Exploring the SATP Working Group at the IETF: Pioneering Blockchain Interoperability Standardization

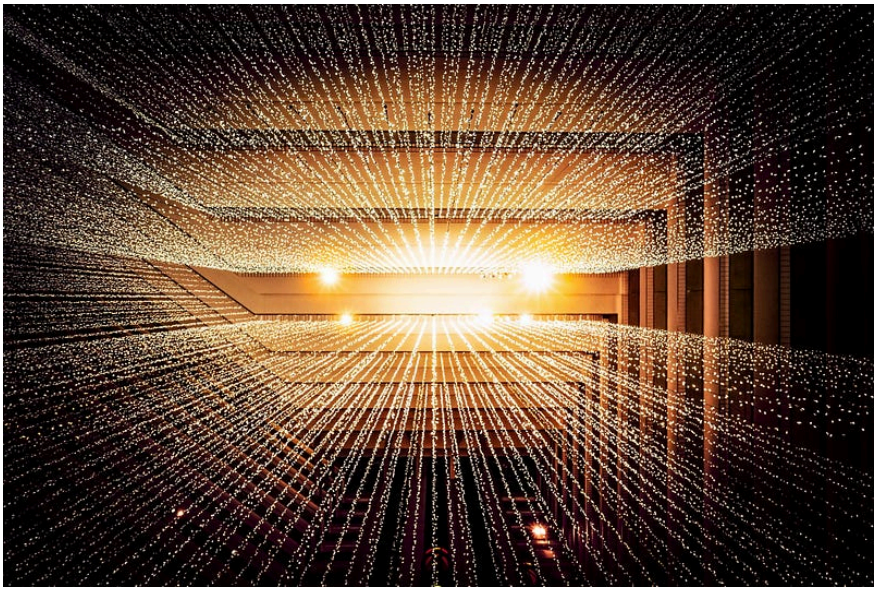

Photo by Joshua Sortino on Unsplash

The **Secure Asset Transfer Protocol (SATP)** Working Group at the **Internet Engineering Task Force (IETF)** is paving the way for a standardized process for asset and data transfers across various domains (e.g., networks or even centralized systems). As blockchain and decentralized technologies evolve, and new systems arise, interoperability becomes increasingly essential, particularly the seamless transfer of assets and data across them. **The SATP protocol addresses these interoperability challenges by enabling a standardized and secure mechanism for transferring assets between blockchains or other systems.** In this post, we explore what SATP aims to achieve, how it functions, some of the protocol's current implementations, and how you can contribute to its development through the SATP Working Group.

Internet Engineering Task Force logo

Why is SATP needed?

The SATP protocol opens up a broad range of use cases for secure and efficient cross-chain interactions. Key applications include **facilitating cross-border transactions between financial institutions**, where interoperability is critical to transfer digital assets. Central banks can use SATP to enable **secure exchanges of central bank digital currencies (CBDCs)** across different networks. **In the supply chain sector, SATP enables the exchange of information between networks with different concerns**—for example, a trade finance network managing business-related processes, and a trade logistics network managing shipping consignment creation and dispatch documents like bills of lading. Other use cases such as the **Delivery vs. Payment (DvP) of Securities**, **Stock Options Contract Fulfillment**, or **Decentralized Commerce** have the potential to be solved using SATP. Further details can be found in the SATP Use Cases draft, I invite you to take a look!

You can access the working group charter below, which explains the motivation for this protocol and provides all group-related links.

Secure Asset Transfer Protocol (satp)

There is currently an interoperability problem in many digital asset networks (frequently shorten...

