Galaxy eSolutions
TECHNICAL PAPER

Abstract

Galaxy eSolutions is an ecommerce ecosystem focusing on the pre-owned and refurbished economy. Together, centralized and decentralized platforms create the Galaxy eSolutions hybrid ecommerce ecosystem hence enabling sellers and buyers to transact on centralized and decentralized open web.

Using Ethereum blockchain and Interplanetary File System (IPFS), the platform and community are allowing sale and buy options with digital crypto currency. We utilized blockchain immutability and crypto currency features to address refurbished industry pain points. MobileFreak will store IMEI number, product details, order details, tracking and payments data on blockchain which is immutable hence giving visibility, trust and eliminate risks and scams. Galaxy eSolutions has its own ERC20 type token called GES. In ecosystem, it can be used in various places like listing by suppliers, to sell, to buy and logistics. Seller and Buyer can do transaction using GES token. MobileFreak cryptocurrency payment option speed up transactions and reduces high cross border transaction costs. Using blockchain technology, Galaxy eSolutions advances circular and sharing economy with hybrid ecommerce ecosystem and cryptocurrency.

This White-paper explains:

- Our technical proposal for designing and implementing Decentralized app (DApp) using separate distributed storage layer in addition to blockchain for fast media content storage and retrieval with minimal transaction cost.
- To present scalable architecture with performance & security at its core.
- Introduces our crypto token GES and its important role in functioning of decentralized ecosystem.

Table of Contents

Introduction

Sharing Economy

The sharing economy, or collaborative consumption, refers to resource circulation systems which allow consumers a two-sided role.

Participants may act as both providers of resources and consumers of resources.

This vision enables us for a broad understanding of the sharing economy regarding the overarching criteria of changing consumer capacity. The sharing economy is a wide spectrum instead of just a black and white ecosystem, and it is increasingly crucial to understand its different shades. The driving forces behind the rise of sharing economy organizations and businesses includes:

- Information technology and social media
- Urban lifestyle & demographic shifts
- Increasing volatility in cost of natural resources

How do we define truly collaborative, sharing economy companies?

- Unlocking the value of unused or under-utilized assets ("idling capacity") whether it's for monetary or non-monetary benefits.
- Have clear values-driven mission and be built on meaningful principles including transparency, humanness, and authenticity that inform short and long-term strategic decisions.
- Providers on supply-side should be valued, respected, and empowered.
- Consumer on demand side of the platform should benefit from
  - Ability to get goods and services.
  - They for access/usage instead of ownership.
- The business should be built on distributed marketplaces or decentralized networks that create a sense of belonging, collective accountability, transparency and mutual benefit through the community they build.

Circular Economy

The circular economy aims to eradicate waste not just from manufacturing processes, as lean management aspires to do, but systematically and throughout the life cycles and uses of products or their components. Looking beyond the current "Take, make and dispose" extractive industrial model, the circular economy is restorative and regenerative by design.

Extending the life of products and material prevents the over-generation of waste and recovers the full value of products.

Relying on system-wide innovation. Circular economy aims to redefine products and services to design waste out, while minimizing negative impacts. The circular model builds economic, natural and social capital.

Hybrid e-Commerce Business Model

Galaxy eSolutions is an ecommerce ecosystem focusing on the pre-owned and refurbished economy which is worth multi-billions. We have several strategic business units, including NDBD, Yabphones, and MobileFreak.

NDBD and Yabphones are centralized, and focused on selling, while MobileFreak is a decentralized P2P buy-and-sell platform. Together, centralized and decentralized platforms create a very powerful hybrid ecommerce ecosystem.

NDBD[1]
Currently a B2C (Business-to-Consumer) site evolving to become a marketplace with approved suppliers.

Yabphones[2]
A B2C and F2C (Factory-to-Consumer) site with own branding refurbished products.

MobileFreak[3]
Decentralized app (DApp) with blockchain to serve the C2C (Consumer-to-Consumer), C2B (Consumer-to-Business) and B2B (Business-to-Business) refurbished markets.

Galaxy eSolutions' believes that in the B2C model, where it is sending goods to end consumers, the consistency in quality of goods and exceeding expectations are of utmost importance. This is a retail experience and only in a centralized model can Galaxy eSolutions fully control quality of supplied goods and consumer experience.

However, Galaxy eSolutions strongly believes that decentralized model would suit a marketplace serving the C2C, C2B and B2B markets. GES will use Mobilefreak.com for this decentralized model and only focus initially on the highly tradable pre-owned and refurbished phones and will open doors of business for other devices sooner.

