

BondTokens: White Paper of ForTube Crypto Bond

V1.0

Abstract

ForTube is a decentralized financial project developed by the Force Protocol, which relies on blockchain technology to carry out innovative experiments. BondTokens is a crypto bond solution provided by the ForTube including credit rating, bond issuance, bond liquidation, and bond trading. In the future, on the premise of compliance, the ForTube platform will continue to explore, open up on-chain and off-chain investment and financing business, as well as build an efficient, transparent, and inclusive financial service platform using blockchain technology to help the development of real industries.

1 Introduction

1.1. The application of blockchain technology in the bond market

As a fixed income tool, bond requires the issuer to pay the pre-agreed interest on a specified date and repay the principal on the expiration date. In the traditional financial market, the issuance of bonds relies on many institutions such as regulatory agencies, underwriters, auditors, lawyers, ratings, custody, registration, and settlement. The process is complicated and costly.

In the scenario of multi-party collaboration, blockchain technology has natural advantages. With blockchain technology, multiple parties place the ledger in a commonly visible network and all transaction records can be seen so information is untamable, open and transparent.

Many financial institutions including the World Bank have tried to utilize blockchain technology to issue bonds. The application of blockchain in the bond market can be divided into two types: one is to optimize the bond issuance process, improve efficiency, and reduce costs using consortium blockchain technology; the other is to realize bond issuance and transactions using public chain technology. The former has greater feasibility in terms of current laws and difficulty of implementation, but the commercial value is smaller; the latter may impact current regulatory laws and technical implementation is more difficult, but the commercial value is higher.

1.2. The rise and current status of crypto bond

Crypto Bond is a new type of bond issued and booked in the form of tokens. On the one hand, it provides financing for outstanding projects or crypto asset holders in the industry; on the other hand, it supplements the market with fixed income products to meet needs of part of investors.

The issuance of crypto bond no longer requires the approval of regulatory agencies and the participation of many intermediaries. The core business processes rely on automatic execution of smart contracts, so efficiency is greatly improved. At present, crypto bond is usually issued with over-collateralized crypto assets as a method of credit enhancement. Once the issuer is unable to repay the debt, the collateral will be liquidated according to the agreed rules, which is similar to traditional collateral trust bond. Crypto bond is still just a new type of innovative financial products. The business model is not mature enough and a certain market size has not been formed yet.

2. ForTube crypto bond solution

ForTube is a decentralized financial project developed by the Force Protocol. Relying on blockchain technology to carry out innovative experiments, it aims to practice inclusive financial services and provide appropriate and effective financial services to all levels and groups of society. ForTube will provide a complete set of solutions for the crypto bond market, including credit rating, bond issuance, bond liquidation, bond trading, etc.

2.1. Bond credit rating

On the ForTube platform, the issuance of crypto bond uses a registration system and does not require any centralized agency to review and approve. The basic information of bond issuance submitted by the bond issuer will be automatically verified by the ForTube platform. Crypto bond will be issued officially after the ForTube community vote to determine its credit rating.

Bond credit rating is a credit rating that is based on the value bonds issued by enterprises or economic entities. Credit rating is an evaluation of the default risk of bonds and provides a reference for investors.

Due to the current immature blockchain industry, it is not suitable for medium and long-term bond issuance. The current crypto bond market will be dominated by short-term bonds. Therefore, the ForTube adopts the following bond credit rating table.

Table 1: Bond credit rating table

Rating	Meaning
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A-1	The risk of default is very small and the security is high
A-2	The risk of default is small and the security is relatively high
A-3	The risk of default is medium , security is vulnerable to adverse environmental changes
B	There is a certain risk of default
C	The risk of default is high
D	Cannot repay the principal and interest on schedule and cannot issue bonds

ForTube platform bond credit rating consists of community rating and professional rating. Community ratings are currently for holders of FOR, the Force Protocol ecological token. After learning about the bond information, voters lock their FOR to the voting level and retrieve the FOR tokens after the rating. Professional ratings are conducted by professional credit rating agencies or professionals. To become a professional rating agency or individual, you need to apply to ForTube developers (later transferred to the community) and provide materials that can prove your professional capabilities and qualifications.

The final rating will be determined jointly by the community rating and the professional rating, with a community rating weight of 60% and a professional rating of 40%. Participating in the rating will receive a rating service fee, which will be distributed in proportions.