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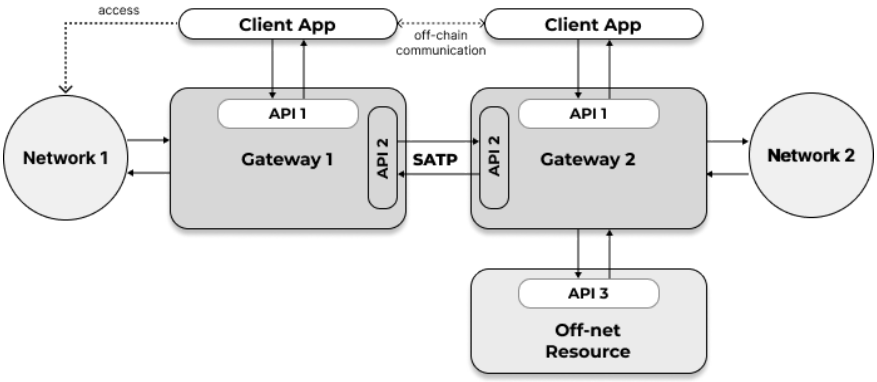
What is SATP, and How Does It Work?

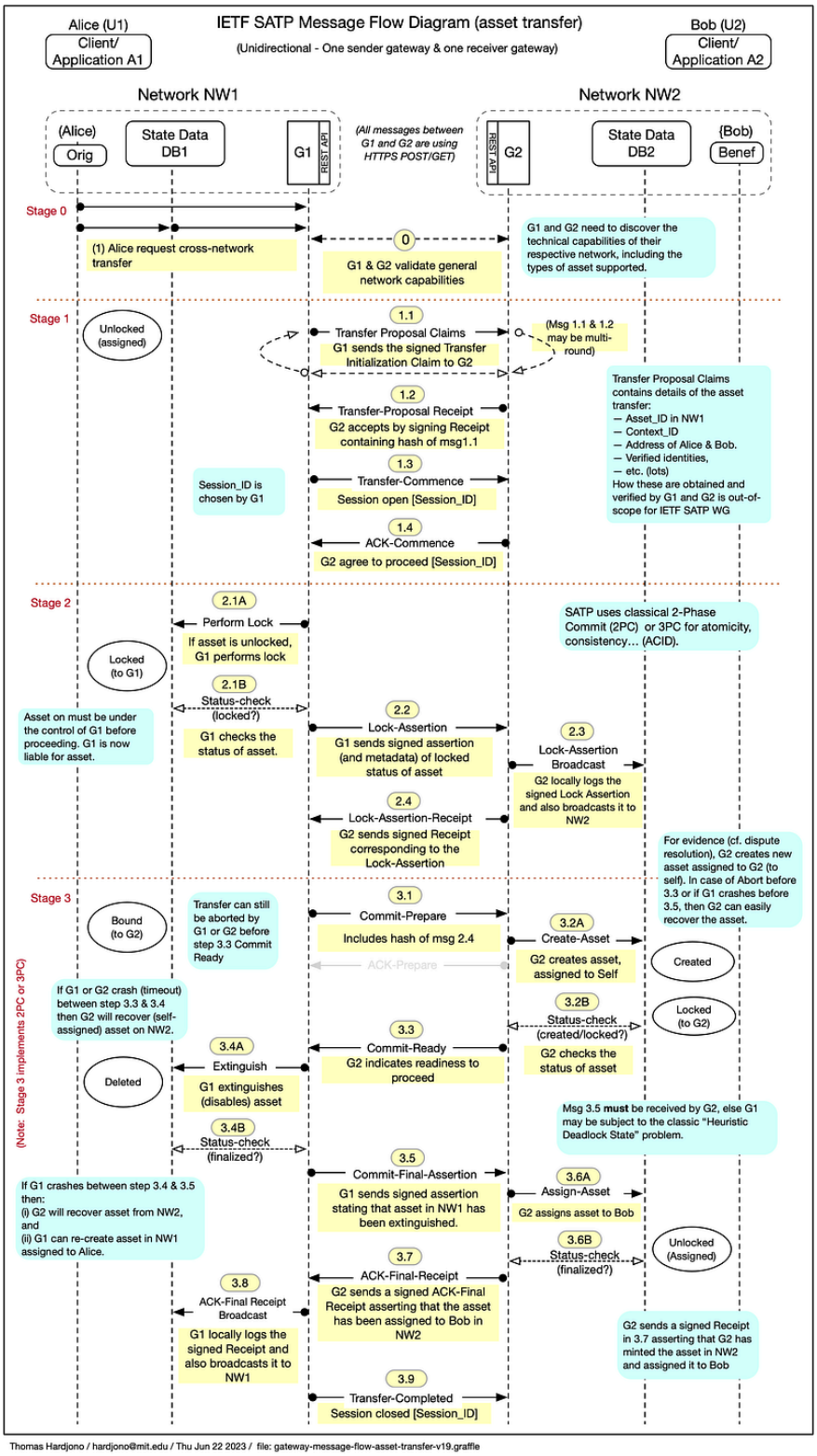
SATP is designed to support a wide variety of cross-chain interactions while ensuring data security and integrity. SATP's approach involves a **gateway-to-gateway communication model**, where each network participating in a transaction runs through an SATP gateway. These gateways facilitate the interaction by establishing secure channels for cross-chain transfers, ensuring that both parties adhere to the agreed transfer rules and validate the transfer conditions.

