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# Lisk Directory Blockchain - Whitepaper

Moosty Group

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**L**isk Directory is a Proof of Concept (side)chain created using the Lisk SDK. It provides an easy and accessible way to show the skills and motivations of delegates, in order to create an easy and sound way to select delegates for a new chain and/or vote for delegates on a certain network. Lisk Directory serves as a go to marketplace to choose reliable delegates for securing and hosting a (side)chain. It provides an accessible and sound way of selecting these delegates. Within the protocol a certain amount of transparency is demanded from delegates. It uses a Proof of Motivation protocol to stimulate transparency and proof skill. Lisk Directory registers delegate information on the blockchain and provides the possibility to link this information to accounts on other (side)chains through interoperability. The delegates own their own data, but it is open for every app to integrate this live data into their projects, every project using delegate data will contain up-to-date information about delegates.

## 1 Introduction

With the alpha release of the Lisk SDK - and the possibility of sidechains in the future - new challenges arise for the ecosystem. One of the challenges is reliability and security of these new networks, which results in trust within the ecosystem. Lisk Directory provides a marketplace for delegates to show information about their skill and motivation in order to create an accessible and easy way to select delegates for voters, and (side)chain creators can find the perfect candidates to help kickstart their new project. The Lisk Directory blockchain let delegate candidates register the information, which they would like to share, on the blockchain. The community can browse through the available delegates to make their choice.

## 2 The Problem

Multiple challenges arise when the current situation around delegates is assessed, from a community member- and a new (side)chain perspective. *How do I know which delegate(s) to vote for? How to get the necessary amount of delegates to run a new sidechain? How do I know if a delegate is reliable and trustworthy? Where can I find potential and willing delegates to run a new sidechain from block 1? What can a project expect from a delegate? Is the ecosystem/(side)chain decentralized enough?* Community members and (side)chain builders do not have decentralized and trustworthy

way of assessing whether a delegate fits into their view of the future.

There is no standard for selecting delegates, there is a lack of information - e.g. skill and motivation - to make an informed decision and it is difficult to assess the added value of specific delegates.

Secondly, when starting a new chain it might not always be profitable to start a delegate position straight away, there might even be chains without a profit motive. There is no information about the willingness of delegates to help new startups, or specific goals.

Thirdly, a delegates' skillset might be broader than securing a server. Running a forging delegate node is not the only thing a delegate does. For example with sidechain(s) a delegate can also help with developing tools, building apps or organize meetups to help grow a specific community. E.g. if a sidechain targets a community of musicians, these musicians might know that the blockchain has the power to securely transfer funds to them for their work though they might not know how to run and maintain blockchain nodes, or be able to assess a network its security or reliability. How to attract the right people with the right knowledge to this new community? Delegates can play a role in growing and facilitating a community.

Lastly, there is no transparent and trustful way of ensuring a delegate on a (side)chain is related to a delegate on another chain. Without a transparent, reliable, connection it is not possible to link accounts together and therefore show skill and reliability. This can also

be a threat to decentralization of the ecosystem.

### 3 The Solution

Lisk Directory provides a solution to all of the before mentioned challenges with a one stop shop for delegate information & selection. It provides four categories of information that are relevant for networks and their delegates; 1) delegate information accessibility; 2) levels of knowledge and skill; 3) motivation; 4) general community knowledge.

With the Delegate Proposal Protocol (more info about section 5) a delegate can register a variety of information on the blockchain. This information can be used to advertise the delegate, show skill and knowledge, and also to provide information about the willingness to help starting new projects. This information can be verified by using signed messaging. Delegate information and contributions on the blockchain are transparent in a sense that everyone can view the history of a specific delegate and verify the validity of this information. By creating a linkage between the delegates throughout the whole Lisk Ecosystem, Lisk Directory provides an “one source of truth for delegate information”.

Thus, it provides a way to show knowledge, skill and experience throughout the whole ecosystem. If a delegate runs a node on one network he builds up credibility and skill to run a node for a new project. Linking accounts is not a mandatory process, but with linking accounts a delegate is able to proof his previous and current experience and skill-set. In addition it also provides a way to verify the (pseudonymous) identity of delegate across chains. This has additional benefit when a new project is in need of a specific delegate skill-set, or to build up credibility throughout the whole ecosystem.