1 NDBD : https://nd-bd.com
2 Yabphone : https://yabphones.com
3 MobileFreak: https://mobilefreak.com/

Refurbished Phone Industry Pain Points

1. Phone Versions Unclear/Products Not as Described

In most phone trading websites, only the phone models are listed. Therefore, the exact versions of the phones are not shown clearly. Phone version information is required so that buyers know that they are buying the right phones for the right markets. For example, a local shop trader in Australia might not be able to sell iPhones which are of USA versions, due to factors such different network bandwidth, causing the phone to not work with local network frequencies. Different phone versions could cause consumer dissatisfaction as well: for example, phones in Japan are required to have an alert sound when taking pictures.

2. Potential Frauds/Scams

In many cases, phones are almost as good as cash, since it is highly tradable and of relative high value. Hence, the phone industry often is littered with scammers. The typical scams include failing to deliver goods after being paid, selling stolen goods on purpose and selling goods of questionable quality. There are also suppliers who mix some bad products with good products just to increase their margins. Clearly, the *industry lacks trust*.

3. High Cross-Border Transaction Costs

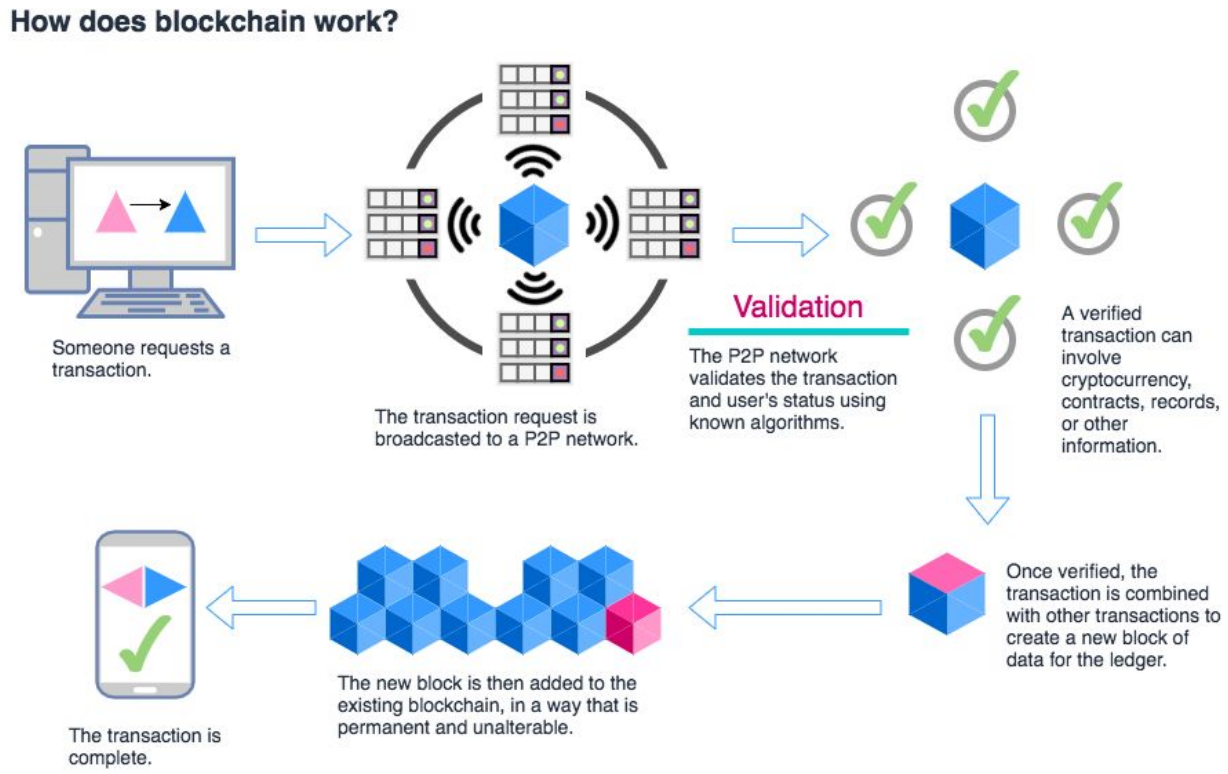
We all know that transacting for international payments is expensive and often incurs exchange losses. In some cases, payments have to go thru intermediary banks, often taking days for one transaction to complete. Add to this concern stricter AML (Anti-Money-Laundering) measures, and we see even higher cross-border transaction costs.

4. Product Movement Verification

When deals are done, what is required next is the movement of the goods. There are many cases of goods not being delivered on time, or that the tracking numbers need to be chased. There are also cases of goods delivered to wrong addresses, held at customs or even being provided fake tracking numbers.

