

WHITE PAPER · SERIES 01

TapeFoundry

A design house on TapeOut. Eleven arithmetic circuits, built one gate at a time, numbered on chain.

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tapefoundry.xyz · x.com/FoundryTape

Chain: BNB Smart Chain (56)



1. Abstract

Most NFT collections sell an image and assert its scarcity. TapeFoundry sells computation, and lets the chain prove what it cost.

Every card in Series 01 is a real gate-level circuit — an adder, a multiplier, a divider, a comparator — described by a public netlist. To make one, a buyer purchases the exact number of NAND gates the circuit needs, burns them in a tapeout transaction, and stamps an edition number into a registry. The number of gates destroyed is the card's rarity. It is not assigned by us, and it cannot be edited afterwards.

Series 01 is the first of five stages that assemble into a working CPU. This paper describes the mechanism, the supply, what is verifiable, and what holding a card does as the series grows — because a card in a set that is still being assembled is a seat in the build, not only an object.

2. The problem with "limited"

A typical collection says: *10,000 unique pieces, 100 of each trait, rare ones are rare*. None of that is measurable. The supply is whatever the contract says. The rarity is a spreadsheet. The artwork is a file on a server that may or may not resolve in five years.

Three things follow from that:

- **Scarcity is a claim, not an observation.** Buyers have to trust the team's spreadsheet.
- **There is no unit of comparison.** Two collections cannot be compared on "how much is actually in this thing".
- **Nothing is used.** A picture is looked at, then listed.

TapeFoundry starts from the opposite direction: begin with a unit that can be counted, and let the count be the product.

3. The unit: one NAND gate

The primitive is a single NAND gate, represented on chain as an ERC-1155 token. Gates are sold at a fixed price of **0.0000234 BNB per gate** — about \$0.017 at the time of writing. There are 12,000,000 of them in this foundry, which is the factory's capacity, not the card supply.

Circuits are described as netlists: a flat byte string of gates, each specifying an operation and two inputs. A 40-gate shifter is 280 bytes. A 2,118-gate multiplier is 14,826 bytes. The netlist is not a rendering of a circuit; it is the circuit, and it is stored on chain when the card is taped out.

PRICING RULE

Card price = gate count $\times$ 0.0000234 BNB + 0.0001 BNB protocol fee + 0.0002 BNB tapeout fee. Gas is paid to the chain, not to the foundry.

4. How a card is made

1. **Buy the parts.** The buyer mints exactly the gates the drawing needs. Each mint pays the protocol fee once.
2. **Tape out.** The gates are burned and an ERC-721 circuit is minted on the processor, with the netlist written on chain and the gate count fixed forever.
3. **Stamp the edition.** The registry verifies the netlist hash against the registered drawing and issues the next number for that drawing, up to its cap.

These are three separate contracts and three signatures. We could hide them behind a single button only by deploying a router that briefly holds the buyer's funds. We chose not to.

5. Series 01

Eleven drawings, 3,450 numbered cards, 2,886,900 gates in total. Gate counts run from 40 to 2,118.

Drawing	Function	Gates	Cards	Gates burned at cap
MUL12	12×12 multiplier	2,118	50	105,900
ALU16	16-bit ALU, eight operations	1,196	700	837,200
DIV8	8-bit divider	976	700	683,200
MUL8	8×8 multiplier	916	700	641,200
CMP64	64-bit comparator	842	700	589,400
CMP4	4-bit comparator	62	100	6,200
EQ8	8-bit equality	58	100	5,800
SUB4	4-bit subtractor	51	100	5,100
ADD4	4-bit adder	46	100	4,600
MUL2	2×2 multiplier	43	100	4,300
SHIFT4	4-bit shifter	40	100	4,000

At the cap, the set consumes 2,886,900 gates and 3,450 edition numbers. A sold-out Series 01 represents **67.55 BNB** of parts plus **1.04 BNB** of protocol and tapeout fees, spread across every buyer.

6. Scarcity, without a rarity table

There is no assigned tier. A card's scarcity is the number of gates that were destroyed to make it, and the number of editions its drawing allows.

