Laplace Protocol

Decentralized Data Exchange Protocol Group

# Content

Abstract

Soaring Global Data

With the advent of mobile internet, mobile terminals and data sensors, data are skyrocketing beyond imagination in this era. According to some surveys, data are rapidly growing in terms of data flow and brand-new data types. The fast speed of data capacity has exceeded that of hardware technology, triggering potential crisis in data storage and handling. The global data volume reached **3.5 zettabytes** in 2013, and it is estimated to arrive at **44 zettabytes** by 2020.
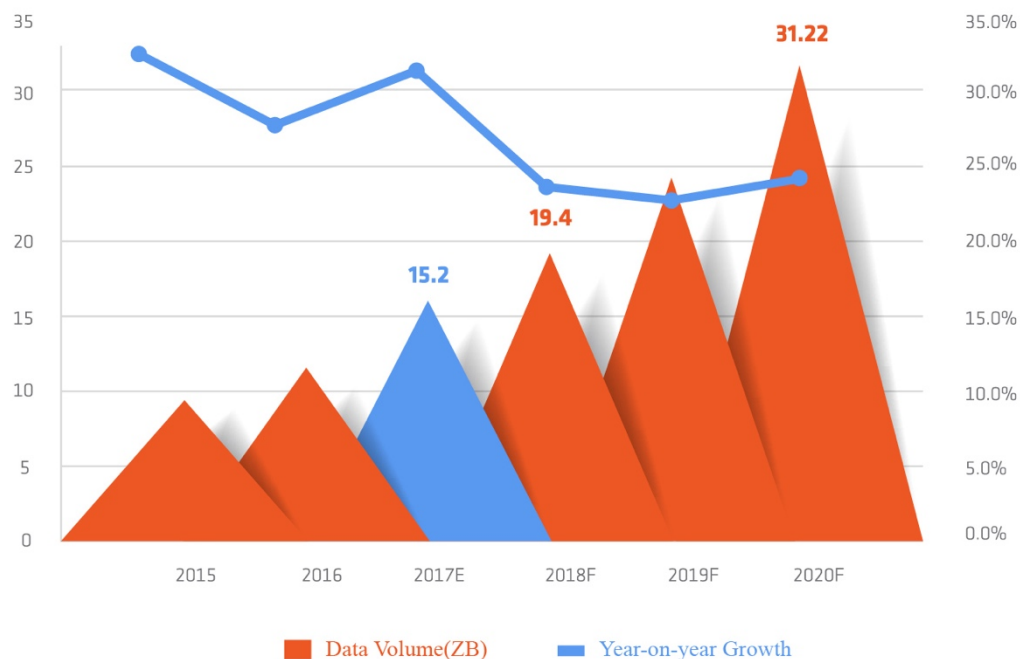
Growth of the Total Data Volume

Exponential growth of data has penetrated into all sectors. With the increasing support from all countries, capital preference and investment, global big data market enjoys full momentum.

According to PAISI, the global big data market was $5.89 billion in 2017, up by 29.1% than the year before. The market will surpass $121.4 billion by 2020.
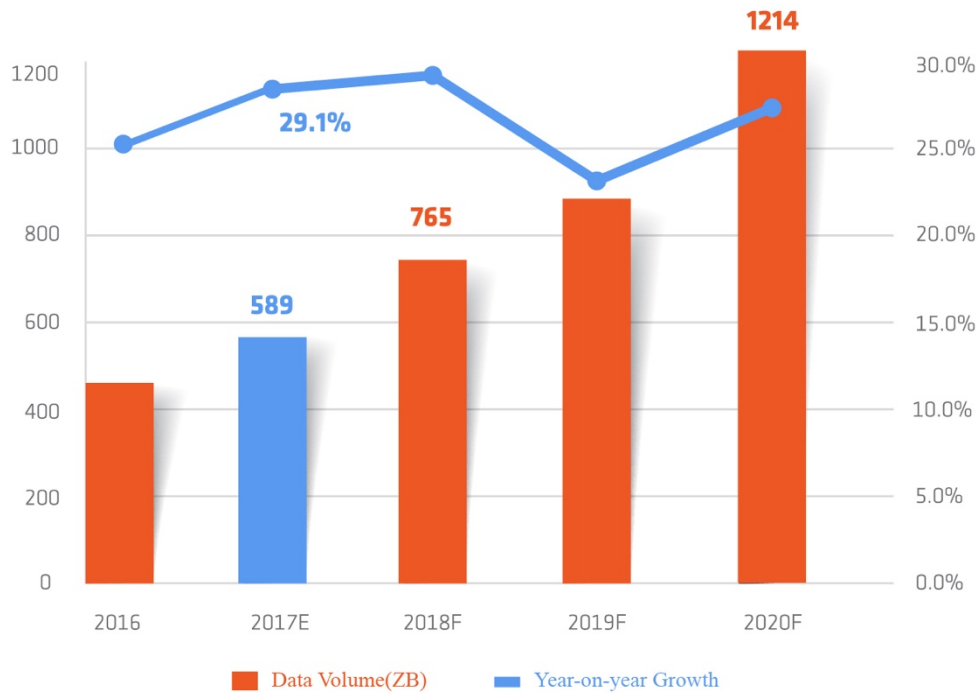
Growth of the Data Transaction Market

With the expansion of transactions, data transaction has become an important type of B2B transactions. Capitalization of data transaction has been plausible. However, it is still in infancy. **Data information asymmetry in transaction process, anonymity, data distinguishing and data authentic right** have always been challenges for the sector, hindering the further development of data transaction and data service market in the future.