Blockchain: The Solution

A blockchain is a shared ledger distributed across a global network. Transactions are permanently recorded in append-only blocks to the ledger. All the consensually confirmed and validated transaction blocks are linked from the genesis block to the most current block with each block linked to its previous block using the cryptographic hash of the previous block building a chain. Hence, the name "Blockchain". A blockchain is a historical record of all the transactions that have taken place in the network since the beginning of the blockchain. The blockchain serves as a single source of truth for the network. We at Galaxy eSolutions are making use of Ethereum[4] public blockchain network.



Technical Design Overview

We are using Ethereum and open-source distributed storage layer to address our problem space.

Our ecosystem is expecting to have huge set of data like multiple images and details of products which includes but not limited to phone IMEI# (International Mobile equipment Identity), model number, region, supporting networks, functionality details of each module such as screen/keypad. All this information are collected and processed to end up in allocating a grade A/B/C/D/E.

Prior to submitting details before listing, product can be verified with online database service provider to ensure the basic sanity.

[4] Ethereum : https://www.ethereum.org/

Media content like images/videos of products are uploaded to IPFS[5] (Inter Planetary File System) using our public gateway which stores all details by default and could scale to any size and be available in any location. Product listing and all other detailed information is packed into a JSON format file and stored along with media content into IPFS and it gives back their unique address hash.

IPFS is to be used for detailed review and feedback as well and could list against a specific listing or seller. Obtained unique hash is stored into blockchain instead of full data, this makes data's integrity secure even when it's off the chain. Any changes to data make a new hash making modified content useless.

IPFS is content-addressable, distributed file system, which enables us to trust the data and its integrity. This is achieved even when data is stored outside of Ethereum Network.

The most important point is that storage in IPFS is way cheaper than storing directly into blockchain.

Payments are stored in escrow until designed condition are met, and funds get released automatically on a successful E2E product delivery.

Information such as - When items have been refurbished, who did the refurbishment, current status of warranty period, courier used, dates dispatched, tracking numbers, shipment weight, and many other logistics records can be put on the blockchain which is immutable in nature, improving trading experience, combating fraud, and preventing shipment inconsistencies.