- **Flagship** — 50 cards. The 12×12 multiplier, 2,118 gates each.
- **Main** — 700 cards per drawing. The ALU, the divider, the 8-bit multiplier, the 64-bit comparator.
- **Entry** — 100 cards per drawing. Six small circuits, from 40 to 62 gates.

The caps are numbers in the registry, not promises in a post. When a drawing reaches its cap, the registry refuses to issue another number. The drawing stays public and anyone may tape out a copy, but no further edition numbers will exist.

The difference is easiest to see rather than read. Drawn at one square per gate, at the same scale, the 12×12 multiplier covers fifty-three times the area of the 4-bit shifter — 2,118 squares against 40. That single picture is the whole pricing argument: the same unit, the same rule, fifty-three times the material. It is published at tapefoundry.xyz/compare.

Rarity is not assigned. It is the number of gates that actually burned.

7. One machine, five stages

Series 01 is arithmetic. The full arc is a computer:

Stage	Subject	What it contributes
S01	Arithmetic	Adders, multipliers, dividers, comparators — the parts that compute.
S02	Memory	Registers, counters, register files — the parts that remember.
S03	Control	Decoders, state machines, timing — the parts that decide.
S04	I/O	Shifters, buffers, bus logic — the parts that talk.
S05	The machine	Everything wired into one CPU.

The next stage opens on conditions, not dates:

- **At 30% of Series 01 sold** (1,035 cards) — the Series 02 drawing list goes to a holder vote, one card one vote.
- **At 60% sold** (2,070 cards) — Series 02 opens: memory circuits, same foundry, same rules.
- **At sold out** (3,450 cards) — Series 01 closes for good.

We publish conditions instead of dates because a date we miss is a broken promise, while a condition is a fact anyone can check.

8. What a card is for

A card is a circuit you own, and a position in the build.

Today it holds a netlist, a gate count and an edition number. It runs in a browser, it verifies against the registry, and it trades on two permissionless markets. None of that depends on us being reachable.

As the series grows, holding a card is how a person takes part in what comes next:

- **A vote.** At 30% of Series 01 — 1,035 numbered cards — the Series 02 drawing list goes to holders. One card, one vote. The vote decides which memory circuits get drawn, not the rules, which are fixed.
- **First access.** Every later series opens to Series 01 holders first, for a fixed window, before the public. The window is the same for one card and for fifty: the card buys a seat, not a size.
- **The set.** Eleven drawings make a complete arithmetic unit. A wallet holding all eleven will carry a non-transferable mark read from the chain — a record that this wallet assembled the set.
- **The machine.** Five stages end in a CPU. At that point the set is not a theme but a parts list: 3,450 numbered circuits, each with a public netlist, wired into one machine.

Two properties make this more than a slogan. The rights travel with the card, so selling a card sells the seat with it — the position belongs to the object, not to the first buyer. And every condition above is checkable on chain: the percentage sold, the ballots cast, the eleven drawings a wallet holds.

Both instruments exist today. The ballot is the contract at `0x9cdb507c0c9ef10d8b3f5a6eac0c35501b171038`: a vote is cast by presenting the cards you own, each checked for ownership and epoch, counted once and marked as spent. The set mark is `0x8c4081c73f19a74a7cee543d422937954c120c07`: it verifies one card from each of the eleven drawings and mints a token that cannot be transferred. Neither depends on our frontend to work.

Using a card: one number a day

Every day the site publishes a target. A holder picks one of their cards and the page searches that card's netlist for inputs that produce the target; the submission is signed, and the server re-runs the netlist. If the output matches, the solve is recorded. The referee is the circuit, not the team.

This is where gate counts stop being a price and become a capability. A 40-gate shifter has four output bits and can never produce a number above 15; a 2,118-gate multiplier has twenty-four and can reach 16,777,215. On a 16-bit day, the entry cards are not slow — they are excluded. The ladder widens as the set fills, and it is the same mechanism that will carry Series 02: registers and counters answer a different kind of question, not a different game.

