Week4

Stellar’s Network Governance and Stellar Tools

Stellar Technical Academy

UNIC | DLRC

Stellar

Session 4: Agenda

1. Stellar Network Governance
2. Stellar Tools
3. Conclusion

Session 4: Objectives

In Week 4 of the Stellar Technical Academy, you will:

- ✓ Learn about Stellar's governance model and its dynamics
- ✓ Discover how the Stellar Consensus Protocol (SCP) contributes to the network's governance
- ✓ Deep dive into Stellar's Decentralised Exchange (DEX)
- ✓ Have a look at Stellar's various tools

1. Stellar Network Governance

Stellar Network Governance

Stellar Proposals

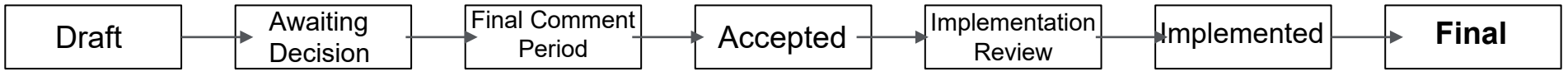
- Frequently, new members of the Stellar community assume that the Stellar Development Foundation (SDF) is the source of every change to the Stellar code base.
- However, since Stellar is an open-source network, the truth is that anyone can review and contribute to the code, and anyone can write technical proposals suggesting changes to the protocol or the ecosystem standards.
- The Stellar Development Foundation (SDF) has the role of guiding and maintaining the development of the network, but not the role of the exclusive contributor.
- For Stellar, developers and network participants are extremely important to help aid in the growth.
- The changes and proposals that can be presented are currently divided into two categories:
  - **Core Advancement Proposals (CAPs)**
  - **Stellar Ecosystem Proposals (SEPs)**

Stellar Network Governance

The Stellar Core Advancement Proposals

Core Advancement Proposals (CAPs)

- These proposals are suggested changes to the core protocol of Stellar and have a direct effect on how the network operates.
- A proposal categorised as a CAP enters a multi-step process to ensure that it is high quality, backwards compatible, and meets the goals of the Stellar network, in order to prevent – among other issues – protocol bugs, which can lead to severe and difficult network issues.
- For a CAP to be classified as Final and go live on the network, it must be:
  - implemented in the code
  - included in a protocol upgrade
  - accepted by the majority of network validators
- Below, you can see the lifecycle of a CAP:

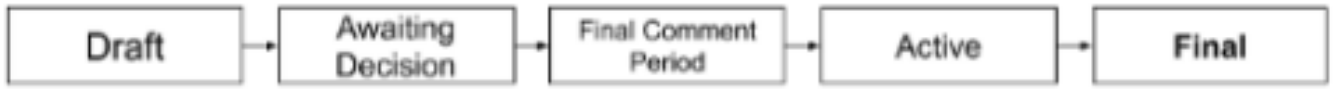


Stellar Network Governance

The Stellar Ecosystem Proposals

Stellar Ecosystem Proposals (SEPs)

- These proposals deal with changes to the standards, protocols, and methods used in the ecosystem built on top of the Stellar network.
- They allow developers to agree on how services using the network should be implemented to allow for maximum interoperability and they often do that by specifying two sides of an interaction: one side creates an API that acts in a predictable way and the other side consumes it.
- SEPs are also divided into two categories:
  - Informational, which is open to use by the Stellar ecosystem but is not endorsed and standardized by SDF
  - Standard, which is not only open to use by the ecosystem but is endorsed and standardized by SDF. It also needs to be approved by two SDF members on the SEP team.
- Below, you can see the life cycle of a SEP:



Picture by Medium

Stellar Network Governance

The Types of Stellar Validators

- All nodes on Stellar perform the same basic functions, like running the Stellar Core, connecting to peers, submitting transactions, storing the state of the ledger in a SQL database and keeping a duplicate copy of the ledger in flat XDR files called buckets.
- In addition to those basic functions, there are two key configuration options that determine how a node behaves.
- For example, a node can:
  - Participate in consensus to validate transactions
  - Publish an archive that other nodes can consult to find the complete history of the network
- Based on the permutations of those two options, we define three different types of nodes:
  - Basic Validator
  - Full Validator
  - Archiver
- It's important to mention that all of these nodes support Horizon and submit transaction to the network.

But why choose one type over any other?

Stellar Network Governance

The Types of Stellar Validators

Basic Validator – Validating, no public archive

- A Basic Validator keeps track of the ledger, submits transactions for possible inclusion and ensures reliable access to the network.
- However, it is not configured to publish history archives.
- Moreover, it does require a secret key and is configured to participate in consensus by voting on – and signing off on – changes to the ledger, meaning it supports the network and increases decentralisation.
- The greatest benefit of the Basic Validator is that the signatures can be used as official endorsements of specific ledgers in real time.
- That's important if, let's say, you issue an asset on Stellar that represents a real-world asset: you can let your customers know that you will only honor transactions and redeem assets from ledgers signed by your validator, and in the unlikely scenario that something happens to the network, you can use your node as the final arbiter of truth.
- Generally, setting up a node as a validator helps in resolving questions up front and in writing about how to deal with disasters and disputes.

Stellar Network Governance

The Types of Stellar Validators

Full Validator – Validating, offers public archive

- A Full Validator implements the same functionality as the Basic Validator, plus publishing a history archive containing snapshots of the ledger, which includes all transactions and their results. A full validator also contributes to the health of the network.
- A Full Validator writes to an Internet-facing blob store – such as AWS or Azure.
- This makes it a bit more expensive and complex to run but it also does the most to support the network's resilience and decentralisation.
- Whether other nodes are joining the network or experiencing difficulty and temporarily fall out of sync, they can consult archives offered by the Full Validators to catch up on the history of the network that they missed.
- Redundant archives prevent a single point of failure and allow network participants to verify the veracity of a given history.
- In general, most of the organizations that run Full Validators are also part of Tier 1 and don't just use them to query network data or submit transactions.

Stellar Network Governance

The Types of Stellar Validators

Archiver – Non-validating, offers public archive

- An Archiver is a rare node (rara-avis).
- Just like a Full Validator, it publishes the activity of the network in long-term storage.
- However, unlike a Full Validator, it does not participate in consensus.
- Archivers act as a referee to the network and help with decentralisation by offering redundant account of the network's history.
- Nonetheless, they don't vote or sign ledgers, so their usefulness is fairly limited.
- It is best for someone to run an Archiver in the case that he runs a Stellar-facing service, like a blockchain explorer.