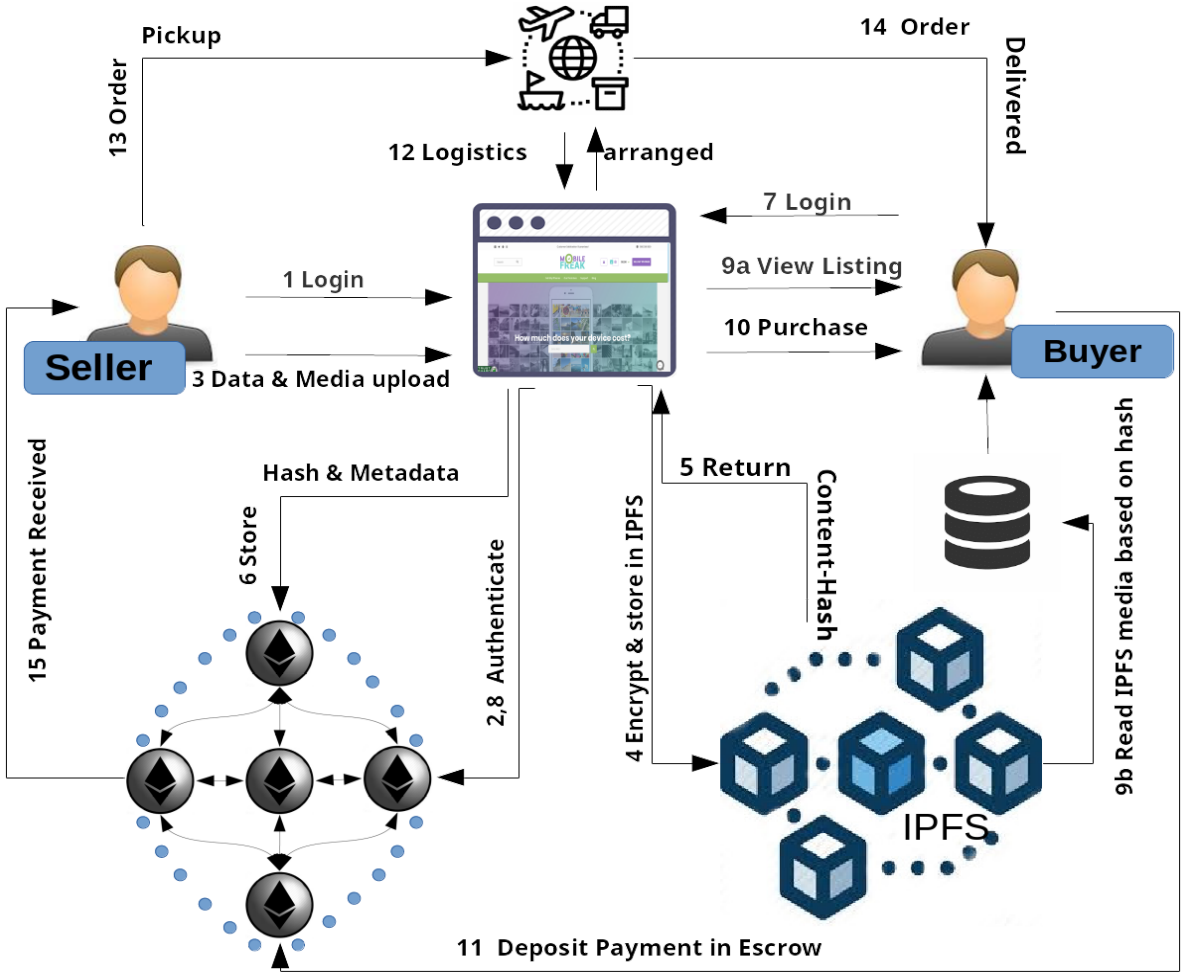
Design Goals

Using Ethereum Blockchain and IPFS gives us all benefits we couldn't easily imagine before

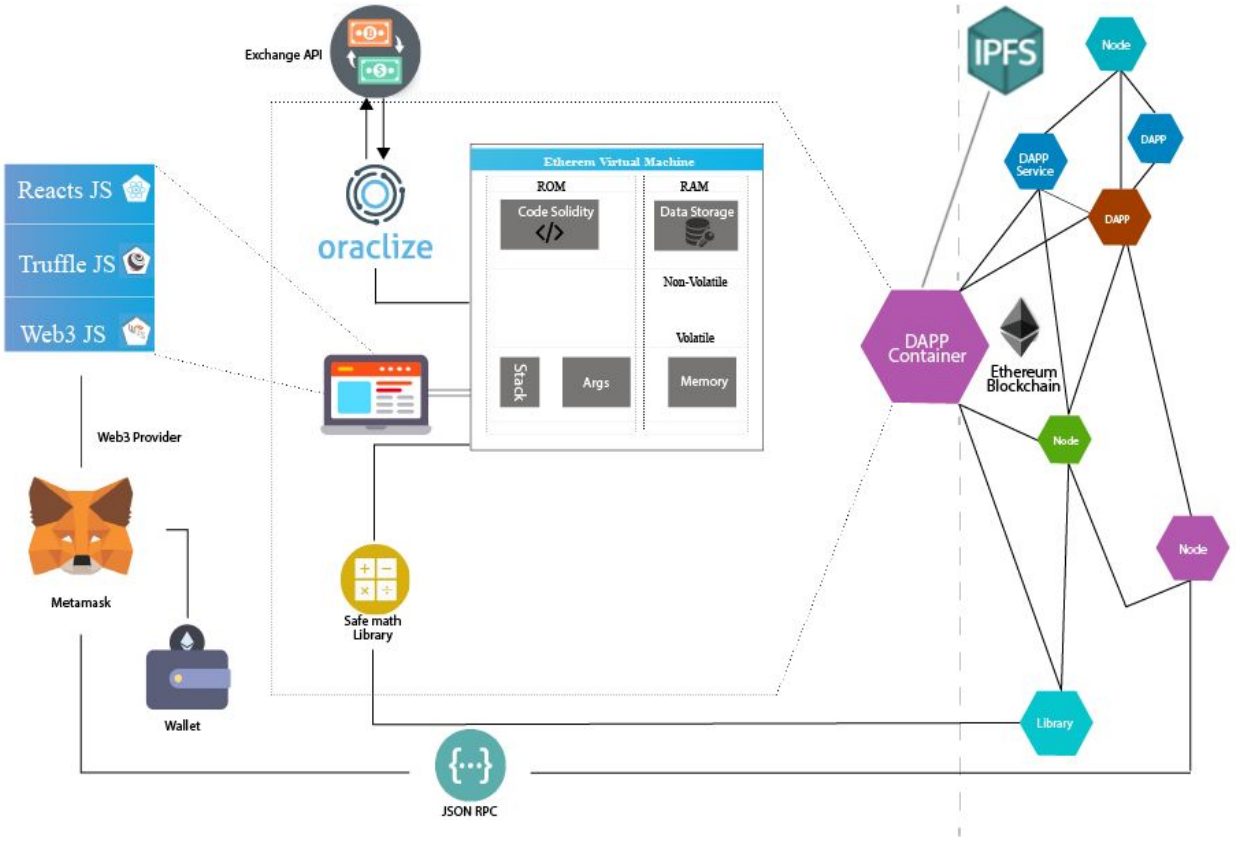
- Everything is distributed and trust less as much as possible.
- No single point of failure
- No centralized controlling
- Efficient, immutable storage outside blockchain but tightly coupled contents.
- Transparent tracking of devices and ownership.
- Trading can be done using cryptocurrency avoiding higher cross border transaction costs.
- GES Token will be used create/update/buy listings.

