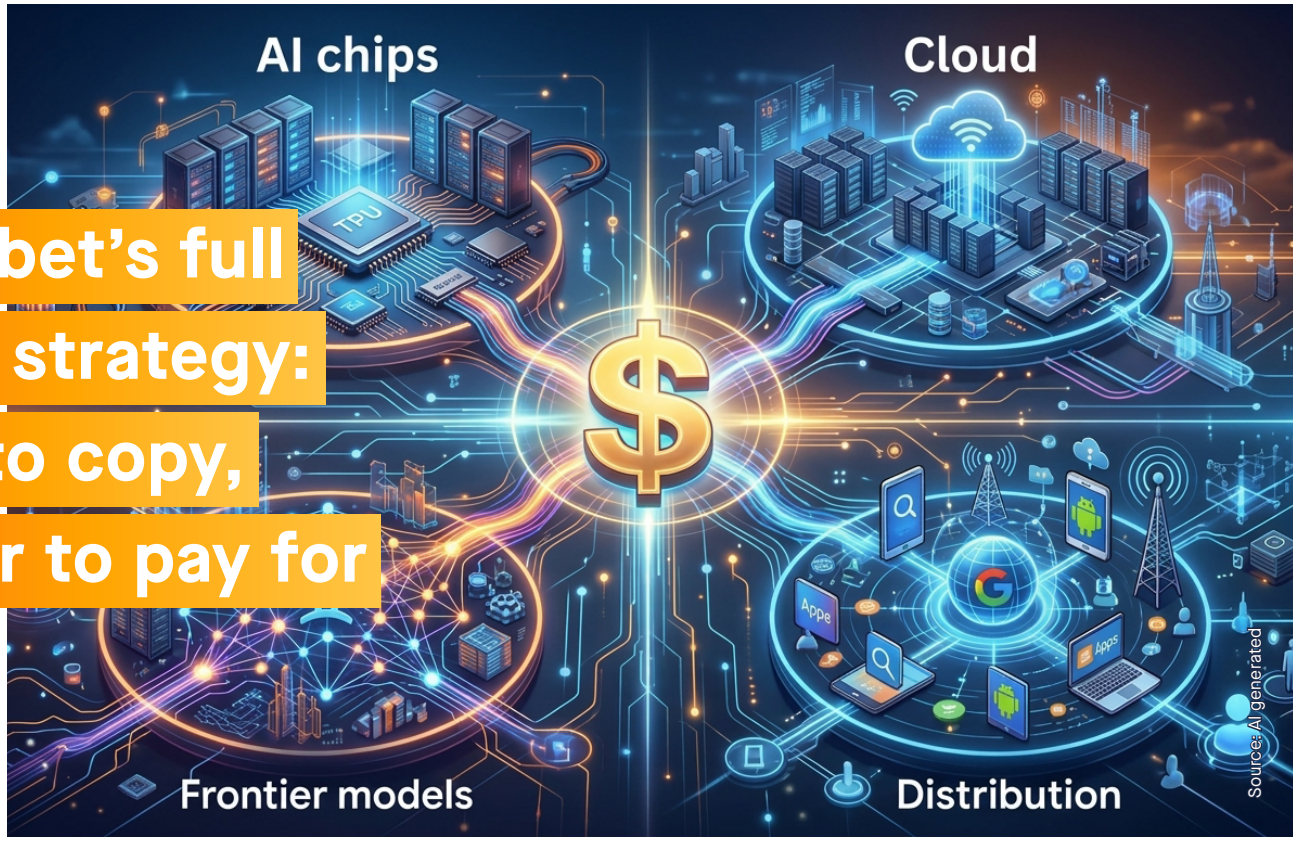
Alphabet's full stack strategy: hard to copy, harder to pay for



AI assistants are challenging Google's dominance in Search. That story is now well known. Far less attention has been paid to what Alphabet has been building on the other side of the AI race: a full stack stretching from its own chips to products used by billions. At its heart is the Tensor Processing Unit (TPU), a chip developed for internal use a decade ago that has since become a product rival that AI labs are willing to pay for. This combination is difficult to replicate and is already driving growth. The catch? The economics are far less attractive than those of Search, with significantly lower profitability.