2.2. BondTokens

After the bond credit rating is completed, crypto bond can be issued. Each bond is issued in the form of ERC20 and we call them BondTokens. Each type of BondTokens has its own ERC20 contract, which contains all the necessary information and related operations of the bond. BondTokens are indivisible, and their face value is usually \$100. BondTokens is a kind of Debt Obligation. Like other Negotiable securities, it is also a kind of virtual capital, not real capital. BondTokens can be transferred arbitrarily. The person who holds BondTokens is the creditor in the debt relationship and can redeem the principal and interest on the ForTube platform.

Table 2: Bond information

Bond Information	Example
Issuer	Ethereum address
Bond credit rating	A-3
Circulation	1,000,000 DAI
Face value	100 DAI

Number of shares	10,000
Coupon rate	15%
Bond duration	30 days
Bond issuance date	2020-02-01
Bond expiration date	2020-03-02
Callable	No
Puttable	No

BondTokens is a new type of crypto assets. BondTokens with different pledged assets, different expiration dates, different interest rates, and different credit ratings can meet the diverse needs of the crypto asset market. BondTokens can be used as the underlying asset in various decentralized financial products and any individual or team can also develop innovative products based on BondTokens.

2.3. Bond liquidation

The liquidation of the pledged assets will be involved if the underlying pledged assets depreciate significantly or the issuer fails to repay on time. The ForTube currently adopts a discounted liquidation model, which means that liquidators can exchange pledges at discounted prices.

To facilitate calculations, the parameters are set as follows: the target collateralization rate is TCR, the current debt is CD, the current collateralization rate is CCR, the discount rate is Discount, the current price of the collateral is Price, and the remaining amount of the collateral before liquidation is AC. The discount rate (1-Discount) is the liquidation reward for liquidators.

2.3.1. Liquidation of bonds during the lifetime

During the duration of the bond, when the value of the collateral falls by 20%, the system will send a reminder to the debtor. When the value of the collateral falls by 30%, the system triggers the disposal of the collateral, and the system will liquidate part of the collateral so that the collateralization rate returns to the initial value.

When

$$CCR \leq 70\% \times TCR$$

Calculate the number of liquidated pledges X and the amount of liquidated debt Y

$$Y = X \times Price \times Discount$$

The calculation process of X is as follows:

If the pledged assets cannot pay off the debt:

$$AC \times Price \times Discount < CD$$

Then system will execute full liquidation:

$$X = AC$$

When the pledged assets can pay off the debt:

$$AC \times Price \times Discount \geq CD$$

The collateralization rate after liquidation needs to be equal to the target collateralization rate TCR:

$$TCR = \frac{(AC-X) \cdot Price}{CD-X \cdot Price \cdot Discount}$$

We can get X from the above formula:

$$X = \frac{AC \cdot Price - TCR \cdot CD}{Price \cdot (1 - TCR \cdot Discount)}$$

2.3.2. Liquidation of overdue repayments

If the debtor fails to repay after the bond expires, the system will trigger the disposal of the collateral: the system will liquidate part of the collateral to repay all debts and service fees, and the remaining collateral is returned to the debtor.

If the pledged assets cannot pay off the debt:

$$AC \times Price \times Discount < CD$$

Then system will execute full liquidation:

$$X = AC$$

When the pledged assets can pay off the debt:

$$AC \times Price \times Discount \geq CD$$

We can get X:

$$X = \frac{CD}{Price \cdot Discount}$$

The number of remaining pledges (AC-X) can be retrieved by the issuer.

2.4. Bond trading market and bond derivatives

In order to facilitate bondholders to withdraw at any time and recover principal and interest, the ForTube platform will launch a bond secondary trading market. Bondholders can freely set the transfer price and transfer quantity on the reference pricing given by the system. Investors can view bond basic information, credit rating information, expected interest, etc. Investors can obtain BondTokens of the

corresponding bonds after paying the investment fund, and can redeem the principal and interest on the platform after expiration date.

With the popularity of BondTokens, the ForTube platform will continue to launch more functions to support various bond derivatives, such as bond repo (including reverse repo), callable bond (a bond issuer may redeem an issued bond before the expiration date of the bond) , puttable bond (a bond holder may sell the bond back to the issuer before the expiration date of the bond), etc.