[5] IPFS :https://ipfs.io/
https://github.com/ipfs/ipfs

Engineering Architecture



Technical Implementation



There are different components involved in its proposed implementation as shown in above diagram.

Dapp structure of truffle[6] is followed, and built by following the OpenZeppelin[7] secure smart contract protocol. UI components are to be built on React JS[8] & Redux[9].

OpenZepplin's SafeMath library is used to ensure that all mathematical operation are safe as per guidelines.

One of the main supporting components is Oraclize. Oraclize is used as a data carrier. Since the DApp resides in a closed environment, the only way to get in touch with the external Web API is by using Oraclize. Oraclize works as a bridge between the DApp and external API. It's used to fetch price conversions between different Tokens /ETH vs other fiat currencies.

Users can use metamask[10] (Google Chrome, Firefox browser extension) to use DApp from these browsers or can choose Ethereum MIST[11] browser to use Dapp.

6 Truffle :http://truffleframework.com/
7 OpenZepplin :https://openzeppelin.org/
8 React :https://reactjs.org/
9 Redux :https://redux.js.org/
10 Metamask :https://metamask.io/
11 Mist browser :https://github.com/ethereum/mist

Description

Galaxy eSolutions' distributed platform MobileFreak has seller, buyer and logistics interaction with Dapp.

- Seller can create, update and publish listing using front-end DApp whereas
- Buyers can browse listing and place order.
- Logistics can pick up, track and deliver using DApp.

Seller will be provided with a questionnaire as part of listing creations. Generalized questions includes two types of questions.

a) Details to be put in by seller:

Phone Make, Model, IMEI, Total RAM, Display Size, Manufacturing Date, Purchase date, Warranty

b) Queries of type Yes/No:

Display/Touch working, Screen Glass broken, front camera works, back camera works, volume button works, Wi-Fi/GPS works, Power /Home button work/ hard to press, charging defect, battery faulty, speaker/microphone working, Dents/scratches, already refurbished.

Based on above type of queries, each product is given grades A/B/C/D/E.

Most sellers will prefer to list their listing with fiat currencies. MobileFreak will make use of external services such Oraclize[12] to calculate and show product listing price in GES/ETH. Buyer at time of placing order will get the current equivalent price in GES Token and will place order accordingly.

Create/update listing needs gas in ETH which will be borne by seller.

Buyer will be able to buy products using GES Token despite that listings are made in fiat currencies.

Buyers can browse and search available listing easily using DApp. Search for different listings become blazing fast as its indexing server caches and pre-fetches media contents. Buyer can filter and choose listings based on different criteria on front-end DApp.

Buyers can order/book selected listing using GES payment method (involves Product cost and logistics cost) which is then added to escrow of smart contract with listing hash. Smart contract will verify order purchase request and handle the transfer of tokens between buyer and seller and buyer and logistics team on order completion.

DApp has given ability for Seller to select proper communication channel to interact with buyers and logistics to disclose their identities. Buyers can interact using those disclosed channels before, during or after transactions. Non transactional communication will be an off chain part and both the parties will be encouraged to use secure and verifiable communication channel.

Buyers can use different wallets or choose single-use wallet to reveal their true identity to sellers. Users are encouraged to leave feedback, review and rating. These will be stored on IPFS and

[12] Oraclize : http://www.oraclize.it/

reference hash linked back into Ethereum. This will enforce users to establish their reputation with verified transactions.