Introduction of Laplace Protocol

Laplace Protocol (LPT) is a data exchange protocol group based on decentralization concept of blockchain. The protocol supports data discovery, authorization and transaction. Our ultimate goal is to build a new, open, global market based on this protocol. This market will witness open data processing, service products, mutual benefits and win-win results where every player in the data ecosystem can acquire whatever they need. LPT utilizes decentralization model to create a unique "cross-chain abstract layer", which provides an abstract layer, totally irrelevant with low-level data. This is convenient for the data portability

among different low-level blockchains. Such a neutral mainnet platform can avert the risks of a single platform. LPT, based on the "cross-chain abstract layer", includes subprotocols such as LPT-CA、 LPT-DATA 、LPT-PRIVACY、LPT-EXCHANGE、LPT-PAY 、LPT-SCORES. It can connect partners in the ecosystem to create a completely automatic data service channel so that ultimate users can be provided with out-of-the-box data products and services. The phases and areas during data handling include but not limited to **data capture, analysis, storage, processing, and forecasting**, enhancing safety and operability of data transactions.
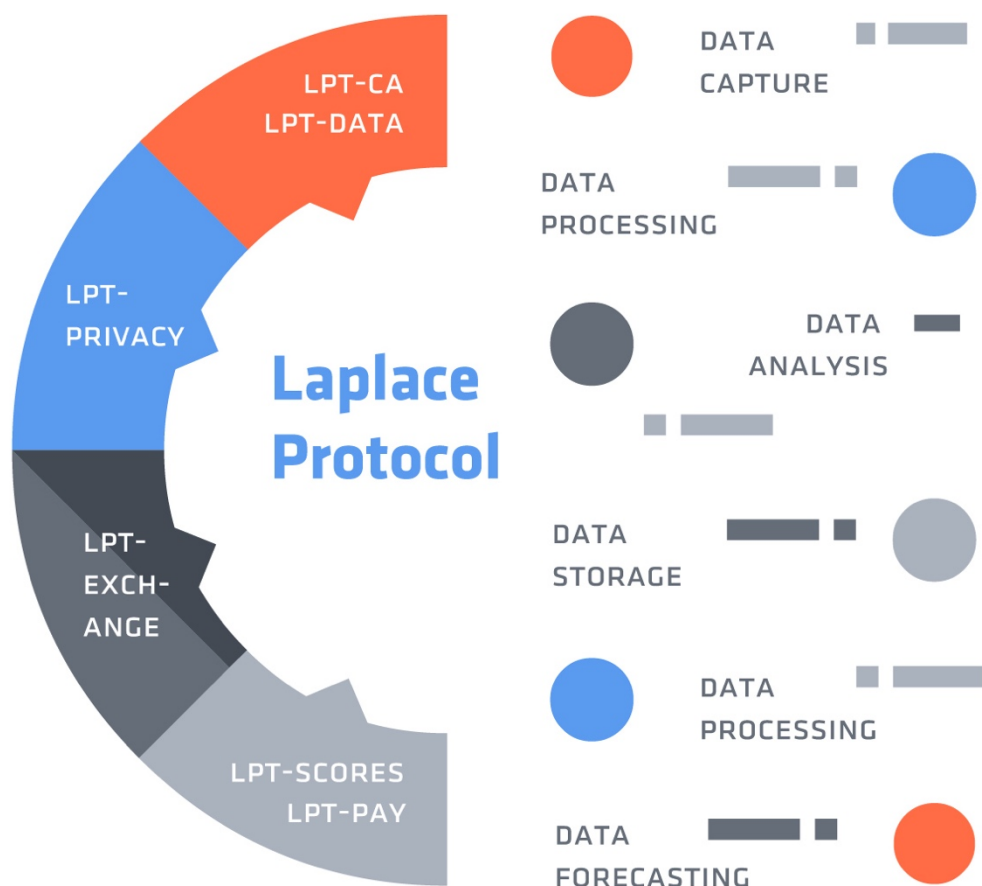
LPT combines the advantages of both centralization and decentralization, and it's a two-layer protocol to be quickly realized. Since not all data processing is required to be on the blockchain, partners in the ecosystem can fully utilize the advantages of the centralized structure to provide robust service availability support. Under the prerequisite of ensuring performance, the protocol harnesses

the distributed trust and traceability of the blockchain, and builds a fair, open data transaction ecosystem which emphasizes on both privacy and trust.

