

# Stateset: A Peer-to-Peer Network for Computational Commerce

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**Abstract.** A purely peer-to-peer network for computational contracts and real-time transactions with low fees, instant finality and minimal trust between nodes would allow for the creation of a globally distributed open commerce platform. We present the Stateset Commerce Network, a permissionless, sovereign blockchain network, and describe in detail how it achieves the goal of a state-of-the-art platform for global commerce. Stateset is built on a new set of fundamental technological advancements; the Cosmos-SDK [2], Tendermint BFT Consensus Engine [3], CosmWasm [5] smart contract framework, and IBC [6] for transport, authorization and ordering of packets with other blockchain networks. This creates an open backend system for computational commerce.

## Introduction

Stateset Commerce Network is its own sovereign blockchain and a new type of distributed financial infrastructure for the world. There will be a collective oneness where contracts and related assets can be securely transacted freely without intermediaries or enforcement agents. Our vision for this type of system extends across the blockchain ecosystem. Stateset is the port-city for computational commerce that scales horizontally and leverages liquidity from other application specific blockchains in the Cosmos network. In the Stateset Commerce Network, assets are programmatically owned by the private key holder and are transacted peer-to-peer via computational contracts powered by CosmWasm. Transactions are validated using a global system of proof-of-stake validator nodes and packets are relayed between blockchains via IBC relayers. Stateset enables developers to write and deploy computational contracts in Rust that are richly composable and execute transactions synchronously and atomically. We exchange the cloud paradigm of custom implemented and siloed workflows within one organization for a new orchestrated, shared and agreed upon set of computational contract flows between nodes in a globally distributed network. There will be a network of interoperable economically incentivized blockchain networks; the cornerstone of the infrastructure of the global economy for the coming years in the future. Data and processes will be implemented upon multiple blockchain protocols that are local to specific regions but that interact with each other through bridges and IBC. These zones will have their own form and order of transactions and be able to interchange assets with

Stateset leveraging the same replicated and highly available cluster of nodes communicating via ABCI [4]. Stateset achieves this through low transaction fees and instant finality across a network of nodes that are able to exchange assets, messages and other types of state and information securely and instantly across the globe.

## **STATE Token**

STATE is the native token of the Stateset Commerce Network.

STATE provides the mechanism to who owns what in the ledger of record. This is provided via the bank module of the Cosmos-SDK. STATE is the underlying asset to the Stateset Commerce Network as a mechanism for securing the network via staking, executing computational contracts and updating the global state of the network. STATE is the token that is staked by validators and used to secure transactions in the network. Transactions Fees are sent to validators and are distributed to users who delegate their STATE tokens to validators. Messages are sent to the Stateset Commerce Network and all transactions require STATE to pay for the gas fees for updating the state of the network. Proof-of-Stake blockchains at the infrastructure level consists of a distributed network of validator nodes used for securing the network against sybil attacks by staking tokens.

## **Tendermint**

Tendermint is the consensus engine that enables this and allows for net new nodes on the network to join and leave the network at will with other nodes in the network. [3] Tendermint's security derives from its use of optimal Byzantine fault-tolerance via super-majority ( $>2/3$ ) voting and a locking mechanism. Together, they ensure that  $\geq 1/3$  voting power must be Byzantine to cause a violation of safety, where more than two values are committed. If any set of validators ever succeeds in violating safety, or even attempts to do so, they can be identified by the protocol. This includes both voting for conflicting blocks and broadcasting unjustified votes. Double spending of STATE is prevented using a cluster of nodes using Tendermint BFT which communicate with the Stateset modules using ABCI (Application Blockchain Interface) via handlers, messages and keepers. Protobufs are used to structure messages to Stateset modules. STATE is also used in order to deploy computational contracts using CosmWasm Smart Contracts on the Stateset Commerce Network.

## **CosmWasm**

Stateset leverages CosmWasm for Smart Contracts. CosmWasm is a smart contracting platform built for the cosmos ecosystem. CosmWasm is designed as a distributed actor framework. The CosmWasm module is plugged into the Stateset Network from the genesis block and contract uploads are permissionless. CosmWasm [3] contracts are written in Rust, a systems level programming language intended for speed and safety. Specifically, CosmWasm standards have deployed contracts similar to Ethereum's erc20 and erc721 with cw20 and cw721 [8]; the specification for fungible and non-fungible tokens. Computational contracts are the basis for the ecosystem development around other blockchains in the cosmos ecosystem, specifically Terra, Juno and Secret Network. The ability to allow developers to write and deploy contracts using

CosmWasm provides many advantages related to security such as avoiding re-entrancy bugs commonly found in Ethereum smart contracts. Additionally, the use of Rust provides a speed advantage as the language is compiled to web assembly (wasm) which can run in a virtual machine. Assets created on the Stateset network using CosmWasm can also be sent to other chains in the cosmos ecosystem such as Osmosis leveraging IBC channels. CosmWasm smart contracts present a largely untapped opportunity to build more robust applications; specifically with the launch of the inter-blockchain communication protocol, the catalyst for the polycentric interchain.