Stellar Network Governance

Tier 1 Organizations and Stellar

- In order to help with Stellar's decentralisation, the Stellar Development Foundation (SDF) works closely with 'Tier 1 Organisations' to ensure the health of the network, maintain good quorum intersection and build in redundancy to minimize network disruptions.
- The 'Tier 1 Organisations' run three validators, coordinate any changes to their quorum sets and hold themselves to a higher standard of uptime and responsiveness.

Why do they run three validators?

- The set up and use of three validators in the most important function of a Tier 1 Org.
- On Stellar, validators choose to trust organisations that build a quorum set and trustworthy organisations want their presence on the network to persist even if a node fails or it gets taken down for maintenance.
- A trio of validating nodes allows that to happen without any disruption: another participant can create a quorum slice for the organisation that requires 2/3 of the validating nodes to agree.
- If, in any case, one of the validators reports issues, the other two can still vote on the organisation's behalf, so the show goes on!
- To ensure redundancy, it's also important that these three validators are also geographically distributed, because if they are in the same data centre, they are at risk of going down at the same time.

Stellar Network Governance

Tier 1 Organisations and Stellar

- As a Tier 1 Org you are expected to:
  - **Publish History Archives:** Stellar Core needs to be configured to record history to a publicly accessible archive in order a Full Validator to publish an archive of the network transactions. Every Tier 1 Org needs to set each of its nodes to record history to a separate archive.
  - **Set Up a Safe Quorum Set:** to maximize network's resilience, we are asking every Tier 1 node to use the same quorum set configuration, which is made up of sub-quorums of all validators from each Tier 1 Org.
  - **Declare Your Node:** refers to the self-verification of validator nodes and it is an easy way to propagate information. Also, it harnesses the network to allow other participants to discover your node and add it to their quorum sets without the need for a centralised database.
  - **Keep Your Nodes Up To Date:** you need to make sure that your nodes run the latest version of Stellar Core and check in public channels for information about what is currently happening with other validators.
  - **Coordinate With Other Validators:** whether you run a trio of validators or a single node, it is important that you coordinate with other validators when you make a significant change, like take your node down for maintenance or make changes to your quorum set, or when you notice something wrong.
  - **Monitor Your Quorum Set:** it is recommended that you use Prometheus to scrape and store the Stellar Core metrics and Grafana to render that data for human consumption.

Stellar Network Governance

Upgrading the Network

- The Stellar network comes along with many network-wide settings that can be updated.
- Each update is performed by validators (nodes) that vote and agree to new values, the same way that they reach consensus (agreement) for transaction sets etc.
- A node can be easily configured to vote for upgrades by using the upgrades endpoint.
- More specifically, the network settings that the network comes along with are:
  - The version of protocol used to process the transactions
  - The maximum number of transactions that can be included in a given ledger close
  - The fee associated with processing operations
  - The base reserve used to calculate the lumen balance needed to store things in the ledger
- Each time the network time is later than the *upgradetime* variable specified in the upgrade settings, the validator will vote to update the network to the value specified in the upgrade setting.
- If the network time has surpassed the *upgradetime* by more than 12 hour, the upgrade will be ignored.
- When a validator has the jurisdiction to change the network values, the output of info will contain information about the vote.

Stellar Network Governance

Upgrading the Network

However, upgrading the network can be tricky and there are a few things that should be considered.

- Changes to network-wide settings have to be orchestrated properly between validating nodes and non-validating nodes:
  - A change is vetted between operators (changes can be bundled)
  - An effective date in the future is picked for the change to take effect, controlled by *upgradetime*
  - If applicable, communication is sent out to all network users
- Moreover, an improper or defective plan can cause issues such as:
  - Nodes missing consensus (or 'getting stuck') and having to use history to rejoin
  - Network reconfiguration taking effect at a non-deterministic time, causing fees to change ahead of schedule

Stellar Network Governance

The Implementation of Protocol 18

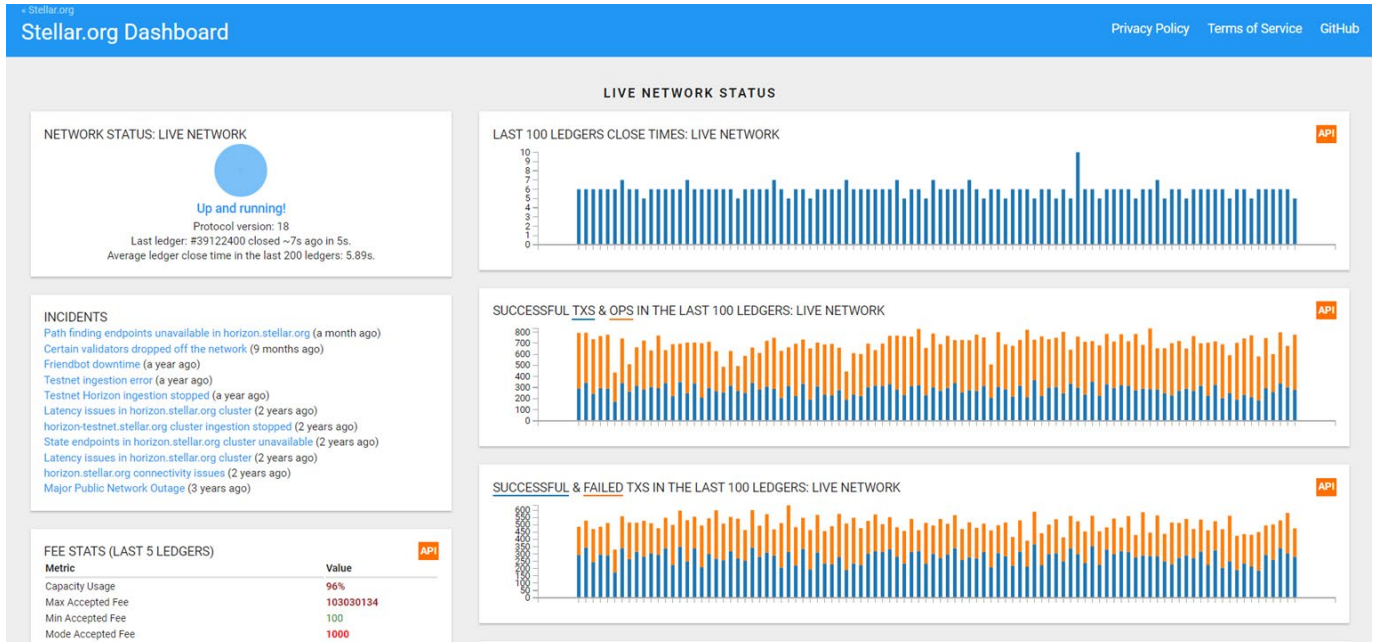
- An good example of a protocol upgrade is the upgrade to Protocol 18.
- On 3 November 2021, the Stellar public network successfully upgraded to Protocol 18, adding native support for automated market makers (AMMs) to Stellar.
- As with every other network upgrade, the Protocol 18 upgrade required the assent of validators, who vote for and agree to a new protocol version just like they vote for and agree to apply transaction sets to the ledger.
- What is great and extremely important for the Stellar community is that Stellar enables anyone to run a validator (or core node) and participate in network governance.
- You can learn more about the Protocol 18 launch here.