LPT is a blockchain protocol group which supports data discovery, authorization and transaction. It is a blockchain design which boasts **safety, decentralization and high performance**. It is a solution designing data service scenarios.

1. Project Context：Blockchain and Data Services

Consensus: Immutable Agreement for the Internet of Value

Blockchain is a new application model of distributed **data storage, peer-to-peer transmission, consensus mechanism, encryption algorithms** and other computer technologies. Consensus mechanism means the algorithm where different nodes in the blockchain system build trust and acquire stake.

Just as Changjia, the founder of 8btc.com, said the relations between the logic of blockchain and the internet is more like mirroring than parallel. Mirroring means contrast, and one contrast is that internet uses information transmission protocols, but for the blockchain, value transmission ones.

 "The internet realizes efficient information transmission, and the blockchain brings quantitative interconnectivity of value."

With the high-speed development of the internet, data are transmitted quickly. It is just a matter of time before the data service network arrives. But the following challenges also exist:

1. Anonymous transactions

During standard data transactions, both sides want to be isolated in terms of transaction and capital information.

2. Traceability of transaction data

Traceability of transaction information is the common wish of both sides of transactions. Through traceability mechanism, both sides can get basic security guarantee. This mechanism is in conflict with anonymity, thus forming a dilemma.

3. Data Island

In the current primary data service market, data island and serious information asymmetry exist in all sectors, which caused irrational transaction value and decision-making.

4. Data Distinguishing

Data Distinguishing is a serious challenge both in C2C data service or data service based on traditional data market. This has impeded data service development to a large extent.

5. Lack of Transaction Guarantee

Transaction guarantee is a solution to data distinguishing, but it is hard to achieve in the original service ecosystem and technology architecture.

2. Core Challenges and Solutions for Data Services

2.1 Impossible Star of David for Data Service

Our team discussed the data service problems in depth and combined the core consensus mechanism- "contribution to the ecosystem is mining". Thus, we built the **Impossible Star of David for Data Service.**
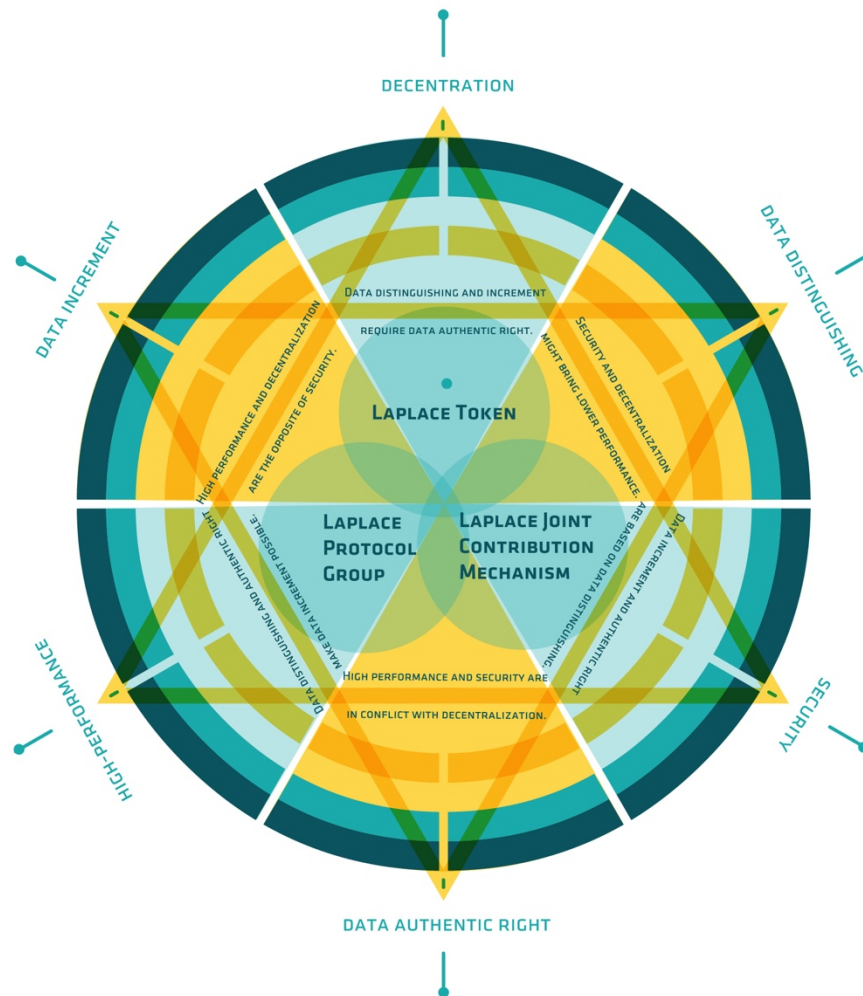
The Impossible Star of David is composed of the following three parts:

First part, problems, including **decentralization, high performance and security**. The three components form a highly impossible trinity.

Second part, hope, including **data increment, data distinguishing and data authentic right**. The three components make an upside-down triangle which represents development possibility.

