AdRealm
real data · real time · real earning

Reconstructing a Global Digital Advertising Ecosystem Powered by Blockchain

Contents

1. Introduction

1.1 Global Digital Advertising Industry at a Glance

In 2018, the global digital advertising market will exceed USD 200 billion，among which mobile ad will account for over 60% of all digital ad income

According to sources, global digital advertising sales has surpassed TV ad spend for the first time ever in 2017. Digital ad sales are expected to reach USD 237 billion in 2018 with a 13% growth rate. Leading the overall growth, mobile advertising contributes 63% of the entire digital advertising market, reaching USD 147 billion at a 27% growth rate.

Unit: USD 100 Million | ■ Overall Digital Advertising Income | ■ Mobile Digital Advertising Income
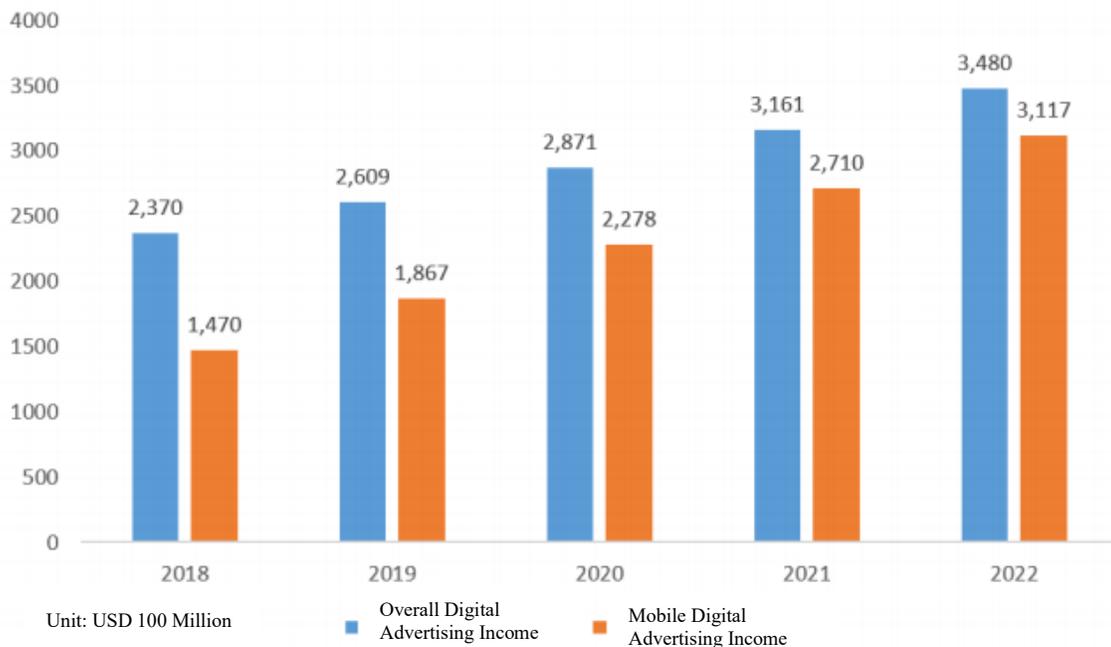
1.2 The Pain Points of the Industry

The lack of information transparency is a huge stumbling block resulting in a zero-sum game between players in the industry

1.2.1 Ad fraud plagues the industry, tracking and measuring the quality of advertising spend becomes difficult

Sources show that of all digital ads, 9% of display ads and 22% of video ads are fraudulent. In 2017, this contributed to an economic loss of USD 6.5 billion. On the other hand, this phenomenon also exists with advertisers and ad platforms; many ad platforms are both unable and unincentivized to put an end to this.

1.2.2 With ad platforms providing varying results, the cost of trying different platforms for small to medium sized advertisers can be intolerably high
For advertisers today, the time and cost associated to testing out their advertising strategy is relatively high in order to reach decision-making data. There is a lack of open and reliable data to evaluate the effectiveness and efficiency of ad platforms available. What ends up happening is that even the worst ad platform can easily trick a client onboard.

1.2.3 The growth of niche channels increases the cost for advertisers when choosing premium traffic

Globally speaking, with giants such as Facebook and Google as exceptions, other advertising channels and networks are relatively scattered. Advertisers (especially small to medium sized ones) will accrue tremendously high costs and time when choosing premium ad traffic.

1.2.4 Margins diminish as giants like Google and Facebook dominate the industry, power and profits are concentrated in few key players

It comes without saying that the Matthew Effect is becoming more apparent with the global digital advertising industry. In 2017, Google and Facebook control over 60% of total ad spend; moreover, they also eat up over 85% of all new market share. Not only do they have a growing market presence, but also present a continuous threat for upstream and downstream players in terms of profit margin. The lack of transparency in packaged service makes it difficult to track the specific advertising performance in each stage. In addition, decentralized publishers have very weak bargaining power in terms of ad pricing, giving ad networks the upper hand in extending the bill settlement process. There are often disputes in bill settlement.

1.2.5 User privacy infringement happens all too often; users are unable to manage their personal info as vulnerable groups

AliPay leaked 20 million user account data in 2013 and Yahoo leaked 3 billion user information in 2017. With technology development, companies become more adept at mining and filching data about their users. However, users often provide information without being completely informed and remunerated.

1.3 The Application of Blockchain

The global digital advertising market could be completely rebuilt by applying Blockchain technology

Information is severely asymmetrical in the traditional internet advertising market where it is hard to establish trusted mechanisms between advertisers, publishers and users. This has caused many unethical behaviors such as deducted traffic from advertisers and fraudulent traffic from publishers. In recent years, we have seen a wave of fraudulent activities coming from mid and downstream players. With high fees charged by data monitoring and verification companies, it significantly increases the transaction cost for all parties which results in lower profits. Blockchain, as a brand new solution, will revolutionize the traditional advertising market at fundamental production relationship level and may change the unhealthy structure of the giant monopoly.

1.3.1 Blockchain can mitigate the risk of trust:
The technology of blockchain has a transparent and open nature. Under consensus of operating rules, all participants are authorized to view and monitor the data contents. Data on the chain is traceable but immutable, drastically lowering extra costs incurred by hiring third party monitoring organizations in the digital ad business.

1.3.2 Blockchain offers decentralized crowdsourcing services:
Within the blockchain, advertisers can outsource each stage of service to multiple vendors through smart contracts with the capability to precisely track the data in real time. A liberalized reward and punishment mechanism for market will incentivize service providers to improve competiveness based on service capability.

1.3.3 Blockchain returns the right of information control back to the users: From a user's perspective, blockchain offers a transparent data system that enables users to be well informed of and manage their own information. Through smart contracts, users can decide whether to publicize their basic personal or behavioral data to specific parties such as data collection and data analytics service providers and receive payment from them based on the usage of their information. We believe this can significantly improve user privacy as well as data accuracy and validity in Adrealm, which equip AdRealm with the potential to surpass giant players such as Facebook and Google.

1.3.4 Blockchain improves payment efficiency for transaction parties:
The characteristics of blockchain's distributed storage and accounting make it highly efficient by having all transaction data presented and settled in real time on the platform. This will effectively eliminate the current circumstance of bill delays by the dominating party.

1.4 Project Highlights

1.4.1 Seamlessly integrating Blockchain's core capability and application scenario:
Putting Blockchain's core capability to practice in solving key pain points for the global digital advertising industry, including the lack of proper trust mechanism, decentralized crowdsourcing operations, and the dominance by monopolies.

1.4.2 Market opportunity is huge and pain points are clear: Despite the digital advertising industry being a hundred-billion dollar market, pain points are still clearly felt within the operating model. There is strong rigid demand for a solution for all parties.