With Proof of Motivation 8 Lisk Directory provides multiple ways to show the willingness of a delegate to help the growth and reliability of the Lisk ecosystem, and e.g. to help startups. Running a node for this public utility (Lisk Directory) helps the ecosystem become more transparent and mature.

In addition to specific delegate related information a delegate can show their willingness to help grow the ecosystem in a different way. Not all communities will have the extended knowledge blockchain development entails, and experienced delegates can play a role in growing and facilitating a community.

### 4 Target Users

Lisk Directory has three target users; (side)chain builders, (new & experienced)delegates, ecosystem related app/tool builders, and LSK (and other token)holders. These are target users will use Lisk Directory chain all in their own way.

For (side)chain builders it provides a one-stop-shop to find skilled, experienced delegates. Perhaps with a specific domain of experience. To find delegates who are willing to support new projects without a direct benefit. Or even delegates who are not active in existing communities.

Current delegates can show their experience and skill-set within the blockchain domain. New delegates can start by showing their skill through setting up a node for Lisk.Directory, share their relevant resume, and they can start their journey through understanding the ecosystem.

If you are an app/tool builder for one or more projects in the Lisk ecosystem. You can use the data submitted by delegates to improve your app/tool. Getting live up-to-date information about delegates can make your app a real asset to the ecosystem.

LSK holders, and other ecosystem token holders, can use Lisk.Directory as their source of information to base their votes upon. One place to browse delegate information and choose who is most eligible for a forging spot.

### 5 Delegate Proposal Protocol

To give a more structured approach for sharing delegate information with the community, we(13) created the Delegate Proposal Protocol (DPP). The is a JSON schema with multiple available information variables for delegates. The DPP is open source and everyone can propose changes to this protocol through github. The first version will give delegates the option to submit the most basic information about what they can, do and share with the community.

The standardization of the DPP give app/tool developers the ability to use the data submitted by delegates. An example can be more details about a delegate in the blockchain explorer or the wallet of a sidechain.

Delegates are free to submit only the information they want to share, they are also the only once that can submit, edit and remove this data. The fact that this data is stored on the blockchain, the community can trust that the available data is shared by the delegate itself and that there is no censorship of this data.

The correctness of the information given by any delegate isn't verified (in all cases yet), this means fraud by delegates is possible. We hope however, with the transparency of storing the data on the blockchain, that delegates who do commit contribution fraud, will be unvoted by the community for doing so, to help securing any network within the Lisk ecosystem.

### 6 Governance

Lisk Directory blockchain will be using a Delegate Proof of Stake (DPoS) governance, similar to Lisk. The DPP token holders will vote for the best delegates to secure and uphold the network.

## 6.1 Consensus

Lisk Directory is based on the DPoS consensus mechanism. This method of consensus was originally created by the BitShares team. DPoS is a consensus protocol requiring less energy than Proof of Work.

DPoS is based on delegates creating blocks. Delegates are trusted accounts which are elected to be active delegates, also referred to as “Forging Delegates”. Lisk Directory will start with 21 forging delegates, when there is enough potential candidates the number of forging delegates can grow.

The 21 delegate accounts with the most votes, become forging delegates and forge the blocks. Other delegates are listed as “Standby Delegates” and can advance to the top 21 delegates list by receiving votes from the other Lisk Directory tokens owners. All users of Lisk Directory have 1 vote available to elect their favorite delegate into the top 21 list. The weight of the 1 vote is proportional to the amount of DPP tokens the user has in the wallet, the vote is casted from. All the vote weight on a delegate combined will determine who are the top 21 delegates, which will then be able to forge new blocks on the Lisk Directory blockchain.

Delegate promotion to the top 21 delegates or demotion to the standby list happens at the completion of the 21 block generation cycle. Each cycle of 21 blocks is created by the forging 21 delegates in a pseudo random order. The block time is 60 seconds. This is a rather slow creation of blocks, the reason is we expect less transactions on Lisk Directory than a regular blockchain where assets are often transferred between accounts. This also results in less empty blocks.

