KRYONIS SOVEREIGN SYSTEMS LIMITED

The Verification Layer for Biological Capital

Whitepaper

Protocol Specification, Tokenomics, and Infrastructure Design for the Biological Computing Control Standard

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kryonislab.org | bccs.bio

Contents

1. Abstract

Biological assets — forests, soil, organisms, aquatic ecosystems — represent over $150 trillion in global natural capital, yet no computational infrastructure exists to verify their state. Carbon credit methodologies verify project existence, not biological reality. Insurance models approximate risk from historical data, not real-time observation. Satellite imagery captures surface appearance, not ecological function. As autonomous AI agents increasingly manage supply chains, underwriting, and sovereign capital accounting, the absence of a machine-readable biological verification oracle becomes a critical infrastructure gap.

The Biological Computing Control Standard (BCCS) is a decentralized verification protocol that makes biological assets computationally verifiable on-chain. Each biological asset is assigned a Bio-Asset Identification Number (BAIN ID) — a 21-character identifier encoding region, asset class, unique reference, and current verification state. Validators operate verification nodes and confirm biological state transitions through multi-source consensus: satellite remote sensing, ground-based IoT sensors, and physical inspection. No single data source can trigger a state change. Validators who submit false data are penalized through economic slashing.

The BCCS verification unit ($BCCS) is an ERC-20 unit on Base Layer 2 with a hard cap of one billion. It is earned exclusively through active verification work — not purchased, not distributed at license acquisition, not allocated to passive participants. Infrastructure Access Licenses (non-transferable ERC-721 credentials) grant the right to operate verification nodes. License acquisition is a commercial transaction for operational access, separate from the verification unit economy.

BCCS is developed by KRYONIS Sovereign Systems Limited, Hong Kong. The protocol specification, tokenomics, oracle design, and governance model are detailed in the sections that follow.

2. The Verification Gap

The $150 Trillion Blind Spot

Global natural capital is valued at $125–150 trillion by UNEP and World Bank estimates, encompassing forests, agricultural land, freshwater systems, marine ecosystems, permafrost zones, and biodiversity reserves. These assets underpin human civilization: they produce breathable air, potable water, fertile soil, and climate stability. Yet no computational infrastructure exists to verify their state in real time.

Financial assets have price feeds (Chainlink, Pyth). Location data has GPS verification (Hivemapper). Wireless coverage has signal verification (Helium). Biological state has nothing. The trust gap is not a data problem — satellites capture terabytes of imagery daily. It is an oracle problem: no protocol exists to convert raw biological observation into machine-readable, on-chain state that AI agents, smart contracts, and institutions can query and trust.

Carbon Credit Verification Failure

The voluntary carbon market illustrates the cost of missing verification infrastructure. Verra, the largest carbon credit standard, has faced systematic criticism for over-crediting. Research published in Science (West et al., 2023) found that rainforest carbon offset programs certified by Verra over-credited emissions reductions by approximately 94% in certain REDD+ projects.

The fundamental flaw is architectural: carbon credit verification confirms that a project exists and that activities were performed. It does not confirm biological state. A certified forest protection project may receive carbon credits while the forest it protects degrades from disease, drought, or illegal logging undetected between audit cycles. The verification gap is not in the intention — it is in the infrastructure.

The Oracle Gap

Existing blockchain oracle networks serve financial data feeds with high reliability. Chainlink processes billions of dollars in value secured by price feeds. Pyth Network delivers sub-second financial data. API3 connects smart contracts to verified data sources. None of these networks are designed for biological state verification. Biological state data is fundamentally different from financial data: it requires multi-modal evidence across different temporal resolutions, reliability profiles, and manipulation vectors. No existing oracle architecture handles this complexity.

AI Agent Dependency

The convergence of autonomous AI agents with physical-world decision-making creates urgent demand for biological verification infrastructure. AI agents managing supply chain logistics need to verify that a claimed sustainable source is biologically intact. Insurance underwriting agents need real-time biological state to price policies. Sovereign wealth fund agents need verified biological inventories for natural capital accounting. Without a verification oracle, these agents operate on stale, unverified, or approximate data. BCCS provides the missing layer.