Malek Dahmani
Head of Equities
malek.dahmani@syzgroup.com

Assia Driss
Syz Research Lab Team Coordinator
assia.driss@syzgroup.com

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Key takeaways

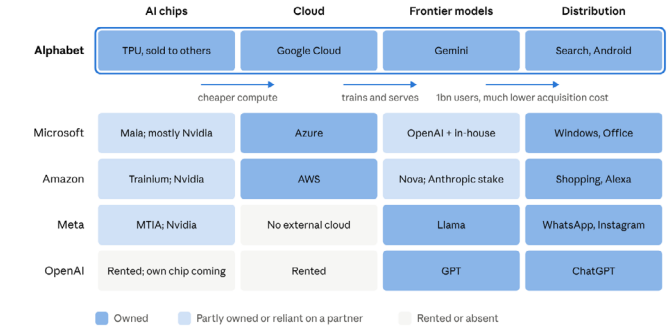
- Google Cloud doubled to USD 30.7bn at a 36.2% operating margin, with a USD 561bn backlog. TPU systems now count more than 100 significant external customers, including Anthropic, Apple and Meta.
- Free cash flow fell to minus USD 9.1bn, about minus USD 3.9bn excluding an EU fine, as capex reached 40% of revenue. Alphabet has bought back no shares in 2026.
- The full stack is Alphabet's strongest response to the AI threat on Search, and hard to copy. But it is a far less profitable business than Search: similar operating margins on paper, much more capital for every dollar of profit.

Four layers, one owner

A full-stack strategy means owning every layer needed to deliver AI, from the chip to the end user, rather than renting some of them. There are four: chips, cloud, models and distribution. Most of Alphabet's rivals own two or three and rent the rest. Alphabet owns all four.

Only Alphabet owns the full AI stack, and each layer feeds the next

From the chip to the end user: rivals own two or three layers and rent the rest



Source: Syz assessment based on company disclosures, October 2026

The value lies in how each layer feeds the next. TPUs give Google Cloud cheaper compute, since Google pays no margin to an outside chip supplier. Google Cloud trains and serves Gemini in data centres Alphabet owns, so it keeps the margin OpenAI pays to its compute providers. Gemini then reaches users through Search, Android and Chrome, which gave the Gemini app one billion users at a much lower acquisition cost than its rivals. Usage at that scale gives the TPU the volumes that lower its cost, and Google Cloud resells to outside clients the chips and models Alphabet first built for itself.

This is why the full stack is Alphabet's answer to the threat on Search. Alphabet earns from AI directly, through Search and Gemini, and indirectly when a rival pays it for compute. Several TPU clients compete with Google in models or cloud. Sundar Pichai, Alphabet's CEO, treats the TPU as a platform, like Android or Chrome, open to all. Even when a user picks another assistant, part of the AI spending can still end up at Alphabet.

What is a TPU, and how does it compare?

A TPU (tensor processing unit) is a chip Google designs only for the maths behind AI models, mostly large matrix multiplications. An Nvidia GPU started life as a graphics processor and is a far more general tool. The TPU gives up that flexibility in exchange for lower cost and energy use per calculation, once thousands of chips work together on the same model.

Three ways to get AI compute

The TPU trades flexibility for cost at very large scale

	Google TPU Google, with Broadcom TPU 8t, TPU 8i	GPU Nvidia; AMD as challenger Nvidia Blackwell, AMD Instinct	In-house chips Amazon, Microsoft, Meta Trainium, Maia, MTIA
Built for	AI calculations only	General use, adapted to AI	Each owner's own AI needs
Strength	Cheapest at very large scale	Flexible; CUDA is the standard	Cheaper for the owner
Limit	Less flexible	Expensive (high margins)	Early stage
Available via	Google Cloud, Oracle, on-site	Everyone	Mostly the owner's cloud

Source: Syz assessment based on company disclosures. Performance claims are company-reported.