Newly created blocks are broadcast to the network and added to the blockchain. After 21 confirmations, a block, along with its transactions, can be considered as confirmed. A complete 21 block generation cycle takes approximately 21 minutes.

In DPoS, forks can occur, but the longest fork wins. Delegates must be online all of the time and have sufficient uptime. Uptime is used to catalog the reliability of a delegate by logging each time that it misses a block that was assigned to it. Users vote for the top 21 delegates based on several factors, uptime can be one key factor used to make a determination. If a delegate drops below a certain rating, users may remove votes from the delegate in question due to poor performance. This makes the DPP token holders partially responsible to help keeping a stable network.

## 7 Transactions

The following subsections contain short descriptions of the Lisk Directory transactions. More specifics can be found in section 15. These are transactions we determined to be a minimum requirement to showcase delegate information.

New transactions can become part of the Lisk Directory in the future. Everyone can propose ideas. See

how in section 13.1.

### 7.1 10. Link Account

The Link Account transaction is used to link a sidechain account to a Lisk Directory account. A signed message from the sidechain account needs to be send with this transaction to be able to verify Proof of Ownership. More details can be found at section 15.1.

### 7.2 11. Register Information

Delegates can register information about who they are and what they do as a delegate. There are different variables that can be filled. None of these fields are required but Lisk Directory encourages every delegate to put as much details in their proposal information as possible to be able to give the community a fair choice on which delegate to vote for. More details can be found at section 15.3.

### 7.3 12. Register Contribution

There are multiple types of contributions a delegate can bring within the blockchain ecosystem. The *register contribution* transaction type lets delegates *register* these contributions to be linked to their account. This transaction is also used for *updating and/or removing* a contribution. And there is a possibility to *add contributors* to your contribution. More details can be found at section 15.5.

Proof of Ownership of specific contributions will be created in a later version of Lisk Directory, feel free to contribute if you have ideas how this should work, see section 13.1 on how to contribute to Lisk Directory.

### 7.4 13. Register Sidechain

To allow Lisk Directory delegates to link accounts to their sidechain accounts a sidechain needs to be registered on the Lisk Directory chain first. There are some steps needed to be taken to verify ownership of a specific sidechain. More details can be found at section 15.7.

#### 7.4.1 Genesis Verification

To determine ownership of the sidechain we would like to incorporate a *genesis verification method*. We propose - when creating a sidechain - to add a specific transaction to the genesis block in which the creator(s) can show that they are the ones that created the genesis block and therefore are the sidechain creators. The public key that needs to be used for adding a transaction to the genesis block can be created in the Lisk Directory Hub and uses a unique public key from the ‘*lisk.directory*’ deterministic wallet. The amount added in this modified transfer transaction needs to be enough to register as a delegate on the sidechain for transparency. This is our decentralized method to verify ownership of sidechains.

## 7.5 14. Message account

If a user wants to contact delegate accounts one can send an encrypted secure message to the account it wants to contact. Messages are encrypted using the public key of the receiving account and can only be read by the receiving account using its passphrase. More details can be found at section [15.10](#).

## 8 Proof of Motivation

To showcase the willingness and skill of delegates to run a node for a Lisk SDK based blockchain Proof of Motivation has been added to the protocol. Proof of Motivation (PoM) proves that the delegate is running a node for the Lisk Directory network. This is shown within the Directory Hub. Proof of Motivation has the purpose to show skill, ability and the willingness to support a sound ecosystem.

Every Lisk Directory node will run an open api which communicates; the broadhash, the delegate public key and its current block height. Every Lisk Directory node will communicate this information with each other constantly so all nodes know about other nodes and who is running the node. This information is also available through the open api.

## 9 Token Distribution

Most new blockchains will launch with an Initial Coin Offering (ICO) to gain funds for further development. With an ICO the token get a certain value. Because Lisk Directory is a Proof of Concept blockchain the tokens used for action, are merely utility tokens which are not holding any value besides voting power. How to get the DPP tokens can be found in section [9.2](#).