1.4.3 Top technical and management team: Our team has accumulated over three years of real global experience and product experience with AI and big data. Our leadership team has had significant experience tackling the overseas market in which we became a global developer case study for Facebook and the fourth largest android developer globally by reaching over 300 million users in less than nine months. Transitioning from mobile apps to gaming, we also became the largest export publisher in China for "casual" and "casino" gaming categories within a year, realizing profitability with scale.

1.4.4 Solid business foundation and leading technology: We have accumulated a strong foundation of clientele, industry resources, and data from our existing products. This allowed us to gain tremendous traction of over 10 million MAUs (monthly active users) and over 900 million displayed impressions within four months of product roll-out. We also have an AI-driven ad monetization platform (UPLTV) as well as a strong data platform built from years of being in the business (Dataverse). These are all critical backbone for AdRealm and the immediate take off, including the technical support, user adoption, traffic integration and development of the overall business.

2. AdRealm's Mission and Goal

2.1 Mission

Reconstructing a global digital advertising marketplace that is a fair, efficient, trustworthy and mutually beneficial ecosystem through blockchain technology.

2.2 Goal

AdRealm reconstructs the mobile advertising value chain and rewrites game rules to allow the growth of an advertising ecosystem that can reach higher efficiency.

2.2.1 AdRealm is a completely open advertising ecosystem network that is based on the decentralizing

nature of blockchain technology. It allows any party willing to adopt the rules of the network to participate in exchange of reasonable return. AdRealm cannot, and will not, become a centralized service provider in which it will not obtain further monopolizing opportunities from other service providers. AdRealm will aim to open up all points of the advertising service value chain to those who are willing to participate.

2.2.2 AdRealm will enable a new mechanism of trust based on blockchain since no one service provider can single-handedly change any historical data during the entire advertising process. From that, each service provider will be given a ranking score from this transparent peer-to-peer system, giving rise to only the best providers in specific niche segments. This will eliminate the need for players to expand their service and reach along the value chain to reap more benefits.

2.2.3 Smart contract application of the blockchain technology allows AdRealm to effectively compartmentalize traditionally neglected processes. Crowdsourced micro services can then be standardized and used to improve efficiency of the entire process (i.e. material service providers).

2.2.4 With our own insights and understanding, AdRealm "unpacks" the many combined features that traditional advertising alliances possess in a fair and clear way. It then aims to build a range of standardized "micro" services with a unified transaction process. No single transaction will be automatically tied to any default services (including AdRealm's own micro services), eliminating the possibility for centralized and monopolizing behavior.

3. Product Solution

Eliminating big platforms and building micro services by creating an environment for the growth of differentiated services and crowdsourcing at key stages of advertising. Re-orienting the advertising business to be both advertiser-centric and developer-centric, allowing for transparent and high efficiency operations.

The first step will be to separate and split each of the technical phases of advertising into the blockchain and redefine each role as a "micro service". Each role will then correspond to a type of service and each type of service will have a group of service providers that fulfills the service need through the form of smart contracts. In this way, risk is reduced through crowdsourcing and may the best service provider win the contract. AdRealm will be responsible for standardizing the operating model for each type of service provider as well as providing standard codes and smart contract templates.

AdRealm's Global Ecosystem

Provide a digital advertising smart contract market based on Ethereum for the advertisers, so that the advertisers can choose contracts on demand, recharge digital tokens and release contracts for real-time advertisement bidding.

AdRealm provides a smart contract marketplace for advertisers based on Ethereum where advertisers choose the contract based on their needs; digital tokens used during the both the bidding process as well as used to publish smart contracts into the network.

3.1 Key roles in the digital advertising industry

Advertisers are the demand-side in which they usually have one or multiple promotional content and are willing to pay for traffic (audiences) coming from the developers'/publishers' end. Payment can be calculated in multiple methods, depending on how the promotional activity is measured in terms of result.

Developers are the supply-side of the service in which they provide the traffic (audiences) needed. Usually they have one or multiple media/sites in which requires monetization, thus realizing their return through offering this service to advertisers. Developers will automatically be allowed to monitor and see smart contracts released by advertisers.

Service providers will register their service "type" through AdRealm and from that, be given the access to specific types of smart contracts released by developers and advertisers. The following are some key service provider types:
● Advertisement optimization: Help developers monetize and improve conversion efficiency through using both public and private data along with their own algorithm.
● Materials production: Produce more effective ad creatives or material based on utilizing private and public data, along with requests from the advertisers.
● Data tracking and analytics: Provide data tracking and analytics services to advertisers and developers based on customized needs utilizing public and private data.
● Anti-fraud: Detection and evaluation of fraudulent activity within advertising transactions based on private and public data along with their own algorithm.

Basic infrastructure service providers offer data chain related services. They usually offer storage space and computational resources to service providers.

3.2 System Architecture
AdRealm adopts a double-layered chain model – transaction chain and data chain – to solve for the technical and business aspects of the ecosystem.

Given the large amount of user behavioral data generated during the advertising process, the completeness of certain data will become the requirement for whether a smart contract is executed (i.e. whether a user watched an ad, completed viewing of an entire ad, downloaded an app based on the ad etc.). In order to avoid ad fraud activity, data throughout this entire process will be decentralized, thus results can be easily tracked. However, many public chains cannot handle high concurrency business activity; we designed a special data chain using Proof of Stake (POS) protocol as a basic infrastructure solution for data storage and processing. This seamlessly integrates big data and blockchain.
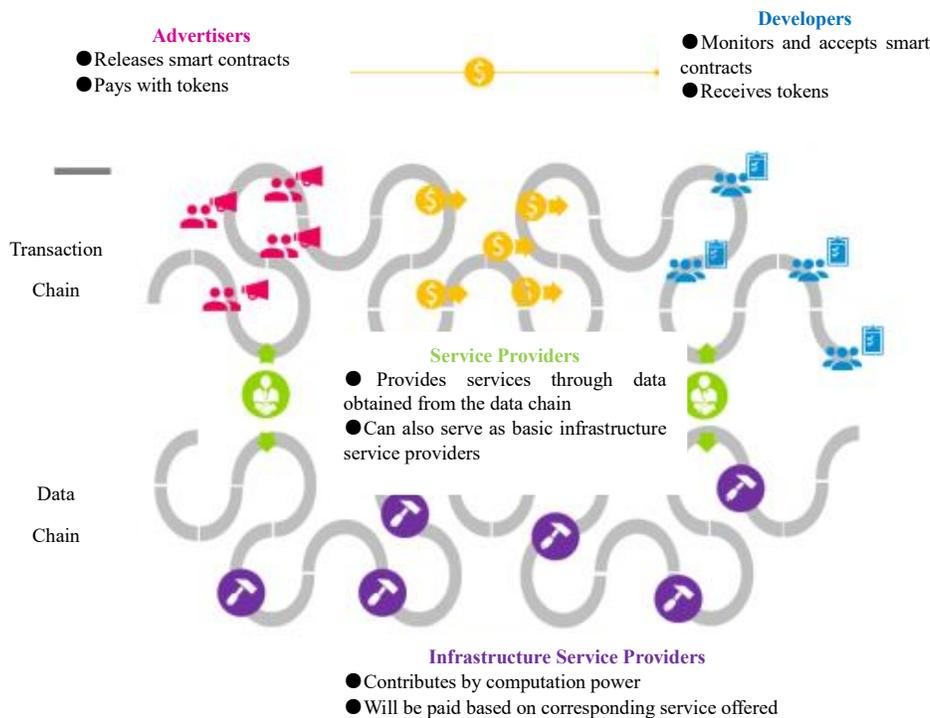
3.2.1 Transaction Chain
The transaction chain is AdRealm's prime chain. To do so, we have initially chosen to build the prime chain through an Ethereum public chain. In the mid to later stages, we will build a dedicated public chain for the prime chain in order to reduce transaction related costs.
The transaction chain is mainly used to record complete advertising transaction data, however not including specific end user advertising behavior data.
The release of smart contracts, execution, and bill settlement processes between advertisers, publishers and service providers will all be done through this chain.
The transacting currency on this chain will be using digital tokens.

