**Subnet Growth Model**

Proposal for a Standardized Subnet Valuation Methodology

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## Introduction

One of the significant challenges to institutional investor participation in Bittensor subnets is valuation: how can we reliably value subnets given nonexistent financial accounting and reporting standards? The blockchain mechanism that powers the Bittensor network is public and transparent, yet there is no information standard for subnet ownership teams that facilitates 1) complete and 2) accurate investment analysis for prospective alpha token holders.

The goal of this paper is twofold:

1) To present for comment a simple but reliable subnet valuation methodology that can be used by both institutional and retail investors alike, and
2) To encourage subnet ownership teams to present *reliable, audited financials* that can be used to carry out the methodology outlined below,

both of which will inspire further confidence in subnet investing at scale.

## Proposed Methods

*Method One: Emissions*

One proposed valuation methodology involves valuing subnets according to emissions. For example (figures are arbitrary and for illustrative purposes only):

- Subnet XX (snXX) is currently valued at 0.02 TAO per alpha token
- Assume TAO currently trades at $500/token
- snXX's emission schedule dictates 1mm alpha tokens emitted over the course of the next year
- Total "free cash flow" (dividends by emission) should be 0.02 x 500 x 1mm = $10mm per year
- This total emission figure would then be divided by [alpha tokens outstanding] to determine a "per alpha" token valuation.

However, this approach has several flaws. First, the math is circular as we are using current token value (as dictated by market pricing) to determine fundamental value. In other words, this approach uses current token value to justify a fundamental value, which is a circular exercise that only justifies a reversion to prior historical market prices (e.g. alpha tokens trading higher to historical prices will appear overbought, and alphas trading lower to historical prices will appear oversold, without any fundamental justification).

Second, this approach assumes that emissions will continue into perpetuity at the current rate, and third, there is no "discount rate" that can be used to compare an alpha token's required rate of return to that of another investment. This results in an unreliable valuation that lacks robust mathematical grounding and adds little insight beyond reversion to mean market prices. Accordingly, we reject Method One as a reliable means of estimating subnet value.

*Method Two: Comparables*

The second valuation methodology to be considered is a comparables analysis. A new or existing subnet can be compared to existing companies based on a multiple of sales or Free Cash Flow (FCF).

For example: if subnet xx specializes in inference and the market knows of an inference startup with a similar use case, business model and TAM that trades at a multiple of 10x projected (NTM) sales, we can calculate a proposed value for the enterprise value of the subnet.

For example:

- A comparable privately-owned startup has raised equity at a valuation of 10x sales
- snXX has projected sales of $100k
- snXX should, in theory, trade at an enterprise value of 10x sales
- Assuming snXX has no debt or external equity agreements that reduce alpha token value (e.g. revenue commitments to outside ownership parties), snXX should trade have a market capitalization equivalent to ~10x sales

New subnets should trade in line with comparable, privately-held startups. Similarly, ss the subnet ecosystem evolves, mature startups should trade in line with comparable, publicly-held startups (for the example above, we would search for a publicly-traded company with a significant portion of revenue derived from inference).

As was the case with Method One, Method Two has limitations. Subnets are unique and many have extremely specific (niche) use-cases. Finding suitable comparables for subnets is challenging due to their specific and novel use cases. Accordingly, we also reject Method Two as a reliable means of estimating subnet value.

*Method Three: The Subnet Growth Model*

Given the concerns highlighted above, this paper proposes the use of a modified Gordon Growth Model (GGM) for Bittensor subnet valuation based on a subnet's anticipated Free Cash Flow to the Firm (FCFF). The single-stage Gordon Growth Model (GGM) can be expressed as:

$$V = \frac{\mathrm{FCFF}_0 \cdot (1 + g)}{\mathrm{WACC} - g}$$

where:

- V = Enterprise value of a firm
- $FCFF_0$ is the FCFF (free cash flow to the firm) for the most recent time period (typically expressed yearly)
- WACC is the weighted average cost of capital, reflecting the cost of equity and debt financing for the firm
- g is the perpetual growth rate of free cash flow to the firm (FCFF), assumed to be constant

If we assume subnets a firm has zero debt outstanding, the single-stage GGM reduces to:

$$V = \frac{\mathrm{FCFF}_0 \cdot (1+g)}{r-g}$$

- $FCFF_0$ is the FCFF (free cash flow to the firm) for the most recent time period (typically expressed yearly)
- r is the discount rate, which will include a unique set of inputs based on a given subnet's unique design
- g: Perpetual growth rate of FCFF, assumed to be constant and necessarily lower than r

A multi-stage GGM can also be generated that reduces to:

$$V = \sum_{t=1}^{n} \frac{\mathrm{FCFF}_t}{(1+r)^t} + \frac{\mathrm{FCFF}_{n+1}}{r-g} \cdot \frac{1}{(1+r)^n}$$

Where $FCFF_{n+1}$ is a terminal value that can be reasonably substantiated with a constant growth rate and WACC (for our purposes, r as outlined above).

