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Introduction

Solana and Cosmos are home to some of the most prolific ecosystems outside of Ethereum, but have lacked connectivity for most of their history due to architectural differences. Unlocking interoperability between Solana and Cosmos IBC chains has been a critical milestone for both ecosystems, as multiple teams have developed key infrastructure to enable new cross-chain applications and synergies.

This paper delves into the current state of Solana <> IBC interoperability solutions, followed by a list of assets and DeFi use-cases we propose Solana <> IBC could help unlock.

Part 1

Interoperability 101

Interoperability refers to the ability for different networks, as well as their components, to seamlessly communicate and interact with one another. Though seemingly inherent, this functionality is critical for building scalable and efficient systems that shape many key components of our daily lives. TCP/IP set a standard to enable different computers and networks to communicate with one another over the internet by exchanging data packets through a set of defined standards. Bluetooth introduced a new technology to allow wireless communication between devices over short distances, that is now used in many different applications around the world. Cross-border payment interoperability allows people to use their credit cards across different countries which may have their own native currencies.

In the context of blockchains, interoperability refers to the ability for blockchains to communicate with one another and transfer value. Blockchains exist as isolated environments which cannot access any external (off-chain) information natively. This includes information on other blockchains, which is why we are writing about this topic in the first place. The rise of the multi-chain blockchain landscape has created the need for building secure and efficient infrastructure for supporting blockchain interoperability. Today, there are over 200 blockchains, and 89 bridges carrying roughly \$20.7B in market value¹.

However, despite the continuously rising number of bridges, and total bridged value, critical connections like Solana <> Ethereum, or Solana <> IBC, Ethereum <> IBC have taken longer to develop due to technical constraints.

The Cosmos IBC Protocol

The Cosmos Inter-Blockchain Communication protocol (IBC) is the interoperability toolbox used to power the Cosmos ecosystem. Cosmos is not a blockchain itself, but rather an “internet of blockchains”. More precisely, Cosmos is a multi-layer technology stack built to enable any blockchain to communicate, transact, and share data with one another seamlessly.

Likewise, the Cosmos IBC is not a bridge itself, but a general purpose cross-chain messaging protocol for communicating arbitrary data between different blockchains, similar to the function of TCP-IP for computers and the internet.

IBC uses a multi-step process to ensure secure and efficient interoperability between supported blockchains. It consists of two layers:

- **Transport, Authentication, Ordering Layer (TAO)** - Establishes secure connections and authenticates the data being transmitted across chains.
- **Application Layer**- Responsible for ensuring data is packaged, distributed, and interpreted across chains.

In short, two different blockchains - the source and destination chain - use a relayer to transmit “packets” of data between one another.



[Source](#)

Today, there are 88 Cosmos zones connected via IBC supporting 250k daily active users with \$57.2B in total market cap². Cosmos is home to prolific app-chains like Celestia, dYdX, Noble, Stride, Akash, and more.

However, despite the proliferation of Cosmos chains and the unique custom features offered, such as native anti-MEV mechanisms, the lack of connectivity between IBC chains and external ecosystems had imposed a restricting upper bound on their overall adoption and value accrual.

Solana

Solana is a parallel-processing layer 1 blockchain optimized for speed and user experience. Solana is an integrated blockchain, meaning all the core functions - consensus, execution, data availability, and settlement - are performed on the base layer, serving as a powerful global state machine for all its applications and programs. Developers can focus purely on building user-centric products and services, taking advantage of the cheap gas fees and low-latency on Solana. The chain has experienced a massive resurgence, [particularly Q4 2023](#), after the post-FTX fallout. Today there are 130 protocols building on Solana, with roughly \$5B in TVL, and \$57.8B in cumulative volume.

(Do you remember when people said Solana was dead because DeGods left?)

Despite its success, Solana faces a similar issue to Cosmos chains, in that its architecture does not enable native connectivity with other blockchains, imposing an upper bound on its long-term growth and value accrual. Although there have been significant breakthroughs in Solana's interoperability, such as the Neon EVM enabling connectivity for smart contracts between Solana and the EVM, there is still a tremendous opportunity for growth of Solana <> Cosmos interoperability solutions.

Part 2

Solana <> IBC

Why no connectivity?

As we mentioned, the architectural designs of Solana and IBC have restricted their ecosystems in growth and thus value accrual. Solana uses the SVM - which has no native method to connect with neither the EVM nor the IBC. Meanwhile, the Cosmos IBC does not natively support connectivity with non-IBC chains.

That said, there have been meaningful developments to bridge the two ecosystems together which we can unpack further.

State of Affairs Today

- **Cascade** - the first interchain SVM rollup from the Eclipse and Injective teams, bringing interchain functionality to Solana developers and users.

