VERSION 1

BBN BTC / S&P 500 BENCHMARK

PUBLIC METHODOLOGY

VERSION 1 · INAUGURAL RELEASE

A weekly relative-performance series that measures Bitcoin against the broad U.S. large-cap equity market. The headline is a rebased ratio of a Bitcoin price index over the S&P 500 Total Return Index (Gross), anchored to a fixed base date. It shows whether Bitcoin is gaining or losing strength against the mainstream U.S. equity-risk benchmark — rather than only against technology or growth-stock proxies. Both legs are USD-denominated, and the equity leg includes reinvested dividends gross of withholding tax, the U.S. domestic standard for equity total-return measurement.

< 100	100	> 100
BTC UNDERPERFORMS	BASE ANCHOR	BTC OUTPERFORMS

BENCHMARK FAMILY	BBN Benchmarks · Bitcoin Macro Benchmarks
BENCHMARK NAME	BBN BTC / S&P 500 Benchmark
PRIMARY OBJECTIVE	Measure Bitcoin's relative performance versus the broad U.S. large-cap equity market
UPDATE FREQUENCY	Weekly — one end-of-week observation
HEADLINE UNIT	Base-100 BTC-to-S&P 500 Total Return rebased ratio
HEADLINE BOUNDS	Unbounded above; bounded below by zero (the index level is structurally positive)
BASE DATE / VALUE	Tuesday, 2 January 2018 · headline = 100.00
S&P 500 REFERENCE	S&P 500 Total Return Index (Gross), USD · Bloomberg SPXT
ADMINISTRATOR	S&P Dow Jones Indices LLC
MATERIAL REVISION	0.5 index points (headline)
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HOW TO READ IT — AND WHAT 100 MEANS

A headline above 100 means Bitcoin has outperformed broad U.S. large-cap equities since the base date; below 100 means U.S. equities have outpaced Bitcoin. Unlike a BBN diffusion index, scored around a 50 mid-point, the 100 here is not a neutral or trailing-norm level — it is a fixed anchor set on 2 January 2018. A headline of exactly 100 would mean Bitcoin and the S&P 500 Total Return Index have moved by identical proportional amounts since that date. Dividing the headline by 100 gives the cumulative outperformance ratio directly.

POSITIONING

This is the U.S. large-cap equity-risk signal in the BBN Bitcoin Macro Benchmarks family. It complements BBN BTC / Emerging Markets (the global higher-beta equity-risk counterpart) alongside the wider macro-pair family — BTC / Gold, BTC / Copper, BTC / Industrial Metals, BTC / Agriculture, BTC / Energy and BTC / 10Y Yield. BBN Benchmarks are proprietary directional indicators for editorial, research and commercial data use. They are not IOSCO-aligned regulated financial benchmarks, not tradable instruments, not investable indices, and not investment recommendations.

01 WHAT THE BENCHMARK MEASURES

The benchmark answers a specific cross-asset question: is Bitcoin gaining or losing strength versus broad U.S. large-cap equity risk, measured from a fixed historical anchor? Bitcoin is often set against technology indices (Nasdaq 100, growth proxies), but the S&P 500 is a wider reference — a diversified large-cap benchmark across many industries, better suited to measuring Bitcoin against mainstream equity-market risk rather than only high-growth or technology exposure. Within the family, BTC / S&P 500 captures developed-market U.S. equity risk, while BTC / Emerging Markets captures global higher-beta non-U.S. equity risk.

ELEMENT	WHAT IS MEASURED
BTC leg	U.S. dollar price of Bitcoin from the CME CF Bitcoin Reference Rate (BRR), an institutional-quality reference price.
S&P 500 leg	Level of the S&P 500 Total Return Index (Gross), Bloomberg ticker SPXT — broad U.S. large-cap performance including reinvested dividends.
Headline	BTC price index ÷ SPXT level index — both rebased to 100 on 2 January 2018 — then multiplied by 100.
Weekly change	Week-on-week percentage change in the headline; a momentum and outlier-review diagnostic.
S&P 500 units per BTC	BTC price ÷ SPXT level, published for scale only. A constant multiple of the headline that cannot disagree with it directionally.

WHY TOTAL RETURN (GROSS), NOT PRICE RETURN OR NET

The benchmark uses the Total Return (Gross) variant rather than the price-only index (SPX) or the Net Total Return variant (SP5N). A price-return index excludes dividends — a difference accumulating to roughly 10–13 percentage points since 2018 — and because Bitcoin pays none, comparing it to a price-return index would understate equity performance and bias the headline upward on the BTC side. The Gross variant rather than Net is correct for a U.S. domestic index because U.S. domestic investors are not subject to withholding tax on U.S. equity dividends. This is a lighter asymmetry than BBN BTC / Emerging Markets, which uses MSCI EM Net Total Return because foreign-investor withholding is the relevant perspective for an international index.