**Proposing the Subnet Growth Model (SGM):**

For valuation of Bittensor subnets using the single-stage GGM outlined above, we use the following formula:

$$V = \frac{\mathrm{FCFA}_0 \cdot (1+g)}{r-g}$$

We require the following inputs to compute V, which is the implied market capitalization of a subnet alpha token:

- $FCFA_0$ (free cash flow to alpha): Requires estimation of the most recent 12-month trailing FCFE, and the assumption that all cash flows accrue to alpha investors, as outlined above. Alternatively, the entire term $FCFA_0$ * (1+g) can be represented by the expected FCFA over the next 12 months (NTM). For the time being, this can be deduced simplistically by subtracting expenses from revenue and stripping out any special considerations, as noted in the example below.

  Please note that the model excludes yield-based income (e.g., emissions) from revenue, as this is reflected in the discount rate applied (r). See note under "Objections" below.

- g: This is the anticipated yearly growth rate for FCFA. This figure can be derived from industry comparables and/or TAM for a subnet's specific product and use-case.
- r: For the GGM, r is typically defined as the cost of equity, or the rate of return required by equity investors. For the SGM, we use the well-known Capital Asset Pricing Model (CAMP) and add a subnet-specific risk premium to define r as:

$$r = r_f + \beta(r_m - r_f) + \text{SSRP}$$

Where:

- $r_f$ is the risk-free rate (~4.2% based on 10-year U.S. Treasury yield as of Sep 2025)
- $\beta$ is a subnet's estimated price volatility relative to the crypto/AI market (e.g. 1.5-3)
- $(r_m - r_f)$ is the crypto market risk premium (e.g. 10–15%)
- Subnet-Specific Risk Premium (SSRP) accounts for subjective risks unique to a particular subnet such as competition, validator support, or deregistration (e.g. 5–15%)

As an example, when $r_f = 4.5\%$, $\beta = 2$, $r_m = 20\%$ and SSRP = 10%, r = 0.045 + 2*(0.2 - 0.045) + 0.1 = 0.455 or 45.5%, which is relatively consistent with required rates of return for venture capital investments

To facilitate institutional investment into subnets, subnet ownership teams should provide 1) accurate (audited) 2) standardized FCFA figures. Investors will be responsible to furnish their own estimates for both r and g, which is the "art behind the science" for this method of fundamental analysis.

**Single-Stage SGM Case Study:**

For a subnet with $10mm in expected revenue and $2.5mm in expenses over the next 12 months, $FCFA_1$ would be:

$10mm - $2.5mm = $7.5mm total

Assuming a discount rate (r) of 50% and a growth rate (g) of 15%:

total alpha token value (market cap) = $7.5mm / (0.5-0.15) = $21.4mm

Assuming 1mm alpha tokens in circulation, the fundamentally justified alpha token value would be:

$21.4mm / 1 million = $21.43 per alpha token

Assuming a TAO token price of $500, this alpha token value would be equivalent to:

$21.43/500 = 0.0429 alpha per TAO.

If r drops to 25% to reflect lower perceived risk for that subnet, the justified alpha market cap would increase dramatically to:

$7.5mm / (0.25-0.15) = $75mm (a ~3x increase versus above with r=50%)

If r remains at 50% but g drops to 5% to reflect lower growth expectations, the token alpha value would decrease to:

$7.5mm / (0.5-0.05) = $16.7mm

Both of these scenarios highlight the sensitivity of the formula outputs to inputs chosen by the investor for both r and g.

Note that adjustments should also be made to [alpha tokens outstanding] for buybacks announced (or projected to be announced) by subnet management teams.

**Multi-Stage SGM**

Finally, given that growth occurs in stages (and cash flow may be negative for several initial years from subnet launch), I propose using a multi-stage SGM:

$$V = \sum_{t=1}^{n} \frac{\mathrm{FCFA}_t}{(1+r)^t} + \frac{\mathrm{FCFA}_{n+1}}{r-g} \cdot \frac{1}{(1+r)^n}$$

where

- V is the current market capitalization of a subnet alpha token
- $FCFA_t$ is the yearly cash flow produced by the subnet for year 1 through year n
- $FCFA_{n+1}$ is the cash flow from year n multiplied by the growth rate or $FCFA_n$ * (1+g)
- g is the assumed growth rate of subnet cash flows from year n+1 into perpetuity
- r is the investor's required rate of return (discount rate) applied to all cash flows and the terminal value, calculated as outlined above in the single-stage SGM

- note: r > g is required as noted in *limitations* below

**Multi-Stage SGM Case Study**

*cash flow and expense estimates obtained from Ken Miyachi at BitMindLabs for subnet 34 as of July 2025*