- **Nitro L2** - A modular SVM rollup which enables developers to leverage the performance of Solana while also benefiting from the interconnectivity with the Cosmos IBC.
- **Eclipse L2** - A new modular infrastructure platform which uses the SVM for its execution environment, to enable the development of rollups that can benefit from Solana's performance.

Picasso Restaking Layer

Picasso Network recently launched its Restaking layer, and now with the Solana <> IBC AVS from Composable Finance, anyone can restake their SOL / Sol- LST for the first time since, well, ever.

The Solana IBC module exists as a guest blockchain deployed as a smart contract on Solana, providing the necessary features for Solana <> IBC connectivity. Think of this as a Solana L2, which replicates Solana but is able to function along the IBC and Composable's Trustless.Zone bridge.

Picasso has secured an impressive list of partnerships and integrations within the Solana ecosystem, and there are more expected ahead

Infrastructure

- Rome Protocol
- Edgevana

DeFi

- Meteora
- MarginFi
- Solend
- Raydium
- Kamino Finance

According to the Picasso blog, we can also expect partnerships with Orca and Marinade Finance in the near future as well.

Part 3

Proposed Integrations

What the people ~~want~~ need

As we expect user demand and liquidity for Solana <> IBC to continue to grow, there will be demand for new assets to be traded cross-chain and new usecases for applications to be built to serve.

Assets

Solana Ecosystem

Jupiter (\$JUP)

- **What:** Jupiter is a multi-faceted trading protocol on Solana, featuring a swap aggregator, limit orders, DCA, perps, and the Jupiter launchpad
- **Why:** Jupiter has its hand in over 60% of trades on Solana regularly, and is a key partner to integrate with for liquidity routing.

Pyth Network(\$PYTH)

- **What:** Oracle provider native to Solana, and supporting many different chains and ecosystems.
- **Why:** Pyth plays an important role for its supported chains and applications, providing critical market data which influences markets and users in those ecosystems

Helium (\$HNT)

- **What:** DePIN protocol.
- **Why:** Helium is a leading DePIN protocol which has migrated its network to Solana.

With the rise of token extensions on Solana, we expect many more exciting integrations and developments in the realm of the Solana <> IBC ecosystem.

DeFi Opportunities

- **Solana <> IBC DEXs**
 - Whether it is spot, perps, or options markets, we foresee an opportunity to build a Solana <> IBC native DEX. Existing DEXs on Solana (i.e. Orca, Drift) will likely

add support for IBC assets and chains, and existing DEXs in the Cosmos ecosystem (i.e. Osmosis) will likely return the favor.

- **Solana <> IBC Borrowing/Lending**

- There is a lucrative opportunity to enable users to borrow and lend across the Solana and IBC ecosystems. Imagine a user holds a lot of SOL as a long-term investment, but wants exposure to the latest trends in the IBC ecosystem. Now imagine an application for this, where the user supplies SOL, and can borrow OSMO based on the amount supplied and the defined liquidation threshold.
- This can be in the form of new applications or existing ones (i.e. MarginFi, Kamino) adding support for this new feature.

- **Solana <> IBC Staking**

- Users can stake assets on one chain using assets from another chain.
 - Imagine you hold SOL which earns you ~7% APY for staking, but you see that you can earn ~15% APY by staking TIA on Celestia. Without the headaches of onboarding to a new ecosystem, users can deposit SOL to stake TIA in one click.

- **Solana <> IBC Liquidity Pools**

- Building cross-ecosystem liquidity pools is important to facilitate trading between Solana <> IBC on a greater scale. These financial products would enable LPs to earn trading fees on different assets on different blockchains. With this in mind, it is not very far-fetched to imagine tools and services which will allow LPs to remove and provide liquidity to maximize profits based on real-time network activity. Make it AI-enabled, and you've got a trendy top-tier narrative to sell right there.

Part 4

Important Considerations

Unfortunately, bridges have been the biggest targets in DeFi exploits ([\\$2.8B in TVH](#)), though much of this can be attributed to flawed security designs such as the lock and mint bridge and multi-sig. Which leads us to consider several important questions regarding Solana <> IBC interoperability solutions such as the Composable Finance Solana <> IBC AVS.

- **Who is securing the bridge? How is it secured?**
- **How does a massive depeg in a major LST (mSOL not too long ago) affect restaking on Picasso?**

Conclusion

Composable Finance's Solana <> IBC AVS marks a critical breakthrough for connecting the Solana and Cosmos ecosystems, unleashing a new era of cross-chain applications and use cases. Picasso is actively building an impressive suite of partnerships and integrations in the Solana ecosystem, but as we demonstrated with our own list of proposals, there are still many exciting developments to come.

We look forward to the proliferation of interoperability between the Solana and Cosmos ecosystems, enabled by the Solana <> IBC AVS.

Footnotes

1 - This value combines the 'Bridges' and 'Cross-Chain' categories on DeFi Llama

2 - [Map of Zones](#)