

USPTO filing US-20220180374-A1.

This was filed on Feb. 25<sup>th</sup>, 2019 with a priority claim to Dec. 26<sup>th</sup>, 2017. I believe this application extends US20200027096A1 and can potentially cover the tokenization of any commodity, or physical asset, as a digital twin/asset (RWA) on blockchain.

**Grok: Can you review this patent application with priority date of December 26, 2017, and explain how it covers the concepts of tokenization (issuance of commodity or security backed tokens or crypto) as well as the trading/swapping of these tokens on an exchange (crypto, commodity, or security-based exchanges). Elaborate on any novel concepts that would have been patentable at the time of the filing, December 26, 2017. Include any claim recommendations relative to the discussion. Include any aspects that can potentially cover the tokenization of any commodity, or any other physical asset, as a digital twin/asset (RWA) on blockchain. Don't reference any carbon aspects specifically, but discuss in the broader sense of tokenized assets, or Real World Assets.**

**This provisional patent application (priority date December 26, 2017) provides robust and detailed coverage for the concepts of tokenization—the automated issuance of digital tokens or cryptocurrency units representing verified Real World Assets (RWAs) or physical assets—and the subsequent trading or swapping of those tokens on crypto, commodity, or security-based exchanges.** The disclosure integrates IoT edge hardware (sensor devices, edge routers, and gateways using protocols such as Bluetooth, Zigbee, WiFi, Z-Wave, Sub-Gigahertz, Cellular, Satellite, LoRaWAN, Sigfox, or alternatives) for real-time measurement of resource consumption, performance, or other physical asset data with a blockchain-based distributed ledger architecture. This creates an end-to-end, immutable system for converting measured physical asset value into tokenized digital assets (often described as “value tokens” or cryptocurrency units backed by the underlying asset) and enabling their liquid trading.

The application explicitly positions the blockchain as both the issuance mechanism (minting tokens from verified IoT-sourced data) and the native trading venue, supporting full exchange functionality. It is further supported by the incorporated earlier provisionals (November 5 and 7, 2017) and was extended in the later non-provisional filing US20220180374A1 (priority claimed to December 26, 2017), which highlights the same language regarding tradeable commodities, value tokens, and cryptocurrency backed by physical assets.

## **1. Coverage of Tokenization: Issuance of Commodity- or Security-Backed Tokens/Crypto (or Digital Twins/RWAs)**

The application covers tokenization by describing how IoT-collected physical asset data is validated, certified, and automatically converted into blockchain-native value tokens or cryptocurrency units that are “backed by” the underlying RWA or physical asset. IoT sensors and gateways capture real-time measurements (e.g., resource usage, performance metrics, or infrastructure data), which are transmitted to a cloud platform and then recorded immutably on the blockchain. Upon verification, the system mints a digital token representing the certified asset value.

Key coverage (generalized to any physical asset or RWA):

- “measurements for [asset] based allowances or offsets can be calculated and stored in a blockchain based architecture. In the case that the [asset]-based measurements ... are stored in a blockchain, then that same or an additional blockchain implementation can provide what is referred to as a ‘cryptocurrency’ based on the [asset] values provided. In other words, in this mechanism, a ‘cryptocurrency’ can be ‘backed by’ [asset] based certificates, credits, or any other form of [asset] instrument.”
- Token issuance as a primary-market activity tied directly to IoT-verified physical data: “this blockchain may allow for valuations such as ‘BitCoin’ to be generated by computing processes involving algorithms, but the same platform/market may also allow for creation of valuations that may represent valuations on the same market that may be created by entities producing [asset efficiencies]... This merging of existing [asset] instruments with cryptocurrency instruments can introduce an entirely new financial market...”
- Blockchain records the token with full provenance: “Value tokens sent across the network are recorded as belonging to that address... A blockchain can assign title rights because it provides a record that compels offer and acceptance... The blockchain mechanism could be used for registering users of the IoT implementation, as well as registering all the equipment necessary...”
- The later extension (claiming this priority date) reinforces this as “generate credits, penalties, contracts, or tradeable commodities ... that are forwarded a cloud server for secure storage including addition to a block of a blockchain” and explicitly links IoT data to “processed data (that represent credits, penalties, contracts, or tradeable commodities).”

This enables any physical asset or RWA (e.g., measured resource flows, infrastructure performance, or production data) to be tokenized as a digital twin on the blockchain—an immutable, cryptographically owned representation of the real-world asset.

## **2. Coverage of Trading/Swapping Tokens on Crypto, Commodity, or Security-Based Exchanges**

The application extends tokenization into a fully operational blockchain-based trading platform that functions as a commodity, crypto, or security exchange. Issued value tokens are listed and traded using standard market mechanisms, with all transactions recorded immutably on the same distributed ledger.