Third part in the middle, control, including **Laplace protocol group, consensus mechanism and Laplace token**. Based on this model, our team uses decentralized structure and sets up a complete automatic data service channel and new token distribution system, trying to make the impossible possible.

2.2 Solutions:

2.2.1 Cross-chain Abstraction Layer

Cross-chain Abstraction Layer is a data service and interface specification on the blockchain. On the implementation layer, it will be linked to a specific low-level platform in the blockchain. In the future, Laplace foundation will provide reference implementation based on Ethereum and ONT. Meanwhile, the foundation also encourages community members to contribute implementation solutions based on other public blockchains.

2.2.2 Complete Multi-layer Protocol Structure

To ensure the reasonable structure of decentralized data service, LPT establishes LPT data protocol group on the cross-chain abstraction layer. The group consists of:
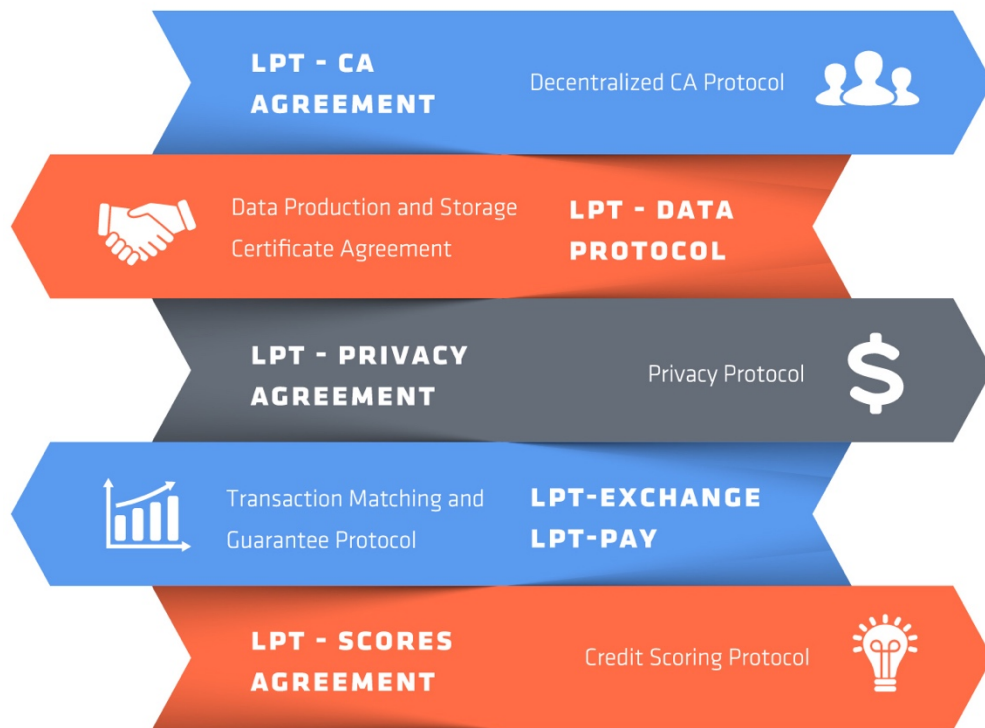
Decentralized CA Protocol (LPT-CA)

Based on CA's decentralized organizational structure, Laplace realizes more decentralized issuance of election certificates and storage through blockchain technology.

Data Production/Storage Certificate Agreement:

Data Production Certificate, used for traffic-based data transaction, is a guaranteed transaction with post-payment model. Data Production Certificate is a sidecar protocol of IPFS.

Data Exchange Protocol (LPT-exchange):

Secure data transmission and transaction guarantee lie at the core of data exchange.

Data Payment Protocol (LPT-pay):

The protocol involves a large amount of chain operation. Offline channel technology is required to enhance the implementation efficiency of the whole protocol.

Credit Scoring Protocol (LPT-scores):

Laplace provides unique credit scoring protocols, which is centered on a unified decentralization credit ID.

Ecosystem Workload Proving Certificate:

Contribution to the ecosystem is mining. Centralized components are required to support the operation.

2.2.3 Interest Distribution under Joint Contribution to the Ecosystem

Due to the special features of the data service market, interest distribution has always been the most complicated and sensitive part of the market. Therefore, it is essential to radically reform the interest distribution for joint contribution to the ecosystem. According to LPT, interest distribution is based on proof of work.

