Shard Frontier — Trait Matrix v1.1

Purpose
Define rarity, evolution, and utility for Shard Frontier, covering **Ore → Shards → Relics → Machine Parts**, and the metadata schema that represents them across BlockDAG (testnet → mainnet) and future ETH/OKX collections. Updates in v1.1 reflect the latest gameplay, economy, and on-chain decisions; where conflicts exist, **v1.1 supersedes v1.0**. Baseline originated in v1.0.

Scope of change from v1.0

- Formalizes **Ore tiers** and their finishes.
- Locks **Shard tiers** (ERC-721) and finish mapping; introduces **proto-shards (SBT, in-game only)**.
- Establishes **Block 1** combine costs and basic crafting matrix.
- Clarifies **Trait Families** as core (Solar/Quantum/Void/Genesis).
- Sets **fair-play perk caps** and **mutation policy** for Block 1.
- Distinguishes **ERC-721 shards** vs **ERC-1155 parts**.
- Confirms metadata attribute keys and image standards.

0) Phasing (for provenance & metadata)

- **Phase 1 — Awakening** (Testnet), two blocks (Block 1 is the demo scope).
- **Phase 2 — Zeus** (Testnet), two blocks.
- **Phase 3 — TGE** (Mainnet), two blocks.
  Use origin_phase and event_tag attributes to stamp provenance across phases.

1) Ore (gameplay materials)

Tiers & visual identity

- **Dust Ore — Amber (common)** → warm amber tones.
- **Alloy Ore — Titanium/Silver (industrial)** → high reflectance, brushed metal.
- **Crystal Ore — Ion Teal/Blue (scarce)** → crystalline, emissive teal/blue.
- **Relic Ore — Iridescent/Holographic (ancient/event)** → color-shifting,

spectral.

Primary uses

- **Dust**: entry-level forging; fast early progression.
- **Alloy**: crafting **Machine Parts** (Mk I) and shard combining fees.
- **Crystal**: mid-tier shard combines (Rare).
- **Relic**: top-tier (Legendary) + future Relic recipes.

(v1.1 addition; v1.0 introduced materials conceptually but not as a fixed ore ladder.)

2) Shards (ERC-721 on BlockDAG)

Rarity tiers (unchanged labels, clarified usage)

- **Raw → matte amber** finish
- **Refined → brushed titanium/silver**
- **Rare → crystalline prismatic (teal/blue)**
- **Legendary → iridescent/holographic**

Functional axes
Each shard has **two** function lines:
functions.primary and functions.secondary from **{Efficiency, Capacity, Speed, Control}** (primary ≠ secondary).

Families (now core, not "future only")

- **Solar** (efficiency tilt), **Quantum** (mobility/speed tilt), **Void** (control tilt), **Genesis** (commemorative/event).
  Stored as family_tag.

Proto-Shards (SBT, Block 1 only)

- **Raw (proto)** minted **in-game only** (soulbound / non-tradable).
- Used as inputs to forge **Refined** (tradable ERC-721).
  (New in v1.1; v1.0 did not formalize SBT proto stage.)

Block 1 progression & costs (Awakening demo)

- **Forge Proto-Shard (Raw, SBT)**
  - Inputs: **100 Dust or 40 Alloy** (off-chain count).

    - Output: 1× **Raw (proto)**; small milestone boost.

- **Combine → Refined Shard (tradable ERC-721)**
    - Inputs: **3× Raw (proto)** + **50 Alloy** + **0.10 BDAG** mint fee.
    - Output: 1× **Refined Shard** (finish = brushed titanium).
- *(Optional in Block 1)* **Rare Shard (tradable)**
    - Inputs: **3× Refined** + **1 Crystal** + **0.20 BDAG**.
    - Output: 1× **Rare Shard** (finish = crystalline).
- **Legendary Shard** deferred to later block (Relic ore required).

Mutation policy (Block 1)

- Cosmetic mutation chance **5% on Rare+ combines only** (pattern/overlay).
- No stat changes from mutation in Block 1 (fairness).
  (Supersedes v1.0 generic mutation table for Block 1; keep v1.0 values as historical guidance.)

3) Relics (final ETH/OKX collection; future)

Definition
"**Frontier Relics**" are ultimate collectibles bridged/minted on ETH/OKX (not in Block 1).

Indicative gate (documented, not implemented in Block 1)

- Inputs (example): **1× Legendary Shard** + **Full Part Set (Mk II+)** + **Season badge/event medal**.
- Output: **Frontier Relic** NFT (ETH/OKX), strong provenance (origin_phase, event_tag).