The figure below illustrates the architecture of SATP, showing how gateways facilitate interactions between networks. *Client Applications* initiate requests to gateways through **API 1.** Upon receiving a client request, *Gateways* communicate with one another through **API 2.** Additionally, gateways may leverage external systems (e.g., an asset registry) through **API 3** to retrieve mandatory information for a specific asset transfer.



SATP Architecture — depicting the different components and APIs. Two gateways run SATP (a gateway-to-gateway protocol) mediating the transfer of data/assets between Network 1 and 2.

The protocol is composed of four stages, depicted below. Stage 0 involves a set of checks between gateways verifying their identity and agreeing on the parameters of the asset transfer. This stage is not yet covered in the current specification. **Stage 1, Transfer Initiation**, begins the execution of the protocol per se by handling gateway identification, mutual authentication, and asset definition exchange to ensure both parties are aligned. **Stage 2, Lock-Assertion**, focuses on locking the asset on the origin network and sending proof to the destination. Finally, **Stage 3, Commitment Preparation and Finalization**, completes the transfer as the two gateways establish and finalize the asset commitment, by burning and minting the asset in the origin and destination network, respectively.



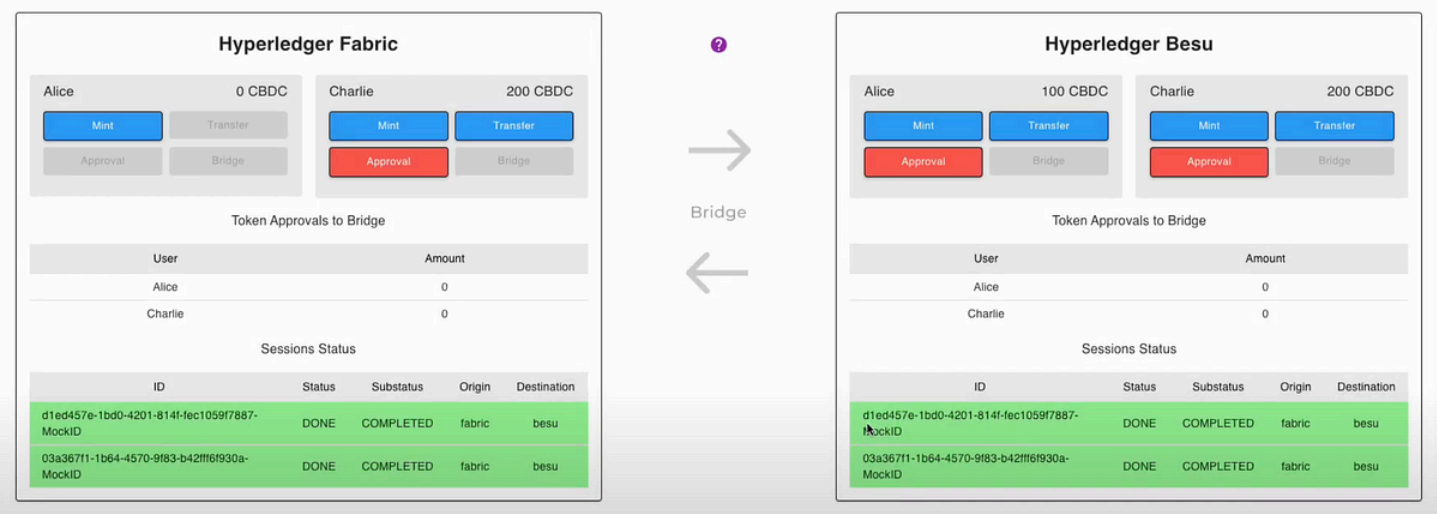
https://raw.githubusercontent.com/ietf-satp/figures/refs/heads/main/gateway-message-flow-asset-transfer-v19PNG.png

