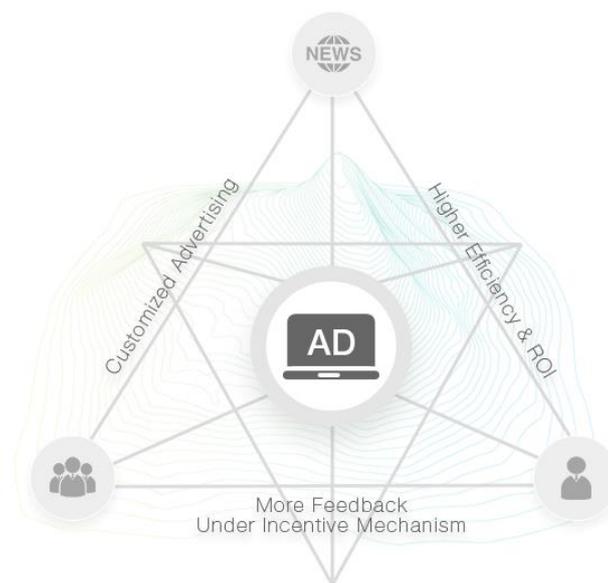
Advertising is all about objectives -- satisfying the advertising target of an advertiser with an optimization algorithm is the basic guarantee of service quality. Through the optimization of machine learning algorithm, the system will help advertisers automatically determine the target audiences (maybe excavate potential users that advertisers are unaware of) and optimal bidding strategies (getting quality users at lowest costs).

4) Comprehensive and consolidated data reports

Just as in the aforementioned challenges that the advertising market has, advertisers cannot fully control all advertisements to avoid repetitive advertising distribution. This requires a unified operating platform and requires DSP to provide advertisers with timely and comprehensive data reports, including information of cost, frequency, effectiveness, order status and so on.

4.2 OBJECTIVE OF DIFFERENT ROLES IN THE ECOSYSTEM

The advertising platform connects the upstream “Advertiser” and the downstream “Publisher”.



Advertisers care about whether they can locate their desired customers and get them at minimized cost.

Publishers care about:

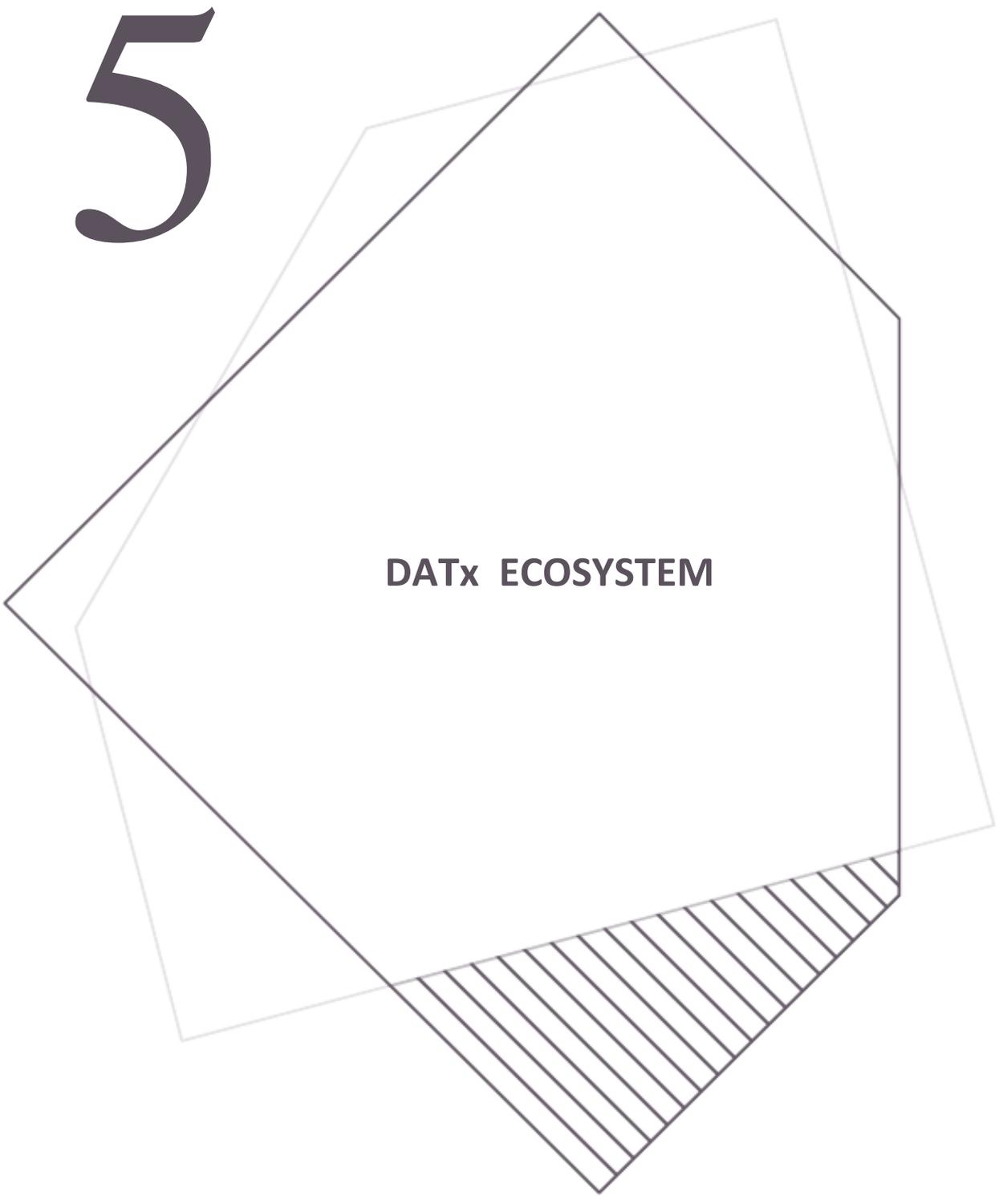
1. Maximized effective cost per thousand (ECPM) from the same traffic.
2. No resistance of end users caused by the appeared advertisements.

End users are concerned about being disturbed by unappealing advertisements. Since the viewing of advertisements by end users will provide valuable data to the ecosystem, they will be incentivised properly.

Advertising platforms then hope to connect with as many advertisers as possible to enrich their inventory, and meanwhile, they can connect with more publishers and get high quality traffic. The quality of traffic is determined by the features of an application, the user group, the location of an advertisement; the display priority and rankings of the advertisement.

The Foundation firmly believes that the efforts of DATx will build a better advertising ecosystem, so that the effectiveness of advertising and user experience will be improved greatly. At the same time, users tend to be active users of DATx because they can be incentivized in the ecosystem.

5

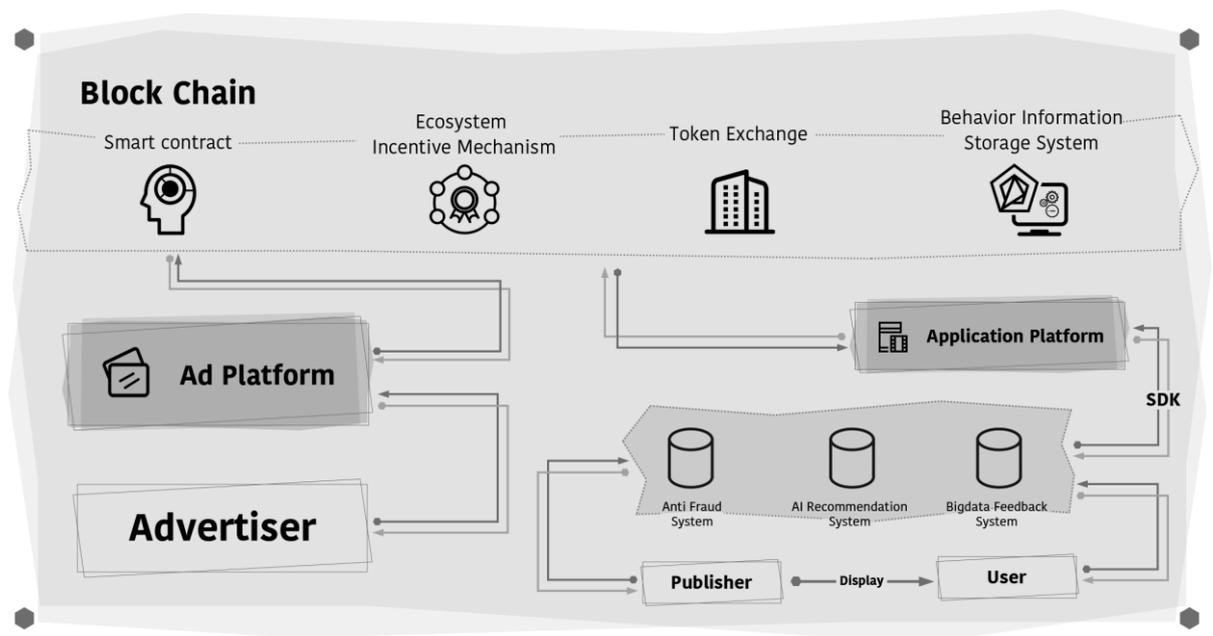
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DATx ECOSYSTEM

5. DATx ECOSYSTEM

5.1 ECOSYSTEM DIAGRAM

The diagram is shown as the following:



The **DATx** ecosystem consists of Behaviour Information Storage System, Incentive Mechanism, Token Exchange, Advertising Platform, AI Recommendation System and Anti-Fraud System etc.

Incentive System: According to interactions between users and advertisements/channels, the system regularly settles token accounts of users and channels.

Behaviour Information Storage System: User Behaviour Profile Analysis data will be encrypted and kept on blockchain.

Application Platform: Including Applications that are connected to the blockchain of **DATx** via SDK, including Web/ APP.

Advertising Platform: On the Platform, Advertisers can provide advertisement serving suggestions and check delivery performance, while Publishers can acquire advertising SDKs and IDs and check the advertising performance. Advertisement delivery analysis is recorded in the blockchain: with a decentralized mechanism ensuring fairness and transparency, both advertising resources and

channel resources can be fully reflected to bring in higher value.

Big Data Feedback System: This system will conduct user behaviour information collection and big data analysis.

AI Recommendation System: The system is empowered by an AI algorithm engine to provide its users precise and personalized advertising recommendations.

Anti-Fraud System: As an open advertising system, criminals may have the motivation of making profit on it via illegal ways. The Anti-Fraud system has to be involved to ensure that the entire ecosystem develops in a correct direction.

5.2 PRODUCT FORM

Generally, advertisements do not appear in high frequency, while media usually integrate multiple advertising channels to maximize their ROI. A user typically would not see advertisements from a specific medium very frequently; even when he/ she sees them, he/ she mostly does not interact with them (an advertisement placement with quite high average CTR is usually considered cheating). It is nearly impossible to motivate the low behaviour of a specific user given its low frequency.

To solve this dilemma, DATx introduces the following innovations:

5.2.1 CUSTOMIZED NATIVE ADS

The design of native advertisements may be customised so that users can better interact with DATx advertisements and obtain DATx Token incentives.

Native advertisements are an advertisement type presented by specific media in a more relevant way based on the material from advertisers. The goal is to include some elements in the form of native advertisements based on DATx ecosystem and let users better understand that an advertisement is from the DATx ecosystem, so that they can engage more proactively.

The following aspects should be considered:

a) It should be easy for users to identify the advertisements from DATx, so that they are more willing to provide real data to get DATx Token incentives.

- b) The advertisements can be linked to users via device ID (users may see DATx advertisements in a number of applications within a day, so there is the need to let these users "login" in a very effortless way.)
- c) Users can choose to link their device IDs to their own Unique Identifications (UID). If users have more than one device or some users switch to new cell phones, they can better synchronize the data.
- d) Users can interact with the advertisements in the following scenarios (e.g. click a logo on native advertisements):
 - (1) View user profiles, and make changes
 - (2) View user ratings
 - (3) Comment on the advertisement material they see
 - (4) Check advertisement engaging behaviours (e.g. clicks, downloads, likes and dislikes) and make modifications, such as mark some as "false click", "not in person", "wish to hide" and so on.
- e) These data will be stored in a decentralized + centralized file system; analysis will be encrypted on blockchain and applicable for other advertisers in the DATx ecosystem.