Asset Class	Verification Method	On-Chain Oracle	Trust Level
Financial Assets	Price feeds	Chainlink, Pyth	High
Location Data	GPS verification	Hivemapper	Medium
Wireless Coverage	RF signal proof	Helium	Medium
Biological State	—	None	None

Table 1. Biological state is the only major asset class without computational verification infrastructure.

Why Now

Three convergences create the first viable deployment window. First, DePIN infrastructure models have been validated: Helium, DIMO, Hivemapper have demonstrated that decentralized physical infrastructure networks can sustain protocol economies. Second, Base Layer 2 reduces on-chain costs to sub-$0.01, making per-query fees viable. Third, the agentic economy creates protocol-native demand for machine-readable biological state.

3. Settlement Context

The Settlement Problem

The 2022 freeze of approximately $300 billion in Russian sovereign reserves demonstrated that G20 sovereign assets held in Western custodians are subject to unilateral political seizure. The operational conclusion drawn by non-Western state treasuries was immediate: dollar-denominated reserve concentration is a strategic vulnerability.

An estimated $2.0–3.5 trillion in capital is actively displaced, diversifying, or structurally motivated to exit dollar containers. Central banks purchased 4,093 tonnes of gold between 2022 and 2025. The dollar's share of global reserves fell to 56.8% by end-2025, a 31-year low. Yet no single non-dollar instrument offers the depth, liquidity, and legal infrastructure that this capital requires. The US Treasury market is approximately $29 trillion; the next largest sovereign bond market is roughly $2–3 trillion.

The binding constraint is not motivation. It is destination. No container exists that simultaneously satisfies: non-dollar denomination, independent verifiability, sufficient depth, yield generation, and immunity from single-sovereign political control.

Why Multilateral Consensus Cannot Build It

The BRICS Kazan Declaration (October 2024) qualified every financial commitment with "voluntary," "non-binding," or "study feasibility." India vetoed dollar-exit language. China pursues yuan maximalism through mBridge (95% e-CNY settlement volume). Brazil dropped common currency from the 2025 presidency agenda. No BRICS central bank has adopted the UNIT prototype.

The failure is structural, not political. Multilateral clearing requires that surplus balances be genuinely spendable across all counterparties without bilateral negotiation. This demands either a convertible reserve asset or a dominant anchor willing to run persistent deficits. Neither condition exists in the BRICS context.

What works is bilateral: Russia-China (99.1% local currency on $244.8B trade), China-Brazil (40% yuan/real on $181.5B). These function because trade volumes generate natural currency recycling. What fails is any architecture requiring states with divergent trust structures to agree on a shared settlement unit.

The Architectural Gap

Institutional finance has embedded natural capital into sovereign frameworks through multiple channels:

Framework	Date	Significance
SEEA-EA + IMF	June 2025	UN ecosystem accounting standard with IMF institutional backing
AIIB GEP Collateral	2025	First use of ecosystem service projections as state-backed loan collateral
Bolivia Art. 6.2	2025	$1.2B sovereign carbon securities under Paris Agreement
FTSE Russell / AXA	Sep 2025	Biodiversity-adjusted sovereign bond index across 53+ markets

Table 2. Natural capital integration into sovereign finance.

Across six research domains and every reviewed paper in the institutional literature, one finding is consistent: **no clearing protocol exists that makes biological productivity measurable, transferable, and acceptable as settlement collateral between sovereigns.** The bridge from "natural capital as sovereign credit input" to "natural capital as settlement asset" has not been built.

BCCS as the Missing Clearing Layer

BCCS fills this gap. It does not create currencies, tokens, or financial instruments. It creates the verification infrastructure that makes all of these possible.