2. Stellar Tools

Stellar Tools

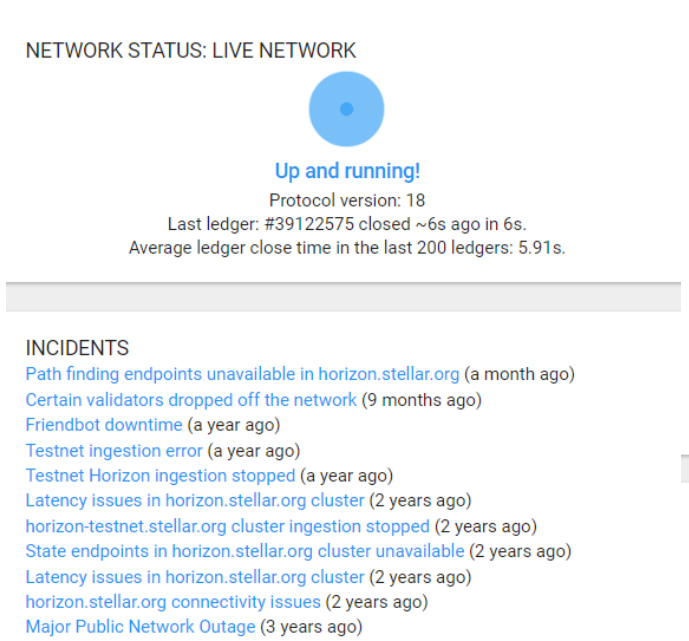
Stellar Dashboard – Monitoring Stellar's Network Activity

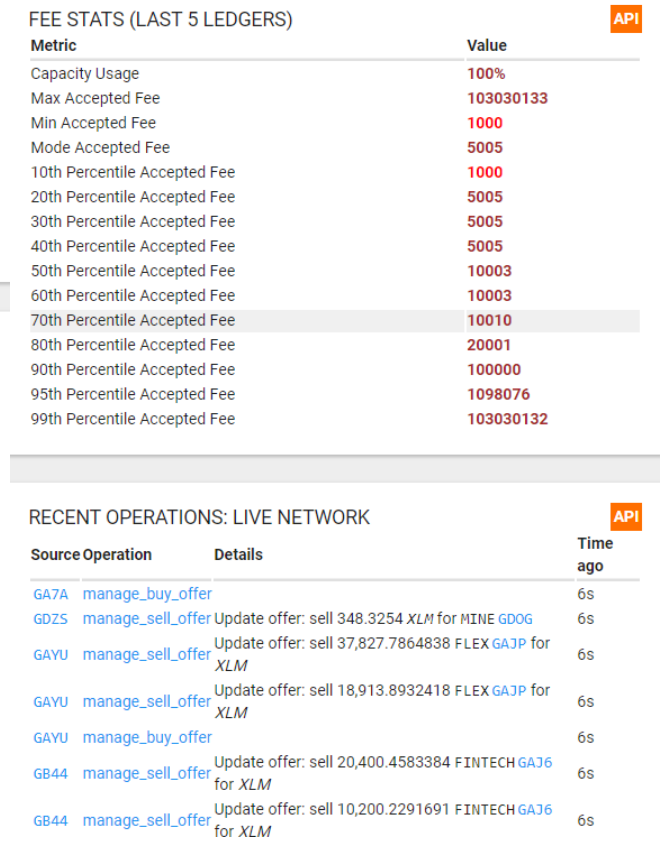
- The Stellar Dashboard – Monitoring Stellar's Network Activity is a monitoring tool that provides us information about the network in real-time. One of the most useful characteristics of the dashboard is that it provides information both for the live and the test network. This gives us the ability to easily compare the networks and monitor more efficiently what is working and what is not.
- When you first open the Stellar Dashboard – Monitoring Stellar's Network Activity, this is the landing page you should see.