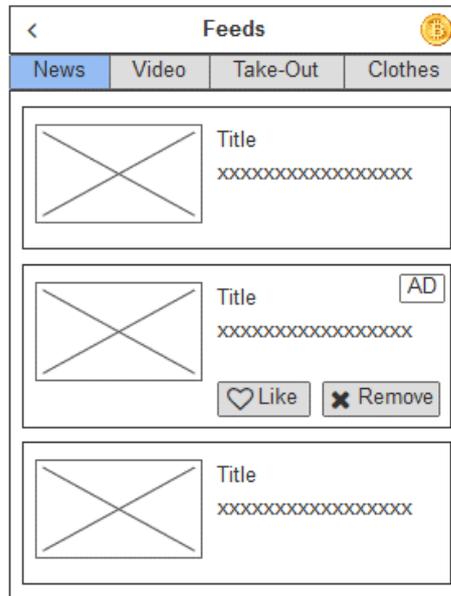
5.2.2 NATIVE ADVERTISEMENTS FEED

Advertising is content. Through combining advertisements with different types of content feed, applications will keep users for longer. Information traffics native advertisements basically lead new forms of advertising to switch from single advertising format to content feed. In this way, the Foundation can set up advertisements feed when users immerse themselves longer on the platform.

Many applications do not actually have the capabilities to run content and a new advertising style that incorporates feed will help them better improve user loyalty. Users exploit more content if they find the content interesting and contribute more behavioural data to gain better incentives. Of course, not all applications fit in such forms of advertising.

Native advertisements feed provides personalized recommendations based on user feedback, including both content and advertising. There are various navigation categories, such as news, video, food ordering, clothing and cosmetics, etc. Users can switch on their individual content feeds from the chosen categories of interest. In each of the chosen categories, users can browse news or videos, order a takeout or purchase desired advertisements. The system will give personalized recommendation based on user feedback, and users can also comment on given content and

advertisements. The following diagram shows a sketch of the style, which can be just a feed without subcategories.



5.3 DATx DECENTRALIZED USER BEHAVIOR ARCHIVE

A number of blockchain projects store user data in centralized data units and then analyse their data with some other techniques. However, this method of data storage is still performed by a centralized data centre. The ownership and usability of data are not completely attributed to the users, which deviates from the decentralized idea of the blockchain.

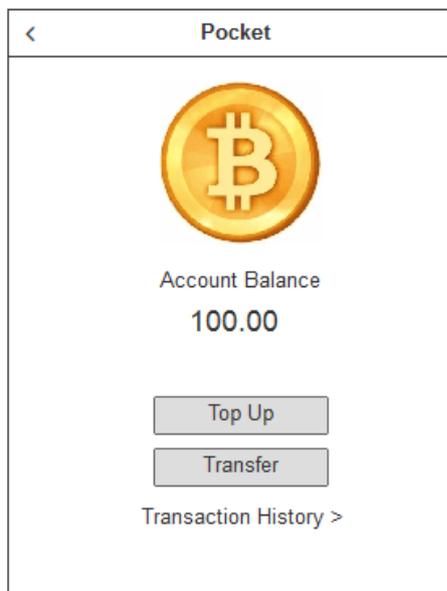
5.3.1 DATx USER BEHAVIOR ARCHIVE SOLUTION

Based on blockchain technology, an account system (DATx user behaviour archive) will be constructed and combined with cryptographic information encryption technology.

These accounts include personal data centres and data sets. A personal data centre includes user data on their own dimension, such as the sequential behaviour data, preference data, virtual image and so on of a user; under the premise that users would authorize the use of their own data, they can aggregate the sequential data fragments scattered in each application of the blockchain. The data sets formed by these data fragments makes a key data source for intelligent analysis.

Normally, when users, media or advertisers access **DATx** advertising ecosystem, the system creates a user profile for each of them-- the DATx Account, the only and unique identity.

The DATx Account contains the behaviour information of an account and the proprietorship of the information is recorded in the blockchain; an exclusive archive is generated for the account, i.e. behaviour archive for that DATx user.

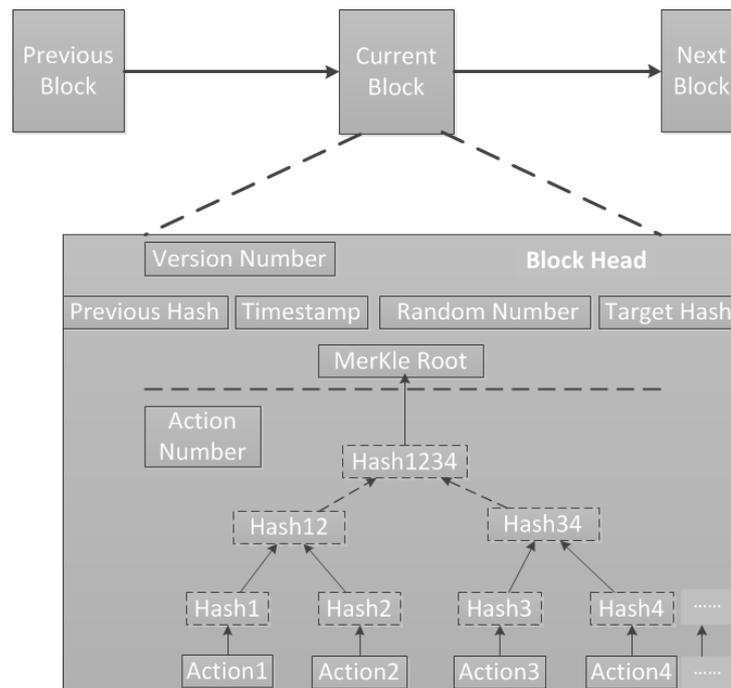


After registration by advertisers and publishers on DATx advertising open platform, their DATx Accounts are generated.

For users, firstly the system weakly links a user and its device ID if no intention is shown to register; automatically generate a weak DATx Account for the user with the device ID. The unique ID is the device ID. Then, the system needs a proper way to let the user consent to ideas from DATx and to be able to quickly recognize DATx advertising. Subsequently, with a simple view on its own data such as registration information, a strong DATx Account is generated. At this point, the information of the device on which registration occurred on the weak DATx Account is migrated to its strong on the weak DATx Account and the user is incentivised.

The system records all the behaviour information of the user in the DATx user behaviour archive based on blockchain technology. And most importantly, these behavioural messages are organized in an orderly way on the blockchain and are no longer a mess.

In the DATx blockchain, the block is a data structure that records transaction and user behaviour information. Each block is composed of a block header and a block body -- the block body is only responsible for recording all transaction information and the previous behaviour information of the user, while most of the functions of the blockchain are realized by the block header.



- 1) Version number: indicating the relevant version information of the software and protocol;
- 2) The parent block hash: referred to as the hash of the parent block in the blockchain. Through this value, each block is connected to form the blockchain and it plays a crucial role securing the blockchain;
- 3) Merkle root: every transaction has a hash associated with it. In a block, all the transaction hashes in the block are themselves hashed (sometimes several times -- the exact process is complex) and the result is the Merkle root;
- 4) Timestamp: records the time produced by the block, in second accuracy;
- 5) Difficulty value: the difficulty target of the block related math problems;
- 6) Nonce: records the value of the answers to the relevant math problems in the block.

When a user owns an archive, some of its publisher activities (such as “like”, “not interested in” and “stay”, etc.) will be recorded on the blockchain. The timings of these actions are accurate to the second.

The user has full ownership of the data and third-parties need to be authorized by the user to use the data. Authorized data will also be placed under good privacy protection. Therefore, DATx decentralized user behaviour archive, ensures complete data ownership for users, protects user rights; it would also be able to establish a complete user archive for the business intelligence (BI) analyses of advertisers and media.

The user account displays the DATx Token balance and transaction details of the user; users can browse their own behaviour information and have security permission settings to set their own behaviour information usability.

With regards to these accounts, it needs to be emphasized that:

1. The data completely belongs to the user. Data is stored and encrypted on decentralized resources, therefore, any organization or individual cannot access the raw data of the user.
2. The data with the consent of the user is open but with restrictions. After the user agrees to authorize its usage, the partial data of the user can be researched on the big data under the differential privacy encryption of the cryptography; the personal data cannot be analysed and the data cannot be viewed, copied and tampered with.
3. Users will be incentivised with DATx Tokens when they agree to allow limited access to their behaviour information. This incentivizes users to participate in the advertising ecosystem. If the user agrees to share more personal information for customized delivery on the platform, more DATx Token will be rewarded.

5.3.2 VALUE OF INFORMATION IN DATx BEHAVIOUR ARCHIVE

Information entropy is the measurement of the amount of information needed to eliminate uncertainty, which is the amount of information that an unknown event may contain. However, too much entropy of information is not a good thing and it represents the disorder of an entire system, which is so disordered that one cannot get valuable information out of it.

For example, for an advertisement, one does not know what kind of behaviour the users will generate and the behaviour of the users is very uncertain. With increased uncertainty, there is greater information, hence greater entropy.

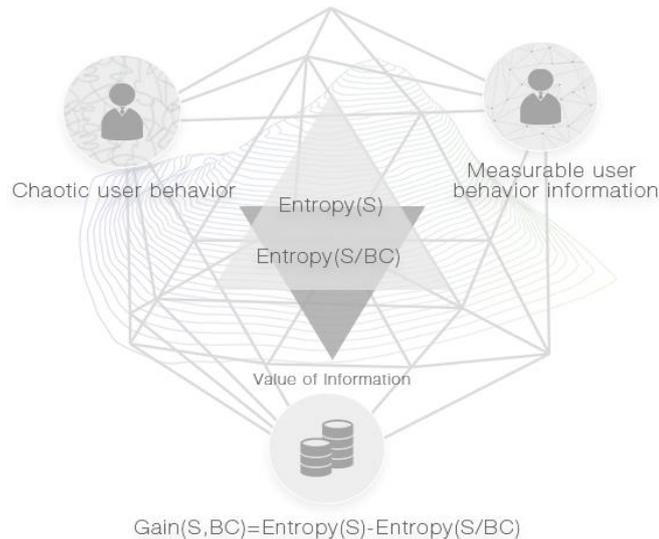
The value of information depends on the decrease of information uncertainty degree, according to the basic point in information entropy theory.

User behaviour per se is chaotic but user information on the blockchain can help DATx to reduce the uncertainty and so the information entropy; also enables the algorithm to estimate the personal preference of users after DATx records the feedback of users onto the blockchain. The degree of uncertainty reduction (information gain) of each feedback behaviour of the users represents the value of each feedback behaviour of the users.

After entering the user information onto the blockchain, the value of user information is expressed as follows:

$$\text{Gain}(S,BC)=\text{Entropy}(S)-\text{Entropy}(S/BC)$$

Of course, according to the user information gained from the users, DATx should endow users corresponding incentives.



After the smart account of a user is built based on blockchain technology, under the premise that the user agrees to authorize usage, data fragments scattered in each application of the blockchain are aggregated, including the dimensions of the personal data of the user, such as advertising behaviour data, other APP application data, relational data, preferences and virtual image, etc. Data set is a collection of the amount of certain sort of data, which is the most critical data source of personalized analysis.

In BI analysis, a complete persona profile of the user is built by aggregating the data fragments scattered in each application of a blockchain to achieve the real personalized advertising recommendation.

The user information on the blockchain can be very valuable; it is expected that such an incentive mechanism to generate a positive cycle of traffic. As more and more users, publishers and developers join, the traffic increase will attract more advertisers to do their advertisement delivery and it will also benefit the platform to achieve a more accurate recommendation algorithm. The more participants in the network, the greater the value of the platform will be, which will directly reflect the long-term appreciation of DATx Token on the platform.