3.2.2 Data Chain
The data chain is the sub-chain, a basic infrastructure side chain.
Its core function is to record end user granular data in each advertising phase based on the original data, providing complete and reliable management.
The data chain will provide storage, bandwidth and computational basic infrastructure in order to

support all parties.

To allow for continuous reliable distributed operations of the data chain, basic infrastructure service providers will receive corresponding returns based on workload.

3.3 Business Process

The advertiser with an advertising need will begin by submitting a smart contract unto the chain, this simultaneously freezes the corresponding advertiser budget. On the developer side, the contract will be automatically carried out with a match. This process may involve service providers in other areas such as creative materials, tracking, analytics, anti-fraud etc. The services carried out by these providers will also be validated and automated through the form of smart contracts.

The entire transaction process will be regulated to follow the revenue sharing ratio of the smart contract, ensuring that the relevant parties will be allocated the right amount of budget split from the advertiser.

As micro services are planned and executed in the way of smart contracts, the whole advertising process, from display to payment, becomes transparent and automated. This creates an open system structure and fair way that fully minimizes the costs associated to ad matching and display.

At the same time, service providers with excellent track record can acquire more customers by further improving their technology without having to incur more costs in marketing and sales.

How it works for advertisers:
- Set up an Ethereum account and charge the account through digital tokens;
- Create a smart contract based on what is needed by selecting a smart contract template from the marketplace
- Select your advertising period/campaign as well as ad budget
- Select your preferred payment terms (CPM/CPA/CPC/CPS) and target price;
- Determine your advertising criteria;
- ○ Geography by country, demographic information and/or by audience interests
- Submit relevant marketing documents/design materials and store it in IPFS/Filecoin;
- ○ Or link with existing creatives/design service provider contract
- Determine a data monitoring service provider;
- ○ Set up warning signal parameters based on your data range criteria
- Charge the digital tokens to the smart contract and release into the ecosystem network.

An example of an advertiser smart contract:

```solidity
pragma solidity ^0.4.2;


contract Offer {

    address adverti    Advertiser's wallet address

    mapping (address => uint) balan    Flow owner's address, supplemented after the flow owner
                                       receives an order

    mapping (string => string) me    Detailed information of advertisement: Target groups, material
                                     information, etc.

    uint bud    Advertiser's budget

    uint c    Daily cap of advertisement

    mapping (string => uint) ru    ROI, CIT and other conditions for reaching
                                   advertiser's budget


    event Match(address from, address to,uint amount);

    event Pay(address from, address to,uint amount);

    event GetBalance(address from, address to,uint amount);

// According to the advertising effect, judge the contract to perform with the
   developer's cap and pay to the developer
function pay(mapping (string => string) result) {


    function Offer(meta, budget, cap, rules) {

        advertiser = msg.sender;

        budget = budget;

        cap = cap;

        rules = rules;

    }


    // The developer starts to make small profit and earn quick return, and
       distribute the quantity of ucap to the developer.
    function match(uint ucap) {

        if (cap < ucap) throw; //    The cap has been fully consumed.

        balances[msg.sender] += ucap;

        cap -= ucap;

    }
```

```
        if (!check(rules, result)) throw; // Check whether the advertising effect meets standard or not
                                           // from API in the data chain.
        address publisher = result[publisher],

        uint pay = budget * balances[publisher] / cap;

        budget -= pay;

        Transfer(advertiser, publisher, pay);
    }


    //   Acquire the cap of an account.
    function getBalance(address account) constant returns (uint) {

        return balances[account];

    }
}
```

How it works for developers:
● Register your media platform/application through a developer's account
● Select a data tracking service provider
● Select an ad optimization service provider
● Determine suitable types of smart contracts and threshold values
● Integrate the AdRealm SDK and publish to App store and Google Play
● Receive digital tokens

How it works for service providers:
● Pass AdRealm's qualification certification or recommended by peer service providers
●Register as a service provider account
●Determine suitable types of smart contracts and threshold values
●Receive push notifications for relevant smart contracts on the marketplace
●Complete service for a specific contract
●Receive digital tokens according to the agreed contract terms

How it works for data chain service providers:
●Acquire the client-account needed for resource contribution through AdRealm's official website
●Receive appropriate payment for computational and storage resources offered

Example of an advertiser's complete transaction process on AdRealm in CPC terms

Advertiser A: casual game G, would like to promote this product to American female audiences.
To begin, advertiser A would need to buy tokens using fiat currency, purchasing ARM tokens worth $1000 dollars.
Advertiser A then submits a smart contract with the following information through AdRealm's smart contract management system:
●Subject of promotion: Game G
●Promotional needs: USA, female
●Promotion budget: $100/Day
●Promotion period: 10 days counting from today
●Tracking service provider: Any service provider with fees no higher than x%

●Payment terms: CPC at $0.1 max
●Media restrictions: None
●Advertising format: Rewarded video ads
●Materials: Official advertising materials for game G

Since advertiser A did not select a specific tracking service provider, AdRealm will randomly select one based on the criteria of "fees no higher than x%" for this transaction.

In most cases, the sub-contract for tracking and data service providers will be immediately matched with service providers who have set the same value thresholds for receiving contracts. The service provider will instantly begin service as the contract is accepted.

If there is no successful match for service providers, advertiser A's entire smart contract would immediately terminate and operations would be rolled back.

In our example, a primary smart contract and two sub contracts were created successfully.

Developer D receives the demand request from advertiser A based on the presets of developer D's requirements and payment terms. If there's a match, developer D will automatically receive the contract through AdRealm's platform.

Developer D has pre-selected its ad optimization service provider, F. With a match from advertiser A, service provider F will also receive a notification from the chain to add the requirements of advertiser A into the existing bidding list.

The end user, U, on developer D's platform will trigger an ad display opportunity within developer D's game.
Service provider F will be able to verify that the end user, U, are indeed American female audiences, matching advertiser A's required conditions. This is done through the support of data service provider M. With that, there would have incurred a small amount of fees between F and M, which will be paid based on the terms in the smart contract pre-signed by respective parties.

Ad optimization provider F will rank the eCPM rates of advertiser A's ad content based on its historical data and algorithm. Advertiser A will receive an ad display opportunity for the highest eCPM ranked content.

Once the ad is displayed, user U clicks on the ad. This behavior will be captured by the tracking service providers selected by both advertiser A and developer D.

Since the user's behavior has triggered the terms of advertiser A's smart contract, thus:
●Digital token at the value of $0.1 is paid to developer D
●Developer D pays service provider F a predetermined percentage based on revenue share of CPC term earnings
●Based on the regulations of the smart contract, the advertiser automatically pays $0.1* x% of fee amount to its tracking service provider

As the CPS model would either need advertisers to report internal sales data or be realized through another chain, this model requires continuous R&D and optimization.

3.4 Examples of Application Scenarios

3.4.1 Dealing with fraudulent ad activity from the developer side

Blockchain cannot directly solve for ad fraud (such as click fraud or misleading users to click) but since all data can be tracked, as long as original records are present, any type of fraudulent activity can be detected afterwards. Since we will freeze developer earnings for a period of time, this gives advertisers the chance to recover any necessary ad spend if fraud is detected.

The recoverable period (i.e. within 7 days) would allow advertisers to submit a request of anti-fraud through an electronic contract if they suspect any possibility of fraud (despite the technical fulfillment of the conditions in the smart contract). The electronic contract will thus freeze the deposit for this request.