Stellar Tools

Stellar Dashboard – Monitoring Stellar's Network Activity



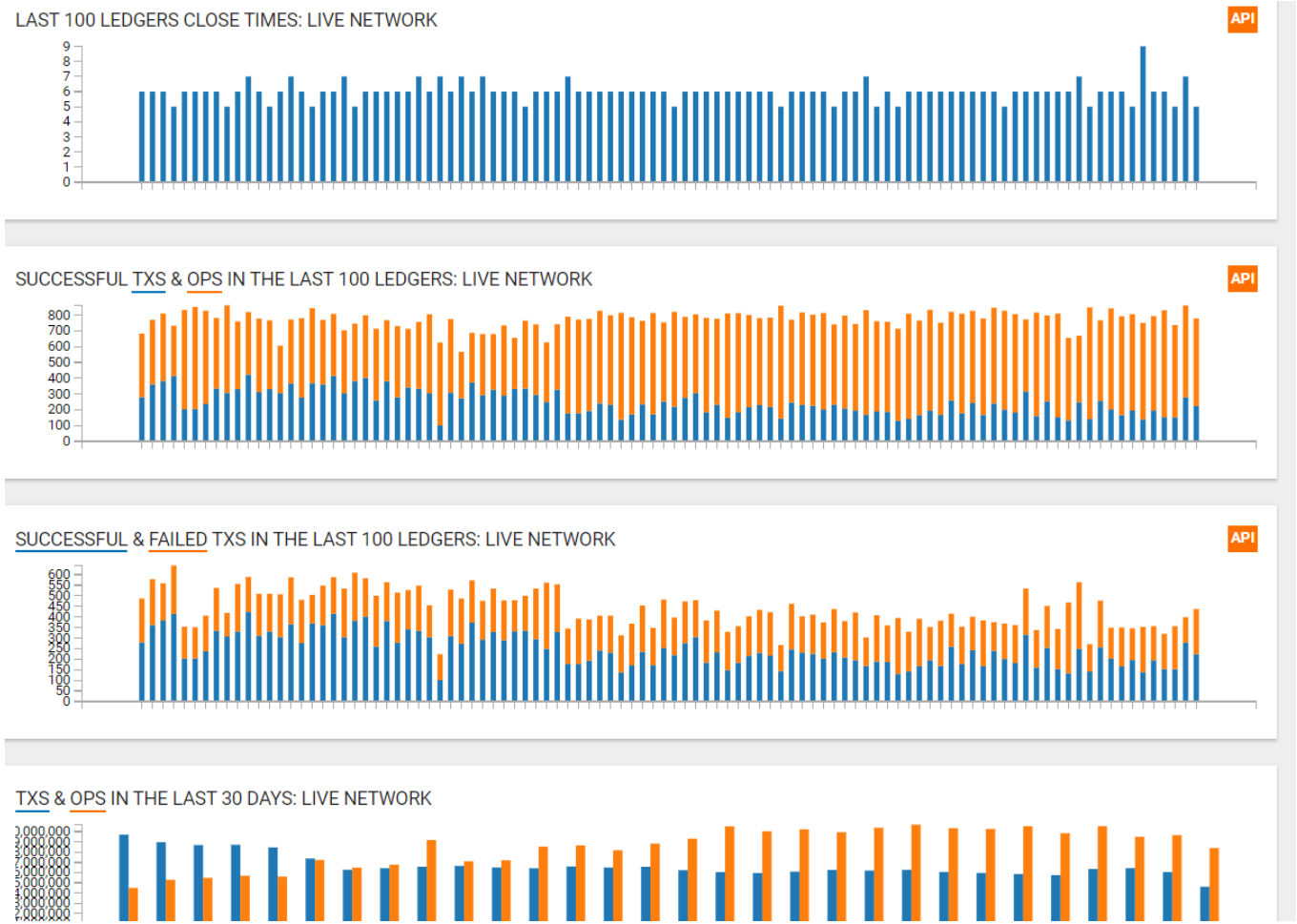


- We will start with the left part of the landing page: It indicates for each network its current state (as in up and running or not), what protocol version it uses, when did the last ledger close and what the average ledger close time is.
- For the live network, it also gives us an overview of all the important incidents and the chance to look more into them, if we would like to.
- Scrolling down, you can see that it provides a breakdown of statistics regarding the fees and the recent operations that took place both in the live and the test networks, along with some basic information.

Stellar Tools

Stellar Dashboard – Monitoring Stellar's Network Activity

- Moving to the right part of the landing page, the dashboard provides us with various bar charts.
- As you can see, these bar charts indicate information about the close time of the last 100 ledgers, the successful transactions and operations in the last 100 ledgers, the successful and failed transactions in the last 100 ledgers and the transactions and operations that occurred over the last 30 days.
- These insights are provided both for the live and testnet networks.

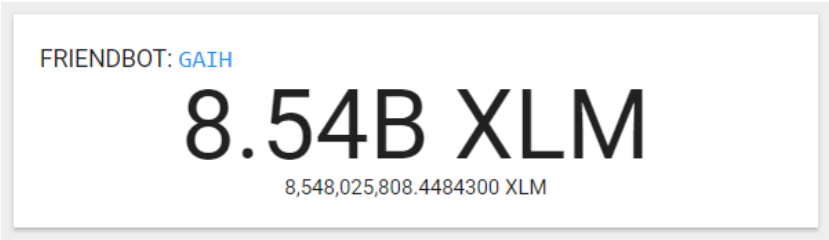


Stellar Tools

Stellar Dashboard – Monitoring Stellar's Network Activity

- Last but not least, the Stellar Dashboard – Monitoring Stellar's Network Activity provides the following metrics, that refer to the Lumen Supply.
- Metrics available for the live network include 'Total Supply', 'Non-circulating Supply' and 'Circulating Supply'.

- For the test network, we are informed about the lumen supply that the Friendbot provides.



