21SHARES

Research Primer

Stellar Lumens

This research primer is a guide to understanding the open-finance platform Stellar. This research will explain what Stellar does and what its main use cases are. Also, we will explain the primary methods by which to value Stellar and analyse the primary risks associated with investing in Lumen, the cryptoasset.

DATA AS OF APRIL 2021

Stellar Research Primer

Executive Summary

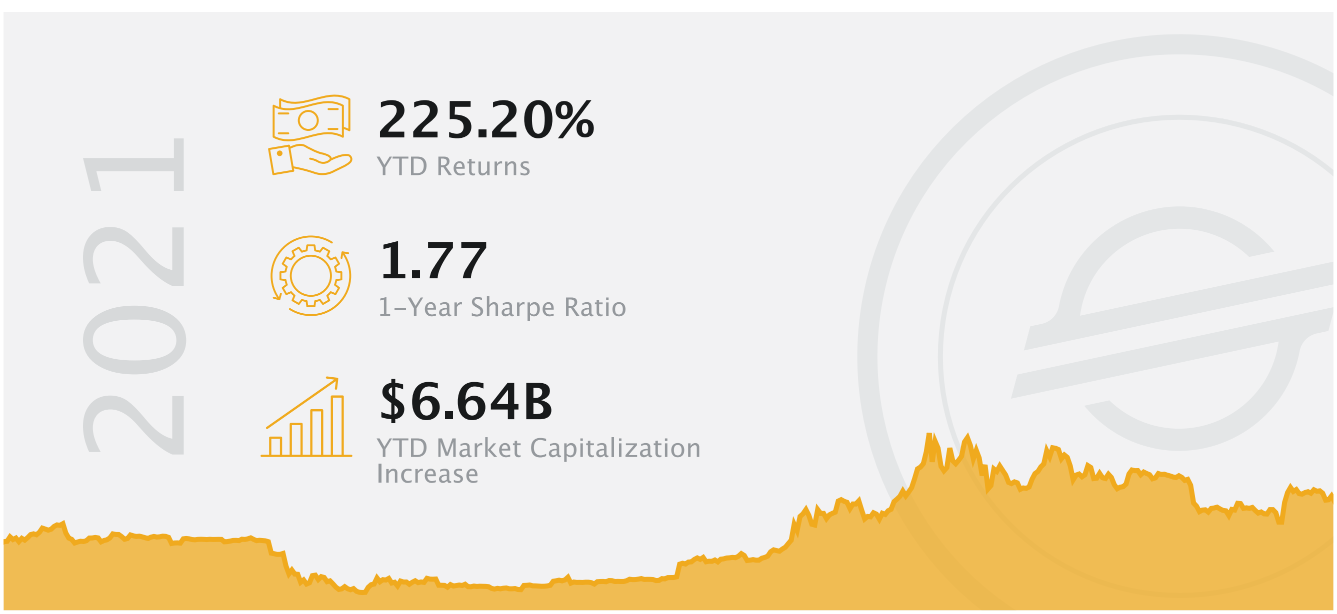
At 21shares, we are excited to have launched the world's first Stellar ETP on the SIX Swiss Exchange on April 26, 2021 (AXLM | ISIN: CH1109575535). Stellar is a purpose-built blockchain enabling the transfer of any kind of assets and currencies such as Bitcoin, dollars and euros, whilst helping financial institutions and financial technology companies to build low-cost financial services platforms. Lumen (XLM), Stellar's native token, serves as a utility token on the platform to pay transaction fees and access the network for accounts with a minimum balance of 1 Lumen.

Stellar was founded in 2014 by Jeb McCaleb, co-founder of Ripple, while its underlying protocol, the Stellar Consensus Protocol, was the brainchild of Stanford professor David Mazières. Since then, the network has processed more than 450 million operations made by over 5 million users[1,2]. In this report, we will offer an exhaustive overview of the Stellar network, the XLM cryptoasset and discuss how an investor can think about the future value of its underlying cryptoasset. This report offers the most-exhaustive coverage of Stellar and XLM available on the market.