The electronic contract will then issue this request to three or more anti-fraud service providers. Once a service provider accepts the request, they will be granted access to the relevant data. Once they are able to provide the relevant analysis on fraudulent activity within a given time frame, the deposit from the advertiser will be released and shared among these service providers.

If a majority of the service providers conclude that fraudulent activity did indeed exist, a punishment towards the developer (to return fraudulent earnings) will come into effect immediately and recorded. Advertisers will also be refunded the paid deposit amount.

Otherwise, the punishment to the developer will not take effect, and the advertiser's deposit does not need to be returned.
● An advertising transaction occurs between an advertiser and a developer
● The advertiser feels that there had been fraudulent activity and submits an anti-fraud smart contract into the system along with a deposit of no less than 10% of the amount in dispute
● The system releases this request to qualified anti-fraud service providers, A/B/C
● The majority of A/B/C makes an unanimous judgment, e.g. fraudulent activity was present
● The system implements the developer's anti-fraud smart contract

3.4.2 Solving for ad price bidding for advertisers

When more than one ad is matched to a specific display opportunity, how do you determine which one gets the ad placement? Google and Facebook both have different ways to determine this (GSP & VCG). We have decided that the algorithm needed here should be crowdsourced to service providers for ad optimization and let that run its own fitness test.

There can be numerous ad optimization providers that can come between advertisers and developers on the AdRealm network. Developers can freely choose between multiple service providers and test different ad display logic to see which brings the highest monetization efficiency.

AdRealm does not provide ad optimization for advertisers because by optimizing monetization for the developers' side is equivalent to optimizing ad display for advertisers.

A chosen ad optimizing service provider by the developer will be granted parts (or all) of relevant user data, thereby controlling the order of ads being displayed.

The key here is to have "ad optimization service providers" replace prior ad networks, thus making all advertising resources the same for all advertisers. For ad optimizing service providers, their key aim will be to gain more data and continuously improving their algorithm to achieve higher efficiency.

3.4.3 Solving for high-concurrency activity and scalability issues with blockchain

By creating a data sub chain that provides for the basic infrastructure, chain nodes providing storage

and computational power and owns complete authorization mechanisms. This will support the scalability of big data and high concurrency activity.

3.4.4 How to reach the similar advertising power of Facebook and Google?

● By focusing on product design, to re-orient ad display service providers to focus on optimization algorithm technology itself
● Attract data providers to come onto the AdRealm platform with a good operational model
○ An innovative operational structure that draws third party data providers through the transaction rev-share model
● AdRealm sets the rules and standards, at the same time providing additional data evaluation, ranking, and mining services
○ Utilizing machine learning AI technology
○ Provide open source tools
● Complement the network by drawing in service providers that allow users to monetize their own data, creating personalized data
○ By authorizing data service providers to acquire certain personal data on accounts such as Facebook and Google, which is paid through tokens through smart contracts on a monthly basis

3.4.5 Dealing with the advertising traffic "futures" model

In special cases, AdRealm may see the emergence of a role for "futures traffic dealer". This is due to some advertisers' belief that there would be a spike in advertising pricing for a specific time frame somewhere down the future. Without having any advertising need in this present moment, they may choose to submit a series of smart contracts to "reserve" parts or all of the target traffic for a specific future time frame.

When the times comes when an advertiser with real advertising need appears and can only bid a much higher price of a smart contract for that same specific target traffic, the "futures traffic dealer" thus makes a margin from this transaction.

Not only does this damage the availability of the network's traffic but also causes inefficient waste of network resources. AdRealm aims to prevent this from happening by implementing several operational models at the current stage to restrict futures traffic dealing:
● There is no transaction model between advertisers
● Restrict traffic reselling through technological means, detects and withdraws smart contracts that seem to not originate from real advertising demand

4. Technical Architecture
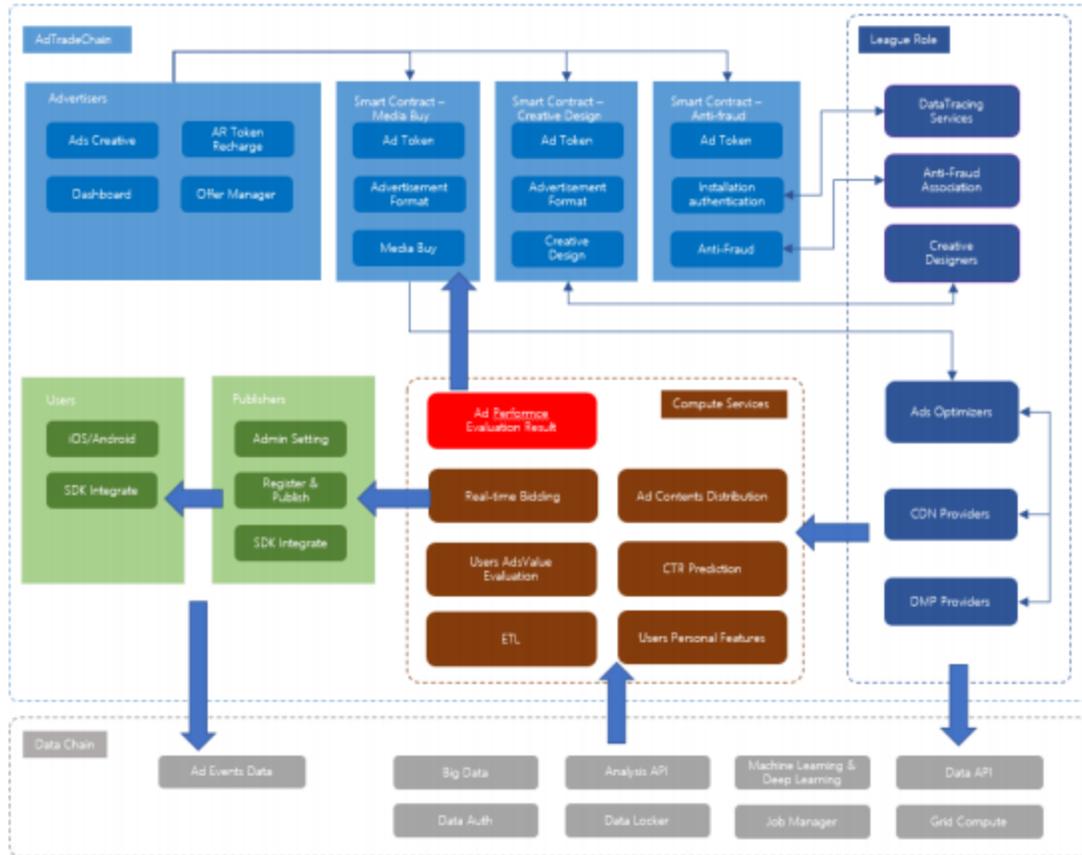
In order to solve for concurrency and speed related issues, AdRealm adopts Ethereum-based smart contract for both the ad trade chain and a league-based data chain.