The user account system based on the blockchain (DATx account system) corresponds to the

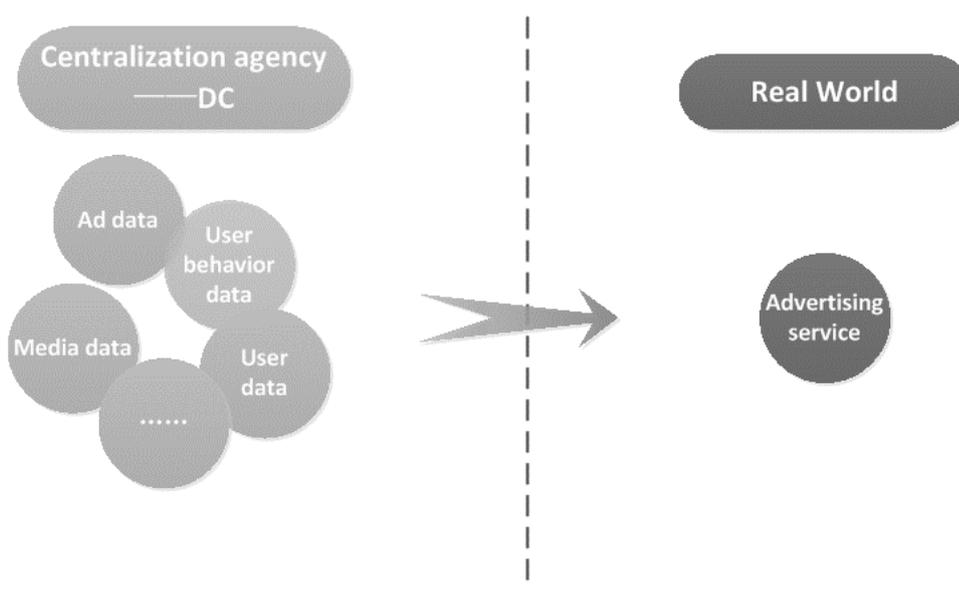
behaviour of the users in the real world, which is the key to the application of the blockchain to the real application. By verifying the assets of the account owner's digital world to be real individuals', DATx connects them to the real social services website to create a richer ecosystem.

Our block chain's account system (the DATx account system) records users' behaviour information. And most importantly, these behavioural messages are organized in an orderly way in the blockchain, and are no longer disorganized. Many blockchain projects use completely centralized data structures to perform user data storage, and then analyse the data with other techniques. But this kind of information storage is still carried out by centralized data centre, which runs counter to the decentralized idea of blockchain.

5.3.3 IMPORTANCE OF DATx USER BEHAVIOR ARCHIVE

1) The importance to advertisers and the publisher

Usually, publishers and advertisers access user data from different sources through their own technology, then set up a data centre to store and analyse user data, then implement marketing activities. For example, the publisher capitalize on user data in its own data centre to provide advertisers with a "crowd-targeted" service, and advertisers use their user data to "redirect" their ads. In this case, the data collected by each advertiser and the publisher is stored on the respective servers, forming a data isolation, thus unable to form a comprehensive and accurate user portrait, and the personalized advertisement delivery efficiency is relatively low.



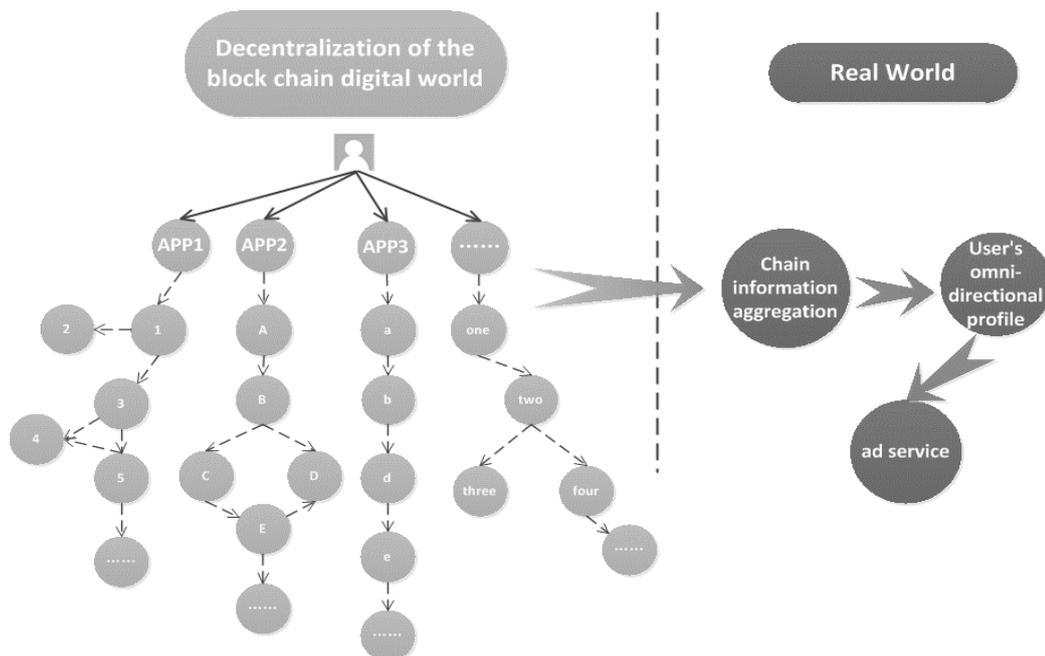
When DATx records the user behavioural data in the blockchain, it will be a different story. In the

blockchain, every step of the user behaviour is ordered and visible.

Any ad platform that joins DATx will have access to these data to better target users and provide a better advertisement experience; similarly, any advertiser who advertises via DATx will also have a better chance of knowing their real ads performance, and reach to more accurate users.

When the user looked at which ads on what platform, what was the advertisement content, how long did the user view the ad, when did the user click on the ad, did she download, subscribe, or purchase the product. All the user's actions constitute a complete chain of events, and this is the user's behaviour chain. With thousands of such event chains on different websites or in different APPs, DATx can learn more accurate user interests. With this chain of events, you can continuously observe user behaviour.

The complete chain of user behaviour records in the blockchain allows us to simulate complete user personas in order to know the business truth behind the various user views, clicks and purchases of the publisher.



For example, advertisers whose objective being conversion will try not to lose users, and retain them once they come online.

DATx decentralized user behaviour files can help analyse how users are lost, why they left, and where they are switching.

DATx Decentralized User Profile records complete user behaviour data. If the advertiser demands, user data can be specified on sheets by hour, by day, by user level, or by event level.

Through this sheet you can know the basic user events, such as login or purchase, you can know users quality, which users are about to leave. And such data can be updated daily or hourly.

Advertisers or publisher would integrate and analyse relevant data, from which they can reveal patterns of online visits and advertising. Then combine with digital marketing strategies to identify problems with current online campaigns, and provide a basis for optimizing or re-planning their online marketing strategy.

2) The importance to the user

In users' perspective and in the era of centralization, all user generated data on is centrally stored in each application and platform, and the ownership and use rights of the data are not completely attributable to the user.

Whatever campaigns the advertisers and the publisher carry out, the users are completely unaware that their own data is used for benefit exchanges. As a rule of thumb, ownership of user data should belong to users, and users can choose to provide their own preferences for personalized advertising services, or hide their own data or choose to provide only partial data.

Blockchain-based user account system (DATx account system), will correspond the user's behaviour in the digital world and physical behaviour, this is the key blockchain can land in the real application. Through behaviour profiles of the account owners in the digital world, the users' real personas are portrayed, then linked to the physical social services site, to achieve more precisely customized advertisement services, so as to create a richer advertising ecosystem.

5.4 AI CUSTOMIZED ADS RECOMMENDATION

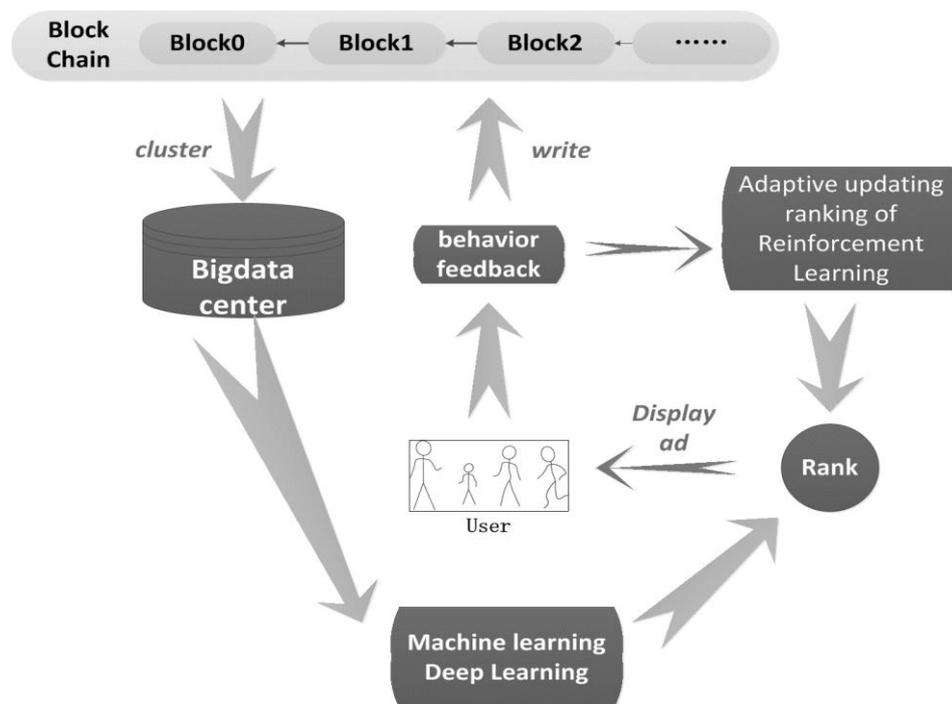
The core data needed by the AI recommendation system is user feedback. The recommendation system without user feedback is a disabled recommendation system. If there is no feedback:

- 1) There is no continuous optimization of the annotation data;
- 2) There is no real data to evaluate the effect;

In a word, if there is no feedback data, no data loop, and the product metabolism will be a big

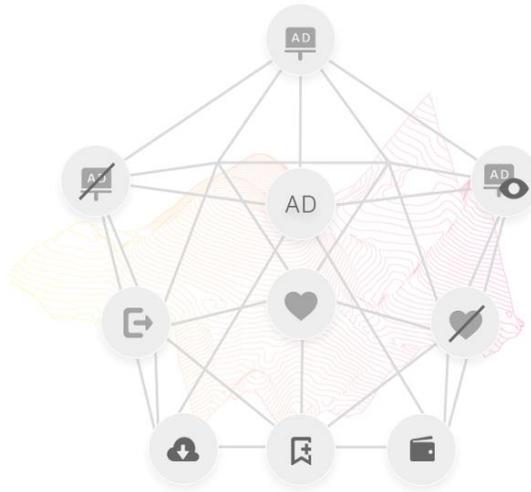
problem.

The user behaviour information recorded on the blockchain makes the DATx feedback mechanism more complete. Feedback mechanism incentivises users to generate feedback, click on 'likes or dislikes' to show feedback, because users know they are expressing their attitudes and give a clear-cut attitude in a more quantitative way. The other feedback is the natural behaviour left by the user when using the product. The user leaves behind the data, not to tell his preferences, but DATx can "try to figure it out" to the user's preferences. Because these are all users of natural behaviour, usually more truly and fully reflect its attitude, but also closer to product targets.



Our advertisement algorithm engine involves responding to massive amounts of ads and users in real time. The number of users is huge, their behavioural characteristics, and their preference for advertising content are also rich and diverse. Therefore, it is necessary for the algorithm engine to sort out the users with different characteristics in a targeted manner, and in this way, the order-led transaction can be promoted. Among the company's proven technologies, Deep Neural Network (DNN) and Logistic Regression (LR) have been used to make offline sorting models, while online sorting models are updated online based on Reinforcement Learning (RL) intelligence so that DATx may obtain returns which tend towards maximum values.

If in the blockchain, the user's behaviour is recorded as follows:



This is very similar to the Markov chain. Take the ranking engine as an Agent, the user as the Environment, then the advertising ranking problem can be considered as a sequential decision problem. Agent's selection of each ranking strategy can be regarded as a trial-and-error, which can be user feedback, click transaction, etc. as a reward from the Environment. In this repeated trial and error process, Agent will gradually learn the optimal ranking strategy to maximize the cumulative reward.