SATP Implementations and Players Involved

Several organizations are already working on implementations of SATP to showcase its real-world applications. For example, IBM has

developed an initial version of SATP designed to facilitate asset transfers across different blockchain ecosystems, called Weaver. Another key implementation effort is underway within Hyperledger Cacti, under the *Linux Foundation Decentralized Trust.* These are open-source, and I invite you to contribute to these projects by implementing the protocols' specifications. These implementations, spanning various programming languages and use cases, exemplify SATP's flexibility and broad applicability. As more organizations adopt and refine these implementations, SATP is anticipated to mature into a protocol that can be applied in diverse scenarios.

I emphasize the existing open-source implementation of SATP within Hyperledger Cacti, specifically in the **SATP-Hermes package**. Hyperledger Cacti is also powered by an **example application** that exemplifies SATP's capabilities in real-world scenarios, such as creating a cross-chain **CBDC (Central Bank Digital Currency) application.** In the demo, CBDC tokens are securely transferred between two blockchains. Below is a screenshot of the application's User Interface.



The CBDC application built on top of a SATP-based bridge. Access the video here.

Numerous industry and academic players are actively engaged in SATP standardization efforts, including Intel, IBM, Blockdaemon, Quant, and Compellio, alongside academic institutions like MIT, Técnico Lisboa (University of Lisbon), and Universidad de la República (Uruguay).

How to Get Involved in the SATP Working Group

The SATP Working Group at the IETF plays a critical role in defining the standards that will shape SATP's evolution. This group includes contributors from industry leaders, academic institutions, and technical experts, all collaborating to refine the protocol and ensure its broad applicability and alignment with industry needs. By participating in the SATP Working Group, you can help influence the protocol's future direction and contribute to establishing interoperability standards that benefit the global ecosystem.

Here's how new participants can engage:

- **Attend Working Group Meetings:** Regular interim meetings and discussions cover updates to the protocol, implementation reviews, and key challenges faced in the standardization process. These meetings are an ideal space to bring forward new ideas, contribute to ongoing discussions, and gain insights into the technical nuances of SATP.
- **Review and Provide Feedback on Drafts**: Drafts are continually revised based on feedback from the working group members. By reviewing these drafts and suggesting improvements, you can directly contribute to shaping the SATP standard. Feedback is usually preferred through the SATP mailing list.
- **Contribute to Ongoing Implementations:** If you have coding experience, contributing to or testing existing implementations is a valuable way to identify gaps in the protocol and propose solutions that could be integrated into existing open-source projects and future versions of the drafts.