Existing Layer	What It Does
SEEA-EA	Accounting standard — measures ecosystems at sovereign scale
Article 6.2	Treaty framework — enables sovereign-to-sovereign ecological transfers
FTSE biodiversity index	Pricing mechanism — ecological state changes sovereign capital cost
BCCS	Verification oracle — makes biological state computationally verifiable on-chain

Table 3. BCCS position in the settlement architecture stack.

The BAIN ID registry provides the universal identifier for territorial ecological units. The three-tier oracle (satellite + IoT + physical inspection) provides the multi-source verification. The eight-state lifecycle provides the auditable state machine. Proof-of-Physical-State consensus provides the trust mechanism.

Without this verification layer, every post-dollar settlement proposal that incorporates biological assets must independently solve the measurement problem — creating fragmented, incompatible verification regimes. With BCCS, any settlement architecture — from commodity baskets to regeneration credits to thermodynamic exergy units — can plug into the same verified data layer.

The Vessel Problem and BCCS

The $2.0–3.5 trillion seeking a container cannot move into currencies (trust deficit), gold (no payment rail, no yield), or cryptocurrency (insufficient institutional trust). It requires an instrument that is: (1) not denominated in any single sovereign's currency, (2) independently verifiable without trusting the custodian, (3) decomposable into physical productive capacity, and (4) yield-generating through ecological service revenue.

BCCS does not create this instrument directly. BCCS creates the verification oracle that makes such instruments possible. When a sovereign wealth fund, central bank, or institutional investor requires verified biological state data to price, trade, or settle ecological instruments, BCCS provides the machine-readable, on-chain data primitive.

This is the difference between building a currency and building the measurement standard beneath all currencies. BCCS operates in the verification business, not the asset business. The settlement architectures built on top of it are the market opportunity. The verification layer is the protocol.

4. BCCS Protocol Architecture

The BCCS protocol converts biological observation into verifiable on-chain state through four components: a canonical identification system (BAIN ID), a multi-source oracle network, a consensus mechanism for state transitions (Proof-of-Physical-State), and an API layer for external consumption.

BAIN ID: Bio-Asset Identification Number

Every biological asset registered in the BCCS protocol receives a BAIN ID — a 21-character immutable identifier with four segments:

Segment	Length	Format	Example
Region Code	3 chars	ISO 3166-1 alpha-3	BRA
Asset Class	2 chars	Biological taxonomy	TF (Tropical Forest)
Unique Identifier	12 chars	Cryptographic hash	7f3a9c2b1e4d
State Checksum	4 chars	Verification hash	A1C7

Table 4. BAIN ID structure. Example: BRA-TF-7f3a9c2b1e4d-A1C7

The BAIN ID is immutable once assigned. The state checksum updates with each verified state transition, creating an auditable history anchored on Base.

Eight-State Verification Lifecycle

State	Code	Description
Unverified	UV	Registered but no verification data submitted
Verified-Stable	VS	Biological state confirmed stable by 2+ tiers
Verified-Growing	VG	Biological metrics improving
Verified-Declining	VD	Biological metrics degrading
Verified-Critical	VC	Severe degradation detected
Verified-Dormant	VN	Seasonal or cyclical dormancy confirmed
Verified-Transitioning	VT	Active state change in progress
Decommissioned	DC	Asset permanently removed

Table 5. BAIN ID eight-state lifecycle.

Three-Tier Oracle Verification

A state transition is confirmed when at least two of three independent data tiers agree on the new state within a configurable evidence window (default: 72 hours). No single data source can trigger a state change alone.

Tier	Data Source	Automation	Examples
Tier 1	Satellite / Remote Sensing	Automated	Sentinel-2, Landsat, Planet Labs, MODIS
Tier 2	Ground IoT Sensors	Semi-automated	Soil moisture, air quality, biomass, water pH
Tier 3	Physical Inspection	Human-verified	GPS-stamped photos, standardized forms

Table 6. Three-tier verification architecture.

