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# The SKY Model of Limited BlockChain in an App Ecosystem

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## ABSTRACT

Mobile App based market is rapidly becoming popular. As such, it is an opportunity to bring hassle-free transactions to people's mobile phones. But the multi-billion dollar App market pays a great amount of money in transaction costs and banking services. This paper provides a solution by integrating BlockChain technology with Mobile-App based economy. We first describe the various concepts involved in BlockChain and App technology. Then we deliberate on how the two can be brought together without a glitch in either of the systems. This model is named as the SKY Model, each letter in the word SKY respectively standing for the initials of the authors. We also discuss the various merits of a BlockChain amalgamated with Mobile App based economy. We then go on to show how a decentralised economic system can be brought about on Mobile Apps through The SKY Model of Limited BlockChain.

## INTRODUCTION

A mobile App is a software application designed to run on mobile devices like tablets and smartphones

Apps are available through distribution platforms called App stores.

A software Development kit (SDK) is a set of software development tools that allows the creation of applications for a certain mobile app. It can be downloaded by App developers and attach the SDK to their apps to do various functions

A BlockChain is a distributed database that maintains a continuously-growing list of records secured from tampering and revision. Each block contains a timestamp and a link to a previous block.

A cryptocurrency (or crypto currency) is a medium of exchange using cryptography to secure the transactions and to control the creation of additional units of the currency.

A Crypto wallet refers to an encrypted electronic device (software or hardware) that permits an individual to make electronic cryptocurrency transactions. Each wallet will have a public key visible to anyone. But it can be operated by only a person who has a private key.

Mobile Apps generate significant revenue by advertisements and selling products and services. Mobile App based advertising facilities are sold to advertisers on either cost-per-impression or either on cost-per-click basis.

[Cost per impression (CPI or CPM), is a term used in traditional advertising media selection, as well as online advertising and marketing related to web traffic. CPM is abbreviation for cost per mille, with mille being Latin for thousand.

It refers to the cost of traditional advertising or internet marketing or email advertising campaigns, where advertisers pay each time an ad is displayed. CPI is the cost or expense incurred for each potential customer who views the advertisement(s), while CPM refers to the cost or expense incurred for every thousand potential customers who view the advertisement(s).

If a website publisher charges \$1.00 CPM, that means an advertiser must pay \$1.00 for every 1,000 impressions of its ad. The "M" in CPM represents the Roman numeral for 1,000.

In cost per click (CPC), the advertiser pays each time a website visitor actually clicks on the ad.]

For the purpose of introducing mobile based BlockChain, we have introduced the concept of **AppCoin** (Short for Applications Coin).

AppCoins are basically cryptocurrencies that use the Limited BlockChain architecture to facilitate cryptocurrency transactions to and from Apps.

The Server Cluster is the main unit which manages the Limited BlockChain. It is a cluster of 5-10 networked computers across various places (or in the same place) which runs the LBC.

The Limited BlockChain is a BlockChain whose access is limited by the owners or managers of the server clusters. Each system on the cluster acts as a node. Each Node verifies all AppCoin transactions and through **PoS<sup>v</sup>**<sup>[1]</sup>, mines AppCoins. These AppCoins are distributed to various Apps (which use the AppCoin SDK) in proportion to the number of clicks they get.

There are several advantages of BlockChain based transactions-

Advantages of a BlockChain based transactions -

- 1) Minimal or no transaction cost to the public- The people can use BlockChain based transactions without any trepidation as it fast and free. Nil transaction cost is the basic feature of a crypto currency. Lack of transaction cost will allow seamless and unhindered exchange of money leading to increased economic activity. It will also leave more money in the hands of the consumer.
- 2) Money Accountability- It will be possible for authorities to account for all the money in the system. This way, the counterfeit and parallel economy can be curbed, Money laundering can be detected and flow of money to possible illegal activities can be monitored.
- 3) No need for Bank Accounts- Banks need to be paid to maintain bank accounts. Bank accounts also need to have a minimum balance so as to be viable. But Crypto currencies do not need accounts. Having only a digital wallet is enough BlockChain based transactions can be conducted through digital wallets at no cost to the owners.
- 4) Easy transfer of funds- Governments can transfer funds or social security benefits to citizens' wallets in an instant, free of cost. Citizens' digital wallets can be linked to their social security number or other Government mandated IDs.
- 5) Easy Taxation- A person's money holding can be inferred by the Government when necessary. The Government can automatically deduct taxes without the need for people to file tax returns. It can wind up its tax collecting infrastructure and invest those resources somewhere else.
- 6) Certification- Assets can be certified, recorded and maintained using the same protocols that BlockChain based transactions use.
- 7) Environmental advantage- Printing currency notes and maintaining them in circulation is costly both for the economy as well as the environment. In the long run, BlockChain based transactions will replace paper currency. It will thus save a lot of trees from being cut and used for paper.