4.1 Advertising Chain

4.1.1 Advertiser Campaign Management Platform:

a. Smart contract management: CPS/CPA/CPC, etc.
b. Account recharging and purchase records
c. Promotion campaign: Target demographic, audiences, budget, timeline, etc.
d. Analysis report for promotional efficiency

4.1.2 Publisher Monetization Management Platform:

e. Manage reference settings for acceptable contract terms
f. Manage contracts from monetization and optimization service providers and data management
g. Analysis report on monetization efficiency
h. Earnings management and withdrawal

4.1.3 Service Provider Platform:

i. Manage preference settings for acceptable contract terms
j. Digital asset management
k. Manage smart contract pricing
l. Earnings management and withdrawal

4.2 Data Chain

4.2.1 The basic infrastructure side chain provides all original data storage and computation for the advertising system, and is implemented to ensure data transparency throughout the entire ad value calculation process.

a. Incentive structure for storage and computation is guaranteed through the Proof of Stake (POS) protocol
b. Development of a complete authorization and verification mechanism that guarantees data privacy and authorization issues for data generated throughout the process
c. An open source SDK, once integrated by the developer for the user end, which syncs end user data directly into the basic infrastructure storage

4.2.2 The basic infrastructure side chain enables basic infrastructure service providers the ability to design and build various data application layers

d. Database application layer: Providing standardized database capability, allow for fast data search and indexing ability
e. Smart data application layer: Provide commonly-used basic services and toolbox for machine learning, allow for services in distributive computation power and algorithms

4.2.3 Advertising service providers may design and build advertiser and developer-facing services through choosing data and application layers.

f. Data analytics service providers can generate business-facing reports through submitting data analysis tasks, and showcasing it to business intelligence.
g. Data tracking service providers can provide strong attribution and anti-fraud service capability based on data and algorithms on the data chain.
h. DMP service providers can provide accurate user portraits through data on the chain.
i. Anti-fraud service providers can offer arbitration through supporting anti-fraud case evidence based on original data found on the data chain from the advertiser.
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5. Token Issuance and Plan

5.1 Token type and usage

AdRealm issues two types of tokens:
● ARM token- A Ethereum-based decentralized blockchain digital asset developed based on Ethereum ERC20 token standard
● AD token- a static token with the rate of USD 1:1 guaranteed by AdRealm. AD token cannot be circulated in the public marketplace and only used for transaction recording and tracking. The AD token is created when ARM token is converted to AD and destroyed when converted back to ARM (entering blank URL).
The purpose of creating two types of tokens is to prevent stock price volatility from impacting business, described below.

The ARM token, being based on Ethereum, will also be directly tied to the value of ETH and openly traded along with ETH. This will naturally cause pricing fluctuations of ARM, in which the range can also get unexpectedly high. Without any insulation, this may impose tremendous negative impact on AdRealm's advertising business. For example, if an advertiser uses ARM to buy traffic, due to pricing fluctuations in the open market, developers on the other side will be reluctant to undertake this risk. To solve for this issue, we designed two tokens such that AD token's value will be restricted to "transaction value", ensured by stability with US currency. This eliminates risk for developers as they will receive

payments in AD tokens. Developers can also convert its AD to ARM and then into fiat currency.

5.2 How the ARM token is used on AdRealm

● The advertiser buys in ARM tokens from the open market with ETH.
● The advertiser creates a smart contract for its advertising need, meanwhile the system converts the ARM tokens into the AD tokens internally and freezes the converted AD tokens
    ○ ARM to AD conversion rates fluctuate in real time to ensure the 1:1 exchange rate of AD to USD.
    ○ If the transaction did not fully complete, the remaining AD tokens will be automatically converted into ARM tokens at the current exchange rate and given back to the account holder
    ○ The AD tokens are created by AdRealm when the contract is created.
● Developers and service providers receive payments in AD tokens upon task completion
● Developers and service providers can exchange the AD tokens into ARM tokens, and further exchange the ARM tokens into ETH in the open market.
    ○ Developers and service providers can hold small amounts of AD tokens temporarily in which AdRealm ensures the 1:1 exchange rate of AD token to USD.
    ○ When developers and service providers exchange the AD tokens into ARM tokens, the value of the ARM tokens will fluctuate with the changes of the market.
    ○ The AD tokens are recovered and destroyed (i.e. enters into a blank account, will not affect historical data tracking capability) by AdRealm, at the same time, AdRealm pays in ARM token at the present exchange rate
    ○ Developers and service providers can hold up to a certain amount of AD tokens, once exceeding the limit, the system will mandatorily exchange AD tokens into ARM tokens.
● AdRealm charges a small percentage of AD token from each transaction as tax fees, the tax rate determined per transaction
● AdRealm must effectively manage its token pool at all times, ensuring for both supply and appropriate amounts of ARM token to deal with daily business needs and possible crisis. ETH and BTC will also be stored to be used when needed to deal with market stability.
    ○ AdRealm will set a mandatory exchange mechanism triggered by intense fluctuations in ARM token value, and mandatorily exchange the AD tokens into ARM tokens under extreme circumstances.
    ○ Tax fees charged in the transactions will also be used for maintaining market stability.

5.3 ARM Token Rights

● For ARM token holders, the token can be used during digital ad transactions as well as to receive equities over time given by the AdRealm Fund on an annual basis. Equity is given out in the form of ARM token, equivalent to ad service rights on AdRealm.
● More specifically, the AdRealm fund will report audited expenses and income at the end of each financial year, including amounts incurred during the construction, promotion and operation of AdRealm. Profit will primarily come from a transaction fee (fixed ratio). Each year, we will also extract a certain ratio of net earnings to be given out to ARM token holders in the form of ARM tokens.
● Earnings for each ARM token holder are calculated as below:
    Token earnings = Amount of ARM Tokens Owned * Time length of ARM Token Ownership
● To lower management cost, ARM token holders who will receive token earnings below a certain quantity will be given their cumulative token earnings in the next year.

5.4 US Dollar reserve mechanism for AD token

● As mentioned before, AD token is created and put to use primarily to insulate parties (advertisers, developers and individual service providers) during a contract transaction from market volatility. The value of AD token itself needs to be strictly maintained for stability purposes. This is the core logic behind setting up a reliable US dollar reserve.

○ The AD token is an intermediary currency that is constantly created and destroyed. Its total size also depends on the total transaction size within the system for a given time period. Since this transaction size is equivalent to AdRealm's business magnitude, it can be effectively forecasted, meaning the reserve can be easily managed.

○ According to a fixed ratio P% (starting with P=100, meaning 100% reserve amount), AdRealm will deposit a reserve amount equal to total AD token amount*P% into the bank or purchase low risk, high liquidity currency funds and short term bonds. This can thus be effectively exchanged from AD tokens to BTC or fiat currency when needed.

○ The reserve ratio P is adjusted according to the scale of AdRealm's business, the storage level of AD tokens and market volatility. It will also be open to inspection by investors and the community. Under stable market conditions, AdRealm will also lower the reserve ratio P accordingly to expand AdRealm's market size. Contrarily, AdRealm will also increase the reserve ratio P to ensure the safety of business and economic conditions.

○ Reserve ratio adjustments as well as other related transaction records will be released on AdRealm's official website regularly.

○ Initial reserve pool will primarily come from initial stage fundraising where AdRealm will be converting part of it into US dollar. As our transaction size increases, the reserve amount will also grow mainly from transaction tax charges as described in 5.2.

○ Regarding mandatory conversion conditions of AD to ARM tokens
- When exceeded the permitted time period of holding AD tokens (initial value set at 72 hours), AD tokens will be mandatorily converted to ARM tokens
- When exceeded a certain amount of AD tokens (initial value at AD token value up to $10,000 USD), AD tokens will be mandatorily converted to ARM tokens
- An alert for evaluation mechanism will initiate when BTC and ETH values fluctuate beyond a specific range (initial value set at 10%) within 24 hours, in extreme cases, all AD tokens can be converted to ARM tokens

● The above described mechanisms will allow AdRealm to effectively manage the stability of AD tokens and reliably support the high efficiency business operations.

6. Governance

AdRealm will establish a nonprofit fund overseas. Funds raised are mainly used for design and R&D, operation and management, comprehensive governance, etc. of AdRealm, in order to improve transparency and promote the development and application of AdRealm's network and ecosystem.

