

# Company Valuation

---

Minh Nguyen Viet Quang

Financial Modelling – FIN405

Professor Mathias Wagner

April 28<sup>th</sup>, 2024



# About Intel..

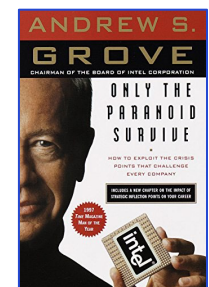
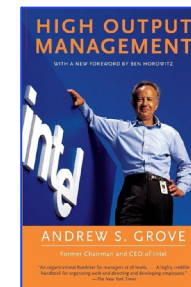
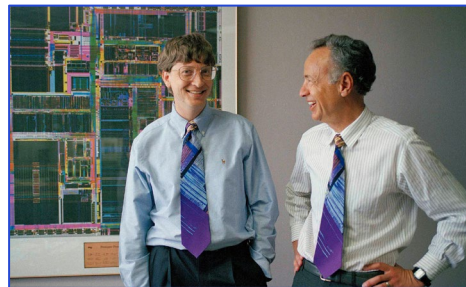
---

Intel Corporation is a leading manufacturer of semiconductor chips and related products. Founded in 1968 and based in Santa Clara, California, Intel is one of the world's largest and most influential technology companies.

Intel pioneered the x86 architecture that became the standard for personal computers and servers. The company's processors and chipsets power most desktop and laptop computers today.

Intel's main business segments are: *(ranked from highest revenue to lowest)*

1. **Client Computing (CCG)** - Produces microprocessors and chipsets for PCs and laptops. Major competitors: AMD, ARM.
2. **Data Center (DCAI) & Networking (NEX)** - Server chips, networking products for data centers/cloud. Key rivals: AMD Epyc, Nvidia data center GPUs.
3. **Internet of Things & FPGA (separated)** - Chips for embedded systems, industrial, retail. Competes with ARM-based designs from Qualcomm, NXP.
4. **Non-Volatile Memory (integrated to CCG and DCAI)** - NAND flash, Optane storage products. Competitors: Samsung, SK Hynix, Micron.



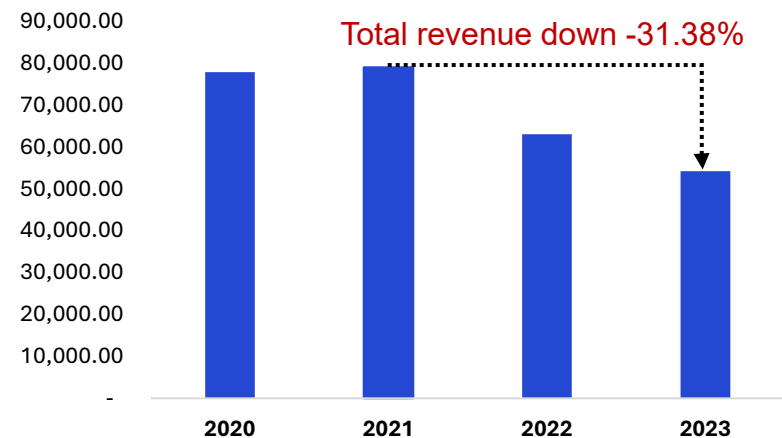
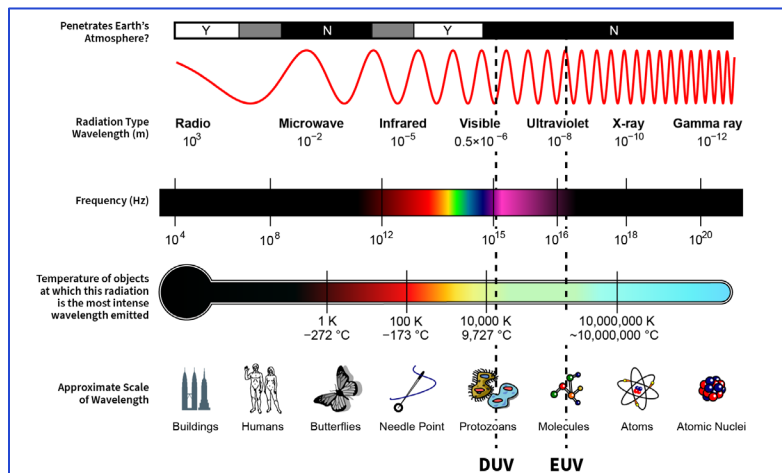
# What happened..?

Intel's struggles can be traced back to its 10nm node, which used an immersion lithography technique called double patterning to scale down transistors. While this allowed Intel to eke out improvements, competitors like TSMC and Samsung adopted extreme ultraviolet (EUV) lithography for their 7nm and 5nm nodes respectively.

EUV enables more precise patterning of transistors at these advanced nodes. By doubling down on its decades-old immersion lithography for 10nm, Intel gained density improvements but fell behind the transistor density and performance gains that TSMC and Samsung realized with EUV.