It is natural to understand the recommendation of a full-link multi-scenario as a continuous decision problem: as an Agent, the recommendation system needs to continually decide what to recommend to the user. Reinforcement Learning is one of the best ways to model the agent: by recursively modelling changes in the short-term state of Agent, they ultimately lead them to progressively optimize their long-term goals.

Let $V_{\pi}(s)$ denote the value function of the states (the state in the ring above) in the advertisement ranking strategy π . r_i is the instant reward in i th step, then the value function is:

$$V_{\pi}(s) = E_{\pi}[\sum_{i=0}^{\infty} \gamma^i r_i | s_0 = s]$$

Where $\gamma \in [0, 1]$ is called the fold factor, indicating the importance of future rewards relative to the current rewards. In particular, when $\gamma = 0$, it is equivalent to considering only long-term returns without considering impublishertely. When $\gamma = 1$, long-term rewards and instant rewards are seen as equally important.

Finally, the optimal strategy for an advertising ranking system can be expressed as:

$$\pi^* = \arg \max_{\pi} V_{\pi}(s), (\forall s)$$

That is, one is looking for strategy π^* that maximizes the value function under any initial conditions.

5.5 INTEGRATED APPROACH

SDK: For App developers.

JS: For Websites.

6

TOKEN AND ECOSYSTEM INCENTIVE MECHANISM

6. TOKEN AND ECOSYSTEM INCENTIVE MECHANISM

6.1 TOKEN (DATx Token)

The native digital cryptographically-secured token of DATx (**DATx Token**) is a major component of the ecosystem on DATx, and is designed to be used solely on the platform. As the digital assets in the system, DATx Token is a non-refundable functional utility token which will be used as the unit of exchange between participants on DATx. The goal of introducing DATx Token is to provide a convenient and secure mode of payment and settlement between participants who interact within the ecosystem on DATx (e.g. end users, advertisers and publishers). DATx Token does not in any way represent any shareholding, participation, right, title, or interest in the Foundation, its affiliates, or any other company, enterprise or undertaking, nor will DATx Token entitle token holders to any promise of fees, revenue, profits or investment returns, and are not intended to constitute securities in Singapore or any relevant jurisdiction. DATx Token may only be utilised on DATx, and ownership of DATx Token carries no rights, express or implied, other than the right to use DATx Token as a means to enable usage of and interaction with DATx.

In particular, you understand and accept that DATx Token:

- (a) is non-refundable and cannot be exchanged for cash (or its equivalent value in any other virtual currency) or any payment obligation by the Foundation or any affiliate;
- (b) does not represent or confer on the token holder any right of any form with respect to the Foundation (or any of its affiliates) or its revenues or assets, including without limitation any right to receive future revenue, shares, ownership right or stake, share or security, any voting, distribution, redemption, liquidation, proprietary (including all forms of intellectual property), or other financial or legal rights or equivalent rights, or intellectual property rights or any other form of participation in or relating to DATx, the Foundation, the Distributor and/or their service providers;
- (c) is not intended to be a representation of money (including electronic money), security, commodity, bond, debt instrument or any other kind of financial instrument or investment;
- (d) is not a loan to the Foundation or any of its affiliates, is not intended to represent a debt owed by the Foundation or any of its affiliates, and there is no expectation of profit; and

- (e) does not provide the token holder with any ownership or other interest in the Foundation or any of its affiliates.

6.2 SMART CONTRACT SYSTEM SCENARIOS

- 1) Send the DATx Token Incentives according to the contribution of publisher.
- 2) Distribution of incentives based on user behaviour (since incentives for an advertisement interaction are limited, it is too expensive to implement smart contracts for each user behaviour).
- 3) Use the smart contract do lucky draw base on the contribution of active users.

Platform rewards will be distributed to maintain and develop the ecosystem. Each participant in the ecosystem will be rewarded with DATx Tokens based on their activity and contribution to the system. To attract new publishers and users, the token distribution will be higher in the early stage. As the number of participants increases and the amount of available tokens becomes less and less (for example : halving per year), the token distribution decreases in the later stage.

The rules for users to obtain tokens are: in the early stage of token issuance, the user clearly gives feedback and obtain DATx Tokens according to the conversion formula, with an upper limit on daily token income. Token rewards are halved over time to encourage early adopters.

6.2.1 USER INCENTIVE MECHANISM

User feedback can help us reduce entropy and let us know what users like. Therefore, the degree of uncertainty reduction (information gain) of each user feedback represents the value of this feedback. Therefore, according to the user's information gain, DATx should give users corresponding incentives in DATx Tokens.

Given that $Score_{userk}$ represents the final score of user k, the $Score_{min}$ is 0, and the $Score_{max}$ is 100 points, i.e., $Score_{userk} \in [0, 100]$. This score is equivalent to the substitution of tokens. The calculation of fractions is as follows:

$$Score_{userk} = \frac{\sum_{i=1}^n w_i}{\sum_{i=1}^n w_i} \cdot Score_{max}$$

Assuming that the user has n feedbacks to the advertisement, w_i represents the weight coefficient of the i-th feedback, $i=1, 2, 3, 4, \dots, n$. The weight coefficient is calculated by information gain or GBDT algorithm, however, in order to make the calculation simple; the coefficient can be

determined by experts.

The user k will generate n behaviours for the advertisement because of his special preference in the i -th feedback of the advertisement, which indicates the user's participation in the advertisement. Using w_{ij} to indicate the weight of this engagement, $j=1,2,3,4,\dots,m$.

The pseudo-code of the calculation method is as follows:

```

0: Inputs:  $\omega \in R^d$  the weights of behaviors ↵
1: observe all users  $u \in U_t$  ↵
2: for  $t=1,2,3,\dots,T$  do ↵
3:   observe all behaviors of a user  $\alpha \in R^m$  ↵
4:    $Score_i = \omega_t \alpha_t score_{max}$  ↵
5: end for ↵

```

It is very important to motivate users to generate feedback behaviour, but the importance of user feedback behaviours varies. As shown below, the classification and weight coefficient of feedback behaviours are listed in the following table.

User feedback behaviour	Weight coefficient	Content	Component weight coefficient
User advertising interaction	w_1	Like	w_{11}
		Not interested	w_{12}
User interaction evaluation	w_2	User evaluation of effective label extraction (natural language processing)	w_{2j}
User residence time	w_3	Time	w_{3j}

User conversion behaviour	w_4	Advertising clicks	w_{4j}
	w_5	Download	w_{5j}
	w_6	Purchase	w_{6j}
	w_7	Subscription	w_{7j}
...
Others	w_n	...	w_{nj}

1) User advertising interaction

Users engage with content and ads, express their preferences through "likes" or "not interested", and help the system to achieve personalization. Here, whether users click "like" or "not interested" can help us locate users' interests, so "like" or "not interested" have the same weight.

2) User interaction evaluation

Users' engagements with content and ads further express their interest in this kind of native ads.

If the user did not comment on the native advertisement content, the score is 0. If the user evaluates the ad, then the word label of the rating content is extracted with the natural language processing algorithm, and the user is graded according to the quantity of valid words. The calculation formula is shown below.

$$w_{2j} = \min(w_2, w_2 \times \lg(n+1))$$

w_2 is the weight of user interaction evaluation on the total score of users, and n is the effective label number for users.

3) User residence time

The length of time the user stays in the content provided by us indicates the quality of the content and whether it can meet their needs well.

Generally speaking, when a user stays on a page for a long time, it indicates that the content of the page is of high quality and able to satiate the user. DATx is able to get the user's preference information since the user is interested in this content. In this case, DATx should give the user appropriate incentives.

When the user has a short stay on the page, it indicates that the content of this page has low quality, and has no features, which can't satisfy and attract users. In this case, DATx can also give users appropriate incentives to extend the user's reading time.

4) User conversion behaviour

When users click, download, buy and subscribe to ads, they can more accurately indicate that users are interested in such advertisements. Therefore, the corresponding reward should be given to the user, and the specific reward method should be changed according to the charging methods of CPM, CPC and CPA.

5) Other behaviours

6.2.2 PUBLISHER INCENTIVE MECHANISM

a) The publisher can get rewards from DATx after accessing to the AD SDK supported by DATx Protocol. Traffic needs to be rated with specific quality. Similarly, if the publisher helps the DATx ecosystem get high quality active users (active users refer to the users who have completed the registration), the corresponding DATx Token incentive will also be obtained.

b) The specific traffic quality can be considered according to the following dimensions: user residence time, user interaction with advertisement, etc.

For example, for a certain channel p , there are lots of ads slots in channel p . Assuming that the advertising platform puts advertisers on some of the ads slots in channel p .

Rewarding of the channel is closely related to the user quality.

1) DATx may make statistics on the advertising space advertised on the channel p ;

2) For each Ad

2.1) Based on each user's session duration, the user's engagement with the ad, the quality of advertisement placement is calculated;

2.2) Summarize the quality of each advertisement placement and calculate the total score of the ad.

3) Count all ad placements scores on channel p;

4) Reward channel p according to its total ad scores.

The pseudocode is as follows:

```

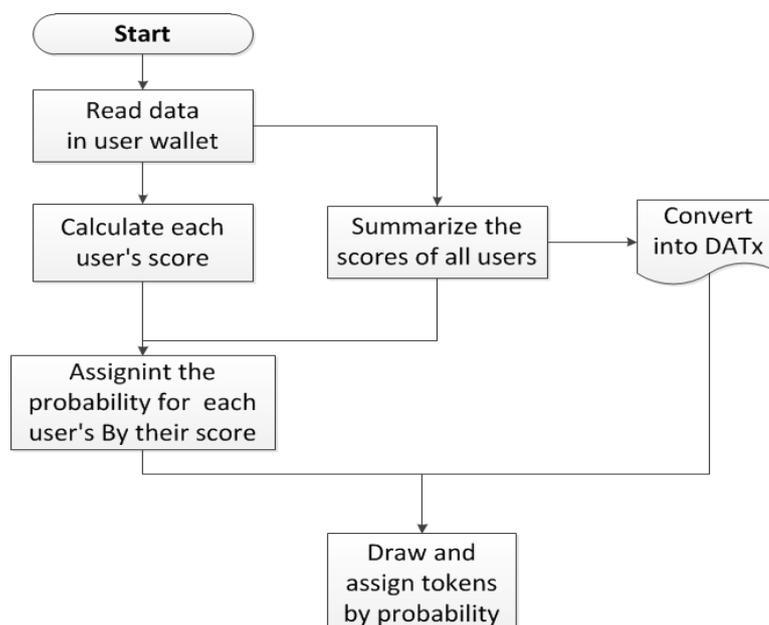
0: Inputs:  $\omega \in R^d$  the weights of user's behaviors ↵
1: observe all ads on a Publisher  $p \in P_t$  ↵
2: for all  $p \in P_t$  do ↵
3:   observe all behaviors of all users  $b \in R^m, u \in U_t$  ↵
4:    $Score_p = \text{sum}(\omega_p b_p score_{max})_{u \in U_t}$  ↵
5: end for ↵

```

6.3 TOKEN CONSUMPTION

1) The advertiser can purchase the traffic by holding the DATx Token and meanwhile refer to POS. Advertisers may obtain discounts on their advertising requirements, by holding enough DATx Token for a long enough time. The previous Publisher could use the DATx Token that was previously incentivized by the platform to continue to buy and sell Ads in the DATx advertising system (the Publisher becomes the advertiser's role at this time) to gain more users.

2) The system will distribute small amount incentives to individual users fairly and periodically, similar to lottery draws. The distribution journey is as follows:



To summarize the flowchart:

- 1) Read the user's wallet data on the blockchain weekly;
- 2) Summarize the scores of all active users in the week (those who have viewed the ads and generated feedbacks during the week), and convert them into DATx Tokens and generate the prize pool. For the avoidance of doubt, DATx Token users which did not participate in DATx will not be entitled to participate;
- 3) The score of each user is calculated separately, and the probability of winning is generated correspondingly based on the total score of the prize pool; users with high scores are more likely to win, but users with lower scores still have a chance, to motivate these users to become an active part of the ecosystem.

The winning algorithm is conceived as follows:

Premise: this winning algorithm is not a completely random algorithm, and the probability of winning is tied to the user's score.

Model: probability model.