Cryptocurrency tokens raised by AdRealm shall be managed with transparency, efficiency and auditable principles. All capitals and digital assets raised post ICO will be managed and controlled under AdRealm's nonprofit fund.

AdRealm will have a council in which all major decisions shall be done through voting. The voting process will be a fixed structure on the AdRealm network and elected by blockchain transparency principle through all network nodes on AdRealm. The council will appoint members those from each party taking part on the AdRealm network. The number of seats on the council will be determined by the same proportion of nodes in the network as well as the weight of contribution to the network.

The term of office for AdRealm's first council and the executive director is 2 years. Later on, based on

token ownership amount and weighted historical records to select top 30 members as the new council and executive director. The new council will then continue to lead AdRealm fund as well as continuous improvements to the AdRealm network.

During the term of office, the executive director is responsible for evaluating AdRealm's rules, and determining whether to make any adjustments. The executive director is also responsible for hiring the technical, operational, marketing and financial departments as well as personnel to provide support for AdRealm's overall development.

The salary package of the executive director is determined by the financial department, and approved by all council members through voting.

The AdRealm fund will receive annual auditing, in which its operations and risk evaluation will be completed by a leading global auditing firm. The foundation will rate events through using key indicators, e.g. the degrees of impact, scope range, affected number of tokens and occurrence probability, to enable priority of decision-making. Events with high ratings will be given priority by the council.

7. Business Roadmap

7.1 Strategic Partnership with UPLTV

Since its inception, AdRealm had entered into a strategic alliance with the world's first AI-driven ad monetization optimization platform, UPLTV. AdRealm will seamlessly integrate advertisers, ad platforms, and content developers from UPLTV platform into the chain ecosystem with UPLTV SDK. At the same time, UPLTV will also provide the talent teams, tech development and industry resources for AdRealm.

UPLTV is an AI-driven monetization operating platform focused on global mobile gaming. The platform will provide key areas of support in the following:

7.1.1 Stable business resources and partnership

○ UPLTV was developed based on Dataverse big data platform on April 7th, 2017.
○ UPLTV released its first operating version by May, 2017 and integrated games published by Avid.ly
○ The mediation platform released a more stable version by mid-June, 2017 and integrating more games for developer testing, also publicly providing backend reporting system
○ An official website upltv.com was launched and the commercial version had become publicly available by early August, 2017.
○ As of December 31, 2017, UPLTV began working with hundreds of gaming developers, with over 10 million MAUs and total impressions displayed exceeding 900 million in the month of December, daily revenue flow on the platform exceeded USD 47,000.

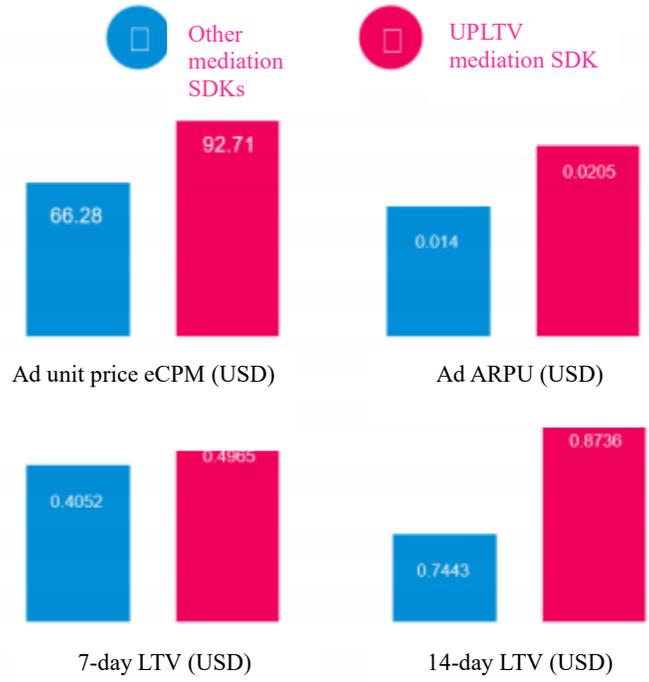UPLTV has built business partnerships with hundreds of content developers, for over a thousand products

Traffic partners include leading industry players such as Facebook and Google AdMob.


7.1.2 Leading technological capability

a) Ad optimization based on deep learning and user path analysis

Replacing manual ad monetization optimization, AI utilizes machine learning on each display opportunity and frequency. Under equivalent circumstances with other globally leading ad mediation platforms, UPLTV SDK increases ad ARPU value by over 50% on the premise of slightly reducing advertisement display volume per person. Over time, as more data is channeled through by the content developers, widening the gap between competitors. The following is a comparison between UPLTV and two other global top ad mediation platforms:

Other mediation SDKs   UPLTV mediation SDK

Ad unit price eCPM (USD)   Ad ARPU (USD)

7-day LTV (USD)   14-day LTV (USD)

b) A big data analytics system as backbone, providing the ability to track, analyze and predict the holistic path from user acquisition to monetization

Researched and developed in-house, Dataverse is a global data collection, statistical analysis system. By acquiring audience related data from international games, it is more accurate, efficient and timely than third party providers. Dataverse can support data storage up to over 100 million DAUs and over a million new user data. This provides fundamental analytics capability for UPLTV's overall gaming business.
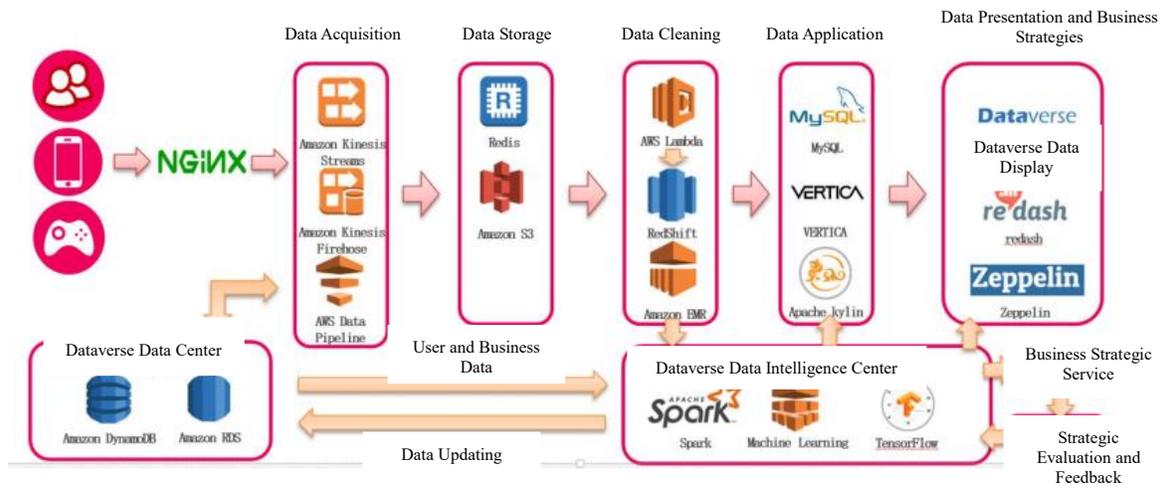
7.1.3 Strong overseas development team

UPLTV is equipped with the industry's top technical and management teams. The tech team has successfully built global leading AI and big data products in two and a half years' time and launched it to hundreds of millions of global audiences. In addition, UPLTV's overseas management team rose from the previous Holaverse network, which achieved the acquisition of over 300 million users within 9 months, being recognized by both Facebook global developer case study and the world's fourth largest android developer.