This technology divergence compounded with issues like repeated delays of Intel's 10nm node and then its 7nm process. As competitors like AMD took advantage of TSMC's EUV-enabled 7nm and 5nm nodes, Intel was stuck on an enhanced 10nm process struggling to catch up.

Intel's insistence on pushing 10nm immersion lithography as far as possible proved a costly mistake. The company missed the crucial transition to EUV that unlocked the semiconductor industry's biggest performance and efficiency gains of the last half-decade. This misstep is a key reason Intel lost its process leadership and now faces an uphill climb to regain parity.

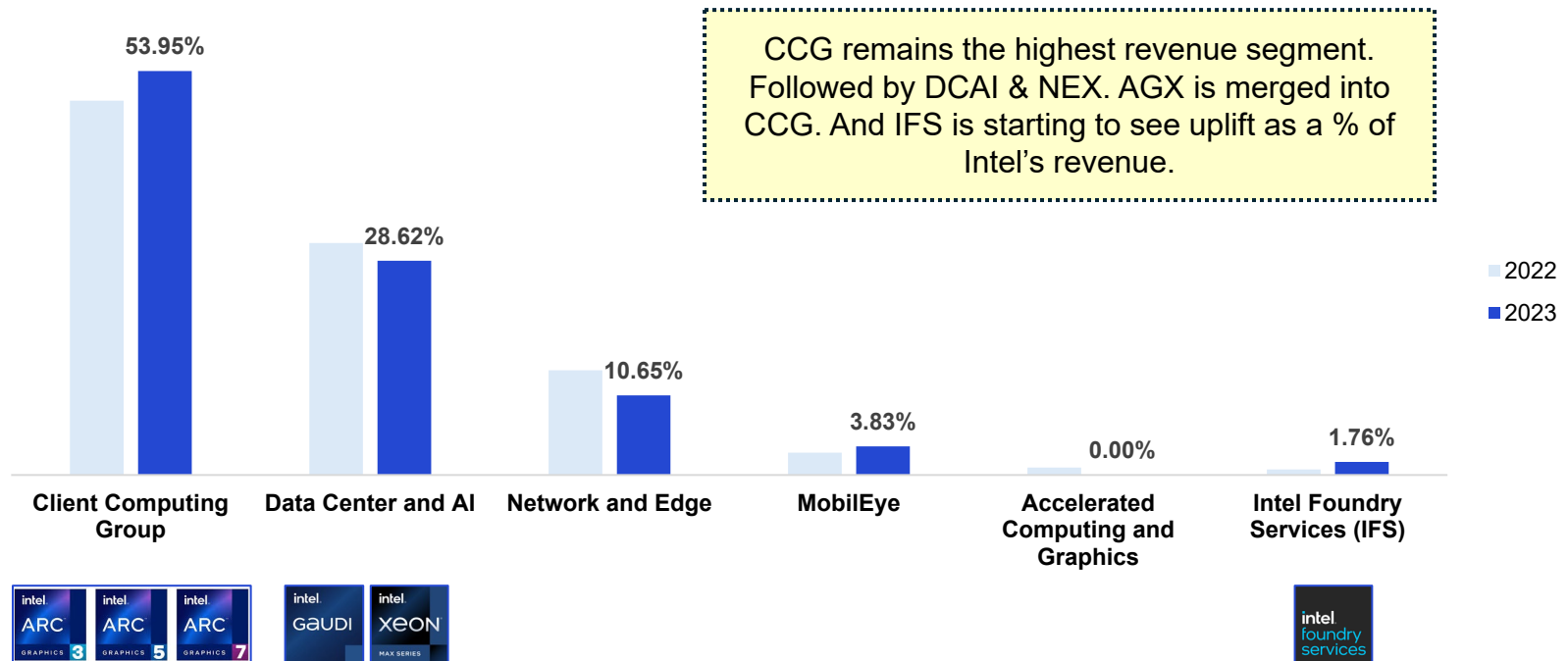


# Intel's turnaround plan..

Pat Gelsinger, Intel's CEO, has an ambitious turnaround plan: invest heavily in High-NA EUV to **catch up with TSMC's process tech by 2027**.

Geopolitical tensions have prompted NATO allies to prioritize secure semiconductor manufacturing within the U.S. and allied nations.

The plan expands into **data centers, AI**, powerful **consumer/corporate GPUs** like Arc and accelerators like Gaudi 3, as well as integrated platforms like Falcon Shores to regain competitiveness against AMD and others across domains.



# Hidden dragon..crouching tiger..

To accurately value Intel, we must ignore marketing narratives and objectively understand the complex AI computing landscape - evaluating Intel's true capabilities, roadmaps, and competitive positioning across diverse AI workloads and domains without being swayed by hype.

Intel is vertically integrated across the supply chain, spanning products and services. This could mean it's a stagnant behemoth or well-positioned to capture value. Notably, its main architecture competitor ARM licenses to others like Apple and cloud providers to build their own chips – instead of selling products itself, contrasting Intel's model.




