Star Bridge

# Multi-chain ecological decentralized cross-chain bridge

## The url: starbsc.gitee.io

# Abstract

Star Bridge is committed to providing trustless cross-chain service platform for blockchain assets such as Ethereum, Poka, HECO and BSC. Assets including blockchain assets such as Ethereum, TRON, BSC and HECO can all be de-neutralized cross-chain transfer through the Star Network of the Trunk Chain. For example, the USDT of the Ethereum network can be transferred across chains to the BSC network, but it should be noted that the network fee will vary depending on the block network selected by the user

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# 1. Introduction

Star Bridge is committed to providing trustless cross-chain service platform for blockchain assets such as Ethereum, Poka, HECO and BSC. Assets including blockchain assets such as Ethereum, Polkadot, BSC and HECO can all be de-neutralized cross-chain transfer through the Star Network of the Trunk Chain. For example, the USDT of the Ethereum network can be transferred across chains to the BSC network, but it should be noted that the network fee will vary depending on the block network selected by the user

Take Ethereum for example

Crossing Star Bridge:

A user initiates a cross-chain application to Star Bridge's cross-chain contract in Ethereum and submits the cross-chain assets to Star Bridge's contract. The super node of Star Network will capture the transaction one after another after 12 blocks of the application transaction. And independently complete Ethereum transaction authenticity verification (Merck Tree Verification), and the verifier of the current era of Star Bridge submits their verification results to the Star Bridge Route, When the corresponding Star Bridge Route successfully collected more than 50% of the verifier node approval signatures, the newly cast SRC22 token will be issued to the user

Crossing the Star Bridge:

The user makes a crossover application through Star Bridge Route and submits the cross-chain asset to Star Bridge. The Star Bridge will temporarily lock the asset, and the super node of Star Network will capture the transaction one after another after 12 blocks of the applied transaction. And independently complete the verification of the authenticity of the transaction (Merck tree verification), and submit the results to Star Bridge, when the corresponding Star Bridge Route successfully collected more than 50% of the verifier nodes approved signatures, the asset will be burned. Users get the approval certificate of the transaction and can withdraw the corresponding assets on the Ethereum network! If more than 50% of the approved signatures are not obtained after N+24 blocks, the locked asset will be returned the way it was

# 2. Minting SRC22

Star Bridge Token is the asset minted by Star Bridge, abbreviated as SRC22. The SRC22 follows the ERC- 20 Token standard which enables the wrapped assets to enter the Ethereum DeFi world.

In this chapter, let’s take BSC as a typical example. The SRC22 minted by Star Bridge is an ERC-20 token backed by BSC and thus is named “Staring BSC”, abbreviated as SRC22. The marketing prices of these SRC22 reflect the values of Bitcoins backing them.

**2.1Minting**

1. Alice needs to bind her SRC22 address and Ethereum address through a smart contract, and then transfers x BSC assets to a designated multi-signature custody address.
2. The asset custodians confirm the receipt of the asset and then mint x SRC22 (equivalent to x BSC value) on the Ethereum.
3. The asset custodian transfers x SRC22 to Alice's BSC address and charges 0.2% fee and extranetwork fees of the asset value as minting fee.

# 3.Tunnel Mechanism

## 3.1Overview

Star Bridge has created a brand new concept "Tunnel". For each blockchain asset, there will be an exclusive minting tunnel operated in the form of Star and performing bi-directional mapping between blockchain assets and SRC-20 tokens.

Any community user can open a new tunnel freely through pledge Star, but each blockchain asset can only have one tunnel. For example, Alice wants to wrap BSC into SRC22 on Ethereum network, but the Star Bridge system has yet to create a channel for BSC. Then, Alice can stake a certain amount of Star and create a BSC- SRC22 wrapping tunnel. Although created, the tunnel will not be activated until Star Bridge community has pledged enough deposites that meets the requirement for a tunnel activation, in which Alice's portion of the pledge will directly enter the pledge pool.

## 3.2Two Important Parameters of "the Tunnel"

There are two important parameters in the creation of the Tunnel: **pledging coefficient (k)** and **commission rate (m, n)**.

In version 1, the pledge coefficient **k** of the tunnel is kept at 50%, while the commission rate for minting as well as redemption are both set at 0.2% fees, and the minting section requires extra network fees.

In version 2, however, we aim to let tunnel operators decide on the pledging coefficient and commission rate.

## 3.3Profit of pledge to earnings

Operating a tunnel requires pledging a certain amount of tokens (composed of Star and other approved form of collaterals). The tunnel is designed in a way that the total value of pledged tokens is positively correlated to the maximum “wrapping” limit of each tunnel, while the pledging coefficient would decide the collateralization ratio of any given channel.

Thus, formula to calculate the minting upper limit of each channel is listed as follows:

Upon reaching the upper limit, the tunnel would not be able to mint new SRC22s unless operators continue to pledge. The significance of pledging would serve to further improve the credibility of wrapping, and reduce the risk of systematic wrong-doing.