XLM Key Metrics	As of Apri 26, 2021
Ticker	XLM
Price (USD)	$0.43
Circulating Supply (XLM)	22,918,382,588 XLM
Market Capitalization (USD)	$10,354,248,339
Annual Inflation (%)	0%

Figure 1: XLM Key Metrics (Source: Messari)

Figure 2: XLM Performance 1-Year Performance (Source: Messari)



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How Stellar Works

This section will briefly overview how the Stellar blockchain works alongside its consensus mechanism and how blocks are formed on its blockchain. As a multi-currency network, the Stellar blockchain is a three-layer protocol aiming to make the transfer of currencies and assets seamlessly interchangeable. These three layers are composed of anchors, a built-in decentralized exchange, and the Stellar Consensus Protocol (SCP), enabling such transfers on the backend.

Anchors

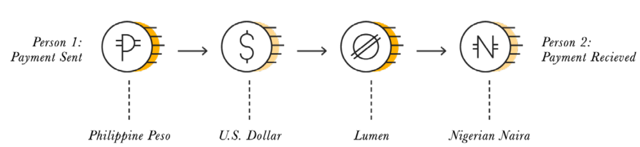
The best way to describe the Stellar blockchain is using the analogy of the Simple Mail Transfer Protocol (SMTP). SMTP is the standard protocol for exchanging emails over the Internet; in Stellar, it was initially designed to build a standard protocol for transfers of currencies and assets of any kind. The first layer of the Stellar protocol is composed of Anchors, which are entities such as bank and remittance companies that connect to the stellar network with external payment systems and tokenise (1:1) assets and currencies to facilitate transfers for stakeholders. Just as someone would give cash to a bank and see it show up in their bank account as a digital IOU, users give Anchors assets, and in return, these institutions put the assets in reserve and tokenise those on the Stellar network. All customer deposits must be held 1:1 in reserve in insured accounts to satisfy redemptions — in the event customers want their assets back[3].

Decentralized Exchange

The second layer of the Stellar protocol allows the interchangeability of assets in a trust-minimized manner with its built-in decentralised exchange (DEX) called StellarX. Namely, the Stellar protocol also enables path payments by allowing users to send one currency or asset and have the recipient receive another. On the backend, Stellar automatically finds the best conversion rate to prevent users from manually finding the best FX rate or receiving currencies or assets they don't want.

Additionally, no single entity holds anyone's funds or secret keys, nor does one maintain an order book or have its proprietary trading system. This non-custodial marketplace is maintained independently by the Stellar network as the order book of StellarX alongside its matching algorithm are integrated into the Stellar blockchain. To take advantage of Stellar's global reach, anyone can list their assets on the Stellar decentralized exchange and use Kelp, its open-source market-making bot, to ensure necessary liquidity and profit from the difference in the bid-ask spread. StellarX is free of charge because every week, there is a refund to users as the DEX charges a base fee of 0.00001 XLM per trade[4,5].

Figure 3: Stellar Exchange Illustrated



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Stellar Consensus Protocol

The last and third layer of the Stellar blockchain is the Stellar Consensus Protocol (SCP), the first implementation of the Federated Byzantine Agreement (FBA). The SCP serves two purposes. First, it ensures the verification and settlement of transactions and that secondly, there's no double-spending in the network. In other words, the SCP prevents stakeholders from spending their assets or currencies twice for different recipients or themselves. The Stellar Consensus Protocol uses the concept of quorums and quorum slices. Quorum is a set of nodes sufficient to reach agreement. A quorum slice is a subset of a quorum that can convince one particular node about agreement.

The Stellar network is composed of a network of validators running the Stellar software called 'Stellar Core' to agree on new blocks of transactions every several seconds to minutes. Each validator votes for transactions and then must independently identify a few other trusted participants called a 'quorum slice' to apply the cryptographic rules used to validate transactions correctly. Their respective ledger is updated to reflect the state of the network once a 'quorum' have also signed off the new block of transactions[6].