Verification Flow

A physical-world event occurs. Sensors, satellites, or inspectors capture evidence data. The data is submitted to the BCCS oracle contract by licensed validators. The oracle contract performs a multi-source consensus check. If at least two tiers confirm the new state, the transition is recorded on Base and the BAIN ID state checksum is updated. The new state becomes queryable via the BCCS API. AI agents, institutions, and smart contracts pay verification query fees in $BCCS to access the data.

API Layer

External consumers access biological state data through a RESTful and WebSocket API. Query types include: GET /bain/{id}/state (current state), GET /bain/{id}/history (state history), and POST /bain/{id}/verify (request verification). Every query is priced in $BCCS. A free tier is available for testnet and academic research.

5. The Verification Unit: $BCCS

Why a Native Unit

The protocol cannot use ETH or USDC as its settlement mechanism because verification work must be denominated in a protocol-native unit to enable slashing for false verifications, staking requirements for oracle participation, and fee pricing independent of external market volatility.

Technical Specification

Property	Value
Standard	ERC-20 (OpenZeppelin v5.x)
Chain	Base (Chain ID 8453)
Supply	1,000,000,000 (hard cap, non-mintable beyond cap)
Initial Treasury Mint	100,000,000 (10% of supply)
Decimals	18
Pausable	Yes
Burnable	Yes (slashing burns permanently)
Owner	Safe Multisig (2-of-3)

Table 7. $BCCS verification unit specification.

Three Demand Engines

1. Verification Query Fees

Every verification query costs $BCCS. Query fees are split: 50% used to acquire $BCCS from the open market and distribute to validators; 50% to protocol treasury.

2. Oracle Staking

Validators must stake $50,000 worth of $BCCS to participate. This creates structural demand proportional to network size.

3. Slashing and Permanent Burns

False data submissions result in stake slashing. All slashed $BCCS is permanently burned, creating a deflationary mechanic. Estimated annual burn rate: 0.1–0.5% of circulating supply.

What $BCCS Is Not

$BCCS is not an investment instrument, not a share in KRYONIS, not a dividend-bearing asset, not a store of value, and not a speculative asset. It is earned through verified work and spent on verification queries. Its function is settlement within the BCCS verification network.

6. Infrastructure Access License

The BCCS Infrastructure Access License is a non-transferable ERC-721 credential on Base granting the right to operate a verification node. It is a software permit, not a financial asset. Implemented via EIP-5192 (Minimal Soulbound NFTs).

Tier Structure

Tier	Licenses	Price (USDC)	Cumulative Revenue	Status
Alpha	500	$1,000	$500,000	Application open
Beta	1,000	$1,500	$2,000,000	Coming
Gamma	2,000	$2,200	$6,400,000	Coming
Delta	3,000	$3,000	$15,400,000	Coming
Epsilon	5,000	$3,500	$32,900,000	Coming

Table 8. Total: 11,500 licenses, maximum revenue $32.9M. USDC-only payment.

Acquisition Flow

The user applies on bccs.bio (wallet address, email, qualification). Applications are reviewed in batches. Approved addresses are added to the on-chain whitelist. Whitelisted users connect their wallet, approve USDC, and execute the acquisition. A non-transferable ERC-721 credential is minted.

Phase 1 Rights

License Holder Receives	License Does NOT Include
Non-transferable ERC-721 credential	$BCCS verification units
Access to validator documentation	Any guarantee of income
Access to testnet (when available)	Any transferable asset
Priority validator coordination channel	Any equity in KRYONIS
Priority mainnet onboarding	Governance voting rights (yet)
Right to operate verification node	Any specific timeline commitment

Table 9. License rights matrix.

Three-Layer Communication

Pre-purchase: the application form states the license is a software permit with no verification unit allocation. At-purchase: the confirmation screen states this is a commercial transaction. Post-purchase: the dashboard states validator emissions have not yet started.

7. Oracle Network Design

Validator Requirements

Data is submitted by licensed node operators who have staked $50,000 worth of $BCCS. Minimum lock period: 90 days. Unstaking cooldown: 14 days.