Proof of Work in the Ecosystem

LPT provides reasonable proof of work for all servers. All services are applied to "**contribution to the ecosystem is mining**" and they can get proportionate LPT as incentives for proof of work.
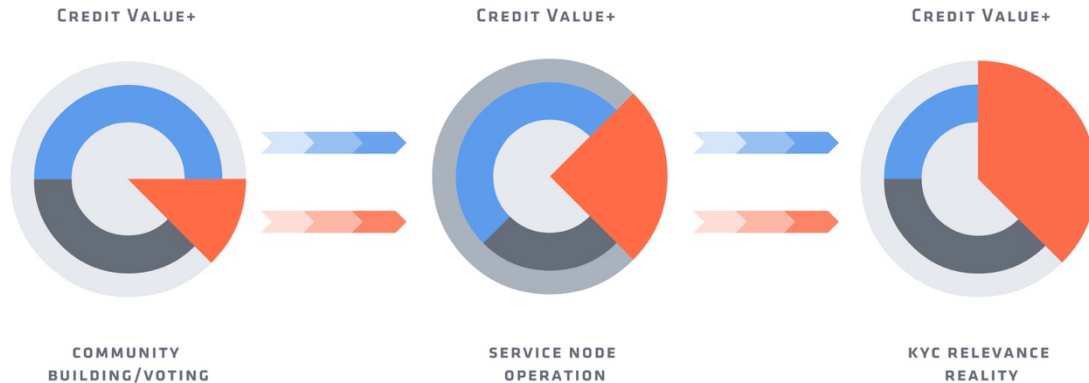
2.2.4 Trust Mechanism Based on Decentralized Root Certificate Institutions

Instead of changing CA institutions' tree structure, LPT uses blockchain token's advantages on voting rights governance to accelerate the election and elimination process.

Laplace foundation will release Laplace-CA Node Election Regulations.

2.2.5 Decentralized Credit Scoring Community

Many layers need credit scoring, so Laplace provides unique credit scoring protocols, which is centered on a unified decentralization credit ID. The CA nodes, individuals in the community and data service providers have only one credit ID.

CREDIT VALUE+   CREDIT VALUE+   CREDIT VALUE+

COMMUNITY BUILDING/VOTING   SERVICE NODE OPERATION   KYC RELEVANCE REALITY

Credit data come from:

1. Community building. Voting raises credit ratings.

2. Different kinds of service operation. More LPT token pledges bring higher credit scores.

3. Laplace network service usage. Transaction completion increases credit scores.

4. Service voting and scoring adds or cuts credit ratings.

5. Linkage with more reality information through KYC channels provided by Laplace.

With the update of credit data, ratings of data service providers are in dynamic changes. For instance, a data product's rating might go up after data guarantee completion or a service provider's rating might increase due to good comments on a data production he/she once provided. The process of credit rating is decentralized, and LPT only extracts and calculates the ratings. All data come from distributed storage environment.

LPT solves the core challenge-data transaction authenticity and guarantees the authenticity of transactions.

Data product owners need to get authentication from LPT-CA (Decentralized CA Protocol) before data transaction. Data product owners need to collateralize a certain amount of LPT tokens before online transactions.

Based on LPT-scores (Decentralized Credit Scoring Protocol), the foundation and the community will create an open, transparent credit scoring community to provide credit guarantee for both transaction sides. The processes above are operated on the open, two-layer LPT and supervised and maintained by the community.

3 Technical Solution

3.1 Decentralized CA Protocol

CA, with a decentralized organizational structure, is an authority issuing and managing digital certificates. As the trusted third party in e-commerce transaction, it is responsible for checking the legitimacy of public keys. In the CA tree structure, root CA lies at the top, and it signs certificates of multiple CA-sub1s, and CA-sub1 signs certificates of multiple CA-sub2. Users who want to acquire a certificate need to file applications to CA. After verifying the identification of the applicant, CA distributes a public key linked with the applicant's ID information and signs the certificate, which will be given to the applicant.

If a user wants to check whether another certificate is authentic or not, he/she can use the public key to verify the signature. If it is verified, then the certificate is deemed legitimate.

Just like traditional CA, Laplace needs to fulfill its responsibility of verifying users' identity. LPT-scores helps to accelerate the process, and we are trying blockchain technology to realize more decentralized issuance of CA election certificates and storage.

3.2 Root Certificate

What is root certificate?

Suppose Certificate C trusts A and B, and A trusts A1 and A2, and B trusts B1 and B2. Then they are forming a tree structure (upside down). A root certificate is the top-most certificate of the tree, and other certificates need to be certified by the upper ones. Root certificate does not need to be certified.

LPT token-holding individuals and institutes in the community can apply to become 12 root node authorities. The whole process consists of public notification and voting, and it is implemented by the smart contract on the blockchain, ensuring fairness and justice.

3.2.1 Exit of Root CA

Exit comes in two forms, voluntary and involuntary. Involuntary exit happens when serious misconduct on the node triggers vote of no confidence in the community.

3.2.2 Guarantee and Economic Incentives

Individuals or organizations participate in the root certificate authority need to pledge a considerable amount of Laplace token LPT in the CA smart contract; the issuance of CA requires the issuer to pay a certain number of LPT, which will be distributed as a reward to CA node.

3.2.3 Operation Principle

The Laplace-CA certification authority is smart contracts that run on the low-level blockchain. The issuance can be divided into the following steps:

1. Certificate application: Initiate a certificate application to the contract interface, and the application materials are stored in LAPLACE-DATA (data production, storage protocol) encrypted with the public key of the issuing authority;

2. Issuance/Rejection: The certificate authority refuses or issues the certificate through the threshold signature scheme.