8) Easy convertibility- People from one country will be able to invest more freely in other countries as money transfers will be seamless. This will lead to the emergence of a loan market which is highly competitive. This will make cheap and safe credit available to the neediest. This is presently not possible due to existing monetary, fiscal and distance barriers.

At present it is very difficult to run mining clients on Mobile Phones and maintain a BlockChain through Apps. The SKY Model of Limited BlockChain is unique in that it marries Mobile Apps technology to BlockChains through SDKs.

A special SDK is coded. This SDK can be downloaded by any App Developer. This will lead to the integration of BlockChains with App Technology.

### **Functions of the SDK**

1. There will be a global timer running on the blockchain which will send a notification every 't' seconds
2. On receipt of push notification (A push notification is a message that pops up on a mobile device. App publishers can send them at any time; users don't have to be using the App or their devices to receive them) , the sdk sends the data block formed from 't-1' seconds to 't' seconds. ie Data that it has stored from the last tick.
3. The data consists of (Number of clicks + Number of Swipes ) . Basically all user interactions with the App forms the data block. This number is normalized and a weightage is calculated. Basically an App which has more user interactions (higher weightage) will get more value compared to an App that has less user interactions.
4. The server cluster will generate App coins based on all the data blocks it receives and distributes it proportionally.

### **Strategy 1**

App coins will sit in the App . Lets say an App developer has developed App 'X'. This App is downloaded by people 'P1' , 'P2'.... Based on interactions of P1 , P2 with App, AppCoins will be created and owned by P1,P2 etc. Thus it acts as a incentive for users of App to interact with App , whereby they will earn App coins.

### **Strategy 2**

This App coins which is generated by users of App will get transferred to App developer. This is necessary to maintain price parity and avoid rapid devaluation of AppCoins due to large number circulating among the consumers.

A blue print of the SKY Model SDK is as follows(Skelton Code):

1. SDK will operate on similar model of push Notifications.
2. First we create a interface called interaction as follows.
3. **public interface** Interaction
4. {
5.       **public int** getNumberOfClicks ();
6.       **public int** getNumberOfSwipes ();
7. };

2. A model which implements this interface will look like to this

```
public class InteractionModel implements Interaction{

    private int number_of_clicks;

    private int number_of_swipes;

    public void resetAll()
    {
        number_of_clicks = 0;
        number_of_swipes=0;
    }

    public void addClick()
    {
        number_of_clicks = number_of_clicks + 1;
    }

    public void addSwipe()
    {
        number_of_swipes = number_of_swipes + 1;
    }

    @Override
    public void getNumberOfClicks() {
        // TODO Auto-generated method stub
    }

    @Override
    public void getNumberOfSwipes() {
        // TODO Auto-generated method stub
    }
}
```

```
}
```

A Manager class is defined which will deal with the interaction model on the following lines

```
public class SdkManager {  
  
    private static SdkManager instance = null;  
  
    InteractionModel interactionModel  
  
    public static SdkManager getInstance() {  
  
        if (instance == null) {  
  
            instance = new SdkManager(AppInit.getContext());  
  
        }  
  
        return instance;  
  
    }  
  
  
    public onRecieptOfTick(Timer time)  
  
    {  
  
        sendInteractionModelToDataServers(interactionModel);  
  
        //create a new model which starts tracking the  
interactions.  
  
        interactionModel = new InteractionModel();  
  
    }  
  
  
    public void onClick()  
  
    {  
  
        interactionModel.addClick();  
  
    }  
  
  
    public void onSwipe()  
  
    {
```

```

        interactionModel.addSwipe();
    }

}

```

The SDK will carry out three important functions amongst others-

- 1) It will allow advertising on the App. The advertising layout and conditions can be decided by managers of the Server Cluster and SDK writers. (like Appbrain SDK)
- 2) It will gather data about the number of clicks that a particular App receives. It then communicates this data to the Server Cluster on a real time basis.
- 3) The SDK will have an in-built AppCoin wallet. It will facilitate AppCoin transactions. The SDK will also gather info on the number of AppCoin transactions and transaction details, bundle them and send them to the Server Cluster on a real time basis.

The following events take place in the SKY Model of Limited Blockchain-

A) The server Cluster releases 9 Million AppCoins. 6 Million Of AppCoins will be in reserve. This is necessary for future price management of AppCoins. 3 Million AppCoins remain.

B) Each App Developer who downloads the SDK will get 1,000 AppCoins. This facility will be available to the first 1,000 App developers who will download the SDK. This 1,000 AppCoin reward to early downloaders will accomplish many things.

- 1) It Incentivises Downloads of AppCoin
- 2) It is useful as a payment tool for advertisements.

C) Once Downloaded, the App developer of App X can pay 10 or 100 AppCoins (price fixed by Server Cluster) to the server cluster to advertise his/her App on other apps (Say on App Y or Z). The same applies to Apps Y and Z.

This will continue till 1 Million AppCoins are given away. Later App developers can download the SDKs but will not get 1,000 AppCoins. Now 2 Million AppCoins remain.