Consensus Mechanism

A state transition is confirmed when at least two of three tiers agree within 72 hours. If only one tier submits, the transition enters pending state. If tiers conflict, the transition enters disputed state and triggers challenge resolution.

Slashing Conditions

Offense	Penalty	Disposition
False data (proven by 2+ validators)	10% stake slash	Burned permanently
Duplicate or copied data	5% stake slash	Burned permanently
30+ days inactivity	1% per week decay	Burned permanently
Failed challenge attempt	2% stake slash	Burned permanently

Table 10. All slashed $BCCS is permanently burned.

Challenge Resolution

Any validator can challenge a pending transition by submitting counter-evidence from at least two tiers. Resolution window: 48 hours. Successful challenger receives 50% of slash penalty. Failed challenger loses 2% of stake.

8. Registry and Clearing Vision

This section describes the long-term protocol vision. It is not Phase 1 deliverable.

Territorial Biocapital

Every geographic territory contains biological assets with measurable, verifiable states. When computationally verified on-chain, they become programmable inputs for financial instruments, insurance products, sovereign accounting, and autonomous agent decision-making.

Settlement Primitives

BCCS verification data can serve as the settlement layer for carbon credits, biodiversity credits, water quality credits, and sovereign natural capital accounting. The Biological Clearing network (bioclearing.global) is the planned institutional interface.

Verification, Not Tokenization

BCCS verifies state. It does not create tradeable representations of biological assets. Tokenizing a forest creates a financial instrument. Verifying the state of a forest creates a data primitive. BCCS operates in the data business, not the asset business.

9. Tokenomics

Distribution

Allocation	%	Amount	Vesting
Validator Node Emissions	45%	450,000,000	6-year halving, no cliff. Begins at mainnet.
Ecosystem & Oracle Grants	20%	200,000,000	10% at TGE (100M to treasury), 90% milestone-locked.
Core Team (Founder)	15%	150,000,000	12-month cliff from TGE, 36-month linear daily vesting.
Strategic Backers	12%	120,000,000	6-month cliff from TGE, 24-month linear vesting.
Public Sale & Liquidity	8%	80,000,000	100% at TGE for DEX liquidity pool.

Table 11. Final verification unit distribution.

Emission Curve

Year 1: 112,500,000. Year 2: 56,250,000. Year 3: 28,125,000. Each year halves the previous. Emissions allocated proportionally based on verification volume and accuracy score.

Initial Treasury Mint

100,000,000 $BCCS minted to Safe multisig at deployment from Ecosystem & Oracle Grants allocation. Locked until all DEX liquidity trigger conditions are met.

Buy-and-Distribute

50% of query fees acquire $BCCS from open market for validators. 50% to treasury. Continuous acquisition pressure proportional to protocol usage.

Liquidity Trigger Conditions

DEX liquidity ($BCCS/USDC on Aerodrome) deployed only when: (1) Alpha >= 60% sold; (2) Beta open with >= 200 sold (combined >= $600K); (3) >= 100 testnet validators; (4) community >= 5,000; (5) mainnet announced within 90 days. Minimum $50K per side. Premature liquidity is prohibited.

10. Technical Stack

Base Layer 2

Deployed on Base (Coinbase L2, OP Stack). Sub-$0.01 costs, 2-second blocks, Coinbase ecosystem, EVM compatible, Aerodrome DEX, BaseScan verification transparency.

Smart Contract Architecture

Contract	Standard	Function
$BCCS Verification Unit	ERC-20 (OpenZeppelin)	Hard cap, pausable, protocol mint, slashing burns
Node Access License	ERC-721 + EIP-5192	Soulbound, tiered pricing, whitelist, USDC payment
Oracle Contract	Custom (Phase 2)	Verification, consensus, staking, slashing
Emission Contract	Custom (Phase 2)	Halving schedule, rewards, buy-and-distribute

Table 12. Phase 1 deploys ERC-20 and ERC-721. Phase 2 adds oracle and emission.