●Hola Launcher becomes the second application which is listed into the case leaning and display of global developers of Facebook ● Displayed at the first place on the display page (Clean Master is at the second place)	●In July 2015, Holaverse ranked No. 4 in the Global Google Play Applications of App Annie-Ranking List of Companies. ●Co-listed with Cheetah Mobile as large key accounts on Google China

7.2 Business Development Plan

Based on the strategic partnership with UPLTV, AdRealm will expand its business in the following three stages in the future:

7.2.1 Stage One-Build basic technical infrastructure [April 2017-2nd quarter of 2018]

Through continuous efforts of building underlying technology and small scale testing with interchanging traffic on UPLTV, AdRealm will quickly reiterate and optimize the product. Following blockchain technology developments, we will also continuously test and revise.
●April 2017: UPLTV was founded
●May 2017: UPLTV SDK integrated to first client
●December 2017: UPLTV integrated to 100 clients, daily advertisement display volume exceeded 18 million
●January 2018: UPLTV begins partnership and integration process with AdRealm
● 2018Q2: UPLTV releases new version of SDK (AdRealm version) online for testing

7.2.2 Stage Two-Cultivate the market (2nd quarter of 2018-4th quarter of 2019)
Along with the strategic partnership with UPLTV and other partner clients, traffic and product resources will also gradually aboard the chain. We will quickly accumulate suppliers, users and data to initialize the construction of a blockchain ecosystem.
● 2018Q3-Implement basic advertising prototype system and service model
● 2018Q4-Internally test the transaction chain, realizing smart contracts submitted by converting AR token to AD token, complete the first blockchain-enabled advertising display
● 2019Q1- AdRealm's self-operated service providers comes online for testing, as well as data chain testing. Launch integration of other ad mediation/optimization partner integration
● 2019Q2- AdRealm's internal service providers and the data chain will both launch online; advertiser and service providers' standardized template 1.0 will become effectively available
● 2019Q3-Complete a first batch of service provider integration into AdRealm, including the top ad

networks and data providers globally
- 2019Q4- AdRealm exceeds a target daily ad display volume of 50 million

7.2.3 Stage Three- Overall explosive growth [2020-2022]

AdRealm platform is fully open and accelerates the integration of service providers, advertisers, developers and end users, forming a complete ecosystem on the chain. This will disrupt the traditional advertising platforms by replacing it with micro services on each path point, operating at higher transparency and efficiency levels.
- 2020-Continuously optimizing and improving the operating efficiency of blockchain networks, integrate with other well performing blockchain to allow for inter-communication, growing total ad traffic
- 2021-AdRealm's self-operated service providers will gradually exit the platform; AdRealm will focus its efforts on providing ecosystem services
- 2022-AdRealm gradually becomes the largest blockchain advertising network

8. Core Team, Advisors and Investors

8.1 Team Members

Dana Gao, CEO of AdRealm
Dana has 8 years of HR learning and overseas work experience; sequentially served as the HR head for Siemens, GE, Motorola, Fosun Pharma, and MSH. She led her team to win multiple business awards; in her latest achievement, she had led MSH to win the "2016 China Enterprise Talent Development: Most Valuable Case Award" by HRROOT as part of MSH Strategic Leadership Program. Dana has a master's in Human Resources Management from Canterbury University, New Zealand.

8.2 Core Team Members of Strategic Partnership Company (UPLTV)

Brian Xie, Founder
A leading figure for China's mobile internet overseas expansion, Brian led the Holaverse team in both publishing and operating multiple mobile applications, accumulating over 500 million overseas users and becoming the fourth largest developer on Google Play. In a year's time, Brian brought Avid.ly from zero to one, becoming China's largest export publisher for casual and casino type games, helping the business realize profit in scale. Brian is strong adept at conquering the overseas mobile internet market, bringing in-depth and acute insights. Holding prior multiple senior roles, Brian has previously served as VP for TCL China, Regional GM for HTC (Dopod), channel marketing for Microsoft China's mobile business and senior sales director for Dopod.

Alix Liu, Partner, Product and R&D
Alix is responsible for the core business technology. Coming from over 10 years of internet industry experience, Alix is equipped with in-depth blockchain knowledge as well as usage scenarios for the advertising industry. Alix previously held roles in product R&D and advertising monetization at Baidu and ValueClick, he is also one of the earliest Bitcoin miners in China.

Will Zhao, Head of AI and Data Analytics
Will specializes in distributive high-concurrency system architectures and is equipped with strong data processing and AI algorithmic practices. He has also developed in-depth research towards the underlying architecture of blockchain technology. Will previously worked at Qihoo 360 and Holaverse, developing and managing projects with over 500 million user downloads.

Lonee Yan, General Architect
Lonee has over 10 years of experience in the internet industry. He became partner with Brian early in 2008, and led the development of electronic membership card "Show Card", digital coupon "SHOOKOOL", and lock screen "ConceptCoupe", the Hola Launcher, Omni Swipe and multiple other mobile internet products. He specializes in implementation practices for blockchain technology.

Bi Hu, Senior Data Algorithm Engineer
Since 2009, Bi had continued his research in AI and participated in the algorithmic research efforts for cnfinance.cn, Youku, and JD. He also has eight patents applied through his work as primary inventor.

Andy Ning, Senior Server Development Engineer
Andy has 11 years of software development experience and 8 years of technical team management experience. He served as the senior development engineer of Telenav and Huawei, as well as the senior server terminal development manager for Holaverse.

Dean Hu, Senior Product Manager
Dean had been involved in the mobile internet industry since 2012 and had focused on product R&D. He had held positions in server technology manager and product director. Dean also led teams to develop 5 mobile products, 2 ad platform systems with over ten million users.

Coly Zhang, Senior Server Development Engineer
Coly has 4 years of experience in ad monetization and 2 years of practical experience in gaming industry. He has sequentially served as the overseas game publishing technical support leader and ad monetization and optimization, helping games with over 2 million DAUs and utility applications with over 10 Million DAUs improve their advertising earnings by at least 20%.

Coober Liang, Senior Operation and Maintenance Engineer
Coober has over 10 years of internet operations and maintenance experience. He has been awarded the Red Hat Certified Engineer (RHCE) certification and was part of multiple transformational milestones from the PC to mobile. He also participates in the practice of implementing blockchain technology architecture.

Carl Cai, Head of Overseas Business Development
With a Master of Philosophy from Cambridge University, Carl has 6 years of experience in overseas M&A and management consulting; he worked at Pricewaterhouse Coopers where he assisted many Chinese enterprises expand overseas for both business development, overseas acquisitions, and business integration.

8.3 Investors and Advisors

Jian Sun, Investor
Founder of JLAB

Bo Shen, Investor
Founding Partner of Blockasset Fund and Fenbushi Capital

InBlockchain, Investor
China's largest blockchain investment firm with a portfolio of top projects such as EOS, Steemit, Ethereum, Candy Box, BigOne etc.

Funcity Capital, Investor
Focused on RMB and USD funds specializing in disruptive areas such as AI, fintech, blockchain and smart travel etc. Invested portfolio includes OTMS, u51.com, fangcloud etc.

Jun Liu, Investor
Angel investor of TouTiao.com, previously held roles at 360 and Sina. Investment portfolio includes TouTiao.com, Tencent music and entertainment etc.

Shanyou Li, Strategic Advisor
Founder of Hundun University; Founder and CEO of former ku6.com

Yan Gong, Strategic Advisor
Professor of Entrepreneurship at China Europe International Business School, CEIBS Entrepreneurship camp course Director. Gong Yan has a Ph. D. in Strategy from University of Wisconsin, he also taught at the University of California. Gong Yan led profound research on lean start-up methodology and other areas, and has authored the titles "Lean Entrepreneurship Methodology" and "Value Revolution".
His research areas include strategy transformation, lean entrepreneurship and business model innovation. His research works are mainly published on "Academy of Management Review", "Journal of Technology Transfer", "Organizational Behavior Manual" and "Frontiers of Entrepreneurship Research". He was shortlisted into the final of the 2016 INFORMS/Organization Science Thematic Thesis Design Contest. In recent years, he dedicated his time to special research on the development of Chinese enterprises.