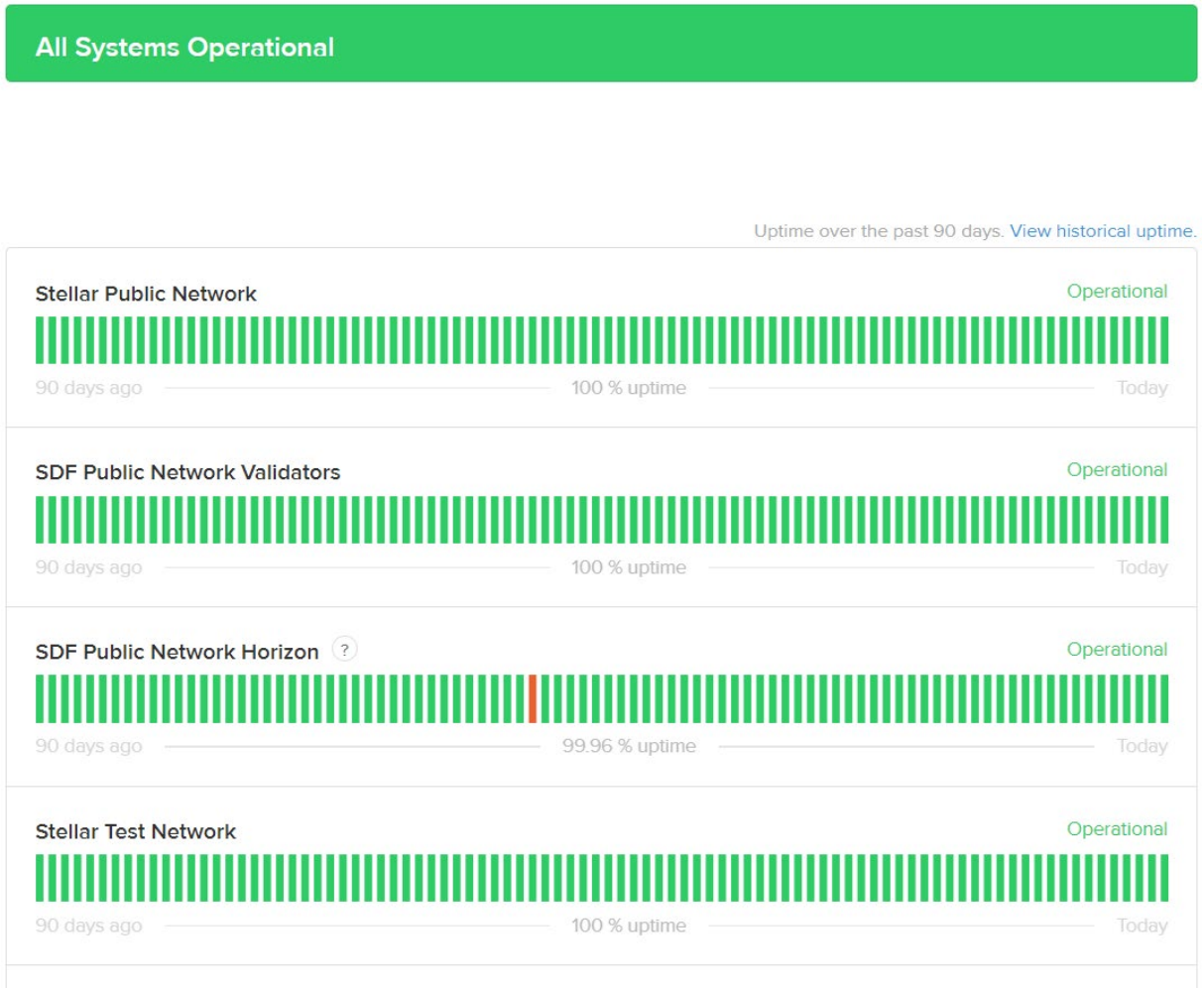
Stellar Tools

Stellar Status – Monitoring Stellar's Network Activity

- Stellar Status – Monitoring Stellar's Network Activity is a monitoring tool that enables us to track Stellar's operational status in real-time.
- It gives us information about the uptime and downtime of the Stellar Public Network, the SDF Public Network Validators, the SDF Public Network Horizon, the Stellar Test Network and many more, as you can see in the next picture.

Stellar Tools

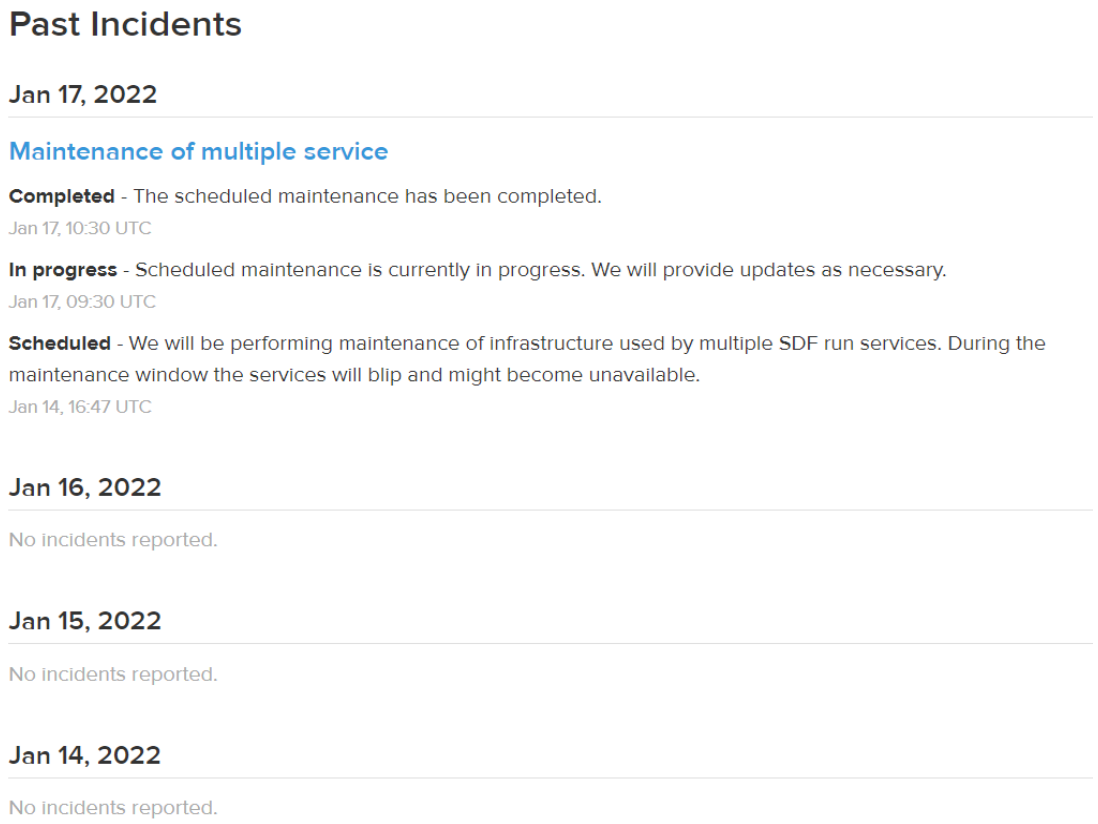
Stellar Status – Monitoring Stellar's Network Activity



Stellar Tools

Stellar Status – Monitoring Stellar's Network Activity

- It also provides information about important incidents in the network that have happened in the last few days and gives us the ability to view the history of past incidents.



Past Incidents

Jan 17, 2022

Maintenance of multiple service

Completed - The scheduled maintenance has been completed.
Jan 17, 10:30 UTC

In progress - Scheduled maintenance is currently in progress. We will provide updates as necessary.
Jan 17, 09:30 UTC

Scheduled - We will be performing maintenance of infrastructure used by multiple SDF run services. During the maintenance window the services will blip and might become unavailable.
Jan 14, 16:47 UTC

Jan 16, 2022

No incidents reported.

Jan 15, 2022

No incidents reported.