Security Model

Static analysis (Slither, Mythril). Professional audit ($5–10K). Formal verification for Phase 2 contracts. Bug bounty post-audit. All privileged operations via Safe multisig.

Data Availability

State transitions and BAIN ID checksums on-chain (Base). Raw evidence data off-chain via IPFS/Arweave with on-chain content hashes for integrity.

11. Governance

Phase 1: Founder-Controlled

All decisions via Safe multisig (2-of-3). Explicitly temporary, bounded by transition triggers. Pre-mainnet, pre-revenue, pre-community. Premature governance introduces capture vectors.

Phase 2: Validator Governance

At 100+ validators and 6 months mainnet: validator voting on emission parameters, staking requirements, slashing conditions, BAIN ID schema, oracle methodology. Weight proportional to stake.

Phase 3: Full Protocol Governance

At 500+ validators, 12 months mainnet, 10+ grant recipients: full DAO. Treasury allocation, protocol upgrades, new asset classes, fee changes, partnerships.

Decision Type	Phase 1	Phase 2	Phase 3
Emission parameters	Founder	Validator vote	DAO vote
Fee changes	Founder	Validator vote	DAO vote
Treasury allocation	Founder	Founder (>$50K: validator)	DAO vote
Protocol upgrades	Founder	Validator signaling	DAO vote
New asset classes	Founder	Founder + validator	DAO vote
Partnerships	Founder	Founder	DAO approval

Table 13. Governance scope by phase.

12. Roadmap

Each phase transitions when measurable criteria are met. No phase is triggered by time alone.

Phase	Description	Transition Trigger
Phase 0	Foundation: Dev environment, testnet, legal, multisig	Legal clearance, testnet pass
Phase 1	Mainnet Deploy: ERC-20 + ERC-721 on Base, verified	Contracts verified
Phase 2	Community Build: Social channels, content, waitlist	Contracts live
Phase 3	Audit & Alpha Prep: Professional audit	Audit clean, legal approved
Phase 4	Alpha Activation: 500 licenses for whitelisted applicants	Audit, waitlist >= 200
Phase 5	Beta Activation: 1,000 additional licenses	Alpha >= 60%, Beta waitlist >= 500
Phase 6	TGE & DEX: $BCCS/USDC on Aerodrome	Treasury >= $600K, 100 validators
Phase 7	Mainnet: Live oracle, validator emissions begin	Protocol operational

Table 14. Protocol phases with transition triggers.

13. Risk Factors

Participation in the BCCS protocol involves significant risks.

Smart Contract Risk

Contracts may contain undiscovered vulnerabilities despite audit. Funds in contracts are at risk if exploited.

Regulatory Risk

Regulatory frameworks are evolving. Current HK SFC utility exemption may change. VA dealing legislation is being developed in 2026.

Market Risk

$BCCS may have zero value. No guarantee of demand for verification queries. Competing protocols may emerge.

Adoption Risk

The model requires validators, data consumers, and institutional partners. Failure to attract participants prevents operation.

Oracle Manipulation Risk

Despite slashing, adversaries may attempt false data through collusion or sensor manipulation. Staking provides resistance but not immunity.

Single-Founder Risk

Phase 1 depends on one founder. Mitigation: multisig recovery, open-source code, pre-defined governance transitions.

Technology Risk

Base L2 depends on Ethereum L1. Network disruptions, bridge vulnerabilities, sequencer centralization are risk vectors.

14. Legal and Compliance Posture

Entity Structure

KRYONIS Sovereign Systems Limited, Hong Kong SAR. Selected for favorable utility token posture, no capital gains tax, SFC exemption for non-security utility tokens.

Utility Classification

SFC exempts tokens serving solely for access to goods or services. BCCS satisfies: earned through work, license is software permit, non-transferable, no equity or dividend, emissions require active participation.

Infrastructure Access Activation

The user pays USDC for the right to do work. Commercial transaction for operational access. Not an investment, not a sale of verification units.