02 S&P 500 LEG AND DATA SOURCES

The benchmark uses one named S&P 500 variant. There is no substitution within the headline series, and alternative variants and indices are explicitly excluded.

INDEX NAME	S&P 500 Total Return Index (Gross), USD.
IDENTIFIERS	Bloomberg SPXT (alt. SPTR) · Refinitiv .SPXT.
ADMINISTRATOR	S&P Dow Jones Indices LLC.
INDEX TYPE	Gross Total Return — includes reinvested dividends gross of withholding tax; the U.S. domestic standard.
COVERAGE	500 leading U.S. companies selected by the S&P U.S. Index Committee, ~80% of available U.S. market capitalisation.
WEIGHTING	Float-adjusted market-capitalisation weighted.
RECONSTITUTION	Quarterly rebalancing; constituent additions and deletions reflected automatically in the index level.
ROLL REQUIREMENT	None. The S&P 500 is a cash equity index — no back-adjustment, roll cycle or splicing.

Excluded from the headline under all circumstances: the price index (SPX, which omits dividends and creates the bias above), the Net Total Return index (SP5N, a foreign-investor perspective), the Nasdaq 100 and Composite (tech-heavy), the Russell 1000 and 2000 (different methodology and coverage), the Dow Jones Industrial Average (price-weighted, 30 constituents), and equal-weight or sector slices. ETF NAVs and closes (SPY, IVV, VOO) are never used, since they embed tracking error, premium/discount and fund-flow effects; they may appear in a release note only as a secondary visual cross-check.

DATA SOURCES AND SOURCE-TIER HIERARCHY

Source choices are fixed; any substitution is a documented methodology change. The BTC leg uses the CME CF BRR at the 16:00 London fix as primary — identical to the other Bitcoin Macro Benchmarks — with the New York variant BRRNY as the first fallback and a Bloomberg Bitcoin index (BBNYBTC or BGCI) as the second; any switch is logged in the release note. The S&P 500 leg uses the S&P Dow Jones Indices distribution of the SPXT level, sourced via Bloomberg or Refinitiv, with the parallel provider as the fallback if the primary distribution is delayed. The excluded variants and ETF proxies above are never eligible.

03 OBSERVATION RULE AND CALENDAR

Bitcoin trades continuously while the S&P 500 follows the U.S. equity-market calendar with a single daily close, so the benchmark fixes a common weekly observation with an explicit timestamp for each leg.

OBSERVATION DAY	Friday.

BTC TIMESTAMP	CME CF BRR fix, 16:00 London time.
S&P 500 TIMESTAMP	NYSE/Nasdaq close at 16:00 Eastern Time; SPXT end-of-day level published by S&P DJI shortly after.
ALIGNMENT	Both legs are taken on the same calendar Friday. The 16:00 ET close lags the 16:00 London fix by about five hours (four during U.S. daylight saving), but both reflect the same Friday business day. Both legs are USD-denominated; no FX conversion is applied.

If the S&P 500 is unavailable on Friday (U.S. holiday or publication delay), the nearest prior valid SPXT close is used and the BTC observation is moved back to the same date so both legs share an observation date. If Bitcoin is unavailable, BRRNY is used for the same Friday; if both BTC sources fail, the observation moves to the nearest prior Friday with a valid BTC value and the S&P leg is aligned to it. If both legs are unavailable, the week is deferred and no headline is published; the next valid Friday resumes the series, with no back-fill. A forward-fill of either leg beyond five calendar days is not permitted; past that point the week is treated as missing.

04 CALCULATION METHODOLOGY

The headline is built in deterministic steps from the weekly observation pair. Values are held to four decimals internally and reported to two.

STEP 1 — BTC PRICE INDEX

$$\mathrm{BTCIndex}(t) = 100 \times \mathrm{BRR}(t) \div \mathrm{BRR}(\mathrm{base})$$

STEP 2 — S&P 500 TOTAL-RETURN INDEX REBASED

$$\mathrm{SPXTIndex}(t) = 100 \times \mathrm{SPXT}(t) \div \mathrm{SPXT}(\mathrm{base})$$

STEP 3 — HEADLINE

$$\begin{aligned}\mathrm{BBN\ BTC/SP500}(t) &= 100 \times \mathrm{BTCIndex}(t) \div \mathrm{SPXTIndex}(t)\\ &= 100 \times [\, \mathrm{BRR}(t) \div \mathrm{BRR}(\mathrm{base})\,] \div [\, \mathrm{SPXT}(t) \div \mathrm{SPXT}(\mathrm{base})\,]\end{aligned}$$

Equals 100 on the base date; bounded below by zero, unbounded above.