Current and Future Deliverables

The SATP working group has several key milestones and deliverables planned as part of its current charter, focusing on standardizing secure, interoperable asset transfers across blockchain networks. Below are the present priorities and upcoming documents that define the initial scope of the group's work:

Date	Milestone	Associated Document
Jul 2025	SATP Architecture Document	`draft-ietf-satp-architecture`
Dec 2024	SATP Asset Transfer Protocol Document	`draft-ietf-satp-core`
Dec 2024	SATP Use-Cases Document	`draft-ietf-satp-usecases`

Deliverables in the scope of the current SATP working group charter

These documents lay the groundwork for SATP, detailing its overall architecture, core protocol operations, and essential use cases that demonstrate practical applications.

Future Milestones and Expansions Once the core documents are accepted and a new charter for the working group is worked on, additional documents and mechanisms will be prioritized to enhance SATP's capabilities. These potential future milestones include:

- **Gateway Recovery Mechanism:** `draft-belchior-satp-gateway-recovery-02` explores recovery strategies for gateway failures, ensuring fault tolerance and guaranteeing ACID (atomicity, consistency, isolation, durability) properties.
- **Data Sharing Protocols:** `draft-ramakrishna-satp-data-sharing-02` and `draft-ramakrishna-satp-views-addresses-03` propose mechanisms for secure data sharing and verification of state across blockchains.
- **Asset Profiles and Schema Architectures:** `draft-avrilionis-satp-asset-profiles-02` and `draft-avrilionis-satp-asset-schema-architecture-04` address standardized structures for defining the characteristics and schema for assets to be seamlessly interpreted in multiple networks.
- **Protocol Setup Stage:** `draft-avrilionis-satp-setup-stage-00` proposes an initial setup phase for establishing secure connections between gateways, and exchanging information mandatory for initiating the core protocol.
- **Client Application Interface (API 1):** `draft-augusto-satp-api1-00` defines the interface for client applications to interact with SATP gateways. It enables cross-chain transactions or retrieval of data related to current or past SATP sessions.

These drafts, though currently secondary, outline the future extensions that could be adopted by the SATP working group,

furthering its role in the evolving landscape of blockchain standardization. Interested contributors are encouraged to participate in these developing discussions, helping shape and refine SATP's direction to ensure comprehensive, secure, and universally adaptable standards.

European Standardization Landscape

Europe is taking a leading role in blockchain standardization through major initiatives aimed at creating cohesive frameworks to support the growth and adoption of distributed ledger technology (DLT). Notable among these is **BlockStand**, funded by the **EU's Digital Europe Programme**, which launched in May 2023 to amplify the EU's standardization strategy for blockchain and DLT. Over its two-year span, BlockStand brings together diverse stakeholders including DIGITAL SME, **Small Business Standards (SBS)**, and the **International Association for Trusted Blockchain Applications (INATBA)**, creating a powerful network that enables European experts to contribute actively to blockchain standards. Another key initiative is **SEEBLOCKS.eu**, backed by the Digital Europe Programme, and is designed to foster industry-driven and democratic input into blockchain standardization. It brings together policymakers, researchers, and industry experts to ensure that European interests are effectively represented on the global stage.

A priority across these initiatives is fostering interoperability between blockchains and other systems, ensuring data and assets can flow seamlessly across platforms. As a result, **these projects provide avenues for experts to contribute to the development of interoperability standards, including protocols like SATP**. If you are involved in blockchain technology and interested in shaping standards, consider engaging with these programs. By participating, you can help define the frameworks that will guide the future of DLT, promote interoperability, and enable more cohesive, scalable blockchain systems worldwide.

Call to Action

As SATP continues to evolve, so will the SATP Working Group's activities and objectives. By fostering a collaborative environment, the group is committed to creating a secure, standardized protocol that addresses the growing need for interoperability. **Whether you're a developer, researcher, or blockchain enthusiast, your input is**

invaluable in refining SATP and advancing interoperability standards worldwide. Join the SATP Working Group to be part of this exciting journey and contribute to a more interconnected digital future!