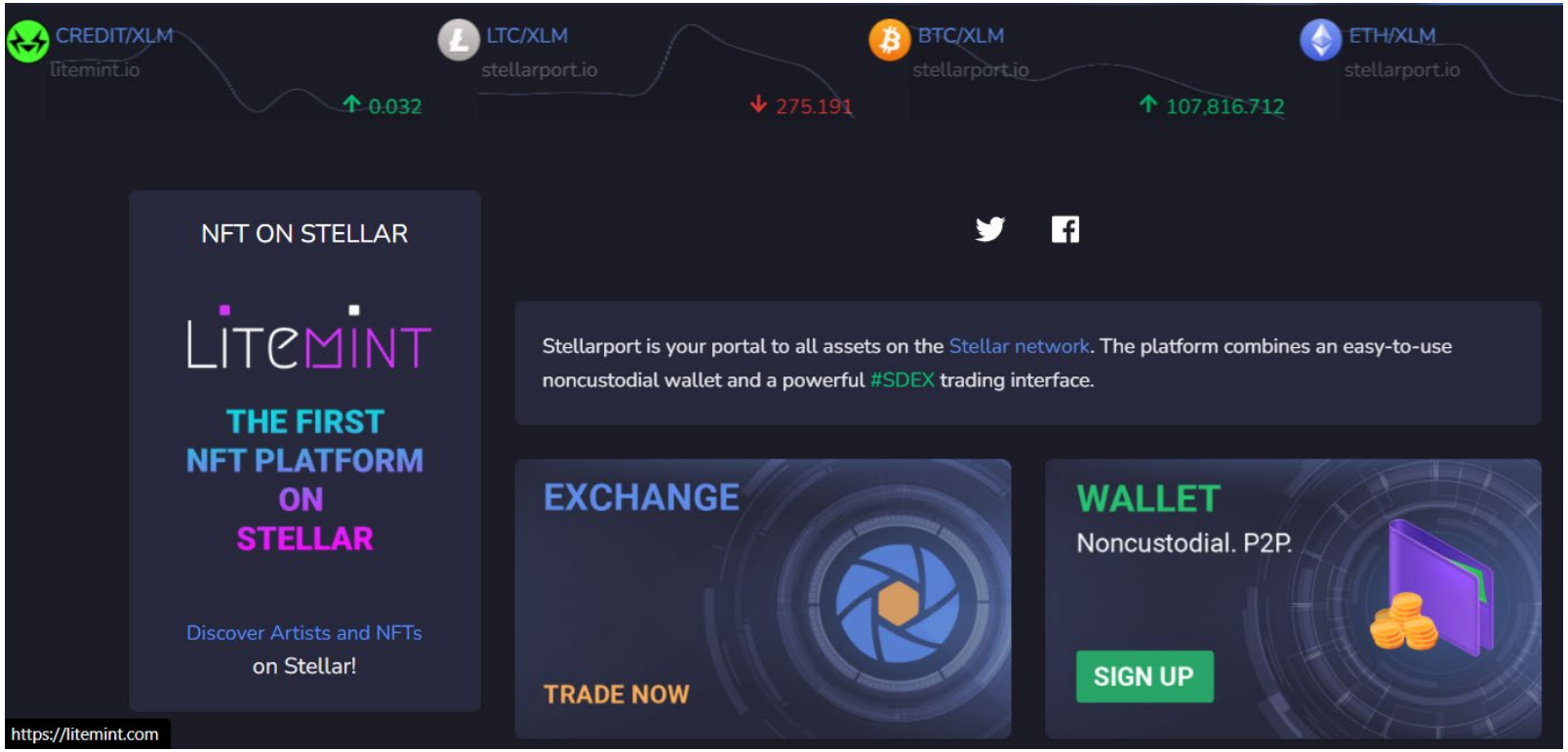
Jan 14, 2022

No incidents reported.

Stellar Tools

StellarPort – A Portal to all Assets

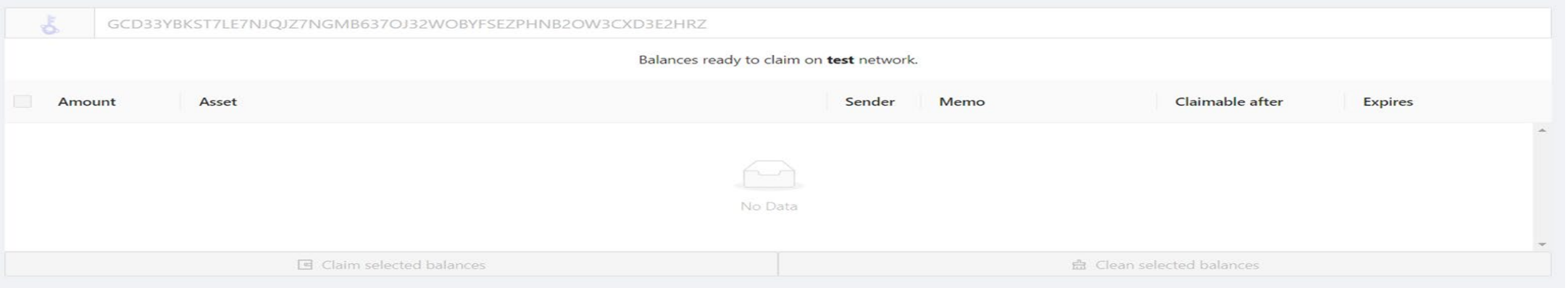
- StellarPort is a gateway for everything connected to Stellar.
- It is a *portal* to anything Stellar offers, from minting NFTs on Stellar, to making your own non-custodial wallet and trading XLMs.