STEP 4 — WEEKLY HEADLINE CHANGE

$$\text{WeeklyChange}(t) = [\ \text{BBN BTC/SP500}(t) \div \text{BBN BTC/SP500}(t-1\ \text{week}) - 1\ ] \times 100\%$$

AUXILIARY DIAGNOSTIC — S&P 500 INDEX UNITS PER BTC

$$\text{SP500UnitsPerBTC}(t) = \text{BRR}(t) \div \text{SPXT}(t)$$

PUBLICATION LAYERS

Every weekly release falls into exactly one layer. Full publication requires the BTC leg from tier-1 BRR and the S&P leg from the tier-1 S&P DJI distribution, with no fallback and a forward-fill of at most one day; it carries the headline, the weekly change, the units-per-BTC diagnostic and a release note. Provisional applies when either leg uses a tier-2 fallback (BRRNY or Bloomberg for BTC, the parallel distribution for SPXT) or is forward-filled by two to five days; the same outputs are published with a "Provisional" label and a deviation note, and may be revised when the primary source returns. No publication applies when either leg is unavailable beyond the five-day limit or a verified source error is unreconciled; a short coverage note is issued and the next valid Friday resumes the series, with no back-fill.

05 WORKED EXAMPLE

A hypothetical Friday observation illustrates the full chain.

INPUT	VALUE	SOURCE
Observation date	**Fri 14 Jun 2024**	Standard weekly Friday (illustrative)
BRR(t)	**$66,250.00**	CME CF BRR, 16:00 London
BRR(base)	**$13,412.44**	2 January 2018 anchor
SPXT(t)	**12,180.00**	S&P 500 TR (SPXT) close, 14 Jun 2024
SPXT(base)	**5,348.66**	2 January 2018 SPXT close

STEP 1 — BTC INDEX

$$100 \times 66{,}250.00 \div 13{,}412.44 = 493.94$$

STEP 2 — S&P 500 TR INDEX REBASED

$$100 \times 12{,}180.00 \div 5{,}348.66 = 227.72$$

DIAGNOSTIC — S&P 500 INDEX UNITS PER BTC

$$66{,}250.00 \div 12{,}180.00 = 5.44$$

HEADLINE

$$100 \times 493.94 \div 227.72 = 216.91$$

A reading of 216.91 means that since the anchor Bitcoin has appreciated by about 4.94× while the S&P 500 Total Return Index has appreciated by about 2.28× (roughly a 128% total return over six and a half years, including reinvested dividends), so Bitcoin has outperformed broad U.S. large-cap equities by about 2.17× — the headline divided by 100 expresses that ratio. This places the benchmark in the "Moderate BTC outperformance versus U.S. large-cap equities" band, and the diagnostic shows that one Bitcoin currently represents about 5.44 index units of the SPXT benchmark.

06 INTERPRETATION FRAMEWORK

The benchmark does not claim Bitcoin is outperforming the real U.S. economy; it says Bitcoin is gaining or losing strength relative to broad U.S. large-cap equity total return since the base date. A rising headline means BTC is strengthening against broad equity risk; a falling headline means equity risk is leading BTC. Reading the two legs together distinguishes a strong risk-on move lifting both higher-beta legs, a rotation out of BTC into equities (or BTC-specific weakness against a benign backdrop), digital-asset strength against a weakening equity complex (a possible decoupling), or a broad risk-off in which BTC draws no defensive flow.

> **BTC-DOMINANT VOLATILITY**
>
> Bitcoin runs at roughly 60–80% annualised volatility against the S&P 500's 15–20%, so almost all weekly headline variance is driven by the BTC leg. A 5% weekly move is far more likely to be a Bitcoin move than an equity move; the underlying BTC and SPXT levels published with each release show which leg drove a given week.

HEADLINE BANDS

The bands partition the full positive range with no gaps or overlaps: each runs from its lower figure up to — but not including — the next. They are deliberately asymmetric around 100 because Bitcoin's volatility is roughly three to four times the S&P 500's; over multi-year horizons the headline drifts upward whenever BTC appreciates meaningfully, even while equities compound at a typical 9–11% annualised total return, so the upper bands widen geometrically.

HEADLINE	BAND	MEANING
≥ 500.0	**Severe BTC outperformance**	BTC has appreciated dramatically more than the S&P 500 TR since the base.