4) Machine Parts (ERC-1155 later; account-bound in Block 1)

Vehicles: Miner → Hover Miner → Space Ship (later).
Block 1 scope: **Miner** only; parts are **account-bound** (non-tradable) for demo simplicity.

- **Mk I Part Recipes (starter)**

Slot	Part (Mk I)	Cost	Perk (cap in B1)

Drill	Tungsten Bit Mk I	30 Alloy + 60 Dust	+5% **Efficiency**
Power Core	Ion Cell Mk I	20 Alloy + 50 Dust	+5% **Capacity**
Cooling	Fins Mk I	25 Alloy + 40 Dust	+3% **Speed sustain**
Storage	Cargo Pod Mk I	40 Alloy + 30 Dust	+10% **Capacity cap**

Fair-play caps (Block 1)

- Total active perks ≤ **+25%**; per-axis soft cap **+15%**.

Melting down

- Refund **60% Alloy + 30% Dust** of input materials.

Combining (preview)

- 2× Mk I → **Mk II** (later block); gains **+50% of lower part perk**, consumes both + small Alloy fee.

(v1.1 adds concrete part economics; v1.0 listed trait categories and perk examples conceptually.)

5) Trait structure (consolidated)

Categories *(v1.0, retained)*:

- **Material** (e.g., Ferrite Dust, BDAG Quartz, Ion Crystal) → influences palette/particles.
- **Energy** (Reactor Core, Flux Cell) → glow/animation intensity.
- **Structural** (Alloy Frame, Nano Mesh) → form/durability cues.
- **Cognitive** (AI Imprint, Memory Core) → lore hooks/narrative.

Families *(now core)*: Solar / Quantum / Void / Genesis (see §2).
Functions: Efficiency, Capacity, Speed, Control (2 lines per shard).
Finish by rarity: Raw/Refined/Rare/Legendary → **matte amber / brushed titanium / crystalline (teal) / iridescent**.

6) Metadata schema (NFT JSON)

Required keys

- name, description, image (ipfs://CID/path), attributes (array of { trait_type,

value }).

Attribute keys for shards

- rarity: Raw | Refined | Rare | Legendary
- functions.primary, functions.secondary: from {Efficiency, Capacity, Speed, Control}
- finish: per rarity map above
- family_tag: Solar | Quantum | Void | Genesis
- origin_phase: Awakening | Zeus | TGE
- event_tag: e.g., Launch Week, Canyon Run Cup, Ion Tempest
- display_color: e.g., amber, silver, teal, holo
- *(Optional for combines)* mutation_flag, mutation_note, mutation_proof (hash)
- *(Optional future awards)* award_class, award_source, edition_size, ocw (bucket/value_pct/expires_at)

Image standards

- Shards: **1:1 (2048×2048)** PNG/WebP; visual mapping by rarity/family.
- Parts: 1:1 (2048×2048), 3/4 renders.
- Relics (ETH): 1:1 or **3:4 (1536×2048)** cinematic poster.

(v1.1 fixes attribute keys and adds optional fields consistent with v1.0's NFT integration goal.)

7) Rarity weighting & function rolls

Default function-axis tilt (guidance for generator; adjustable by season)

- **Raw**: Efficiency-weighted (e.g., Eff/Cap/Speed/Control ≈ **60/20/15/5**)
- **Refined**: **40/30/20/10**
- **Rare**: **30/30/25/15**
- **Legendary**: ~even **25/25/25/25**

(Supersedes the generic v1.0 table for function bias while keeping v1.0 rarity/utility intent.)

8) Anti-duplication & provenance (unchanged intent)

- Each NFT stores a **fusion hash** derived from input shard IDs to prevent dupes.
- Verify randomness and fusion via auditable seeds; expose combine history in metadata.

9) Economy & fairness notes (Block 1)

- **On-chain scarcity** is created primarily by **combines** (burning inputs).
- **Perk caps** prevent pay-to-win spikes; **mutations** are cosmetic in Block 1.
- **Ore sinks** (forging, parts, combines) ensure long-term economy health.

10) Open items / gaps to confirm

- **ERC-721 Enumerable vs indexer**: For inventory UX at scale, confirm whether we add Enumerable or rely on a lightweight indexer.
- **Exact BDAG mint fees per tier** (Refined = 0.10 BDAG set; Rare/Legendary later).
- **Relic bridge spec** (ETH/OKX): finalize method (L2 bridge vs custodial mint) and event badge proofs.
- **DAO/award fields**: confirm ocw (off-chain weight) usage and governance link in Phase 2+.
- **Parts tradability**: switch from account-bound to ERC-1155 tradable in later block; confirm royalty rules.

Version stamp

- **Trait Matrix v1.1** — replaces/extends v1.0 where specified; other v1.0 content remains valid background.