Revenue and Expense figures entered by subnet management team:

| Year | Revenue | Expenses | FCFA (rev – exp) |
|---|---|---|---|
| 2025 | $300,000 | $900,000 | ($600,000) |
| 2026 | $1,500,000 | $1,125,000 | $375,000 |
| 2027 | $6,000,000 | $1,406,000 | $4,594,000 |
| 2028 | $9,000,000 | $1,758,000 | $7,242,000 |
| 2029 | $13,500,000 | $2,197,000 | $11,303,000 |
| 2030 | $20,250,000 | $2,746,000 | $17,504,000 |

Assuming a discount rate of r=50% and a growth rate of g=15%:

Present value (PV) of $FCFA_0$ = ($600,000)
PV of $FCFA_1$ = $375,000 / (1+0.50)^1 = $250,000
PV of $FCFA_2$ = $4,594,000 / (1+0.50)^2 = $2,041,778
PV of $FCFA_3$ = $7,242,000 / (1+0.50)^3 = $2,145,778
PV of $FCFA_4$ = $11,303,000 / (1+0.50)^4 = $2,232,691
PV of $FCFA_5$ = $17,504,000 / (1+0.50)^5 = $2,305,053

Total PV for cash flows through year 5 (Stage One value) = $8,375,300

Next, we calculate the subnet's terminal value, where:

$FCFA_{n+1}$ = $17,504,000 * (1+0.15) = $20,129,600
$FCFA_{n+1}$ / (r-g) = $57,513,143

and the present value of the terminal value (the Stage Two value) is:

$FCFA_{n+1}$ / (r-g) = Stage Two value = $7,573,747

Finally, we add the Stage One and Stage Two values for a total implied alpha market cap of:

$8,375,300 + $7,573,747 = $15,949,047

Assuming there are currently 2.5mm alpha tokens outstanding, we can calculate an implied alpha price of:

$15,494,047 PV of cash flows / 2.5mm alpha outstanding = $6.38 per alpha

A TAO price of $300 would imply an alpha/TAO price of:

$6.38 / $300 = 0.021

which implies BitMind is slightly undervalued at a current trading price of .019 per TAO (as of 9/25/25).

Note that if an investor's required rate of return (r) drops to 40% in this example with all else remaining equal, the implied alpha price increases to 0.034 alpha/TAO or $10.33 per alpha.

**Objections/Assumptions/Limitations with the SGM**

*Objections:*

Note the omission of several components from the SGM:

1) yield earned on subnet (alpha tokens) as a numerator (income) input
2) dilution from additional alpha tokens emitted and accretion from alpha tokens burned as a denominator input and/or additive component of r

This is the strength of the SGM vs. the emission-revenue approach noted above as Method One. Here any yield (subnet alpha APY) is offset by dilution. Yield received in alpha tokens is not considered accretive, consistent with treatment of stock dividends. As noted above, anticipated alpha token buybacks should be accounted for in the [alpha tokens outstanding] count utilized during the final stage of analysis.

*Assumptions:*

All value accrues to alpha token holders. This methodology assumes no equity partners are owed compensation for ownership outside of alpha token ownership (e.g. no parallel equity agreements for a portion of revenue and/or cash flows that dilute alpha holders).

*Limitations:*

r must exceed g. Consistent with historical limitations of the Gordon Growth Model (GGM), as g approaches r, valuations become less reliable: e,g, an r of 25% and a g of 20% will yield a denominator value that produces an artificially high market capitalization. As r and g converge, model outputs become increasingly unreliable.

This model also relies on cash flow for value generation. Some subnets will be penalized by this model if they are just launching. The SGM is not meant to serve as one-size-fits-all model, but rather one tool of many for subnet investors. It should be noted that, as in the sn34 example above, the multi-stage SGM model can account for one (or several) initial period(s) of negative cash flow, followed by a terminal value that reflects positive cash flow. The SGM necessarily assumes that goal of every subnet owner should be cash flow generation.

**Proposed Implementation**

There are two ways the SGM can be implemented:

1) Using FCFA estimates from subnet ownership teams, individual investors supply estimates of r and g to produce an implied fundamental price (market cap and value per alpha token, as done in our multi-stage example above). This requires an estimation of r which is more 1) subjective and 2) mathematically complex, but the output will be more intuitive to equity investors who are used to seeing price targets in dollar terms as opposed to yield terms as in [implementation 2] below.

2) Using FCFA estimates from subnet ownership teams and a common g (both treated as a "fixed" or independent variables), and current market capitalization for a subnet's alpha token as reported on sources such as taostats.io or tao.app, the SGM is implemented to calculate an implied r, similar to the implied yield on a fixed income security.

   Investment decisions can be made based on the extrapolated value of r: all other considerations being equal, investors should want to invest in subnets with a *higher* implied r for a subnet's stream of cash flows. This implementation can be used to compare the potential profitability of multiple subnets. The strength of this implementation is that it can be automated: as assumptions for FCFA and g are held constant, implied r will adjust real-time with a live market feed of the alpha token's market capitalization.

Questions/Comments:
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