HEADLINE	BAND	MEANING
250.0 – <500.0	**Strong BTC outperformance**	Pronounced BTC strength relative to the S&P 500 TR.
150.0 – <250.0	**Moderate BTC outperformance**	BTC has clearly outpaced the S&P 500 TR.
>100.0 – <150.0	**Slight BTC outperformance**	BTC has marginally outperformed the S&P 500 TR.
100.0	**On the base-date anchor**	Identical proportional moves since the base.
75.0 – <100.0	**Slight BTC underperformance**	The S&P 500 TR has compounded slightly faster than BTC has risen.
40.0 – <75.0	**Moderate BTC underperformance**	The S&P 500 TR has materially outpaced BTC.
20.0 – <40.0	**Strong BTC underperformance**	Pronounced relative weakness of BTC versus the S&P 500 TR.
< 20.0	**Severe BTC underperformance**	BTC has lost dramatically relative to the S&P 500 TR.

07 STRUCTURAL FEATURES AND LIMITATIONS

The S&P 500 carries structural features that the headline mechanically reflects but that readers should not treat as a Bitcoin signal; the benchmark discloses rather than adjusts for them.

- *Mega-cap technology concentration.* As of 2024 roughly 30–35% of index weight sits in the top seven mega-cap stocks (the "Magnificent Seven"). The index is no longer "broad" in the 2018 sense, and that concentration influences headline moves.
- *AI-narrative sector tilt.* Post-2022 returns have been disproportionately driven by AI-related stocks, shifting the index from a broad-economy proxy toward a partial bet on the artificial-intelligence cycle.
- *Federal Reserve policy sensitivity.* Equity multiples compress in rate-hike cycles and expand in rate-cut cycles; headline moves during clear Fed regimes reflect this transmission rather than BTC-versus-equity fundamentals.
- *Reconstitution mechanical effects.* Constituent changes pass through automatically — for example Tesla's December 2020 inclusion (the largest single addition at the time) and ongoing Magnificent-Seven weight accumulation.
- *Drivers absent from BTC.* Equity returns reflect earnings growth, buybacks, dividends and forward-growth expectations — fundamental drivers entirely absent on the Bitcoin side, so the two respond to different forces even when they co-move.
- *Regime non-stationarity.* The empirical BTC–equity correlation has shifted across periods — near zero in 2017–2021, strongly positive in 2022–2023 as BTC traded as a long-duration risk asset, mixed from 2024. The benchmark measures the rebased ratio at every point and does not assume the relationship is constant.
- *No FX confound.* Both legs are quoted natively in U.S. dollars, so there is no embedded currency exposure on the equity leg — unlike BBN BTC / Emerging Markets.

Beyond these, the benchmark relies on a single equity index (single-source resilience risk applies, and it is not interchangeable with the Russell or total-market indices); it is a directional indicator, not a tradable spread, since the SPXT is not directly investable; its level is mechanically dependent on the fixed, disclosed base date; and the weekly cadence captures intraweek events — FOMC, earnings, U.S. data — only at the next Friday.

08 QUALITY CONTROL AND GOVERNANCE

QUALITY CONTROLS AND OUTLIER HANDLING

On every publication the SPXT level is cross-checked between Bloomberg and Refinitiv, with a discrepancy beyond 0.10% triggering manual review; the S&P series is validated as Total Return Gross (not SPX, not SP5N); constituent-change announcements from the S&P U.S. Index Committee are logged with their effective dates and any mechanical level effects; and the single-Friday alignment, USD denomination and series continuity (missing weeks, duplicates, consistent base date) are confirmed, with each release appended to an immutable archive. A weekly headline change of 12% or more, or a single-leg daily change of 8% or more, forces re-verification against tier-2 sources before publication — a single-day S&P move beyond 8% is historically very rare and is checked against direct S&P DJI publication. For stale prices, two consecutive unchanged SPXT closes are flagged, three trigger manual review against the S&P DJI direct feed, and five exclude the leg for that week, after which the substitution chain applies. Any forward-fill is logged with its exact day count and the five-day limit is enforced automatically.

REVISIONS AND VERSIONING

A material revision is a change of 0.5 index points or more to a published headline, or any methodology change that would have produced such a difference; smaller corrections are archived without public notice. Revisions are triggered by republished SPXT or BRR data, a variant error (Price versus Gross versus Net), a calendar-alignment error, a stale-data violation, or an undisclosed source-tier fallback. This is the inaugural publication, Version 1. Any change to the base date, the primary BTC source, the S&P 500 variant, or a substitution of a different broad equity benchmark is a material methodology change, carrying at least 30 calendar days' public notice, a parallel-published transition of at least four weeks, a versioned changelog entry and a new version number. Non-substantive editorial edits are made without notice but recorded in the archive.

SCOPE AND LEGAL NOTE

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