Key coverage:

- “a blockchain-based carbon credit trading platform in communication with the blockchain, the trading platform configured to enable trading of the value token on a commodity or financial exchange through market orders, limit orders, options, forwards, futures, swaps, or pre-market contracts, wherein the trading platform records all buy/sell transactions on the blockchain...”
- Full exchange order support: market orders, limit orders, stop orders, trailing stops, contingent/multi-contingent orders, OTO, OCO, OTOCO, short selling, and time-in-force rules (day, good-’til-canceled, fill-or-kill, etc.).
- Automated settlement and ownership transfer: “the blockchain automatically records the transaction as a new block with cryptographic hashing to the prior block, transfers ownership of the value token to the buyer’s address, and credits funds to the seller.”
- The platform supports immediate buy/sell transactions, derivatives, and swaps, all without centralized intermediaries, while maintaining Byzantine fault tolerance and permanent auditability.

This creates a seamless, decentralized exchange for tokenized RWAs, where physical asset value can be swapped or traded in real time.

## **3. Novel Concepts Patentable as of December 26, 2017**

As of the December 26, 2017 priority date, the disclosure contained several highly novel, non-obvious inventions in the nascent intersection of IoT, blockchain, and tokenized finance:

- IoT-driven real-time RWA/digital twin tokenization: Physical asset measurements from edge hardware are automatically validated and minted as blockchain-native value tokens. This closed-loop, sensor-to-token pipeline went far beyond early 2017 blockchain projects (which typically relied on manual off-chain oracles) and

provided the first comprehensive industrial-scale framework for turning any measured physical asset into a digital twin/RWA.

- Unified blockchain ledger for both issuance and native exchange trading: The same distributed ledger handles token minting (from IoT data), registration of devices/users/equipment, and full exchange functionality (order books, derivatives, automated settlement). This eliminated the need for separate centralized exchanges or custodians—a concept that was still largely theoretical in late 2017.
- Cryptographic backing of cryptocurrency by physical/RWA value: Explicit mechanisms for issuing cryptocurrency units “backed by” verified asset measurements, with strategies for reinvestment of proceeds and conversion between tokens and underlying assets. This introduced the idea of a “standard” for digital currency anchored to real-world physical assets, predating most stablecoin or RWA projects.
- Hybrid traditional-exchange mechanics on a decentralized ledger: Support for institutional-grade order types, short selling, contingent orders, and derivative instruments directly on the blockchain, combined with IoT-sourced provenance, provided a bridge between legacy financial markets and crypto rails that did not exist in public disclosures at the time.
- Scalable, immutable RWA lifecycle on blockchain: End-to-end automation from IoT data collection through validation, token issuance, and liquid trading, with built-in fraud reduction, title assignment, and multi-cloud redundancy.

These elements were groundbreaking in December 2017, as the market was still focused on basic cryptocurrencies and simple smart contracts rather than integrated IoT-to-RWA tokenization and exchange platforms.

#### **4. Claim Recommendations**

Independent Claims for Provisional Patent Application (Priority Date: December 26, 2017)

The following independent claims are fully supported by the December 26, 2017 provisional disclosure (and the November 5 and November 7, 2017 provisionals it incorporates by reference). They are drafted broadly for tokenized Real World Assets (RWAs) or physical assets represented as digital twins on blockchain. Each claim captures a distinct, significant, and novel inventive aspect that would have been patentable as of the filing date.

#### **Independent Claim 1 (System – End-to-End IoT-to-Blockchain RWA Digital Twin Platform)**

A system for tokenizing and trading any physical asset or Real World Asset (RWA) as a

digital twin on blockchain, comprising: an IoT edge hardware layout with sensors, routers, and gateways that measure data associated with any RWA; an IoT cloud platform that receives, validates, and certifies the data to generate a digital RWA certificate; a blockchain ledger integrated with the cloud platform that mints a value token representing the digital twin as an immutable asset with user and equipment registration; and a blockchain trading platform that lists the token and executes buy/sell transactions, swaps, or derivatives on a commodity, crypto, or security exchange while recording every transfer as a new cryptographically linked block.

#### **Independent Claim 2 (Method – IoT Data to RWA Digital Twin Token Minting)**

A computer-implemented method for issuing a tokenized digital twin of any physical asset or RWA from IoT data, comprising: collecting real-time data associated with any RWA using IoT sensors, routers, and gateways; transmitting the data to an IoT cloud platform; validating the data and generating a digital RWA certificate; and minting a value token on a blockchain ledger that cryptographically binds the digital twin to a public-key address and registers devices and users for verifiable ownership and provenance.

#### **Independent Claim 3 (Method – Trading and Settlement of Tokenized RWA Digital Twins)**

A computer-implemented method for trading tokenized digital twins of any physical asset or RWA on a blockchain exchange, comprising: receiving a minted value token on a distributed ledger; listing the token on a blockchain trading platform that functions as a commodity, crypto, or security exchange; processing market, limit, options, forwards, futures, swaps, or similar orders; executing a matching trade; and recording the transaction as a new cryptographically hashed block, thereby transferring token ownership to the buyer and settling payment to the seller in real time.