Unlike Bitcoin miners, Stellar validators are not remunerated for their work as the validation process of Stellar does not rely on Proof of Work nor does it require purpose-built computers for miners (ie, ASICs). Validators simply run the Stellar Core or access the network's data via its API called Horizon[7].

XLM Token

Stellar Lumens (XLM) is the medium of exchange used within the Stellar network. For example, XLM is the native asset used to pay transaction fees in the network, acting as an anti-spam mechanism. In addition, each account on the Stellar network must hold a minimum of 1 XLM. Stellar's initial supply was distributed to groups including Bitcoin and Ripple holders, those who joined Stellar's "Direct Sign-up" program, and Stellar's Partnership program. 95 billion XLM tokens were allocated to the groups mentioned above, and 5 billion XLM tokens were issued to Stripe and the Stellar Development Foundation. For the record, the Stellar Development Foundation was created in collaboration with Stripe as the foundation received $3 million in seed funding from this collaboration[8]. However, the vast majority of Stellar Lumens tokens were not distributed.

Until October 2019, the Stellar network featured a fixed inflation rate of 1% each year. However, from October 2019, Stellar removed the 1% annual inflation rate from the Stellar protocol. In addition, 55 billion worth of XLM was burned from the original supply of 100 billion XLM (100 billion initial supply and 5 billion inflation) making Stellar's fully-diluted supply, 50 billion XLM[9].

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Governance

As covered previously, Stellar uses a consensus mechanism called the Stellar Consensus Protocol based on a system pioneered by Ripple. Nodes within the Stellar network are able to choose other nodes or peers which they trust; these interconnected trusted sets of nodes can form quorums and relay information between them. The network then reaches agreement on transactions by the use of "quorum slices" being subsets of the quorum for reaching agreement with the wider quorum. In addition, the Stellar network relies on the reputation and identity of the various nodes and quorums in order to decrease the possibility of bad actors.

Stellar adheres to open source principals and developers are able to suggest upgrades to the protocol. Ultimately, changes to the protocol are ratified on-chain when they have been accepted by the majority of nodes within the Stellar network.

Submitted proposals can be divided into two categories: Core Advancement Proposals (CAPs) and Stellar Ecosystem Proposals (SEPs). CAPs deal with changes to Stellar's core protocol, while SEPs deal with the wider ecosystem and the protocols associated with that. The Stellar Development Foundation (SDF) also plays a crucial role in the advancement of the network with about 30 billion XLM to be used over 10 years per its mandate. The foundation helps shepherd and maintain Stellar's codebase, supports the technical and business communities around Stellar, and provides thought leadership to regulators and other stakeholders. SDF has no shareholders, no dividends, and no profit motive. The 30 billion XLM are allocated across more than half a dozen funds such as the Direct Development Fund and the Enterprise Fund, which are subject to a vesting schedule[10].

Figure 4: SDF's funds (Source: Stellar.org)

Name	Original Balance	Current Balance
New Products	2,000,000,000	2,000,000,001
Enterprise Fund	8,000,000,000	7,919,108,114
Total	**10,000,000,000**	**9,919,108,114**

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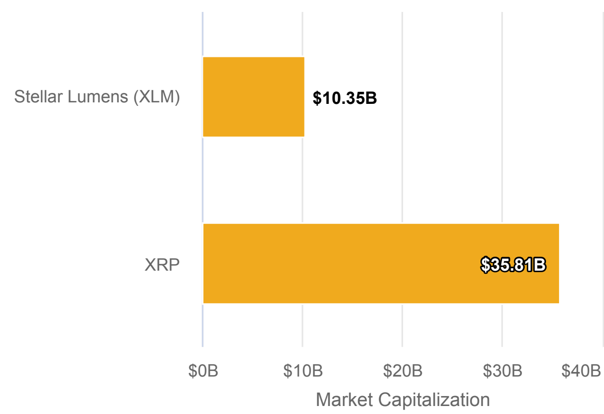
Valuing Stellar