The complete set

One card from each of the eleven drawings is 6,348 gates: one parts purchase, eleven tapeouts, eleven claims, and the non-transferable mark at the end. It is roughly 0.15 BNB at the Series 01 unit price, and it is the only way to hold a complete arithmetic unit — every operation a CPU performs on data, each one a numbered circuit whose netlist is public.

WHAT WE COMMIT TO

Conditions published before they are reached. Every number on chain. The next stage opens only when the current one is real. If something slips, it is said in public rather than quietly rescheduled.

A card is a circuit and a seat in a build. What comes after the cards is decided after the cards exist — with the holders who are here when it does.

9. What can be verified, and how

Nothing in this paper needs to be taken on trust. Each claim maps to a contract read:

Claim	How to check
The card's netlist is real	Read <code>netlist(id)</code> from the processor and hash it in a browser. The verify page does exactly this.
The card came from this foundry	The processor address is part of the check. A copy on another processor fails it.
It burned N gates	<code>circuitInfo(id).gates</code> , fixed at tapeout.
Its edition is n of cap	<code>editionOf(cpu, id)</code> on the registry.
The cap cannot be raised	The registry's per-drawing maximum is enforced on claim.
The price per gate is fixed	<code>mintPrice()</code> on the parts contract.

10. Market and liquidity

Two doors, both open without our permission:

- **TapeOut's own circuit market.** Approve, then list. The protocol takes 1% of the sale. Buyers there are already inside TapeOut.
- **Wrapping for other marketplaces.** A raw circuit has no metadata, so external marketplaces show a blank card. Wrapping locks the original and mints a TFD token carrying the drawing, gate count and edition on chain. Unwrapping is always available, for gas only.

A secondary sale pays a 5% royalty configured on the wrapper. The edition number travels with the circuit, not the wallet: sell it ten times and it is still the same number.

11. What this is not

- **Not a presale.** No whitelist, no allocation, no insider round. Cards are taped out and numbered on chain before anything else happens.
- **Not a picture of a circuit.** The gates are real and were burned.

12. Contracts

Processor #1400	0x5a4eaff589c9e410260a61d658a893876710ba83
Parts (ERC-1155)	0x9039e4cd6ceba37522382eb1ad8076ba38c975dc
Edition registry	0xb69215ce68792eca5672b49196868369555ea181
Wrapper (TFD, ERC-721)	0xB4A7B988B77Bd7b29E56F42229464a8dD72361bF
Protocol market	0x6feEbbEbC07BcB90bd1Ac8b0CF9BaA4f0fF2B46f
Series vote	0x9cdb507c0c9ef10d8b3f5a6eac0c35501b171038
Set mark (soulbound)	0x8c4081c73f19a74a7cee543d422937954c120c07

13. Questions

Why three transactions?

Three different contracts: buy the gates, burn them to tape out the circuit, stamp the edition. One button would require a router holding your funds.

What does a card cost?

Gates $\times$ 0.0000234 BNB, plus 0.0001 protocol and 0.0002 tapeout fees. A 40-gate card is 0.001236 BNB; a 2,118-gate card is 0.049861 BNB.

My card says #7 but the edition is 6/100.

Both are right. #7 is the token id on the wrapper, a global counter. 6/100 is the edition inside its own drawing. Token ids run globally; editions run per drawing.

What do I get for holding a card?

A circuit you own, a vote on the Series 02 drawing list at 30% sold, first access to the next series, and a non-transferable mark for the wallet that holds all eleven drawings. The vote (0x9cdb507c0c9ef10d8b3f5a6eac0c35501b171038) and the mark (0x8c4081c73f19a74a7cee543d422937954c120c07) are deployed; section 8 sets out each one.

Why is the multiplier 53 times the shifter?

Because it is 53 times the gates. One unit price, one rule, 2,118 squares against 40 — drawn at the same scale at tapefoundry.xyz/compare.

Can the foundry issue more?

The per-gate price and the supply cap were fixed when the foundry opened. The registry enforces edition caps. We cannot edit either.

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TapeFoundry · a design house on TapeOut.