Google began designing the TPU around 2013 for its own needs and opened it to Google Cloud clients in 2018. For years, it was a cost line that helped Search, YouTube and later Gemini run more cheaply.

That changed over 2025 and 2026. Google now sells complete TPU systems, installs them outside its own data centres and counts rival AI labs among its clients. The TPU now appears in three places in the accounts: in Cloud revenue, where system sales were a "meaningful contributor" in Q3; in the USD 561bn backlog; and in inventory. An internal tool is turning into a product that investors can value on its own.

The TPU, an essential building block

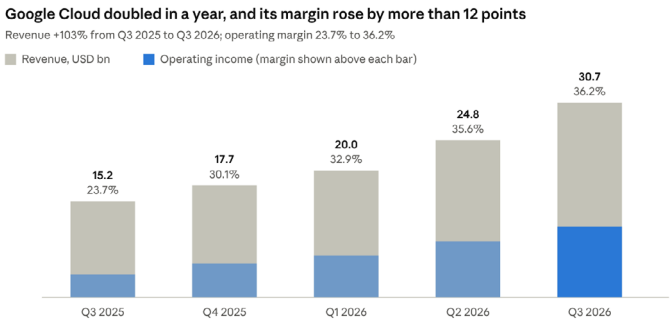
The TPU is not the advantage on its own, but it is the layer rivals find hardest to replicate, for two reasons.

Cost comes first. Google pays no margin to an outside chip supplier, and the 8th generation launched this year offers up to 2.7x better training performance and 80% better inference price-performance than the last. That matters most for Search. If an AI answer earns less than a page of links, the cheapest server wins as usage shifts. Alphabet CEO Sundar Pichai added that selling TPUs outside Google raises volumes, and that in semiconductors scale "directly translates into better economics".

The second is a new source of revenue. Alphabet no longer rents only cloud access. It now sells complete TPU systems, with networking, storage and software included. Thomas Kurian, CEO of Google Cloud, counts more than 100 significant TPU customers, served in Google Cloud, in their own data centres, at Oracle and through Crux AI, a joint venture with Blackstone. Clients include Anthropic, Apple, Meta, Citadel Securities and Jump Trading.

What it brings to Google Cloud

Google Cloud is now a business of more than USD 120bn of annualised revenue, with USD 11.1bn of operating profit in Q3 2026 alone.



Source: Alphabet earnings releases, Q3 2025 to Q3 2026; Q4 2025 and Q1 2026 Cloud figures via Nasdaq/Zacks and Eastern Progress reports, rounded

The Cloud backlog reached USD 561bn, of which just over 55% should turn into revenue within 24 months. TPU system sales contributed to growth, but Google Cloud Platform services made up the vast majority of Q3 revenue. The margin has two limits. It will face headwinds in Q4 as rented capacity ramps up, and it excludes the USD 7.7bn of shared AI costs booked at Alphabet level.

The cost in cash

Alphabet pays for its full stack before it earns from it. In Q3 2026, Alphabet generated USD 42.3bn of operating cash flow but spent USD 51.4bn on capex, leaving free cash flow of minus USD 9.1bn. Excluding the USD 5.2bn EU fine, it was still about minus USD 3.9bn. Trailing twelve-month free cash flow fell to USD 19.7bn.