## **IBC**

IBC [6] stands for the inter-blockchain communication protocol and is like TCP/IP for Blockchain Networks. Interoperability is a key component for developing the next generation of blockchain and cryptographic networks by having traversable and configurable chains that have metadata that is immutable but data that is mutable. Different application specific blockchain networks are going to be used in different use cases. Prior to IBC, they could not talk to each other, transfer packets, token transfers, signatures, votes and other types of transactions. IBC enables communication between chains via packets, like TCP/IP transfers packets between devices. The IBC protocol is designed to solve the problem of the blockchain trilemma. IBC allows for the interoperability between the security and scalability of Proof of Stake and the decentralization of Proof of Work. IBC enables multi-chain account synchronization and continuous innovation across multiple state machines. Stateset specializes in computational commerce with a focus being interoperable with other state machines and smart contracts via IBC.

## **Stateset Network Governance**

Governance of the Stateset Blockchain Network will be done on chain using the gov module given by the Cosmos-SDK. This includes all upgrades across the network for platform versioning, changes to the core system, and proposals to upgrade the network. Proposals are submitted and voted on by validators in the network or individual users. These include governing limits associated with max transactions and message sizes and the computation that occurs across the network. Governance also includes the actual core committers to the codebase and the ownership of the technology. The Stateset Network is Open-Source Software. This means that developers, community members and users can contribute to the open source version of the protocol and can submit proposals to be voted on. 1 vote weight corresponds to 1 STATE.

## **Stateset Agents**

Stateset Agents are individual actors on the Stateset Commerce Network that can execute computational contracts. The agents living on the network are instantiating contracts between addresses on the network. The agents will also be able to give the same answer to everyone across the Stateset network. The agents will be operated via voice and text using a deep learning based Natural Language Understanding RNN powered by GPT-3. The agents are able to execute

the RPC calls on the network to make state changes within computation contracts. The agents are leveraging natural language processing to perform intent and entity detection from a given utterance which can trigger actions on other chains via computational contracts directly or via interchain accounts. One of the most anticipated endpoints will be audio that is calling to the agent to perform state changes on the network from VR and AR applications.

### **Virtual and Augmented Reality Interface**

VR and AR will be used as one of the primary graphical user interfaces of the Stateset Commerce Network. Stateset will leverage virtual and augmented reality headsets as well as Augmented Reality from mobile devices to interact with the Stateset Commerce Network. The primary input mechanism is voice leveraging Natural Language Processing powered by GPT-3 to interact with computational contracts on the network. Different devices such as Oculus and the Hololens will be used as an interface into the specific applications built on Stateset and also to visualize the current state of the network. This allows for visualizations of the current status of the network and also the interaction with other users and the network from within a virtual reality. Stateset Commerce Network will be the open state backend for applications that need settlement with low fees and instant finality within VR and AR.

### **Bitcoin Lightning**

Commerce on the Internet has come to rely almost exclusively on financial institutions serving as trusted third parties to process electronic payments [1]. Bitcoin has changed the world of money and over the past decade has accrued most of the value in the new era of the internet. Bitcoin Lightning Network is used as a Payment and Protocol on Stateset. Lightning is a true advancement in leveraging the shared security of the Bitcoin Network in order to create a privacy preserving and instant payment settlement network for the internet. The Lightning Network [5] protocol is a 2-of-2 multi-signature program that allows for these transactions to be settled off of the main bitcoin network by the fulfillment of payment invoices. The program is designed to allow users to fund a channel for future payments and commitment transactions between channel participants are kept. The Lightning Network is capable of running above multiple blockchains. Stateset will leverage the lightning network for global payments and security as a base protocol for internet native money that is anchored to Stateset.

### **Conclusion**

We have proposed a state-of-the art platform and distributed network for global computational commerce powered by Tendermint BFT, CosmWasm smart contracts and IBC. Stateset Commerce Network is a peer-to-peer network of nodes for real-time transactions that have low transaction fees and instant finality. This creates an open state backend system for scalable and interoperable commerce around the world. This is the natural progression of computing. Going from on-premise databases, to distributed cloud multi-tenant instances, to a completely

decentralized and open blockchain based backend state machine for commerce and finance. Stateset is the commerce infrastructure for the future of this computing paradigm.

## References

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