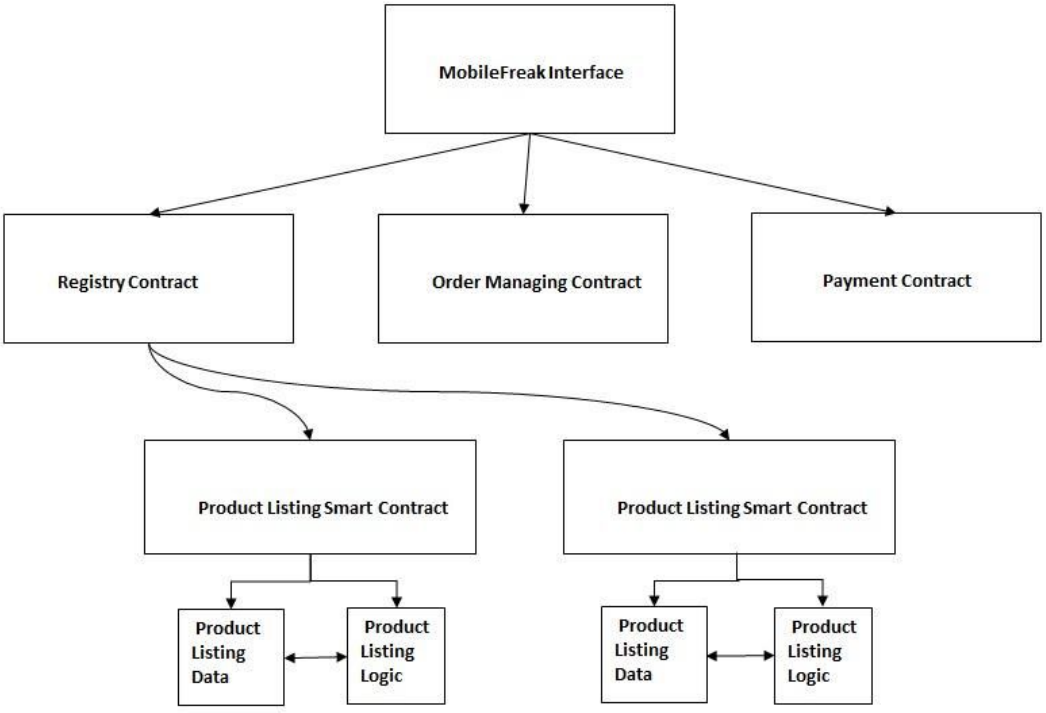
On part of successful order placement, escrow is going to have product price and shipment charges submitted by seller. This order is confirmed back to involved logistics parties which will be arranging pickup and delivery accordingly between seller & buyer. As part of B2C, C2B journeys, business will have bulk order facility and 3rd party logistics companies could be involved as well. Business back-end team will have responsibility to update blockchain with necessary details in-case 3rd Party logistics team are involved. At same time these companies are also encouraged to use our platform for seamless experience.

Module Details

Smart Contract

Smart contracts are self-executing contracts with the terms of the agreement between buyer and seller being directly written into lines of code. The code and the agreements contained therein exist across a distributed, decentralized blockchain network. Smart contracts permit trusted transactions and agreements to be carried out among disparate, anonymous parties without the need for a central authority, legal system, or external enforcement mechanism. They render transactions traceable, transparent, and irreversible.

Galaxy eSolutions have different smart contracts which are separately designed with independent logic and integrated them with abstraction layer to update, upgrade and enhance further.



Product Listing

Registry contract is used to store listing details which is stored in IPFS. JSON schema for listing is mentioned in IPFS section on page 18. Contract itself is going to have very minimal information on chain to reduce transaction cost. It will have below details per listing.


```
{
    "listing_id": 808950810,
    "ipfs_listing_hash": "5d6f6617f1616ed44445bb349ee652a8",
    "listing_available": "yes/no"
}
```


Order Management:

Order contract manages order data with Seller and Buyer information. It handles state of orders and other relevant details.


```
{
    "listing_id": 808950810,
    "seller_address": "0x627306090abaB3A6e1400e9345bC60c78a8BEf57",
    "buyer              _address": "0xf17f52151EbEF6C7334FAD080c5704D77216b732",
    "pickUp_address" : "pickUp_address details here with zipcode",
    "delivery_address" : "delivery_address details here with zipcode",
    "order_date" : "dd-mm-yyyy"
    "order_id:  "1231",
    "tracking_id" : "N123234H",
    "logistic_company" : "xyz shipment services",
    "logistic_branch_address" : "company_detail_here",
    "delivered" : "y/n",
    "delivery_date": ""
}
```

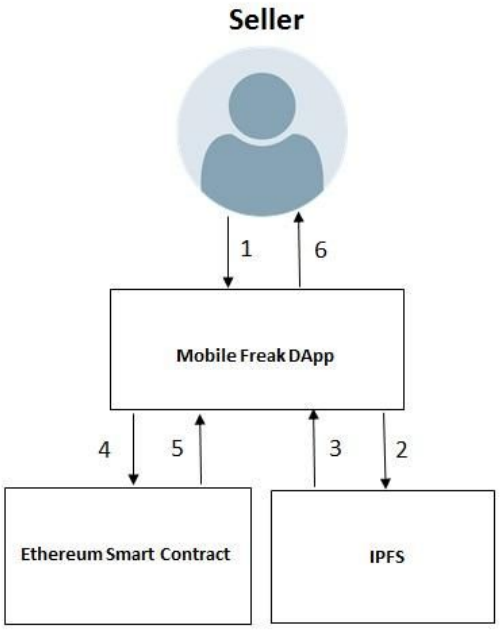

Payment Handler

Payment contract holds addresses of seller, buyer parties and conditions for which payments settle. It does payment settlement according to seller policies set.


```
{
    "order_id" : "1231",
    "seller_address": "0x627306090abaB3A6e1400e9345bC60c78a8BEf57",
    "buyer_address": "0xf17f52151EbEF6C7334FAD080c5704D77216b732",
    "logistic_address" : "0xC5fdf4076b8F3A5357c5E395ab970B5B54098Fef",
    "buyer_to_seller_amt" : "12300",
    "logistic_charges" : "50",
        "order_delivered" : "true/false",
    "payment_settled" : "true/false"
}
```