Types of cryptocurrency assets accepted as form of pledging collateral: Pledged assets could be either Star or cryptocurrency recognized as collateralized assets by the Staring community.

In version 1, we only recognize Star as the definitive pledging asset for the tunnel. In future versions, we would allow other forms of collateralizations, with the list be decided and voted on through community governance mechanisms. However, in future versions, Star pledging must account for at least  of the total pledge of each tunnel. That is, if the pledge pool of a given wrapping tunnel is consist of 1 million USDT worth of Star,  then the total pledging value equals to

However, the pledge coefficient is abstract, it is only used as a system parameter. Usually, Star Bridge tunnel uses Asset Ratio to describe SRC22. For example, at a certain moment, the pledge coefficient is 50%, which means that each SRC22 is backed by 1 BSC + 0.5 BSC equivalent ERC-20 assets, then the current SRC22 Asset Ratio should be 100%

## 3.4Satellite City Pledge

Imagine a Staring tunnel connecting different blockchain universes. Sometimes the capacity of the tunnel may not meet requirements. Thus, we are introducing a Satellite City to provide greater capacity for SRC22 Tunnel. Now, the Satellite City will launched BSC/USDT/USDC/DAI, etc. These assets will be used as collaterals of the SRC22 Tunnel togBSCer with Star in the tunnel and will becalculated

in Asset Ratio. Please note that there is no impermanent loss of assets in Satellite City, nor will they become PP Tokens. If the Asset Ratio is less than the specified ratio (For example 150%), assets will not be liquidated, but the minting will stop. However, if a black swan incident occurs (eg. loss of the underlying BSC), compensation will be offered by the decentralized insurance protocols (Nsure, COVER, etc.) first, followed by Satellite City assets and Star in the tunnel. In return for extremely rare events, those who stake assets in Satellite City can receive a long-term reward of Star yield-farming.

### 3.5Tunnel Creation

User needs to pledge at least 500 Star for the initial tunnel creation. However, it should be noted that after the initial creation, the tunnel would maintain inactive until the pledge requirement for tunnel activation is met within 48 hours of initial tunnel creation. In version 1, the activation requirement of each tunnel is set to 3,000 Star; that is, although the tunnel has been created after pledging 500 Star, the tunnel would only start to create wrapped SRC22s after a total of 3,000 Star is pledged. After the activation requirement has been met, the tunnel will go live after a tunnel-creation countdown.

Why require pledging Star for proposals: to avoid a large number of meaningless proposals which cause waste of community's energy; the Star pre-pledged at the time of the proposal will be converted into the actual pledge of the tunnel as soon as the proposal is passed, allowing the tunnel to have the initial pledge amount and minting capacity.

### 3.6Tunnel Settlement

Tunnel settlement would only occur when the losses occur in the cryptoassets under custody. In V1 and V2 stages, in the event of cryptocurrency assets lost under custody, the corresponding minting tunnel will be frozen immediately for settlement. First, the asset custodian will confirm the remaining assets in the wallet and match them with the assets issued on the blockchain to calculate the exposure to be settled. Then, the tunnel pledge will be settled in an equal amount. After clearing, the multi-signature wallet will be replenished with assets, and then the minting will be available. In the V3 stage, dynamic clearing will be realized.

## 4.Participants in the Star Bridge Ecosystem

User: Pay a certain amount of commission fee to have one's own non-ERC-20 token converted into a wrapped ERC-20 version, namely minting and redemption of one's native cryptocurrency assets.

Tunnel operator: Pledge Star assets to set up a tunnel, be responsible for the complete minting and redemption process, and obtain a part of the commission paid by users.

Custodian: Composed of community members with high reputation and Star pledge amount, and is responsible for helping users to complete on-chain multi-signature custody of other blockchain assets and obtain a part of the commission paid by users.

## 4.1Tunnel Operators

Each tunnel has “operators,” and their mission is to help users complete minting/redeeming cryptoassets in the tunnel.

Explanation on participating in tunnel operation (pledge): Star Holders participating in tunnel pledge will become operators of the tunnel. In other words, it works similarly to staking. For example, once the proposal is approved, the proposer will become the initial ‘operator’ of the tunnel because he has deposited Star as a pledge for the tunnel at the proposal stage.

Subsequently, when more operators join in, all operators will obtain the respective share of the tunnel commission according to the respective proportion of the pledge amount. However, at the same time, if there is a Black Swan risk in the custody assets of the tunnel, the tunnel pledge will be settled and compensated to the minting users in proportion.

For example, Alice has pledged 100 Star to participate in the operation of the SRC22 tunnel. At present, the total pledge amount of the SRC22 tunnel is 300  Star, so Alice takes up of the operation amount of all operators and will obtain of the income when the operating income is distributed. However, if an extreme situation occurs (the possibility is very low), i.e., the BSC hosted by the system is stolen by hackers, all pledged Star in the tunnel will be cleared and paid to all SRC22 holders as compensation after the proposal is approved. Alice owning of the operating rights, will also bear of the clearing losses in this clearing. Therefore, operators who set up a tunnel need to bear small-possibility risk while gaining income.