Market Sizing

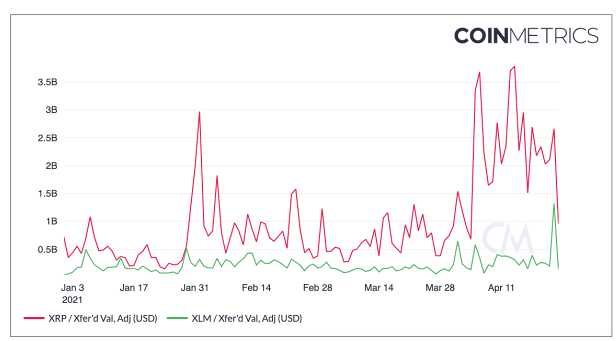
The best way to understand the potential value of Stellar Lumens and the wider Stellar network is through comparisons to similar assets. For example, at a high level, the Stellar Lumens shares some similarities with the Ripple network as both aim to facilitate payments and transfers for businesses. The chart below compares the market capitalisation of Stellar Lumens to that of XRP, the token associated with Ripple. XRP, the token associated with the Ripple network, is valued at around twice that of Stellar Lumens and the associated network. Often the value of a crypto asset is closely tied to the fundamental demand for the platform, so one method to better understand how XLM would perform is by understanding the network's current fundamental traction.

Figure 5: XLM Market Sizing



The chart on the right compares the transaction values (in USD) of the Stellar network to that of Ripple. As one can see, in general, the transaction values on the Stellar network has been substantially lower than that of XRP throughout 2021 — though the two figures have converged in late April. It is likely that Stellar would require a consistent amount of transactional activity on the network for a sustained period as a means to generate demand for its native asset.

Figure 6: XLM Transaction Values



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Risks

Technological Risks

As stated by its creator, David Mazières, the Stellar Consensus Protocol (SCP) has various limitations that could present a threat to the sustainability of the Stellar network. It does not provide a system for minting digital coins as part of an incentive scheme to encourage good behaviour from validators akin to Bitcoin and Ethereum's Proof of Work algorithms. In addition, SCP does not tell nodes who they can trust, meaning that nodes can choose potentially malicious quorum slices without knowing beforehand, which could possibly harm consensus in theory[11].

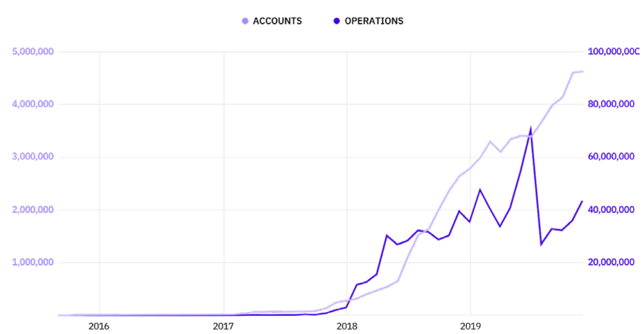
Adoption Risks

Adopting Stellar is predicated on financial institutions and companies bidding to provide liquidity in the network and choosing to build financial applications. For the end-users it will be to use specific applications. To date, there has been sizable investment and funding put towards more than 70 projects that leverage the Stellar tech stack such as Wyre and Abra. As of writing, the Stellar network processes 16 transactions per second, supports more than 10K currencies and assets across more than 5 million unique users. To put things in perspective, Visa handles an average of 150 million transactions every day and is capable of handling more than 24,000 transactions per second. This is a testament to the fact that the Stellar network still has a lot of room for growth to be considered a challenger to incumbents like Visa or even TransferWise now called Wise — its closest competitor in the financial technology sector.

Regulatory risks

Though the Stellar Development Foundation has no shareholders, no dividends, and no profit motive, it was seed-funded by Stripe with $3 million. In return for its seed investment, the fintech company received two billion Lumens (XLM). As such, XLM could be vulnerable to some level of potential regulatory scrutiny due to the suspicion of some jurisdictions, namely the United States, to that particular method of fundraising. As Stellar continues to further decentralise and build working applications, in a similar vein to what Ethereum has done, the likelihood of serious regulatory scrutiny from any governmental body would likely decrease.

Figure 7: XLM Accounts and Operations Growth



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Footnotes

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