3.3 Privacy Protection

In addition to the institutions and individuals providing public services, the credit ID does not force associate any reality information about the natural/legal person, which protects the user's personal privacy to a certain extent; Besides, other credit information except for scores is stored on Laplace-DATA (data production, storage protocol) encrypted with ID owners' public key, and cannot be accessed without authorization;

3.4 Authorized Access

Only CA-certified applications can initiate an application to a credit-authorized smart contract. When the user agrees, a copy of the credit data encrypted with the applicant's public key will be generated. In fact, the entire process is completed by Laplace-EXCHANGE.

4. Data Transaction Protocol

Secure data transmission and transaction guarantee lie at the core of data exchange.

4.1 Encrypted Data Transmission

When it comes to encrypted data transmission, the first thing we think of is the SSL/TLS protocol. The Laplace Protocol also handles secured data transmission and storage in a similar manner;

1. Providers of data services must be certified by the CA;

2. Data users need to provide a credit ID public key to encrypt the data to be transmitted;

3. Data transmission and forwarding channels can be: mail, instant messaging software, Laplace-DATA storage or a tripartite protocol supported by the data provider;

4. For the above data forwarding channels, Laplace will develop a standard data storage and forwarding format to facilitate coordination of various supporting software and systems;
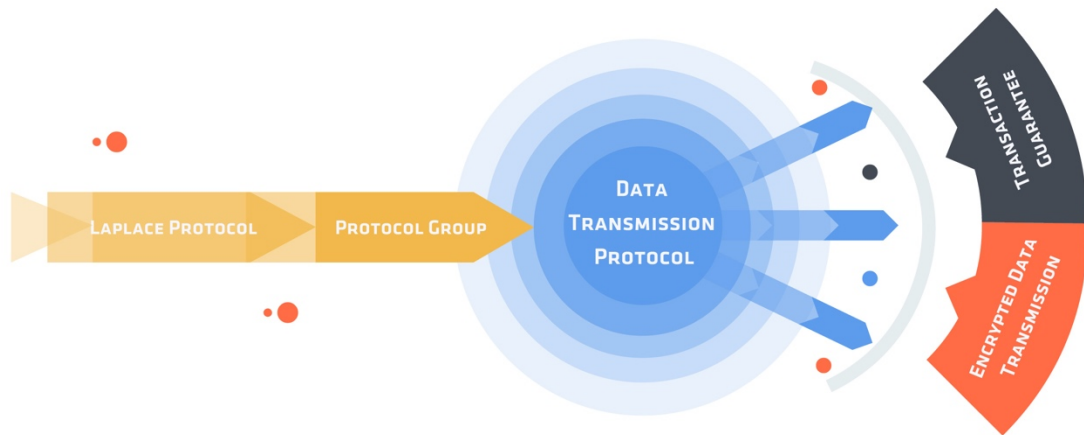
4.2 Transaction Guarantee

Laplace provides decentralized transaction guarantee services, and the transacting parties send the transaction contract and fee (token LPT) to the online guarantee smart contract.

When the transaction is completed, there are several situations:

1. If both the buyer and seller have no disagreement and send a transaction completion request to the guarantee contract, the transaction fee will be automatically paid to the seller's account;

2. If the seller agrees to refund when the buyer has disagreement, the funds will be automatically refunded to the buyer's account

3. If the seller disagrees to refund when the buyer has disagreement, the funds will be frozen until they reach an agreement again; In this case, the money is automatically transferred to the transacting parties according to the ratio reached in the agreement;

5. Payment Agreement

Laplace involves a large amount of chain operation, but the existing public chain TPS cannot meet the application requirements. In this case, offline channel technology like lightning network is needed to accelerate the efficiency of the entire protocol.

Laplace does not exclude existing offline channel technology. It also designed a proprietary offline channel protocol LPT-PAY (guaranteed transaction protocol) for insurance.

LPT-PAY does not pursue complete decentralization. It acknowledges that offline channels such as lightning networks will eventually converge to several major trading nodes. Therefore, joining the LPT-PAY node requires CA certification, and mortgages a large number of LPT tokens with high requirements on the performance of the access node machine;

5.1 Node Economic Incentive

The implementation of LPT-PAY does not require the user to pay, and the node economic incentive is derived from the LPT token reward obtained by the workload proof mining;

6. Data Production/Storage Certificate Agreement

6.1 Data Production Certificate Agreement

Data Production Certificate, used for traffic-based data transaction, is a guaranteed transaction with post-payment model. In this case, the buyer's disagreement is not supported. The buyer needs to carefully check the seller's credit and CA information before the transaction, and interrupt the transaction in time to stop loss in the event of abnormality.

6.2 Storage Certification Agreement

This is a protocol for community members contributing storage space for LPT token mining. The specific implementation method is that the user runs the IPFS node in LPT version.

The Storage Certification Protocol is a Sidecar protocol of IPFS.

7. The Ecological Components

For the healthy operation of the entire data ecosystem, some centralized components are needed.