Shengdong Pang, Strategic Advisor
Founder of domestic A-share 2345; Founder of 51.com

Wei Duan, Strategic Advisor
Founder of Mobvista, the largest export mobile advertising platform in China.

Edward Jiang, Strategic Adviser
Senior R&D Director at Google Admob. He has long been following the developments of blockchain and its application to advertising. Edward holds in-depth insights and R&D capability in this area.

Chunhe Liu, Strategic Adviser
Founder of newborntown, a bridge for general internet industry players in China to expand overseas. It has built a software product Solo which has accumulated over 600 million users globally. Additionally, its self-developed global market mobile internet platform Solo Ads covers over one billion users worldwide.

9. Risk Warning
Digital assets are a new investment model with many risks involved. Potential investors should carefully consider all investments and personal risks before undertaking investment:

Risks from the cryptocurrency trading market
The market for token sales is inseparable from the larger cryptocurrency market. In the case of market recession or other uncontrollable factors, the value of tokens may be undervalued for a long period of time despite the prospects of tokenization itself.

Regulatory Risks
As blockchain is still at its infancy, there is a lack of legal documents globally (including China) regarding the premises, transaction, information disclosure and locking requirements for an ICO. It is still uncertain how the policies will exactly play out, thus causing many uncertainties to investment and liquidation. Blockchain has also attracted much monitoring and supervision from countries throughout the world. There could be additional interference or policies surrounding AdRealm application and the AdRealm token, such as policy restrictions to the usage and trading of ARM tokens, which could

become an obstacle to the development of AdRealm and the token.

Risk of competition
With the development of information technology and mobile internet, digital assets represented by "BTC" and "ETH" gradually emerge, multiple sorts of decentralized advertising platforms continue to appear making competition fierce. However, with the endless emergence and continuous expansion of other application platforms, communities will face continuous operational pressure and certain market competition risks.

Risk of Loss of Personnel
AdRealm has attracted a group of technical and business experts with rich experiences in their own domains, including professionals who have been engaged in the blockchain industry for a long time and those involved in internet product development and operations. The stability of the team and its resources are critical to AdRealm's competitiveness in the industry. The loss of core team members may impact the platform's operations and may negatively affect future development.

Risk of Development Failure due to lack of funds
The sharp decline of token value raised by the founding team or extended development time may all cause funds to fall short. This may cause risks in realizing development goals in the lack of funds.

Risk of Loss of Password
Once a token is purchased and transmitted to a digital wallet address, in order to access this address would be to access it with a private password (wallet password). The user is responsible for guarding this password as it is used to prove asset ownership during the transaction. The user needs to understand and accept that if his/her private documents or passport is lost or stolen, the tokens related to that account will be lost forever as it cannot be restored. The safest way to store this login information will be for the account holder to separately store it in multiple secure storage locations, and not on a public computer.

Risk of Hackers or Theft
Hackers or other organizations or countries may try to interrupt AdRealm's application or its token functions in any way possible, including but not limited to service rejection attacks, Sybil attack, visitor attack, malicious software attack, consistent attack, etc.

Risk of Uninsured Loss
Unlike bank accounts or accounts opened in other financial institutions, the deposit in AdRealm's account or relevant blockchain network is usually uninsured, and losses under any circumstances will not be compensated by any public individuals or organizations.

Risks Related to Core Protocols
The AdRealm platform is currently developed based on Ethereum. Therefore, any malfunctions of Ethereum, unexpected functional problems or attacks may lead to the paralysis of the platform or token malfunctions.

Systematic Risks
Neglected fatal flaws in open resource software or risks caused by large-scale faults of global network infrastructure. Although some of the risks will be greatly reduced with time, e.g. loophole repair and computational bottleneck breakthrough, other risks are still unpredictable, e.g. political factors or natural disasters which may interrupt regional or global Internet connection.

Loophole Risks or Risk of Accelerated Development of Cryptology
The accelerated development of cryptology or the development of science and technology, e.g. the development of quantum computer, may uncover risks to the AdRealm Platform, which may result in the loss of tokens.

Risk of lack of awareness to its application
AdRealm's applications may potentially not be adopted by enough individuals or organizations, which means that the public does not have enough interest in developing this type of distributive application. The lack of interest may have negative impact on the tokens and AdRealm's applications.

Risks of Not Being Recognized or lack of user adoption

Tokens should not be treated as an investment despite its accumulated value after a period of time. Token value can drastically drop in the case that AdRealm is not recognized or valued by the market. In circumstances including but not limited to marketing and sales failures and business partnership failures (or any other possible reasons), AdRealm may not be able to achieve success after series of funding and marketing. If this happens, the platform will no longer sustain and no leads will follow.

Risks of application malfunction
Out of various known and unknown reasons, the AdRealm platform may malfunction (i.e. large-scale outage) and can no longer provide normal service. Depending on the level of severity, it may cause the loss of tokens.

Risk of product not meeting expectations of users or AdRealm
AdRealm's applications are still in the development phase, meaning that until the official release date, there can still be major changes made. There may be unmet expectations towards AdRealm application, token functionality or form (including participant behavior) by PST itself or the users. In addition, wrongful analysis or any changes in design may also cause this to happen.

Unforeseeable Risks
Cryptographic currency is a brand-new technology which remains untested. Apart from the risks aforementioned in this whitepaper, there are some risks we may have missed or cannot predict. These additional risks may occur, or may present itself in combination with risks outlined above.

Disclaimer

All contents communicated in this whitepaper act only as a point of reference, it does not constitute investment advice, solicitation or offer to the selling and buying of stocks and shares from AdRealm and affiliated companies. Offers must be done confidentially and according to relevant legal terms.

Contents in this document are not a means of coercion for participation in the public issuance of tokens. Any behaviors related to this whitepaper shall not be viewed as participation in token public issuance, including the request for a copy of this whitepaper and/or sharing this whitepaper with others.

Any participants or groups willing to invest in the AdRealm token must be qualified investors. AdRealm does not accept investment from American and Chinese investors. The AdRealm team will continuously revise and update information within this whitepaper to ensure informational accuracy.

Platform updates may occur throughout the development process, including but not limited to platform mechanism, token structure and token distribution. Contents within this document may be updated and adjusted according to the actual development of AdRealm, in which case our team will release the content changes or newer versions of the whitepaper on the official website. All participants are encouraged to download the latest version of the whitepaper and be aware of your own investment decision.

The team will try our best to achieve the goals outlined in this document. However, given situations that may fall beyond our hands, we cannot make a complete promise.

As the official token issued by AdRealm, it is not designed to be an investment product but rather an important tool for the platform to become effective. The ownership of ARM tokens does not mean the ownership, controlling rights as well as decision-making authority to the platform. ARM token is an encrypted token used within AdRealm and does not belong to any of the following currencies: (a) stocks; (b) legal shareholder equity; (c) shares, bonds, notes, warrants, certificates or other documents granting any rights.

The value of ARM tokens is decided upon market forces and actual scenario usage. Its value may be impacted by market participants. Our team does not promise token value growth and is not responsible for consequences pertaining token value fluctuations.

AdRealm abides all regulatory rules and policies that are beneficial to the health of the industry. Through participation, participants are considered to also fully abide by such rules and necessary checks and balances. Participants must also disclose all information required for complete inspections to ensure credible information.

AdRealm clearly states all potential risks to those choosing to participate with the platform. Once engaged with the public issuance of tokens, participants enter into tacit agreement with all rules and clauses stated as well as risks involved, and will bear all following consequences.