### 9.1 DPP token value

The DPP token is a utility token with the sole purpose of doing transactions on the Lisk Directory blockchain. It is not intended to attach a fiat value to the DPP token. To obtain DPP a small LSK fee will be required. This is done to mitigate certain risks on the blockchain. How to get the DPP tokens can be found in section [9.2](#).

### 9.2 Minting Tokens

Because there never was, and never will be an ICO for Lisk Directory, the question arises - how will DPP tokens be distributed within the community? The answer is through *minting tokens* - creating tokens without the tokens existing before. When a small LSK fee is send over the Lisk Mainnet to the *lisk.directory* delegate address (10992244721741460886L), with a specific data value, the Lisk Directory nodes will pick up this amount

and mint the corresponding DPP tokens for the specified Lisk Directory address. With these minted tokens a Lisk Directory account can do transactions.

If you send the LSK fee from your Lisk delegate address, you will be automatically verified as delegate on Lisk Directory. This way of getting tokens is easy for users and is a nice exploration into this most simplest form of interoperability we could think of, after all this is a Proof of Concept chain.

For a user guide to do so, visit: [lisk.directory/help](https://lisk.directory/help). The minting process will be one way only. You can only get DPP tokens, you cannot trade back DPP tokens for LSK tokens.

### 9.3 Fees

Because the main purpose of this blockchain is to store data about delegates, transactions contain more bytes than for example just a transfer of tokens on the Lisk main chain. We will work towards dynamic fees based on transaction size. The fees for every transaction will be determined later.

## 10 Lisk Directory Hub (GUI)

The Lisk Directory Hub is a locally run graphical user interface and it consists of two main parts. The wallet and the directory itself. In the following subsections is described what these parts will be for. The hub without wallet functionality will also be available on [lisk.directory](https://lisk.directory).

### 10.1 Wallet

With the Lisk Directory wallet you can make an account, view your transaction history and perform transactions. The wallet should be as simple as possible in order to make maintaining delegate information and contributions easy and not time consuming. In the wallet received messages can be viewed and sent to other addresses on the Lisk Directory blockchain to be able to contact delegates and users, knowing you are contacting the right person.

### 10.2 Directory

The directory part of the Lisk Directory Hub is a viewer for all the information registered on the blockchain. The directory consists of three main sections; 1. Delegates, 2. Sidechains and 3. Contributions.

- The delegates section will give an overview existing delegates on Lisk Directory.
- The sidechains section will give an overview of all the registered sidechains on Lisk Directory.
- The contributions section will give an overview of contributions made by delegates.

## 10.3 Third Party Integration

With public api nodes running the Lisk Directory blockchain everyone can obtain the registered data at all times. This data is structured and can be sorted and filtered. Or you can run your own node and have all this data cached on your own server.

This will allow developers to integrate proven delegate information to be used in their apps. For example; [liskdiscovery](#) has, besides other things, a nice delegate explorer where you can find information about delegates, this information can come from the Lisk Directory blockchain.

Updated delegate information and contributions can be automatically downloaded from the decentralised blockchain and used throughout the explorer. Delegates can change their information at one place and all apps using their information are updated live at the same time.

## 11 Lisk.Directory delegate

In order to get DPP tokens you will need to send LSK tokens to the 'lisk.directory' delegate on the Lisk mainnet (see section 9.2). Therefore 'lisk.directory' will receive and hold LSK tokens. We ( 13) are in control of this delegate. This means the tokens owned by 'lisk.directory' are centralized. Control over the blockchain however is still decentralized. The LSK going to 'lisk.directory' will be used for costs concerning running servers for the network and even sidechain nodes when applicable.

### 11.1 Sidechains

To proof ownership of sidechains a 'lisk.directory' delegate also will be created on those sidechains. This will be done for transparency reasons. If asked or voted in we will run a node on this sidechains as well. Tokens gained by sidechain 'lisk.directory' delegates will be distributed, after cost reduction, over Lisk Directory

blockchain delegates who also own linked sidechain accounts.