Stellar Tools

StellarClaim – Claiming Balances into a Stellar Wallet

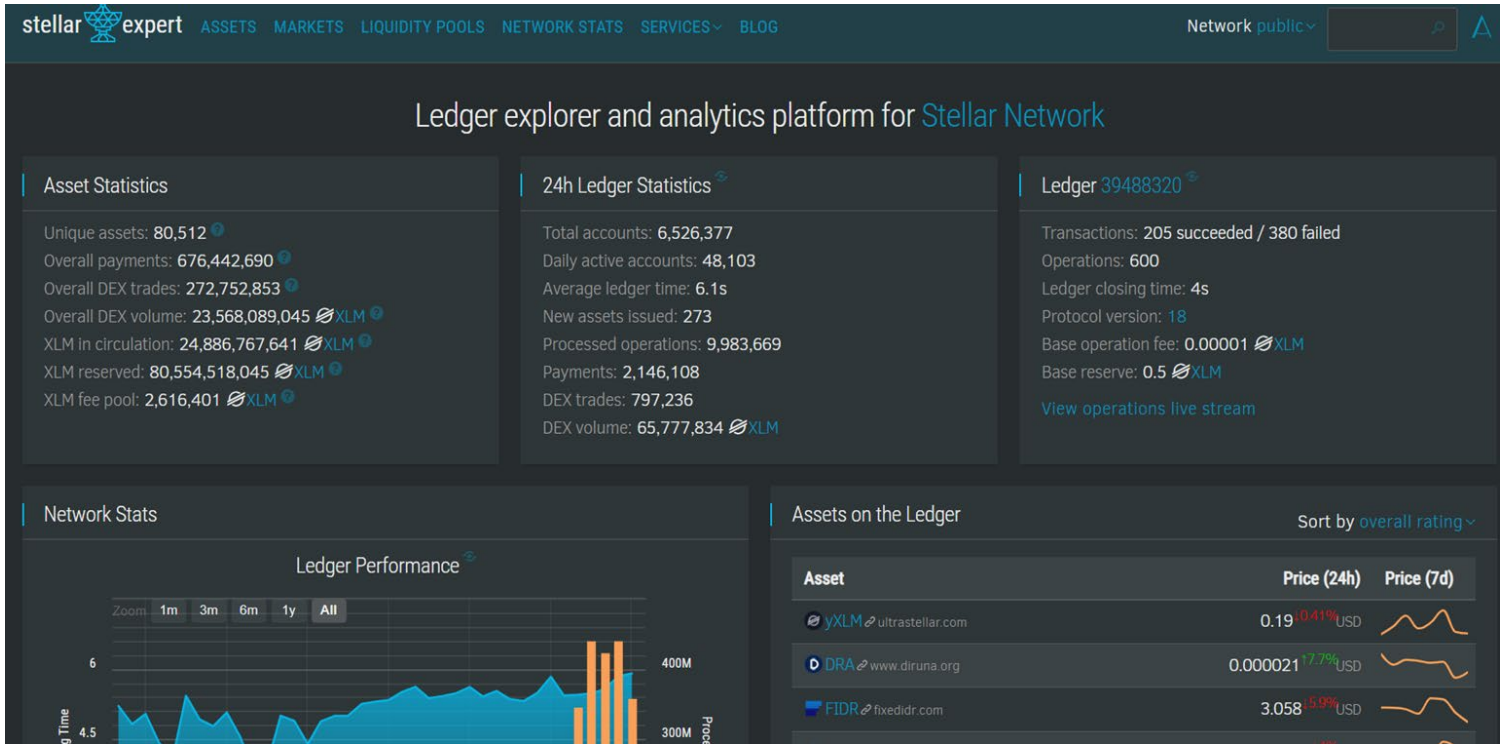
- StellarClaim gives Stellar's users the ability to explore claimable balances and claim them into the given account.
- It only takes five simple steps to utilize StellarClaim:
  1. First, you enter the public key of the Stellar account into the search bar
  2. Then, you have access to a list showing all balances that can be claimed into your account
  3. You select the balances that you want to claim
  4. You click the corresponding button to trade them and sign them
  5. If successful, you can see the balances in your wallet



Stellar Tools

StellarExpert – Ledger Explorer

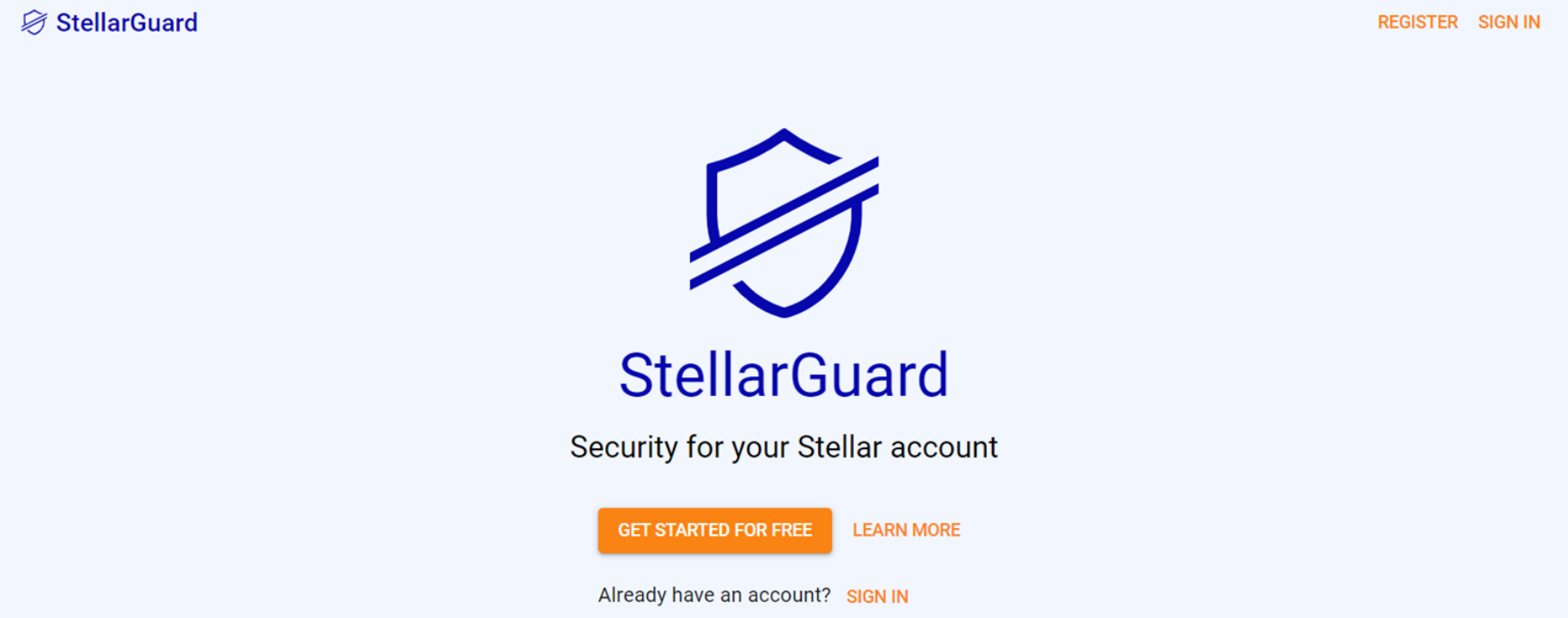
- StellarExpert is a ledger explorer and analytics platform that works for the Stellar Network.
- It provides asset statistics, network statistics, liquidity pool statistics, assets on the ledger and more.