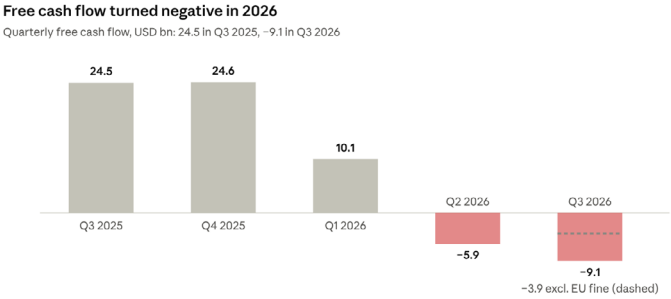
The largest item is capex. Guidance for 2026 is USD 195–205bn, and management already expects a significant increase in 2027. About 65% goes to servers and networking that wear out in six years, so depreciation, up 49% in Q3, will keep rising for years. Behind capex sit USD 924bn of future purchase commitments and USD 152bn of leases not yet started, although some contracts allow lower volumes.

The TPU business adds a cash cycle of its own. A signed contract enters the backlog; Google then buys components, builds the systems and holds them in inventory, which jumped from USD 2.4bn at the end of 2025 to USD 13.3bn. Cash comes back only on delivery and billing, mostly in 2027.

Management calls this a different cash cycle rather than traditional capex, and components are bought only once a contract is signed. In a ramp-up, however, every new contract consumes cash before it returns any.

Hard to copy, but less profitable than Search

This is the heart of the matter. Search is a near-monopoly that sets its prices through an auction and runs on infrastructure built long ago. Cloud and TPUs are a different kind of business. The margins look close on paper, with 36.2% for Cloud against 40.7% for Google Services in Q3. But Cloud competes with AWS and Azure, sells to a few large AI clients that can negotiate or build their own chips, and needs heavy new capital for every dollar of profit. Its margin also excludes USD 7.7bn of shared AI costs. The same dollar of profit is worth less when it comes from Cloud than from Search, and the market will not pay the same multiple for it.



Source: Alphabet earnings releases, Syz Research

Capital intensity has nearly doubled. Capex rose to 40% of revenue in Q3 2026, up from 23% a year earlier. Revenue grew by 25%, while capex increased by 114%. An increasing share of growth is now driven by Cloud and TPUs, which require far more capital than Search ever did.

Buybacks have stopped. Alphabet repurchased no shares in the first nine months of 2026, compared with USD 39.8bn in the same period a year earlier. Dividends are now the only remaining form of direct shareholder returns. For many investors, buybacks formed a significant part of the investment case for owning the stock.

Search still funds most of the build-out, but its growth has slowed while capex keeps accelerating.

Management promises returns on invested capital well above its cost of capital, and much of the TPU inventory should turn into revenue in 2027. Neither shows up yet in the cash flow statement. Until it does, the full stack protects Alphabet's strategic position more than it answers the market's demand for cash. Management is walking a tightrope.

The indicators to watch

Indicator	Why it matters	Next data point
TPU inventory (USD 13.3bn at end Q3, from USD 2.4bn at end 2025)	Shows whether TPU systems are being delivered and billed, or keep piling up	Q4 2026 results
2027 capex guidance	Management has flagged a significant increase; the size sets the cash outlook for the year	Q4 2026 call
Resumption of buybacks	The clearest signal that management sees cash generation returning	Any quarter
Cloud margin with rented capacity	Tests whether 36% holds as third-party compute ramps up	Q4 2026 results

Source: Alphabet Q3 2026 earnings release and call.

For two decades, Search paid for everything Alphabet wanted to build. With Search now under pressure, the full stack is Alphabet's answer, and the TPU is what makes it hard to copy. The backlog suggests customers are buying in. But the full stack replaces a capital-light near-monopoly with a capital-heavy business in a competitive market. It can protect Alphabet's growth. Whether it can also deliver returns comparable to those Search has delivered is still to be proven.

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For further information

Banque Syz SA
Quai des Bergues 1
CH-1201 Geneva
T. +41 58 799 10 00
syzgroup.com

Malek Dahmani
Head of Equities
malek.dahmani@syzgroup.com

Assia Driss
Syz Research Lab Team Coordinator
assia.driss@syzgroup.com

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