Specific ideas:

- 1) Initialize the probability of winning, assuming the total score of this week's pool is 100 DATx Token, and the probability of initializing each user is 30%.
- 2) Adjust probability according to user score:
- 3) During the lottery, scoremax and scoremin are available to active users this week. Then the probability PI of each user is adjusted to:

$$pi = \frac{score}{scoremax - scoremin} \times 30\%$$

In this way, users who are more active have a greater chance to win, and also ensure that users who are less active still have a chance to win, thus encouraging them to become more active.

To be clear, assume that the user scored 10 points, with a total score of 100, then his winning rate is 10%. It's not the same as taking 10 times to win once. This is obviously wrong, the winning lottery number of probability model is based on the normal distribution, and each draw is independent, you won't win the tenth time because you didn't win the prize nine times before.

According to the simulation statistics, the standard deviation of 10% of the winning rate is 9.62 - most of people will win the lottery by 10 ± 9.62 times, and should be rewarded after 20 times lucky draw.

- 4) Assign DATx Tokens to the winners and record them in the blockchain.

6.4 ANTI-FRAUD MONITORING

It is undeniable that some fraud actions might be done which harms the positive development of the whole ecosystem.

Traffic fraud is driven by market interest, the main problem is that the previous monitoring was all collected by http services in large scale advertising (especially RTB). Information collected includes: IP, browser information, device information, time, website information, etc. The industry conducts fraud monitoring, which is basically the post facto log analysis to find out abnormal data and blacklist overheated websites.

6.4.1 LOGIC OF FRAUD

1) Fraud session

In terms of the whole advertising process, frauds exist in three stages: impression, click and conversion (including but not limited to registration, activation, interaction, purchase, etc.)

The session of Impression: Fraud behaviours specialized for Impression session is the mostly simple and crude way, and it is also a most efficient fraud behaviours, which is usually happened in the publisher of CPM settlement.

- The session of Click: it is commonly happened in the publisher with CPC settlement. As advertisers increasingly value CTR, some non-CPC settlement publisher will also fraud on clicks to improve CTR.
- The session of conversion: In order to reduce risks, advertisers directly negotiate with the publisher about CPA and even CPS settlement. But the rate of evolution of fraud has exceeded the speed of the advertiser's response.

2)

Approaches to fraud

In most cases, the demand side focuses on non-human traffic, but fraud is much more than that. Here are a few common ways to fraud:

- Fake users: typically, robots are used to transform IP, cookie, and even device ID to disguise different "users" to swipe ads or click ads.
- False traffic of real users: this kind of fraud is the advanced version of robot fraud. It takes advantage of the real user device, which makes the user attribute characteristics of the fraud traffic closer to the real traffic.
- True user traffic: this kind of fraud is more advanced than the former two. In some cases, it

is typically sailing under false colours. In other cases, the traffic gets hijacked via HTTP or DNS which is not exactly traffic, and may be more accurate to be named "illegal traffic".

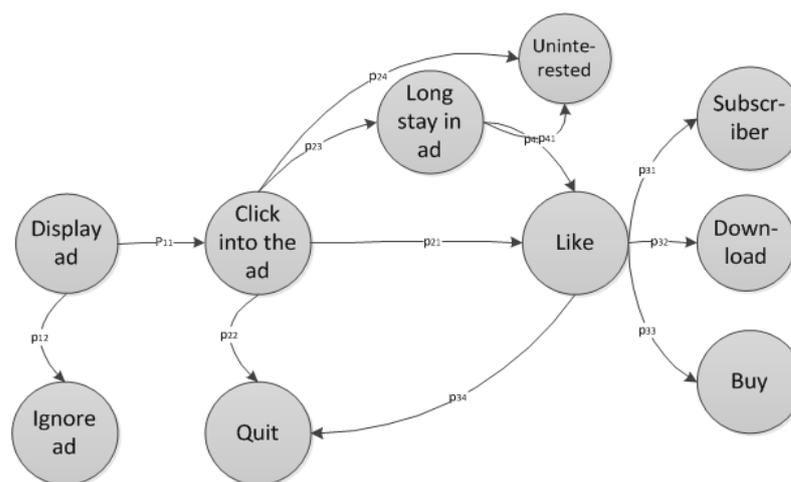
6.4.2 ANTI-FRAUD BASED ON DATx USER BEHAVIOR ARCHIVE

The DATx user behaviour archive builds the user's exclusive, secure information security account. These accounts include personal data centre and data set. The personal data centre includes user's own dimension data, such as the user's ordered behaviour data, preference data, virtual image and so on.

In order to prevent the phenomenon of malicious fraud, the DATx user behaviour file provides a good solution. In the anti-fraud system with various anti-fraud policies, such as abnormal based on time difference protection, additional equipment validation information and IP calibration strategies and other strategies are based on discrete degree DATx user behaviour records to prevent fraud.

1) Abnormal time difference protection strategy

According to the checking analysis, click and activate the time difference set range to exclude abnormal data. By updating the version of the SDK integration fraud protection module, add more equipment validation information, the SDK will launch a data channel encryption during data transmission, increase the cost of fraud, ensure the security of the data transmission.



For example, in the user behaviour chain, a real user, there is a certain time difference from the click to the convert. If the time of user's behaviour 1 (click on the ad), and the time of transferring to next move (click like or subscribe or download) is too short (within a few seconds), then you can preliminarily judge that the user may not be true, but a dubious machine click.

2) Device authentication information policy

After the user authorizes, the DATx user behaviour archive will record the user's device ID, cookie, and IP information. The user ID is generally based on IP, cookie (or device ID) for resolving users.

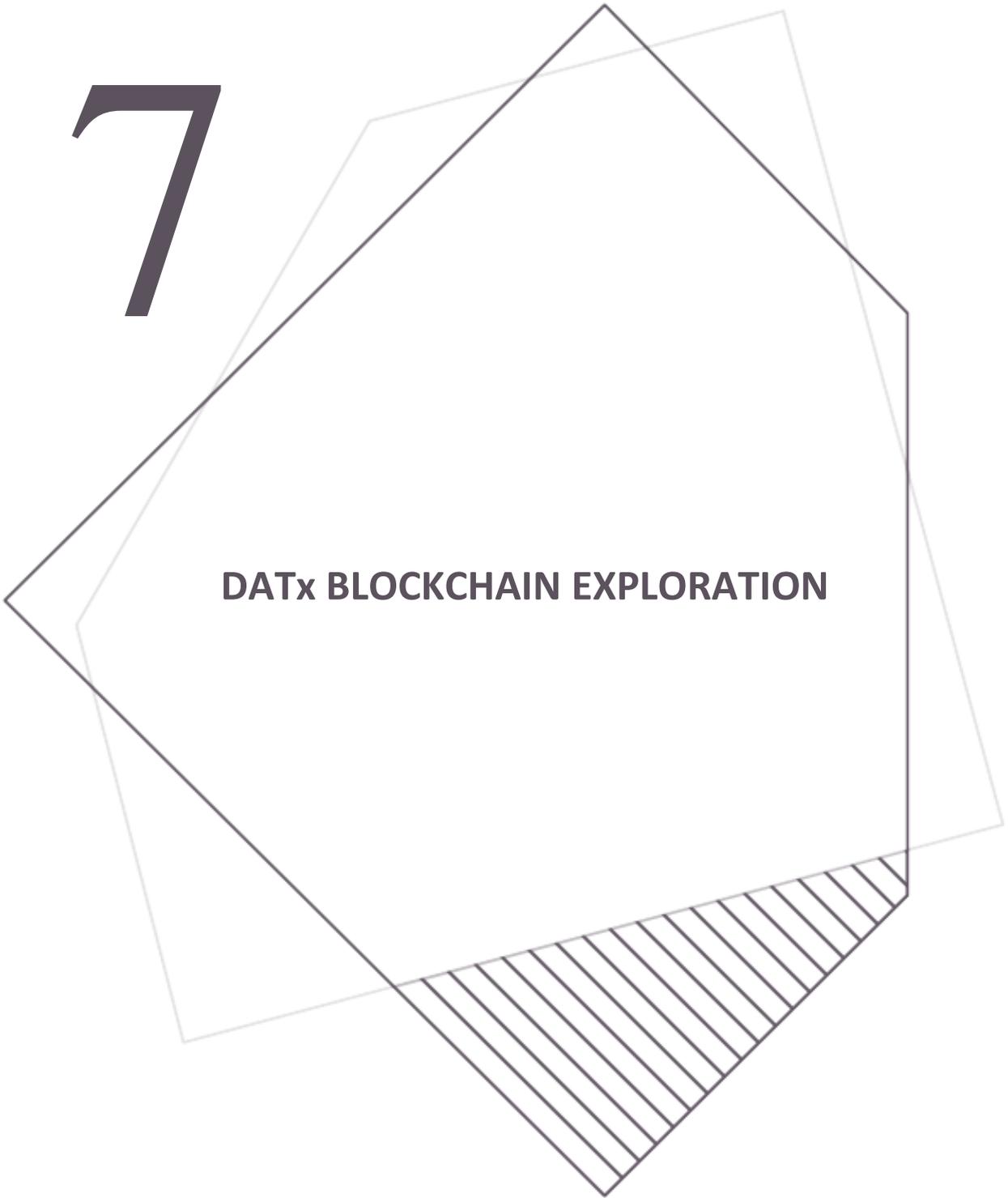
For Users with a DATx user behaviour profile, DATx can easily know if certain users have frequent exposure or clicks. Some publisher will use robots to change the IP to disguise. In this case, the information in the DATx user behaviour archive can be taken into account to identify the traffic.

The user's IP or cookie in the DATx user behaviour file is different, but when this group of IP or cookie browser type, resolution, user window size, the operating system version number and equipment brands are the same, it will cause the attention of the anti-fraud system to take the necessary measures.

3) IP dispersion calibration strategy

According to the DATx user behaviour archive, each records the IP that the user has requested. Suppose that the IP access information recorded in a user's DATx user behaviour file exceeds the peak range of the set IP number within a short time, it will be recorded by anti-fraud function automatically. By using a large number of fraud logs, if the IP that is clicked or activated during a certain period is too centralized, that is the performance of the data exception.

7



DAT_x BLOCKCHAIN EXPLORATION

7. DATx BLOCKCHAIN EXPLORATION

Advertising Platform involves massive user scale, thus requires fast response time, which poses a great challenge for blockchain to cope with user behaviour data in real time. Meanwhile, it does not make sense technically and economically if all user behaviour data are processed via Ethereum smart contracts, considering its limitation on response time, throughput and expensive Gas fee for every single transaction.

Different from existing mainstream blockchains' generic one-for-all approach, the Foundation is proactively developing the native DATx blockchain to resolve above mentioned industry specific challenges to achieve DATx mission as the next generation revolutionary blockchain for programmatic advertising industry. The Board of Directors of the Foundation is tasked with managing the use of resources for the development of DATx for the best benefit of all users, participants and stakeholders, including operation management, market promotion, development of underlying technology and construction of service system, planning and technology development.

DATx blockchain will bring in innovations in blockchain technology from below perspectives:

- 1) Better compatibility with major existing blockchain ecosystems (such as Bitcoin UTXO Core infrastructure, Ethereum Virtual Machine (EVM));
- 2) More flexibility in smart contract trigger mechanism and consensus protocol;
- 3) User-friendly development system;
- 4) Lower transaction costs;
- 5) Lower latency;
- 6) Better TPS performance;
- 7) Hybrid Model of centralized and decentralized data architecture;
- 8) "POI" - Power of Identification to balance data commercialization and user privacy.