## 12 Roadmap

Our roadmap is in an order of prioritization, rather than a detailed (and brittle) plan

- Create transactions: 11, 12, 13 and 14
- Create the front-end hub wallet for transactions: 11, 12, 13 and 14
- Create the front-end delegate directory
- Create the simple interoperability module
- Create transaction 10 to be able to proof delegate ownership
- Create the minting module
- Create the front-end "get DPP tokens" wizard
- Create tests, documentation and finalize front-end
- Start the Lisk Directory blockchain with active community delegates!!

## 13 Moosty Team

Moosty is a multidisciplinary project team working on a diverse set of innovative solutions. Currently focusing mainly on blockchain related initiatives such as; The Moosty Music Platform, Lisk Directory & Lisk Center Utrecht. Get in contact with us through our Discord channel [discord.gg/YQvywps](https://discord.gg/YQvywps). If you want to support our team please consider voting for [moosty](#) on the Lisk mainchain.

### 13.1 Join us

Join us in our journey to create the perfect delegate marketplace for the whole Lisk ecosystem there can be. Keep in contact, follow updates and contribute to the project by joining our Discord channel [discord.gg/YQvywps](https://discord.gg/YQvywps).

## 14 References

## 15 Transaction Details

The following sections give in detail the available options for transactions specific to Lisk Directory. The next sections are subject to change during the development phase. Input from the community might lead to a change in the working of the Lisk Directory blockchain.

### 15.1 Link Account

This transaction will link a sidechain account to your Lisk Directory account. When you have a sidechain account you can prove ownership of this account with signing a message. The message in this case will be your Lisk Directory address because this message can't be abused by other people, it will only tell people that the Lisk Directory account is hardwired to a specific sidechain account. When a *Link Account* transaction happens on the Lisk Directory chain the nodes will validate the signature and verify existence of the account on the sidechain. If this validation and verification passes the transaction will be accepted in the next block and it will become part of the delegate information.

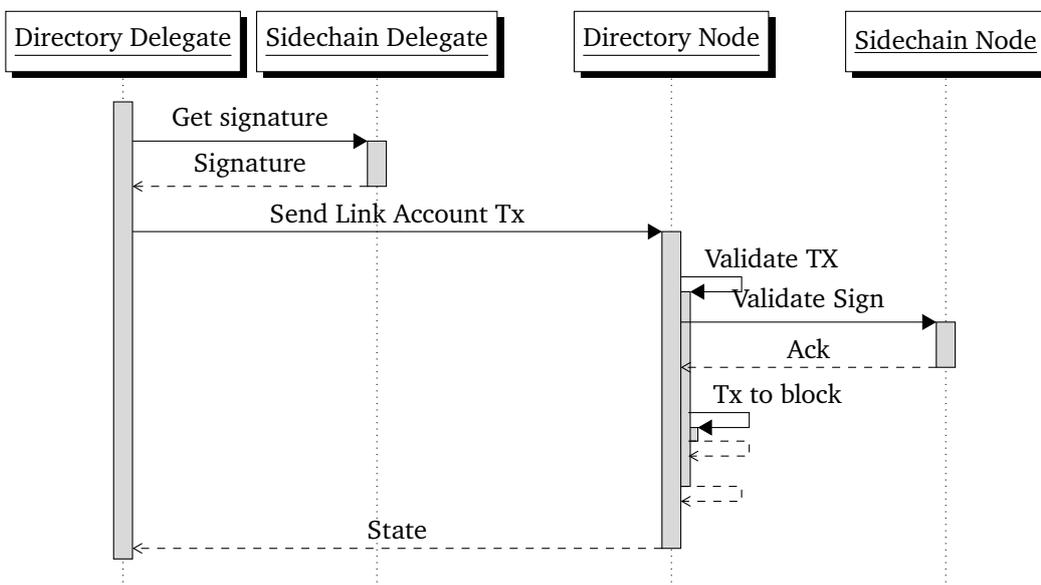


Figure 1: Link Account Sequence Diagram

### 15.2 Transaction

```
1 {
2   "type": 10,
3   "fee": "-",
4   "asset": {
5     "chain": "Chain id",
6     "address": "Sidechain address",
7     "signature": "Lisk Directory address signed signature"
8   }
9 }
```

### 15.3 Register Information

This transaction allows delegates to register information about themselves. To be able to do this transaction the account needs to be linked to- and a verified Lisk mainnet delegate. Variable restrictions will be available on the Delegate Proposal Protocol github once released. To update information not all data needs to be resend every time only the data a delegate wants to update needs to be submitted. Historical changes of the data will always be available on the blockchain.