D) Consumers can use AppCoins by downloading AppCoin wallet. They can buy AppCoins from the Server cluster. The wallets will contain a ticker that will send real time information on AppCoin transactions conducted by customer. The Server Cluster will verify the transactions cryptographically, confirm them and add it to the Limited Blockchain. This is necessary to provide free AppCoin transactions to the customers.

E) The Server Cluster will negotiate with service providers who run apps to subsidise services with AppCoin. For example, a service provider runs an App Q which can hire cabs. A customer P has bought services worth \$100 (assume that 1 AppCoin=\$1) from App Q. App Q will, instead of charging \$100, charges 90 AppCoins (i.e. \$90) from P. P thus has an incentive to transact in AppCoins rather than fiat money. The Balance 10 AppCoins will be given to Q by the Server Cluster along with an additional 10 AppCoins as bonus to incentivise AppCoin usage.

As already discussed, The Limited BlockChain is a BlockChain whose access is limited by the owners or managers of the Server Clusters. Each system on the cluster acts as a node. Each Node verifies all AppCoin transactions and through PoSv, mines AppCoins.

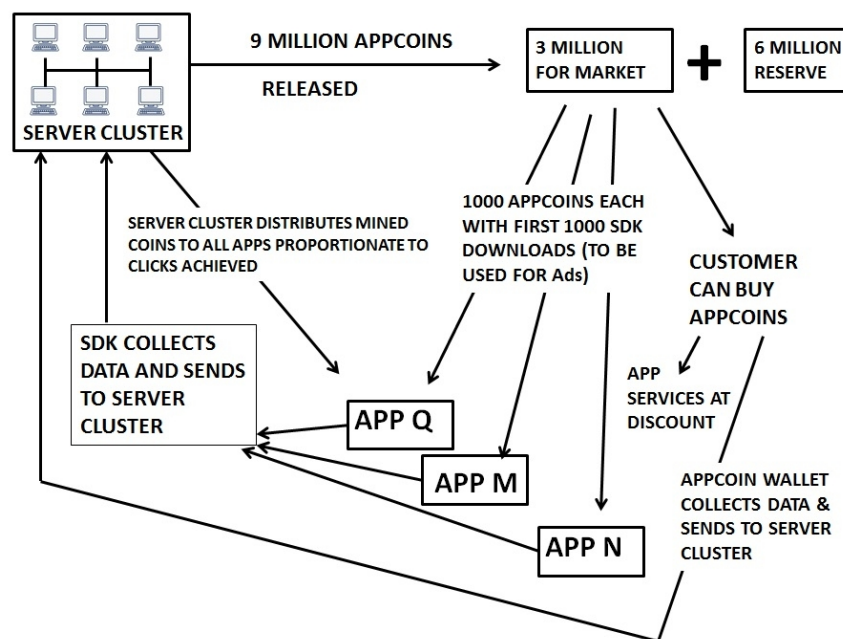
These AppCoins are distributed to various Apps (which use the AppCoin SDK) in proportion to the number of clicks/swipes they get. For example, there are 3 Apps-L,M and N. L gets 100 clicks, M gets 150 clicks and N gets 250 clicks. Of the total 500 clicks (100+150+250), L gets 100/500 i.e 20% of the AppCoins mined on that day. Similarly, M gets 30% and N gets 50% of AppCoins mined per day.

Thus, AppCoin transaction data from customers will be used for verifying those very same transactions and adding it to the Limited BlockChain. Whereas, the data on clicks/swipes from Apps will be used to distribute freshly mined AppCoins to the App Developers. This will act as an incentive to use AppCoins and also generate more AppCoins in the economy.

F) Consumers and App Developers can monetise their AppCoins in cryptocurrency exchanges where AppCoins are listed. In this manner, price of AppCoin will be market determined.

G) AppCoins in Reserve will be used to manage prices within a certain range. The reserve will be used only in cases where AppCoin becomes too costly.

H) If need be, certain nodes in the cluster can be 'outsourced' i.e people can bid to become part of the server cluster. Those selected will be given Sovereign Key as Server Clusters run on PoSv.



## CONCLUSION

We can see that the SKY Model of Limited BlockChain seamlessly integrates App technology with BlockChain architecture to provide immense benefits to customers. There will be literally no banking costs or payment delays. Investment needed to run Service Cluster is far less than that needed to run centralised banking system. Moreover, the price of the AppCoin is market determined. The surplus AppCoins with the Service Cluster (including the Reserve) can be further used to subsidise cost of services and products, thus bringing the market within the reach of the poor millions. Thus a decentralised, cost-free economic system can be brought about on Mobile Apps.



## **REFERENCES**

[1] Hegadekatti, Kartik and S G, Yatish, Proof-of-Sovereignty (PoSv) As a Method to Achieve Distributed Consensus in Crypto-Currency Networks (September 1, 2016). Available at SSRN: <https://ssrn.com/abstract=2833194>