Stellar Tools

StellarGuard – Protecting the Stellar Account

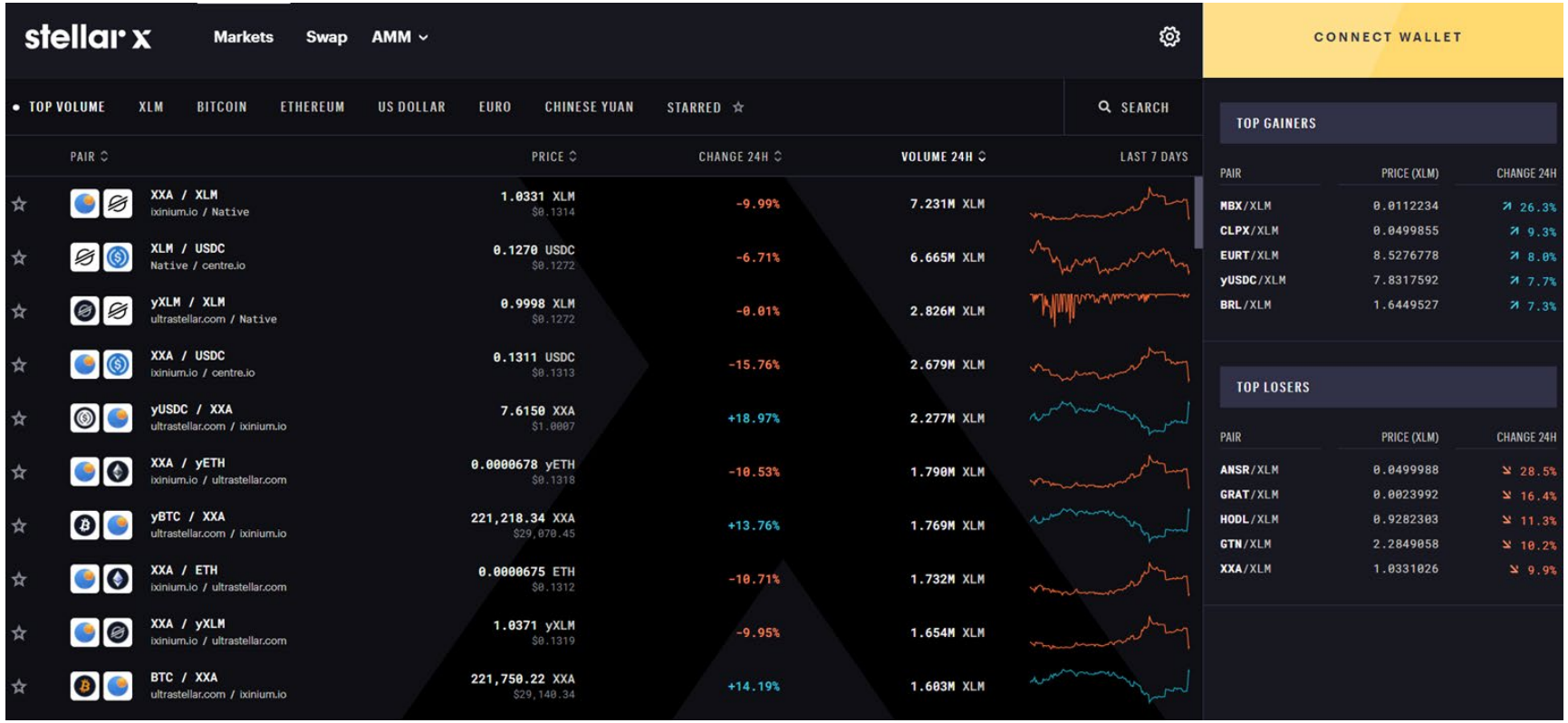
- StellarGuard provides additional security for a Stellar wallet by adding multi-sig and two-factor authentication (2FA) to each transaction.



Stellar Tools

StellarX – A Stellar Wallet

- StellarX serves as a decentralized crypto platform with global fiat gateways.
- It gives you the ability to buy crypto and makes trading borderless, giving its users the ability to trade, e.g., Bitcoin for Euros and then for Chinese Yuan.



3. Conclusion

Conclusion

Key Learnings

- Every change and update is derived by proposals that are presented by anyone interested in Stellar and are currently divided into two categories: the Core Advancement Proposals (CAPs) and the Stellar Ecosystem Proposals (SEPs).
- The CAPs suggest changes to the core protocol of Stellar and have a direct effect on how the network operates, while the SEPs deal with changes to the standards, protocols, and methods used in the ecosystem built on top of the Stellar network.
- The Stellar Consensus Protocol significantly supports implementation of CAPs and ensures smooth operation of network governance.
- The Stellar network accommodates three types of validators: the basic validator, the full validator and the archiver and works closely with ‘Tier 1 Organisations’ to ensure the health of the network and minimize disruptions.
- Stellar offers a variety of tools to monitor the network, explore ledgers, and protect Stellar accounts, etc.

References

Self-Assessment Exercises

1. https://dashboard.stellar.org/
2. https://stellarport.io/
3. https://stellar.expert/explorer/public
4. https://stellarguard.me/
5. https://www.stellarx.com/
6. https://medium.com/stellar-community/how-changes-are-made-to-the-stellar-network-760abbb8d127
7. https://github.com/stellar/stellar-protocol/blob/master/ecosystem/README.md
8. https://cointelegraph.com/defi-101/what-are-decentralized-exchanges-and-how-do-dexs-work
9. https://developers.stellar.org/docs/glossary/decentralized-exchange/
10. https://stellarguard.me/
11. https://github.com/stellarguard/secret-memo

Self-Assessment Exercises

1. https://github.com/stellar/stellar-protocol/blob/master/core/cap-0038.md
2. https://medium.com/stellarxhq/amms-on-stellarx-b0f9c493936c
3. https://developers.stellar.org/docs/run-core-node/network-upgrades/
4. https://developers.stellar.org/docs/run-core-node/tier-1-orgs/
5. https://stellar.org/developers-blog/protocol-18-upgrade-complete
6. http://www.scs.stanford.edu/~dm/blog/simplified-scp.html

Questions?

Contact Us: Stellar Developers Discord

Twitter: @StellarOrg

UNIC | DLRC

Stellar