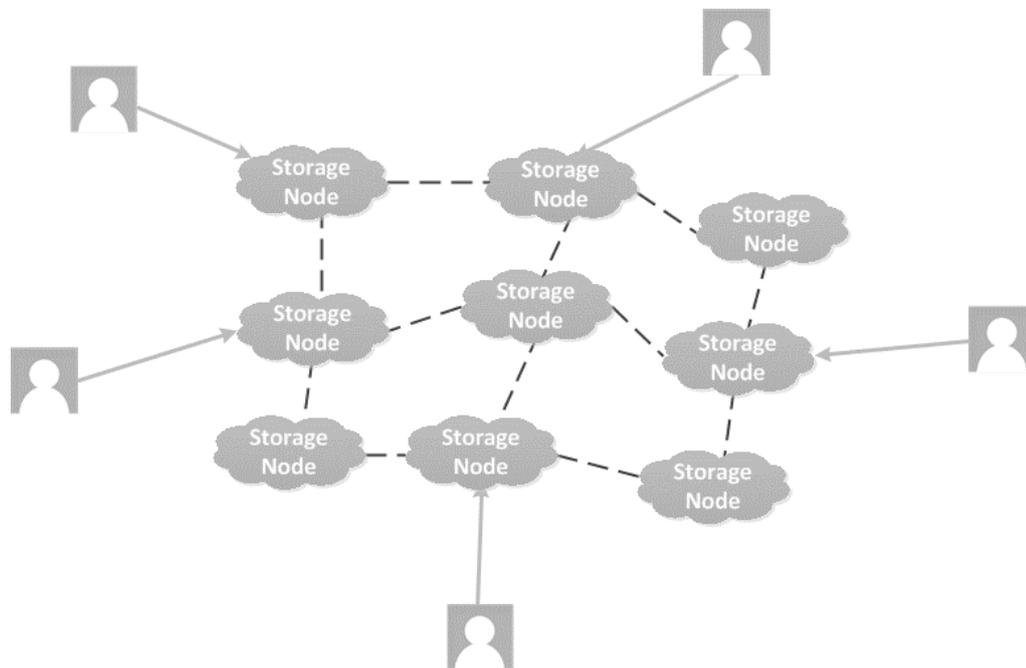
DATx will build an open source platform, provide blockchain infrastructure for programmatic ad ecosystem participants, and increase their advertising effectiveness and ROI. DATx will rate commercial scalability highly and make DATx blockchain a easy-to-implement, tailor fitted infrastructure for all relevant ecosystem participants.

7.1 DATx USER BEHAVIOR ARCHIVAL STORAGE DESIGN REQUIREMENTS

DATx needs to support distant storage of user behaviour archives. The core function is that users store their behaviour data in network nodes, and later the users could acquire and access above

data anywhere.

Storing user behaviour data in one network, means that other network nodes (i.e. storage nodes) will have the data archived, and these nodes will be responsible for returning the data for users' access requests and ad platforms' big data analyses.



Due to the importance of the network nodes, DATx forms the following hypotheses:

- 1) Storage nodes are untrustworthy: in worst scenario, the storage nodes could steal, modify the archived data. Therefore, forceful mechanism should be applied to prevent and terminate this kind of malicious behaviours.
- 2) Storage nodes are profitable: economic income is required to maintain the storage nodes, especially, when data requires high privacy and security, higher fees should be charged for the storage nodes. And it should be guaranteed that storage network nodes are fairly paid for.
- 3) Storage nodes are unstable: when data access is requested, the storage nodes cannot be online simultaneously, and could go offline anytime.
- 4) Network might not be of goodwill: if a network flaw exists, someone possibly will take advantage of the flaw and attack the nodes for personal profit.

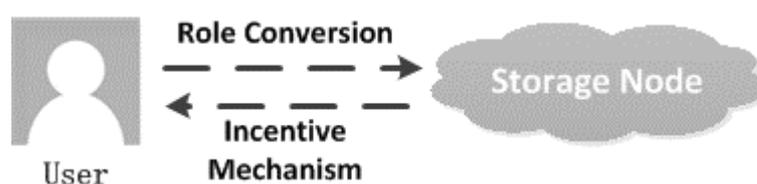
DATx is mandatorily designed to securely store the data of above features.

7.2 PRINCIPLE OF STORAGE NODE SELECTION

The selection of storage nodes is essential in DATx user behaviour archive system.

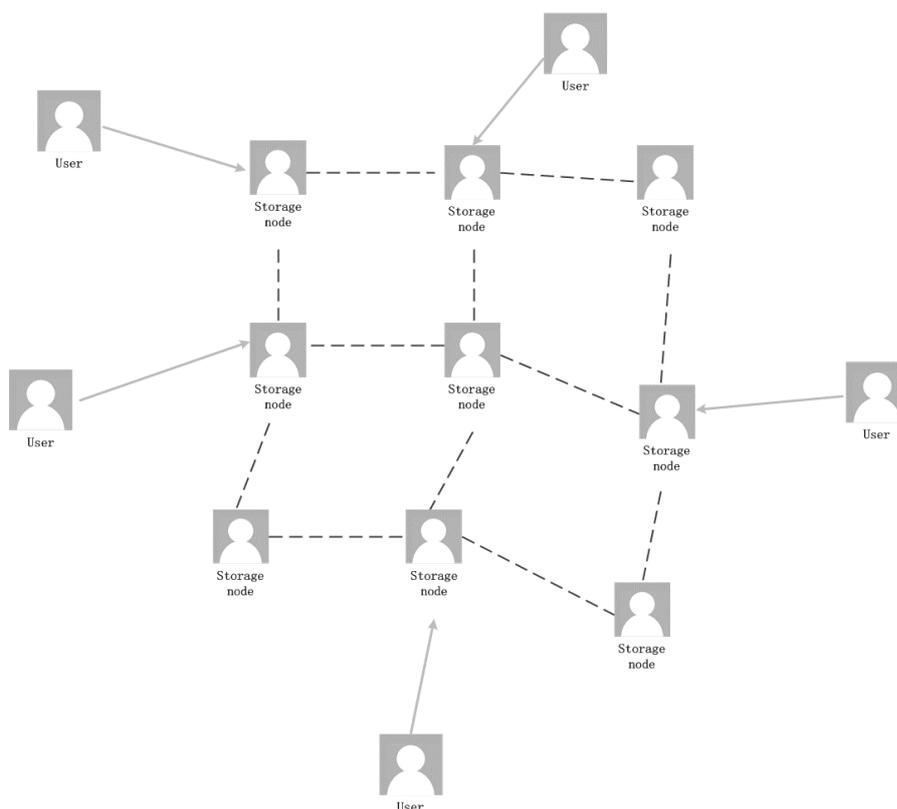
In DATx system, any user or participant (including advertisers, publishers, ad audiences) of DATx ecosystem could become a storage node. The users are entitled to choose their own storage nodes, or to become the storage nodes.

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DATx Token is required as virtual crypto “fuel” for the usage of storage resources on DATx, providing the economic incentives which will be consumed to encourage participants to contribute and maintain the ecosystem on DATx. Computational resources are required for storage of information on DATx, thus providers of these resources would require payment for the consumption of these resources (i.e. "mining") to maintain network integrity, and DATx Token will be used as the unit of exchange to quantify and pay the costs of the consumed storage resources. DATx Token is an integral and indispensable part of DATx, because in the absence of DATx Token, there would be no common unit of exchange to pay for these costs, thus rendering the ecosystem on DATx unsustainable. When a user becomes a storage node, he will be rewarded with DATx Token. Moreover, if a user stores data in the node, this node will be rewarded extra DATx Token.

To be noticed, attackers could try to lower the price and disguise themselves to manipulate users' choices.



An archive contract is the contract between the storage demand side and a storage node. The demand side agrees to pay for a storage node, so the node stores the data for the demand side in a given term of time. Having storage nodes to archive requires an incentive mechanism. The archive contracts provide forceful incentive mechanism and motivation for nodes to securely store data.

Having properly stored user behaviour archive, the storage nodes will be rewarded, otherwise, they will be punished.

When an archive contract is enforced, both the storage demand side and the storage node put a certain amount of DATx Token as deposit under the contract.

Once the storage node completes the contract, the contract deposit is paid to the node, with its own deposit returned along. If the node defaults, its contract deposit will be deducted.

Archive contracts are recorded in a blockchain, it turns to be a third-party regulator for these contracts. When archive contracts are completed, the storage node must provide proof and certifies that is still has the data archived. Not until the storage node provides the proof, can it retrieve its deposit and payment from demand side. And if the node is unable to provide the storage proof in time, is cannot be rewarded.

7.3 ARCHIVE CONTRACTS

An archive contract is the contract between the storage demand side and a storage node. The demand side agrees to pay for a storage node, so the node stores the data for the demand side in a given term of time.

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7.4 ARCHIVE REDUNDANCY

It makes no sense that the storage demand side would store the data only on a single node, because as DATx hypothesized the storage nodes are inevitably unstable, meaning they cannot be all-and-real-time online or they just go down.

Under this circumstance, simultaneously store data on multi nodes can spread the risks. If a user profile is archived on five different hosts, only when all five hosts go wrong, the data loss could occur. This, is a technology of storage replications. The storage replication replicates n copies of the original data, and distribute to various nodes; once a node fails it could resume lost data from other nodes. However, this storage replication technology largely increases storage costs, thus unable to support rapid development of blockchain technology.

There is an alternative, called Reed-Solomon Codes. If original data goes invalid when a user accesses the data, k redundant data blocks have to be downloaded prior of removing all original data blocks. In this way, random access to a single original data block would be a loading mess, due to the incredible downloading volume.

Based on the probability distribution of random access and sequential access, DATx realizes data storage with Regenerating Codes, which take a smaller bandwidth to resume compared with Reed-Solomon Codes.

First, partition a user behaviour file of M bytes into n parts according to MDS, and store in n nodes respectively, each partition of M/n bytes, and any k partitions can be used for the original data reformation.

Once a node fails, redundancy must be constantly refreshed, and this leads to transfer of enormous data in the network.

At this time, DATx should effectively reconstruct new partitions to cope with such failure. A new partition copy should be replicated directly from another node storing this partition, but traditional error-correcting codes need original data to generate a new coding partition. While DATx consider generating an error-correcting coding partition with accessing only error-correcting coding partitions.

In the initial strategy, the node storing new partition (so-called Newbie) downloads k partitions and reconstruct the file, then it generates new coding partition from original file. Consequently, the data transferring M bytes only generates M/k bytes partition.

Given that a minimum data volume requires that a Newbie generates a MDS or semi-MDS partition, this is called optimal maintaining MDS (OMMDS). It can be particularly proven that M -byte download volume is the minimum in information theory, if the Newbie can only connect to k nodes, download data and generate partitions. If the Newbie is allowed to connect over k nodes, then the data volume required for download would significantly reduce. For example, $k=7$, $n=14$, the Newbie can connect to $n-1$ nodes, then only 0.27 MB data is required to generate new partitions, 73% less than with the initial strategy.

Nevertheless, relevant extra expenses would be also required, and consequently the hybrid

solution provides better secure bandwidth than OMMDS. In order to improve the hybrid solution, DATx must have foresight over MDS.

Here DATx introduces a new solution, Regenerating Codes, which minimize the data download volume required by a Newbie under the symmetry of MDS that DATx requires. On a higher level, RC improves OMMDS through the data downloaded by the Newbie, instead of discarding the data. As a consequence, RC has larger partitions than MDS, while costs only minor bandwidth maintaining expenses, even though the Newbie interacts with k nodes. For instance, $k=7$, a Newbie needs to download only 0.16 MB data, 39% less than OMMDS, and 84% less than the initial strategy. Furthermore, DATx conducted simulation experiment of nodes stability measured in real distributed storage system, the results state that when $k=7$, RC reduces bandwidth by 25% than the hybrid solution. The larger k is, the better RC performs.

7.5 DATA ENCRYPTION

Data ENCRYPTION is to protect data privacy and security in case that storage nodes try to spy, steal or damage the data. Before users behaviour data is uploaded to the network, all DATx users behaviour archives have been through advanced cipher, and a decipher cannot occur on storage nodes, but only after download. In no circumstances can storage nodes decipher its stored data.

We utilize a cryptography mechanism to guarantee the information security. It is a mathematical algorithm that maps data of arbitrary size to a bit string of a fixed size (a hash) and is designed to be a one-way function, that is, a function which is infeasible to invert. The only way to recreate the input data from an ideal cryptographic hash function output is to attempt a brute-force search of possible inputs to see if they produce a match, or use a rainbow table of matched hashes.

Hash function is given as:

$$\text{Hash}(\text{original information}) = \text{Message Digest}$$

Ideal hash function generates output varies with input.

A cryptographic hash function allows one to easily verify that some input data maps to a given hash value, but if the input data is unknown, it is deliberately difficult to reconstruct it (or equivalent alternatives) by knowing the stored hash value.