Seller Front-End

The DApp has provided Seller a user-friendly frontend to create and publish listing. Using this frontend user has ability to create listing with specific price and offer. User can show his listing price with fiat as well as cryptocurrency.

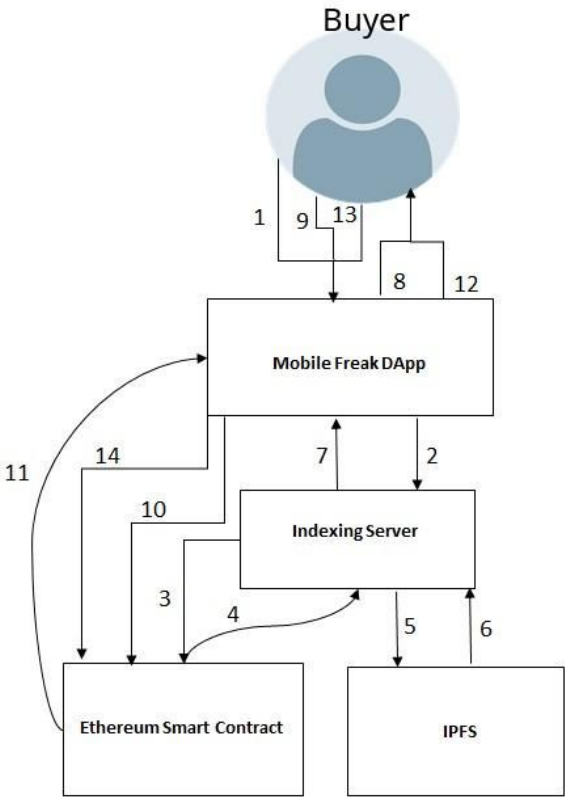


Seller Sequence Steps

1. Seller connects to MobileFreak DApp.
2. Seller can create listing by specifying product details, price and offer if applicable, DApp then creates JSON object of listing then verifies and validates that object according to rules and standards. Then DApp publishes JSON object to IPFS node.
3. IPFS node adds JSON object to IPFS network and returns the content hash.
4. DApp keeps content hash reference on Ethereum blockchain.
5. Ethereum returns transaction ID to DApp.
6. DApp monitors pending transactions and notifies sellers with fail or successful result.

Buyer Front-End

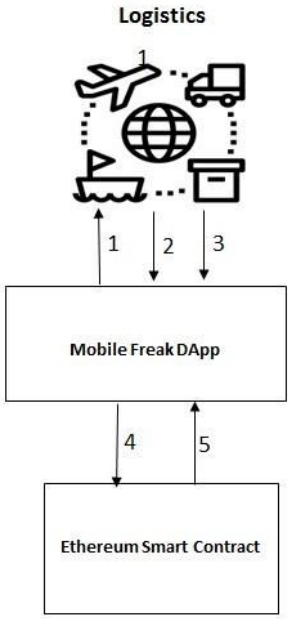
The DApp has buyer frontend with browse, search and order functionality.



Buyer Sequence Steps

1. Buyer connects to MobileFreak DApp frontend.
2. DApp connects to indexing server.
3. Indexing server requests content of listing from smart contracts.
4. Smart contracts returns list of IPFS content hashes.
5. Indexing server requests each of those content hashes from the IPFS network.
6. Indexing server stores the results in a cache for future requests.
7. The indexing server returns listing results to DApp.
8. Buyer can then browse all listing through DApp.
9. Buyer place an order using DApp.
10. Assuming availability and correct amount DApp extracts order payment from Buyers wallet and sends order request to smart contract.
11. Smart contracts adds order payment in escrow and stores order content with listing hash on blockchain. Send confirmation of booking to DApp.
12. DApp will inform the buyer of successful order place.
13. If buyer has to cancel order then he can choose to cancel option from DApp. Evaluating certain conditions according to seller policies DApp sends cancellation request to Smart Contracts.
14. Smart contracts cancels order and refund money to buyers' wallet according to listing policy.