7.1 Laplace Services Website / Mobile Application

Official entrance to various services:

1. LPT-CA (Decentralized CA Protocol) Node election – Root node authorities

2. Generate Credit ID - Community individuals or data service providers have a unique Credit ID

3. Service Evaluation - Source of credit data

4. LPT-PAY Wallet - Offline channel technology

5. Data Product Search - Indexing service component

7.2 Indexing Service

Data products require a recommendation and search system for potential users to discover and use, but existing blockchain technologies cannot directly support the development of such applications. It must be able to adapt to very large data scales, as well as high data efficiency, fast responsiveness, and the ability to support disaster tolerance. The indexing service is a centralized component that supports the registration, retrieval and recommendation of data products.

In order to enable the community to actively build index services, the registration and recommendation of data products need to pay a certain fee through LPT-PAY (offline channel protocol);

At the same time, the indexing service needs to be reviewed by the LPT-CA (Decentralized CA Protocol) and evaluated by the LPT-SCORES (Credit Assessment Protocol).

7.3 LPT Development Framework

In order to facilitate community partners to develop mature commercial applications based on the Laplace Protocol, the Foundation will launch an LPT development framework that supports mainstream programming languages.

8. LPT APPLICATION SCENARIOS

8.1 B2B Data Transaction Center

In the standard data transaction scenario, the data providers and users are at both ends of the suspicion chain. Data users, afraid of trading useless data, doubt the authenticity of the data, while data providers are afraid that users will not pay the follow-up fees after receiving the data and fear data depreciation due to the second sale of the data by users. LPT applies to the B2B data transaction center to store, transfer and exchange data. On the basis of decentralized concept and blockchain technology, except the data transacting parties, no third party can obtain data, which protects the anonymity of data transactions.

8.2 B2B Digital Copyright Market-La Shop

The pain point of the traditional copyright industry are contradictions between the supply and demand caused by insufficient copyright value and information asymmetry, high transaction costs, copyright confusion, frequent infringements, lack of big data and financial support, lack of integrity system as well as an open and transparent third-party trading market. In the blockchain decentralized digital copyright market, the author, time and content are trinity due to the irreversibility

of the blockchain technology, further reducing the likelihood of infringements; in addition, the data will become an asset of real value, meeting the revenues requirements of suppliers and content creators. La Shop based on the LPT protocol establishes the ownership of digital assets. Regardless of the reselling times, the proceeds will still be owned by the original producer, which guarantees the rights of the data owner.

9. Token Value

9.1 Data Island Effect

Data Island means that various data between departments of a unit are often stored and defined separately. The data in each department is like an island that cannot interact with others, which leads to a lack of connectivity among data in various production and operation channels (such as production data, sales data, purchasing data, order data and financial data) of the enterprise, and impossibility of data compatibility and information sharing.
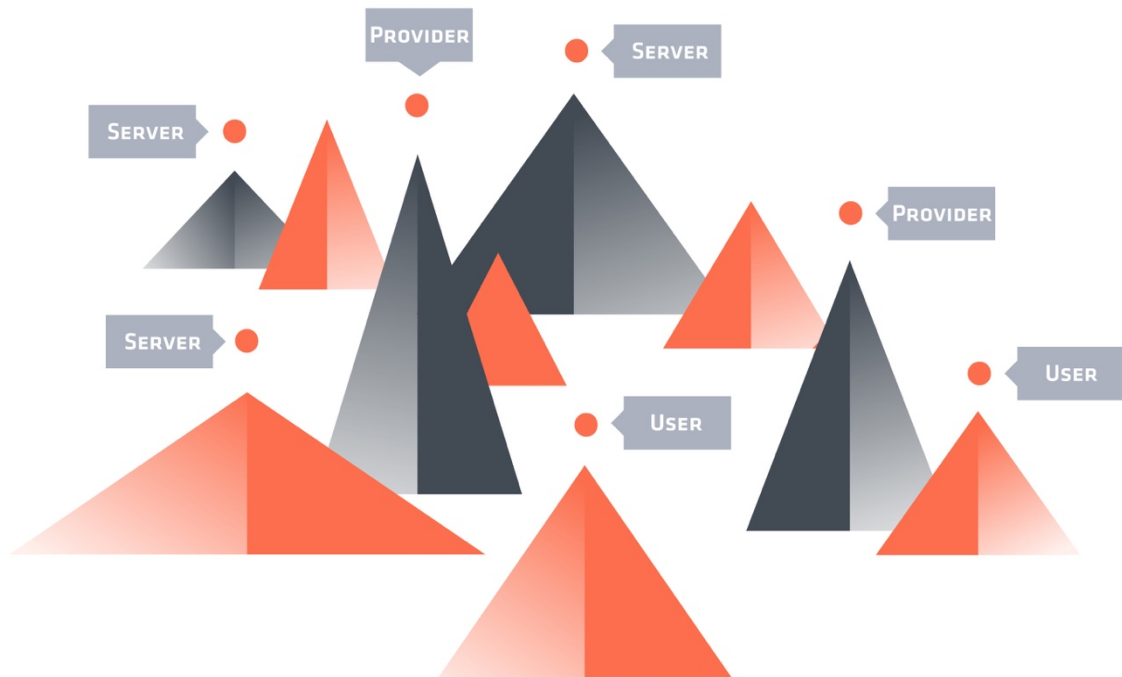
The Laplace Protocol team realized through research that data provision, data authentication, data processing and data storage are still independent of each other as an island. The team calls this state the "Data Island Effect".