For example, a user interact with an ad at a certain moment, and this is recorded in blockchain, then following is executed:

$$\text{Hash}(\text{a user is doing something with an ad at this time})$$

= GAHGAAH787DAFAFt

The ledger then would record an item as GAHGAAH787DAFAF, which stands for the action the user takes with the ad at the moment, the original information is hidden, and user privacy is ensured.

The linked blocks form a chain. This iterative process confirms the integrity of the previous block (any change of the information changes hash value, failing to be verified), all the way back to the original genesis block (once verifying the hash value of the last block, the whole ledger is verified).

We also apply a cryptosystem, known as asymmetric public-private key cryptosystem. In such a cryptosystem, the encryption key is public and it is different from the decryption key which is kept secret (private). To clarify it briefly, let us have a look at a classic asymmetric public-private key cryptosystem - RSA (Rivest–Shamir–Adleman) algorithm.

The keys for the RSA algorithm are generated the following way:

- 1) Choose two distinct prime numbers p and q . Prime integers can be efficiently found using a primality test, so that $n = pq$.

For security purposes, the integers p and q should be chosen at random, and should be similar in magnitude but differ in length by a few digits to make factoring harder.

n is used as the modulus for both the public and private keys. Its length, usually expressed in bits, is the key length.

Compute $\lambda(n) = \text{lcm}(\lambda(p), \lambda(q)) = \text{lcm}(p - 1, q - 1)$, where λ is Carmichael's totient function. This value is kept private.

Choose an integer e such that $1 < e < \lambda(n)$ and $\text{gcd}(e, \lambda(n)) = 1$; i.e., e and $\lambda(n)$ are coprime.

Determine d as $d \equiv e^{-1} \pmod{\lambda(n)}$; i.e., d is the modular multiplicative inverse of e (modulo $\lambda(n)$).

This is more clearly stated as: solve for d given $d \cdot e \equiv 1 \pmod{\lambda(n)}$.

e is released as the public key exponent.

d is kept as the private key exponent.

More generally, for any e and d satisfying $ed \equiv 1 \pmod{\lambda(n)}$, the same conclusion follows from Carmichael's generalization of Euler's theorem, which states that $m\lambda(n) \equiv 1 \pmod{n}$ for all m relatively prime to n .

Cited from: [https://en.wikipedia.org/wiki/RSA_\(cryptosystem\)](https://en.wikipedia.org/wiki/RSA_(cryptosystem))

(N, e) is encapsulated as public key, (N, d) is encapsulated as private key.

Suppose m is plain text, then encryption is to calculate ciphertext c :

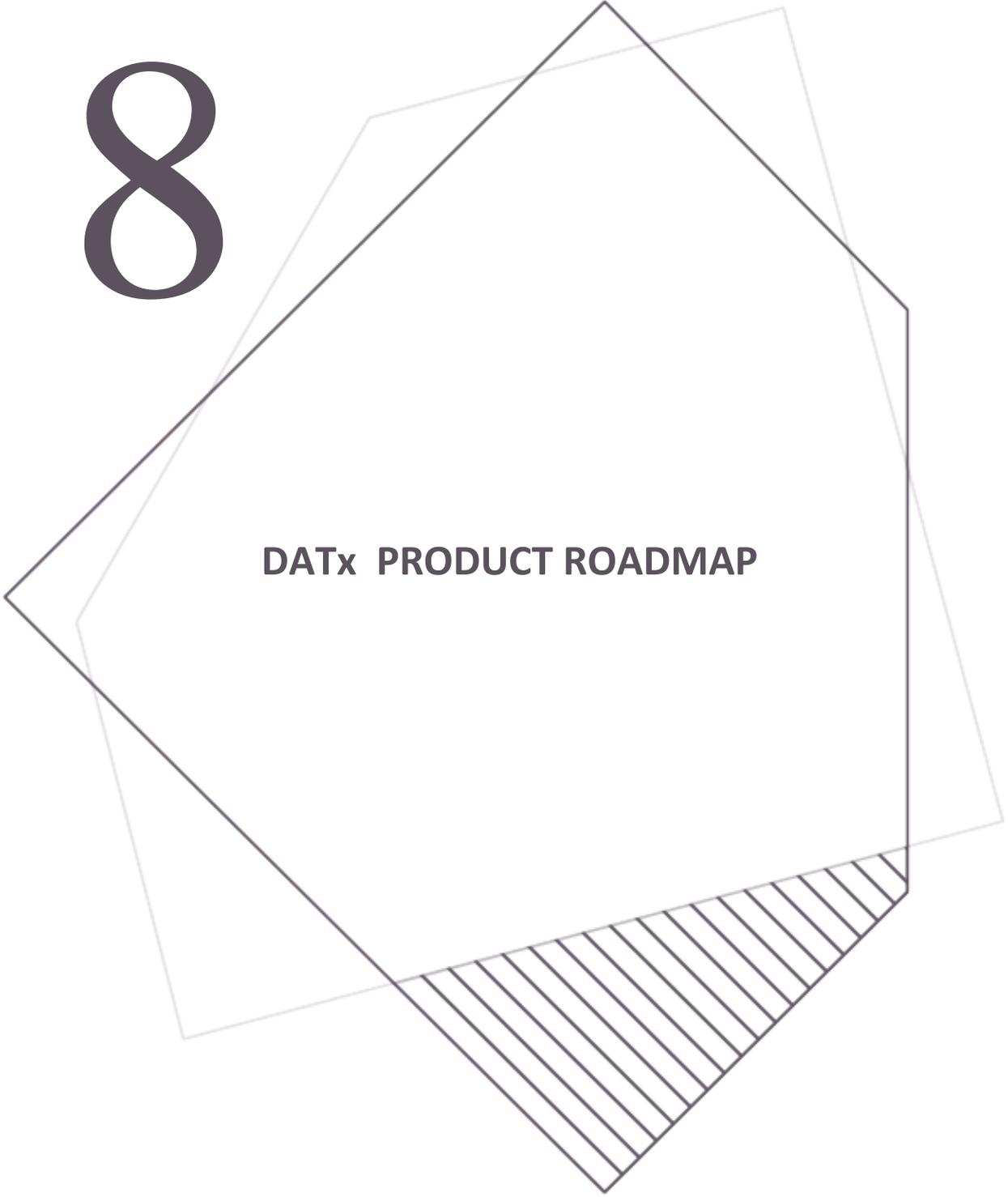
The public key consists of the modulus n and the public (or encryption) exponent e . The private key consists of the modulus n and the private (or decryption) exponent d , which must be kept secret. p , q , and $\lambda(n)$ must also be kept secret because they can be used to calculate d .

When the key is long enough, RSA encrypted information would be never be deciphered.

7.6 SUMMARY

The Foundation proposes its own technology to realise its objectives of building an ecosystem for the advertising industry. The DATx public blockchain would not only be able to meet advertising needs, but also potentially support other businesses with similar demands. During the exploration process, real user behaviour is better integrated in the public blockchain design, with this process called Power of Identification (POI).

8

A large, light gray geometric shape, resembling a stylized diamond or a complex polygon, is centered on the page. It has a hatched bottom-right corner. The text "DATx PRODUCT ROADMAP" is centered within this shape.

DATx PRODUCT ROADMAP

8. PRODUCT ROADMAP

STAGE I (2018 Q2 - 2018 Q4)

Ad Platform Integration + POI User-oriented Behaviour Data Implementation

- 1) Avazu as the first advertising platform to be compatible with DATx. Achieve customized native ads and acquisition of active users;
- 2) Implement incentive mechanism for users, publishers and advertising platforms;
- 3) Establish user-oriented decentralized behaviour archive, set as a data foundation for advertising eco-DMP;
- 4) Develop anti-fraud system based on user behavioural data, better cleanse the ecosystem.

STAGE II (2019Q1 - 2019Q4)

Ad Content Upgrade + AI Customized Content Recommendation

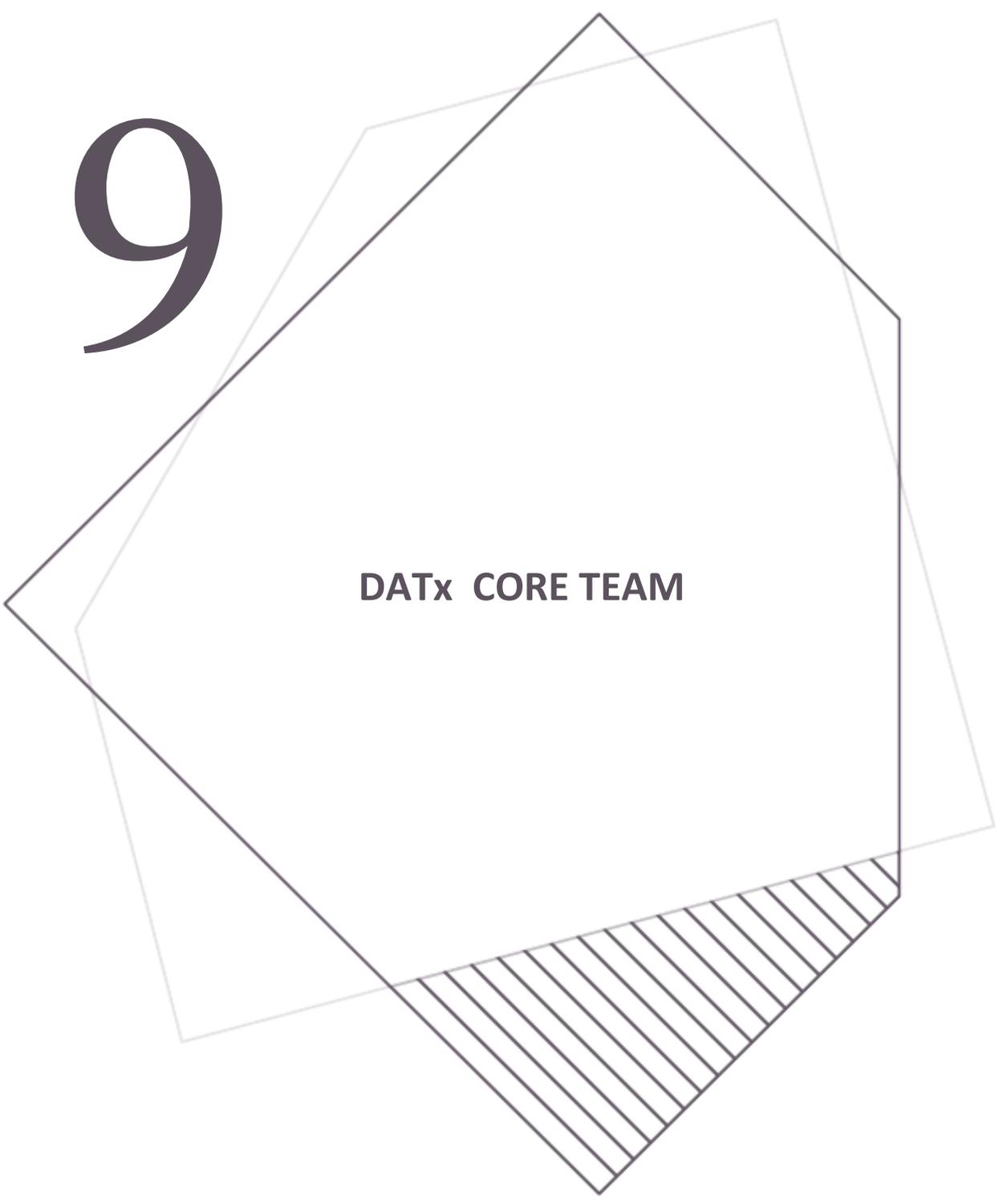
- 1) Establish the form of native ads feed;
- 2) Attract additional advertisers to deliver on DATx ad platform based on new ad form of content feed;
- 3) Implement personalized recommendation system based on AI and user-oriented decentralized behaviour archive, and continuously optimize the ad performance.