2.5. Data dashboard

Data dashboard reflects the overall operation of the ForTube platform. The contents displayed on the data dashboard include bond issuance volume, pledge value, bond default rate, liquidation rate, liquidation data, default rate of various credit ratings, data performance of professional rating agencies, etc.

3. Community governance

ForTube is committed to promoting a decentralized (or multi-centralized) bond issuance and liquidation platform. The system authority and core parameters will be handed over to the community at the end. However, in the early stage of the project, in order to quickly promote project development and platform development, system authority and parameters will be maintained by ForTube developers. ForTube developers will uphold the principles of fairness and transparency. Any changes to the system will be promptly notified to the community.

Currently, the system parameters maintained by ForTube developers include but are not limited to:

- Supported crypto assets and their collateralization rate, maximum number of bonds that can be issued, liquidation discounts, etc.
- The basic parameters of bond issuance, such as coupon interest rate, bond duration, issuance fee, rating service fee, etc.
- Time parameters, such as credit rating period, bond issuance duration, repayment grace period, etc.
- bond credit rating setting
- Credible oracle price-feed program.

4. Risk management of crypto bond market

4.1. Credit risk

The biggest risk faced by the bond market is credit risk, which means that the debtor may not be able to meet its repayment obligations. The reason for the credit risk may be that the debtor is unable to repay; in addition, because of the huge fluctuations in the price of cryptocurrency, the debtor's willingness to repay decreases when the value of the pledged cryptocurrency drops sharply. In order to reduce credit risk, we require the debtor to over-collateralized the cryptocurrency and to supplement the collateral when the value of the cryptocurrency falls. In extreme cases, the liquidator will promptly dispose of the collateral.

4.2. Liquidity risk

Liquidity risk is one of the core risks in the field of cryptocurrency. Liquidity risk refers to the risk that the cryptocurrency cannot be sold at a price close to the market price. The liquidator will face this problem when disposing of the collateral. ForTube will set different liquidation service fees according to different pledged assets and attract more liquidators to participate in the system through economic incentives.

4.3. Operational risks

Operational risks may come from system failures and hacker attacks. For this reason, ForTube will cooperate with world-renowned system security audit institutions to conduct code audits to reduce this risk to a minimum.

5. Main participants

Issuer: It can be an individual, a project party, or even a real entity. The issuer needs to have certain repayment ability and pledge the crypto assets it holds as repayment guarantee. Due to the large volatility of the value of crypto assets, issuers need to over-collateralized the cryptocurrency and face the risk of liquidation at the same time.

Investors: The ForTube platform provides investors with bond products with considerable returns and relatively controllable risks. Investors who hold USDT, DAI, USDC and other stable coins can easily participate in bond investment. Bond products will be secured by over-collateralized crypto assets, and liquidators will promptly liquidate non-performing assets to protect investors' rights and interests.

Rater: It can be an individual or a professional rating agency holding FOR, the Force Protocol ecological token. Participating in bond credit ratings can obtain rating service fees.

Liquidator: an individual or program that handles bad debts in the system. The ForTube platform provides a liquidation interface where everyone can participate in liquidation and obtain liquidation service fees.

6. Compliance considerations

The ForTube platform aims to build a decentralized bond issuance and investment platform, reduce financial intermediaries, and improve investment and financing efficiency. The ForTube platform is a global platform. Users should follow relevant national laws and regulations when using it. The platform may also require identity verification procedures (KYC, Know Your Customer) and anti-money laundering procedures (AML, Anti-Money Laundering) as required by relevant national laws and regulations.

7. Outlook

We can see that traditional finance has performed poorly in early stage corporate financing services, inclusive financial services, and SME financial services. There is also significant room for improvement in online lending, cross-border trading, supply chain finance, asset securitization, etc. The blockchain technology has the potential to solve these problems and deficiencies and has begun to drive changes in the financial industry.

ForTube crypto bond platform takes crypto assets as a test field and supports flexible business expansion in overall design. Under the premise of compliance, the ForTube will continue to explore on-chain authentic right of assets, introduce guarantee institutions, launch more types of bond products, etc., The ForTube is also committed to opening up the on-chain and off-chain investment and financing business, building an efficient, transparent and inclusive financial service platform using blockchain technology to help the development of the real industries.