### 15.4 Transaction

```
1 {
2   "type": 11,
3   "fee": "-",
4   "asset": {
5     "avatar": "Image url",
6     "location": "What country is the delegate located",
7     "timezone": "eg. GMT+1",
8     "description": "Information you want to share with the community",
9     "format": "Description format [0: plain, 1: Markdown]",
10    "website": "Url to website ex. https://lisk.io",
11    "contact": [
12      {
13        "action": "Contact action [create|update|remove]",
14        "media": "Contact media [github|discord|reddit|twitter|youtube|
15          facebook|telegram]",
16        "handle": "Social handle",
17      },
18      {
19        "action": "update",
20        "media": "twitter",
21        "handle": "lisk",
22      }
23    ],
24    "sharing": [
25      {
26        "action": "Sharing action [create|update|remove]",
27        "chain": "Chain id",
28        "name": "Rule name (must be unique)",
29        "type": "Type share [amount|percentage]",
30        "amount": "Share amount",
31        "threshold": "Payment treshold",
32        "conditions": [
33          {
34            "type": "Condition type [vote|voteNot|none]",
35            "delegates": [
36              "Delegate name"
37            ]
38          }
39        ]
40      }
41    ]
42  }
```

## 15.5 Register Contribution

Contributions made and relevant to the delegate can be published by the delegate using the *Register Contribution* transaction. Types of contributions need still to be determined. Available variables are subject to change.

## 15.6 Transaction

```
1 {
2   "type": 12,
3   "fee": "-",
4   "asset": {
5     "type": 0,
6     "contribution_id": "Id existing contribution for updating contribution",
7     "title": "Contribution title",
8     "description": "Contribution description",
9     "format": "Description format [plain|Markdown]",
10    "link": "Url to contribution",
11    "image": "Image url",
12    "tags": "Tags seperated by ,",
13    "contributors": [
14      {
15        "action": "Contributor action [create|update|remove]",
16        "address": "Lisk Directory address",
17        "signature": "Signature that co contributor provides"
18      }
19    ]
20  }
21 }
```

## 15.7 Register Sidechain

## 15.8 Proof of Creation

When registering a new sidechain on the Lisk Directory blockchain, this sidechain needs to be active and publicly available. If you want to link a sidechain to your delegate account there needs to be proof of creation inside the genesis block.

Proof of Creation is a simple registration of a *'lisk.directory'* delegate inside the genesis block of the blockchain. In addition of creating the *'lisk.directory'* delegate, also send a transaction to the *'lisk.directory'* delegate with your Lisk Directory delegate public key. More detailed information on how to do this will be in the Lisk.Directory wallet.

## 15.9 Transaction

```
1 {
2   "type": 13,
3   "fee": "-",
4   "asset": {
5     "sidechain_id": "Id existing sidechain for updating sidechain",
6     "name": "Sidechain name",
7     "description": "Sidechain description",
8     "format": "Description format [plain|Markdown]",
9     "link": "Url to sidechain website",
10    "github": "Github location ex. liskHQ/lisk-sdk",
11    "explorer": "Explorer link ex. https://explorer.lisk.io",
12    "active_delegates": "Active delegates ex. 101",
13    "image": "Image url",
14    "seed_nodes": [
15      {
16        "action": "Seed node action [create|update|remove]",
17        "ip": "Seed node ip",
18        "port": "Seed port"
19      }
20    ],
21    "tokens": [
22      {
23        "action": "Token action [create|update|remove]",
24        "name": "Token name",
25        "token": "Token short (ex. LSK)",
26        "purpose": "Token purpose"
27      }
28    ]
29  }
30 }
```

## 15.10 Message account

## 15.11 Transaction

```
1 {
2   "type": 14,
3   "fee": "-",
4   "recipientId": "Recipient address",
5   "asset": {
6     "message": "Public key encrypted message"
7   }
8 }
```

## 16 Architecture Diagram