Logistics Front-End



Logistics Sequence Steps

1. On receiving order MobileFreak will notify Logistics about pickup, delivery addresses with timings.
2. Logistics initiates pickup and starts delivery
3. Logistics confirms delivery to DApp after successful delivery.
4. DApp does final settlement and sends Order complete request to Smart Contracts.
5. Smart Contracts updates order status to complete and moves money from escrow to sellers account.

IPFS

IPFS (Inter Planetary File System) is a new hypermedia distribution protocol, addressed by content and identities. IPFS enables the creation of completely distributed applications. It aims to make the web faster, safer, and more open.

IPFS is a distributed file system that seeks to connect all computing devices with the same system of files. In some ways, this is similar to the original aims of the Web, but IPFS is actually more similar to a single bit torrent swarm exchanging git objects.

MobileFreak DApp will store all media content and listing data to IPFS. Reference hashes of IPFS would be store in Smart Contracts.

Listing for phone is stored in JSON format into IPFS and it contains details (hash) of uploaded images as well.


```
{
 "listing": [{
        "id": 808950810,
        "title": "Phone summary for listing",
```

```
"price": "1990.00",
"price_unit": "GES",
"manufacturer": "Apple",
"model": "iPhone 7s",
"imei_1": "0340303234234234",
"imei_2": "0340303234234235",
"imei_3": "",
"imei_4": "",
"color": "black",
"ram": "2GB",
"storage": "32GB",
"screen_size": "6",
"purchase_date": "dd-mm-yyyy",
"warranty_available": "y/n",
"display_working": "y/n",
"refurbished": "y/n",
"screen_broken": "y/n",
"front_camera_working": "y/n",
"back_camera_working": "y/n",
"vol_button_working": "y/n",
"wifi_working": "y/n",
"gps_working": "y/n",
"bluetooth_working": "y/n",
"charging_working": "y/n",
"charger_available": "y/n",
"original_box_available": "y/n",
"headphone_available": "y/n",
"mic_working": "y/n",
"speaker_working": "y/n",
"minor_scratches": "y/n",
"dents_on_body": "y/n",
"allocated_grade": "A/B/C/D/E",
"media_details": [{
                "type": "image/video",
                "image_hash": "a9beacb1866a387698e3b2a528875ed4"
        },
        {
                "type": "image/video",
                "image_hash": "5d56a0ba41e2fe43d8a92a4e76023a15"
        },
        {
                "type": "image/video",
                "image_hash": "9a8004186caff3c4a08b10482573514d"
        },
        {
                "type": "image/video",
                "image_hash": "9ad6d100425eb1838447a87ce01108f0"
        }
```

```
                ]
            }
        ]
    }
```

Indexing Server

Indexing server is a server side application that continually fetches the list content hashes from smart contract. It then fetches those listing from IPFS and indexes them, so they can be quickly searched and filtered by MobileFreak DApp. Indexing server increases scalability to the network.

GES Tokens

The GES token is exciting not only in that it can be used on the Galaxy eSolutions marketplace, but also because of the buyback and burn model employed in conjunction with a very generous value protection mechanism.

Token Utility

GES tokens will have the following usages in the ecosystem:

- For listings services (applicable on suppliers).
- Upgraded services, such as accreditation of verified and /or featured suppliers.
- For Galaxy eSolutions services such as product refurbishment & inspection services (on goods quality).
- To act as ship-on-hold logistic centre (giving greater peace of mind on trading than smart contracts).
- GES tokens can be used on Galaxy eSolutions' sites for purchases. The redeem value of each GES token in the marketplace will be current token market price (according to coinmarketcap.com).
- GES will burn at least 50% of the bought back tokens from the market so that the token supply on market will be reduced and when profits increase, holders will rewarded.

Summary

Galaxy eSolutions aims to further environmental sustainability by utilizing a decentralized, pre-owned and refurbished ecommerce ecosystem designed to advance the sharing and circular economies.

Galaxy eSolutions focused on bringing change and innovation to the circular and sharing economy with the help of Ethereum based blockchain.

Cryptography helped in achieving trust in trust less environment. All critical data like refurbished details will be written to blockchain hence will cause getting user confidence about refurbished product and its tracking.

Crypto currency is used to reduce cross border transaction costs. User has option to transact using BTC, ETH, GES token or any equivalent ERC20 type token. Cryptocurrency payment method speed up the transaction speed.

Disclaimer

This whitepaper prepared by Galaxy eSolutions presents current plan & vision of our platform based on current assessment of market. While we intend to realize this vision, the white paper content is subject to change at any time without notification.

Please know that we plan to work hard in seeking to achieve the laid vision out in the white paper, and any changes in it will be towards betterment of the solution in terms of features, performance and scalability.

Last updated: March 29, 2018


galaxy-esolutions.com