STAGE III (2020Q1 - 2022Q4)

Ecosystem Booming + Enhanced Value Creation + DATx Blockchain Implementation

- 1) Integrate subsequent advertising platforms to DATx and become part of the ecosystem;
- 2) Attract more advertisers to join DATx Ad platform based on native ads;
- 3) Integrate more D-app into DATx ecosystem;
- 4) Implement DATx blockchain, the No. 1 blockchain for programmatic advertising.

9

A large, light gray geometric graphic consisting of two overlapping, irregular polygons. The bottom-right portion of the graphic is filled with diagonal hatching lines.

DATx CORE TEAM

9. DATx CORE TEAM

The Foundation comprises members of the core DATx team, and oversees the development of DATx in cooperation with QTUM Foundation and Avazu. The core DATx team includes a development team of over 80 engineers, product managers, architects and UEX experts.

Other Team Members include:

Ralph Sas

Ralph graduated from the University of Avans Hogeschool Den Bosch in Germany. Currently, he is the acting CEO of DotC United Group and the CEO of Avazu Europe Europe/NA/Latam, a subsidiary of the mobile advertising platform. He is the Member of the Board of Directors of Avazu Holding.

In addition, Ralph ever worked for ZinQ Media and R&D Media, both of these two companies are the leading company in mobile internet and online digital marketing of Netherlands.

Guus Esbir Wildeman

Guus graduated from the University of Hogeschool INHOLLAND, he is an expert in Affiliate Marketing, Social media, SEO, PPC, PPV, online promotion areas.

He served for DotC United Group for over 3 years and now is the current COO of Avazu Europe /NA/Latam, before that, he was ever a Sales Director of EU area of iQU.

Guus devoted his efforts into Creating a perfect connections between gamers, publishers and advertisers and try to earn more robust marketplace for online games. By using his previous intelligence platform - sophisticated GameriQU™ across the Internet, social media, mobile devices and more, carries a big and deep influence in European countries.

Robert Körbs

Robert Körbs graduated from the University of Applied Sciences Berlin (which was listed in the first place of West Europe area) ,he specialized in Business Computer Science. Until now, he had more than 8 years of work experience in digital marketing, user access, Ad business, as a pioneer team leader of running start-up ecosystem.

At present, Robert is holding the position of Managing Director of Avazu Europe/NA/Latam. He ever worked for sub corporation of Hitfox group, ad2games, a digital innovation marketing game company, with the title of the Head of Advertiser Relations.

Alejandro Bonsignore

Alejandro has been professor within Law and Social Science at UADE university, one of the top ranked universities in Buenos Aires, with experience of leading roles for major companies in the Digital Advertising industry, such as Improve Media Network. He has deep knowledge about the Aviation Industry after working many years as Consultant. Today, Alejandro is the Director of Business Development at Avazu LATAM.

Ben Pony van Kessel

Ben Pony van Kessel graduated from Amsterdam University of Applied Science, and is currently the Director of Business Development at Avazu Europe. Ben came in contact with the online marketing industry in young age working for an multinational lead generation company where he achieved great heights of success by being responsible of devising business development strategies and the entry and settlement in new markets. Having a past experience in sales, Ben was able to develop strong skills within the online marketing and international sales field.

Stefan Suripatty

Stefan Suripatty is the current European and North American Director Advertiser Relations at Avazu Latam. Stefan served many years as Senior Developer of R&D Media, an internationally operating Media company that operates in B2C Mobile & Internet entertainment, Ecommerce and Online lead generation industry. Stefan has worked many years within the Online - and Digital Advertising Industry with major companies such as R&D Media and Bandbreed and had an initial career as web developer.

Justin Turner

Justin Turner graduated from Esdal College with Economics and Society.

For many years Justin had leading roles at IQU, which is an online performance marketing

company specialized in games. Currently, iQU serves more than 6000 gaming specialized publishers with more than 150 game offers. Justin is the European and North American VP Affiliate Manager at Avazu LATAM. Justin has over 5 years of experience within the advertising and publishing industry, with great knowledge about Online and Mobile Performance marketing and great insights in the gaming industry.

Kiki Henrichs

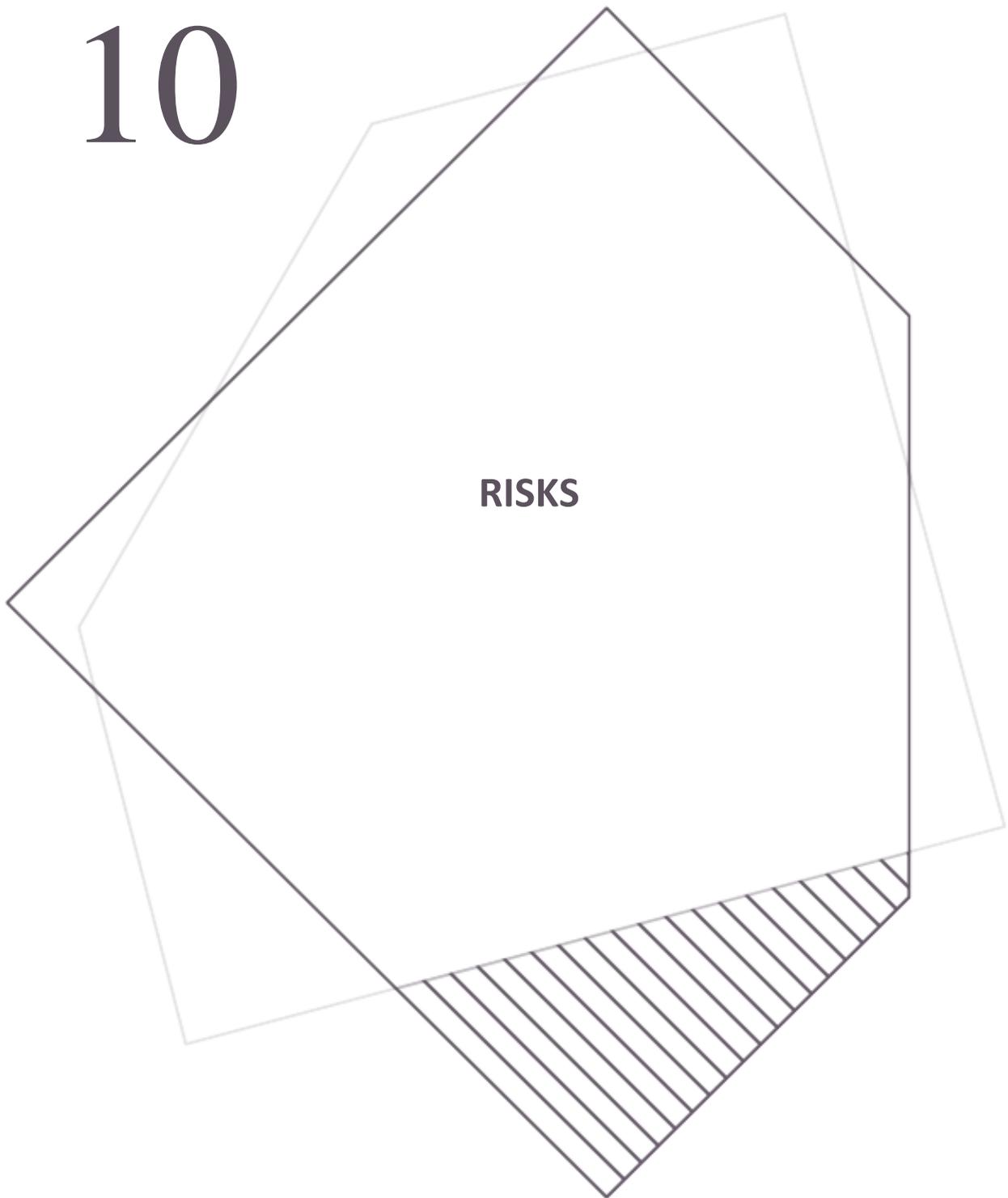
Kiki Henrichs is currently European and North American Global Sales Director at Avazu Latam. Kiki has many years of experience within Media buying and online advertising, for example managing major clients at Match My Brand, part of the AEGIS group.

Amos Fang

Amos Fang graduated from National Chio-Tung Tung University and formerly served as the R&D Assistant Manager of CyberLink, which is one of the leading Multimedia software companies, with PerfectCorp as its subsidiary, one of largest Taiwanese Mobile Internet enterprise.

He has nearly a decade of experience within International Business Development with success in online & offline user growth in global market for E-Commerce clients such as Alibaba, Yahoo and Amazon. Currently, Amos is Head of APAC Business at DotC United Group.

10



RISKS

10. Risks

You acknowledge and agree that there are numerous risks associated with purchasing DATx Token, holding DATx Token, and using DATx Token for participation in DATx.

1. Uncertain Regulations and Enforcement Actions

The regulatory status of DATx Token and distributed ledger technology is unclear or unsettled in many jurisdictions. The regulation of virtual currencies has become a primary target of regulation in all major countries in the world. It is impossible to predict how, when or whether regulatory agencies may apply existing regulations or create new regulations with respect to such technology and its applications, including DATx Token and/or DATx. Regulatory actions could negatively impact DATx Token and/or DATx in various ways. The Foundation (or its affiliates) may cease operations in a jurisdiction in the event that regulatory actions, or changes to law or regulation, make it illegal to operate in such jurisdiction, or commercially undesirable to obtain the necessary regulatory approval(s) to operate in such jurisdiction. After consulting with a wide range of legal advisors and continuous analysis of the development and legal structure of virtual currencies, the Foundation will apply a cautious approach towards the sale of DATx Token. Therefore, for the crowdsale, the Foundation may constantly adjust the sale strategy in order to avoid relevant legal risks as much as possible. For the crowdsale, the Foundation is working with Tzedek Law LLC, a boutique corporate law firm in Singapore with a good reputation in the blockchain space.

2. Inadequate disclosure of information

As at the date hereof, DATx is still under development and its design concepts, consensus mechanisms, algorithms, codes, and other technical details and parameters may be constantly and frequently updated and changed. Although this white paper contains the most current information relating to DATx, it is not absolutely complete and may still be adjusted and updated by the DATx team from time to time. The DATx team has no ability and obligation to keep holders of DATx Token informed of every detail (including development progress and expected milestones) regarding the project to develop DATx, hence insufficient information disclosure is inevitable and reasonable.

3. Competitors

Various types of decentralised applications are emerging at a rapid rate, and the industry is increasingly competitive. It is possible that alternative networks could be established that utilise the same or similar code and protocol underlying DATx Token and/or DATx and attempt to re-create similar facilities. DATx may be required to compete with these alternative networks, which could negatively impact DATx Token and/or DATx.

4. Loss of Talent

The development of DATx depends on the continued co-operation of the existing technical team and expert consultants, who are highly knowledgeable and experienced in their respective sectors. The loss of any member may adversely affect DATx or its future development. Further, stability and cohesion within the team is critical to the overall development of DATx. There is the possibility that conflict within the team and/or departure of core personnel may occur, resulting in negative influence on the project in the future.

5. Failure to develop

There is the risk that the development of DATx will not be executed or implemented as planned, for a variety of reasons, including without limitation the event of a decline in the prices of any digital asset, virtual currency or DATx Token, unforeseen technical difficulties, and shortage of development funds for activities.

6. Security weaknesses

Hackers or other malicious groups or organisations may attempt to interfere with DATx Token and/or DATx in a variety of ways, including, but not limited to, malware attacks, denial of service attacks, consensus-based attacks, Sybil attacks, smurfing and spoofing. Furthermore, there is a risk that a third party or a member of the Foundation or its affiliates may intentionally or unintentionally introduce weaknesses into the core infrastructure of DATx Token and/or DATx, which could negatively affect DATx Token and/or DATx.

Further, the future of cryptography and security innovations are highly unpredictable and advances in cryptography, or technical advances (including without limitation development of quantum computing), could present unknown risks to DATx Token and/or DATx by rendering ineffective the cryptographic consensus mechanism that underpins that

blockchain protocol.

7. Other risks

In addition to the aforementioned risks, there are other risks (as more particularly set out in the Terms and Conditions) associated with your purchase, holding and use of DATx Token, including those that the Foundation cannot anticipate. Such risks may further materialise as unanticipated variations or combinations of the aforementioned risks. You should conduct full due diligence on the Foundation, its affiliates and the DATx team, as well as understand the overall framework and vision for DATx prior to purchasing DATx Token.