Therefore, the higher the pledge coefficient **k**, the safer the tunnel. In V1, we set the pledge coefficient of all tunnels to be 50%, which makes tunnel operators provide excessive pledge for tunnels and is a double guarantee for the safety of minting assets.

## 4.2Asset Custodian

The asset custodians in the Star Bridge are composed of a series of node parties with a high community reputation and Star pledge amount. They are responsible for helping users to complete the on-chain multi-signature custody of other blockchain assets and ensure the security of the underlying assets minted.

In the V1 version, the asset custody is mainly based on well-known institutions in the blockchain sector, and the Star Bridge core developers are invited to assume the post jointly. Because in the early stage, it is difficult to guarantee that the custodians fully elected by the community can correctly ensure both the high efficiency and safety of the assets.

In the V2 stage of the project, Star Bridge will appropriately increase the number of asset custodians to 7 and introduce a node-election mechanism so that nodes with higher community reputation and more considerable tunnel pledge amount can be elected as asset custodians.

In the V3 stage, Star Bridge will further increase the number of asset custodians to 21 and use the BFT + DPOP (Delegated Proof of Pledge) mechanism for the first time for custodian election. The top 48 nodes with the highest total pledge amount in the system will all become custodian candidates and share the custodians' income. Among them, the nodes ranked in the top 21 in terms of the total pledge amount will become the custodians, being responsible for maintaining the security of multi-signature wallet assets. However, we will have slash and node rotation mechanisms to inhibit and eliminate those custodian nodes that do not act or do evil.

In the past, the industry was exploring the security of assets under custody in several aspects.

# 5.Star Governance in Star Bridge

Star Bridge will govern in accordance with the Star mBSCod.

The governance authority of Star will be unimaginably great. Star holders are the dedicated controllers of Star Bridge.

In the V1 stage, Star Bridge will be preset with some basic parameters to run the whole project quickly; however, by the V2, V3 and subsequent stages, Star holders will be able to modify most parameters and mechanisms.

Besides, due to the existence of the initial pledge of the BSC tunnel, this part of the pledge will also receive tunnel operation rewards, and these rewards will enter the Treasury address which will be managed by the community.

Community proposals include but are not limited to the following general directions:

- Opening new tunnel types;
- Revise the proportion of rewards distribution for tunnel commission;
- Revise the output reduction rate;
- Revise the pledge ratio of Star assets and other assets in the tunnel;
- Plan for the use of insurance money in the insurance address;
- Plan for the use of treasury fund in the treasury address;
- Clearing plan of tunnel pledge in extreme cases.

# 6.Star Insurance

Just because the Starbridge system is well designed doesn't mean it's foolproof.

50% of the redemption commission in the tunnel will be deposited into the node equity pool and the 7 day equity pool. The insurance pool is completely managed and controlled by the community. Only if the community proposal is met and a referendum is completed will the insurance amount locked in the contract be used to settle the claim. Claims settlement is often used to deal with black swan risks in the system.

Star Insurance will provide a third guarantee for the Star Bridge system, allowing all assets to roam freely, safely and untrusted across the BSC network.

# 7.Star Bridge Development Planning

Star Bridge - V1

Establish SRC22 and mainstream currency channel, pledge coefficient and commission rate are constant;
Establish SRC22 liquidity pool in mainstream DEX;
Support BSC cross - HECO assets

Star Bridge - V2

supports tunneling in most cryptocurrencies. Tunnel operators can adjust the pledge coefficient and commission rate by themselves;
Achieve major asset support cooperation with Defi such as Chuangxing and AVE;
Increase the number of assets trustee seats (7 seats);
Support Star Insurance.

Starbridge V3 and later versions

support to open more cryptocurrency channels, open coinage function; further communicate with managed nodes and introduce BFT+DPOP node election mechanism;
Support the application of Makerstar, Compound and BSC in DEFI ecology;
Develop a Defi application similar to Makerstar;
Support BSC Trans Boca assets

Increase asset custody seats (21 seats), build multi-signature system with zero-knowledge proof, and create an open and credible multi-signature system.
Star Distribution

Token Name: Star

Maximum Supply: 20,000,000 (fixed)

3% for candy airdrops

10% for technical teams and team operations

5% for angel rounds

7% is used for node equity pool and 7-day equity pool allocation

75% for liquidity

# 8.Summary

Due to the complexity of cross-chain technology, the current transfer of linked assets and the interconnection of chains still have many problems that have not reached full maturity and are still in the exploration stage. At present, the Star Bridge blockchain system can be linked through a standardized cross-chain protocol. Many blockchain systems can work togBSCer to provide support for more users and more services. Later, it will support the mutual transfer of assets between Ethereum, Pokar, HECO, BSC and other public chains. To bring more prosperity to the DEFI world