9.2 The Economic Model of LPT

The economic model of the Laplace Protocol consists of four scenarios of value circulation.

1. Prove stimulate to the workload

Sharing award for personal idle storage resources and dedicated storage devices

2. Ecological partnership governance

Decentralized DAPP development based on the protocol, community contribution award

3. Data and service value measurement

Free trade pricing for data contributions, data processing, processing results, etc.

4. Fuel costs for protocol execute

The channel fuel that the calling protocol needs to pay, preventing the system from crashing with millions of calling protocols when someone have ulterior motives.

The first two are the main source of tokens, and the third is the main scenario of token circulation. Business elements consist of decentralized application developers, miners, data owners, data buyers, certification authorities, third-party component developers and business partners. In the Laplace network, all community participants are decentralized co-governors who work together to discover, authorize, and circulate data under established business rules.

10. Organizational Structure of the Foundation

The Laplace Protocol project establishes a community co-government committee that empowers community members to exercise their day-to-day work and special issues.

The Laplace Protocol Strategic Decision-making Committee is responsible for the management and decision-making of major issues, including the appointment and dismissal of executives and the heads of the centers, making important decisions and convening important meetings. Members of the Strategic Decision-making Committee are appointed for a three-year term and are eligible for reappointment. Members of the first Strategic Decision Committee will be discussed by Laplace's founding team and investors.

The following matters must be resolved by the Decision-making Committee:

1) Modify the foundation governance structure; make important decisions;

2) Appoint and dismiss members of the Committee in office;

3) Appoint and dismiss executive officers and heads of each committee;

4) Emergency events, software security, system upgrades, etc.;

The members shall attend the meeting of the Strategic Decision-making Committee in person. When a member is unable to participate in the meeting, he/she may entrust a committee member to attend the meeting. If not, it is deemed to have waived the right to vote at the meeting.

11. Introduction of Laplace

Introduction of Laplace

SIMON LAPLACE (1749-1827), French analyst, probability theorist and physicist, academician of the French Academy of Sciences. Born on March 23, 1749 in Beaumont, in Calvados, northwestern France, he died in Paris on March 5, 1827. In 1816, he was elected as an academician of the French Academy and in 1817 he was the dean of the Academy. In 1812, he published an important book *Analytical*

Theory of Probability, in which he summarized the study of the whole probability theory at that time, and discussed the application of probability in election trial investigation and meteorology, and introduced *Laplace Transform*. He is a supporter of determinism and proposes the Laplace's demon.

Laplace firmly believes in determinism, and he wrote in the overview of *Essai philosophique sur les probabilités*:

"We may regard the present state of the universe as the effect of its past and the cause of its future. An intellect which at a certain moment would know all forces that set nature in motion, and all positions of all items of which nature is composed, if this intellect were also vast enough to submit these data to analysis, it would embrace in a single formula the movements of the greatest bodies of the universe and those of the tiniest atom; for such an intellect nothing would be uncertain and the future just like the past would be present before its eyes." — Laplace

The "intellect" Laplace mentioned here is the so-called Laplace demon, which is the data forecast in the industry. The Laplace Protocol team firmly believes that the current data trading market is only a short-term cashing action, which is at early stage in the data service industry.

Future data processing, data analysis, data model and other related services will become more and more frequent. These services are the core business of the data service market in the future.

At the beginning of the design, the Laplace Protocol took the compatibility and scalability into considerations. The team agreed with Laplace's concept that data determines the future. Therefore, this protocol set is defined as the Laplace Protocol.

12. Disclaimer

The operations and application scenarios of the Laplace Protocol use virtual digital assets (i.e. virtual goods) rather than monetary reward mechanisms.

The LPT is a digital currency using the Laplace Protocol as one of its application scenarios. It is a virtual token mechanism of the system operations, not a monetary return. Holding an LPT token does not represent the ownership of the Laplace Protocol or its application, and the Laplace Protocol does not grant any individual any rights to participate or control the Laplace Protocol and its application decisions. LPT holders can participate in the application scenarios of the Laplace Protocol platform. We can't guarantee that LPT tokens will add value, and there may be a decline in psychological cognitive value under certain circumstances. The goals outlined in this white paper may change in the light of unpredictable circumstances. While the team will do its best to achieve all of the objectives of this white paper, all individuals and groups that purchase LPT tokens will be at their own risk.

This white paper or the contents of this whitepaper should not be considered as solicitation, proposal to buy, selling any securities, futures, options or other financial instruments, or to provide any investment advice or services to anyone in any jurisdiction. Therefore, any offer or sale of securities does not depend on this document.

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