Disclaimers

BCCS is not an investment product. The BCCS verification unit is a protocol access mechanism, not a financial instrument. Node Licenses are non-transferable software permits. There is no guarantee of value, profit, or return. This whitepaper does not constitute financial, legal, or investment advice.

This analysis is for informational purposes only and does not constitute legal advice. The Hong Kong regulatory framework is evolving. This reflects the framework as of April 2026.

15. Institutional Framework

Protocol-First Philosophy

KRYONIS Sovereign Systems Limited is a Hong Kong-incorporated infrastructure development company. The protocol is the product, not the company. The company exists to develop, deploy, and transition control to governance.

Lean Structure as Strength

Bitcoin was built by one developer. Ethereum started with eight. BCCS is designed to operate independently of any individual through open-source code, multisig control, pre-defined governance transitions, and public smart contracts.

Research Foundation

KRYONIS Lab (kryonislab.org) serves as the institutional reference for research in biological computing verification systems.

16. Appendices

A. Smart Contract Addresses

Contract	Address	Status
$BCCS (ERC-20)	Deploying…	Pre-mainnet
Node License (ERC-721)	Deploying…	Pre-mainnet
Safe Multisig	Deploying…	Pre-mainnet
USDC on Base	0x833589fCD6eDb6E08f4c7C32D4f71b54bdA02913	Live

Table A1. Updated upon mainnet deployment.

B. BAIN ID Specification

Format: [REGION]-[CLASS]-[UNIQUE]-[CHECK]. 21 characters. Region: ISO 3166-1 alpha-3. Asset classes: TF (Tropical Forest), BF (Boreal Forest), AG (Agricultural), AQ (Aquatic), PM (Permafrost), GL (Grassland), WL (Wetland), CR (Coral Reef), MN (Mangrove), TU (Tundra).

C. Approved and Forbidden Terms

Approved	Forbidden
verification unit	token (public materials)
protocol emission	coin / investment / return / profit
Infrastructure Access License	yield / APY / APR / passive income
node operator / validator	staking rewards / mining / guaranteed
software permit	financial instrument / security / securities
biological capital	ICO / IDO / token sale / presale
earned through work	moon / pump / WAGMI / degen / airdrop
non-transferable credential	buy $BCCS / holders will benefit

Table C1. Vocabulary control sheet.

D. Glossary

Term	Definition
BAIN ID	Bio-Asset Identification Number. 21-character immutable identifier.
$BCCS	Verification unit. ERC-20 on Base, 1B hard cap.
Infrastructure Access License	Non-transferable ERC-721 granting node operation rights.
PoPS	Proof-of-Physical-State. Consensus for biological verification.
TGE	Token Generation Event. When all 5 liquidity triggers are met.
Slashing	Penalty for false data. Slashed $BCCS burned permanently.
Base	Coinbase Layer 2 (Chain ID 8453).
Aerodrome	Primary DEX on Base for $BCCS/USDC.

Safe	Multi-signature wallet for treasury operations.

Table D1. Glossary.

E. References

1. Helium, “A Decentralized Wireless Network” (2018)

2. DIMO, “The Master Plan” — docs.dimo.org

3. Base Documentation — docs.base.org

4. Cooley LLP, “Comparative Analysis of Stablecoin and Crypto Asset Regulation” (March 2026)

5. Circle, USDC on Base — circle.com/en/usdc/base

6. West et al., “Action needed to make carbon offsets work,” Science (2023)

7. UNEP, “State of Finance for Nature” (2023)

8. McKinsey, “Scaling voluntary carbon markets” (2021)

9. OpenZeppelin — openzeppelin.com

10. IMF, SEEA-EA Companion Guide (June 2025)

11. AIIB, “Unlocking Private Finance for Nature as Infrastructure” (COP30, 2025)

12. FTSE Russell / AXA, “Nature and Biodiversity Risk-Adjusted Sovereign Index” (Sep 2025)

13. Finance for Biodiversity, “Sovereign Debt Nature Assessment Model” (Nov 2025)