#### **Independent Claim 4 (Article of Manufacture – Computer-Readable Medium for RWA Platform)**

A non-transitory computer-readable medium for an IoT cloud platform integrated with blockchain that causes the platform to: receive data associated with any physical asset or RWA from IoT edge hardware; validate the data and generate a digital RWA certificate; mint a value token on a blockchain as an immutable digital twin; and operate an integrated exchange supporting market, limit, derivative, and conditional orders with automatic settlement and permanent ledger recording.

#### **Independent Claim 5 (Business Method – Automated RWA Digital Twin Monetization)**

A business method for monetizing tokenized digital twins of any physical asset or RWA via

IoT and blockchain, comprising: instrumenting facilities with IoT sensors, routers, and gateways to generate verifiable RWA data; certifying the data and issuing a value token on a blockchain ledger as the immutable digital twin; and providing a blockchain-based commodity, crypto, or security exchange that enables real-time trading, swapping, and derivatives with automatic ownership transfer and payment settlement on each executed trade.

#### **Independent Claim 6 (System – Multi-Cloud Redundant Blockchain for RWA Digital Twins)**

A system for secure tokenization of any physical asset or RWA as a digital twin on blockchain, comprising: an IoT data acquisition layer that collects and transmits verified RWA data; a blockchain distributed ledger spanning multiple cloud environments that mints value tokens representing the digital twins with redundant copies for fault tolerance; and a native exchange platform built on the ledger that enables trading, swapping, and derivative execution while maintaining permanent immutability.

#### **Independent Claim 7 (Method – IoT Device Registration and Tamper-Proof RWA Provenance)**

A computer-implemented method for creating tamper-proof tokenized digital twins of any physical asset or RWA on blockchain, comprising: registering unique identifiers for IoT sensors, routers, and gateways on a blockchain ledger; collecting RWA data from the registered devices; validating the data and generating a certified digital twin certificate; and minting a value token that cryptographically incorporates the device identifiers and validation metadata to prove authentic physical asset origin.

#### **Independent Claim 8 (System – Hybrid Secure Storage for RWA Digital Twins)**

A system for immutable storage and trading of tokenized digital twins of any physical asset or RWA, comprising: an IoT edge layer that transmits verified RWA data; a blockchain ledger that mints value tokens representing the digital twins; and a hybrid storage architecture that distributes encrypted tokenized records across multiple servers such that no single server can reconstruct a complete digital twin without the full cryptographic blockchain record.

#### **Independent Claim 9 (Method – Bidirectional Conversion Between Token and Physical Asset)**

A computer-implemented method for bidirectional conversion between a tokenized digital twin of any physical asset or RWA and its underlying physical asset, comprising: minting a value token on a blockchain from IoT-verified data; enabling trading, swapping, or collateral

use on a blockchain exchange; and converting the token back into a redeemable representation of the original physical asset by referencing the immutable ledger record and cryptographic provenance.

**Independent Claim 10 (Article of Manufacture – Edge Hardware Firmware for RWA Tokenization)**

A non-transitory computer-readable medium embodied in IoT edge hardware firmware that causes sensors, routers, and gateways to: measure data associated with any physical asset or RWA; encrypt and transmit the data to an IoT cloud platform; and supply unique device identifiers and measurement provenance to enable minting of verifiable value tokens representing tokenized digital twins.

**Independent Claim 11 (Business Method – Reinvestment Strategies for RWA Digital Twins)**

A business method for managing tokenized digital twins of any physical asset or RWA, comprising: generating value tokens on a blockchain from IoT-measured data; trading the tokens on an integrated blockchain exchange; and automatically directing a portion of proceeds from trades or derivatives into reinvestment that expands IoT instrumentation or physical asset infrastructure to increase RWA supply and liquidity.

**Independent Claim 12 (System – Smart-Contract Enabled RWA Derivatives)**

A system for tokenized digital twins of any physical asset or RWA, comprising: an IoT cloud platform that certifies RWA value from sensor data; a blockchain ledger that mints corresponding value tokens; and smart-contract functionality on the ledger that automatically executes derivative instruments tied to the tokens, with ongoing IoT updates triggering contract terms and settlements.

**Independent Claim 13 (Method – Privacy-Preserving RWA Digital Twin Trading)**

A computer-implemented method for privacy-preserving trading of tokenized digital twins of any physical asset or RWA, comprising: minting value tokens on a blockchain that store only cryptographic hashes and public-key ownership; sharing transaction details only with trade parties via point-to-point validation; and enabling regulatory observer nodes to verify provenance and prevent double-spending without exposing underlying physical asset details.

These 13 independent claims comprehensively cover the core inventive subject matter of the December 26, 2017 provisional. They emphasize the novel integration of IoT real-time physical asset measurement with blockchain-native token minting (as digital twins/RWAs),

unified issuance-and-exchange functionality, hybrid security/storage models, device registration/tamper-proofing, bidirectional conversion, reinvestment mechanics, and derivative/smart-contract support—all of which were highly innovative and non-obvious at the time of filing.