# Being certain..

---

Questions we must answer:

1. How can we see revenue uplift from Intel? And how sure are we?
  1. Can Intel continue to keep or increase CCG segment against AMD and NVIDIA's PC solutions?
  2. Can Intel continue to keep or increase CCG segment that Apple's laptop is threatening to take away?
  3. Can Intel execute on Intel Foundry Services? How sure are the expected cashflows?
  4. Can Intel continue to keep or increase DCAI segment against AMD, NVIDIA and other cloud services provider?
  5. Can Intel continue to keep or increase NEX segment? Would it correlate to DCAI uplift? How can we make sure it is not?
  6. Can Intel's execute financially and maximize shareholder value?
  - ★ 7. Can they even pay down the debt financing the new fabs?
  - ★ 8. What is Intel's footing for the future? Will ARM displace x86 both for consumer and commercial computing? How sure are we?

*What is the market looking at? How are they valuing Intel? Are we missing something? Or they are missing something? Can we get them to see our perspective? If yes, how quick?*



# Intel Foundry Services

---

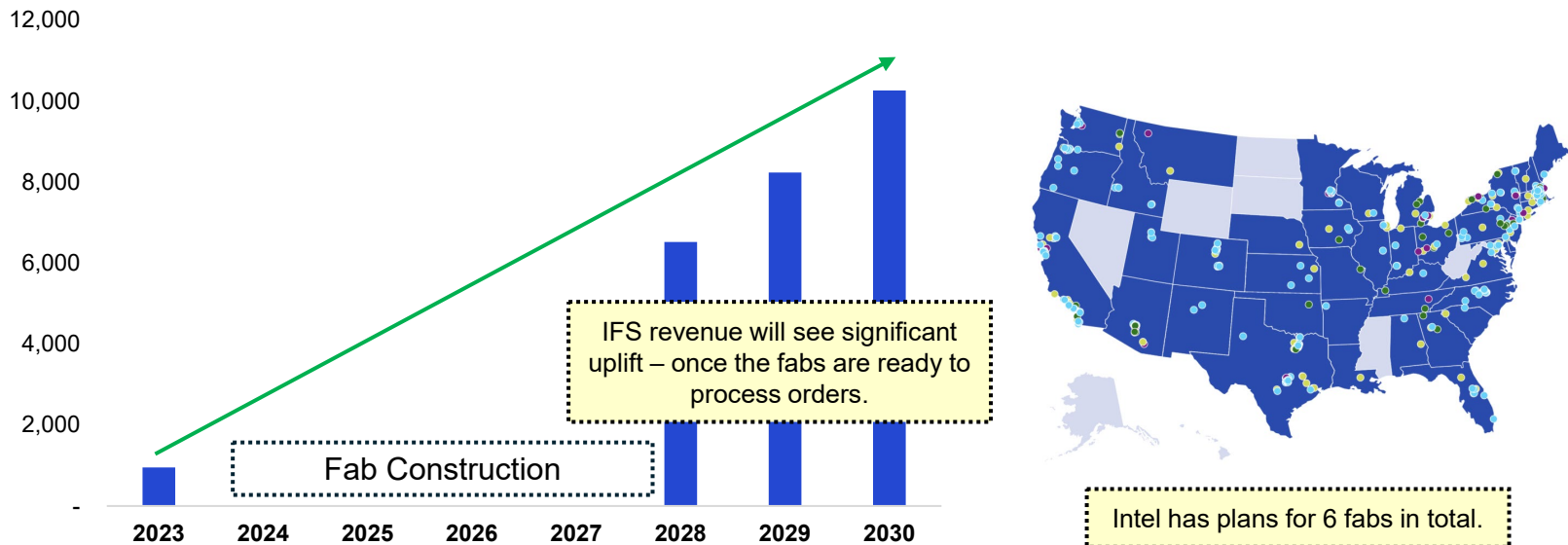


# Unlocking value..

Pat Gelsinger plans to revamp Intel's integrated device manufacturer (IDM) model by restructuring the company into two separate operations.

One operation, **Intel Products**, will focus solely on in-house research and development of products. The other, **Intel Foundry Services (IFS)**, will handle manufacturing and fabrication as a separate entity. This separation ensures the two groups don't inadvertently hinder each other's profitability goals.

It allows IFS to operate as an independent foundry, fabricating chips for fabless clients without compromising their intellectual property. Simultaneously, the Intel Products group gains flexibility to leverage external foundries when beneficial, rather than relying solely on Intel's fabs.



*“Intel Foundry currently has an expected lifetime deal value with external customers of more than \$15 billion and remains focused on its goal of becoming the world’s second-largest foundry by 2030.” – Pat Gelsinger*



A close-up, high-angle photograph of an Intel i9-14900K processor mounted on a motherboard. The processor is a square, silver-colored chip with a green LGA (Land Grid Array) pin grid. It is secured by a metal mounting bracket with four screws. The motherboard is dark-colored with various components visible, including capacitors and other chips. The text on the processor is clearly visible.

# Client Computing Group

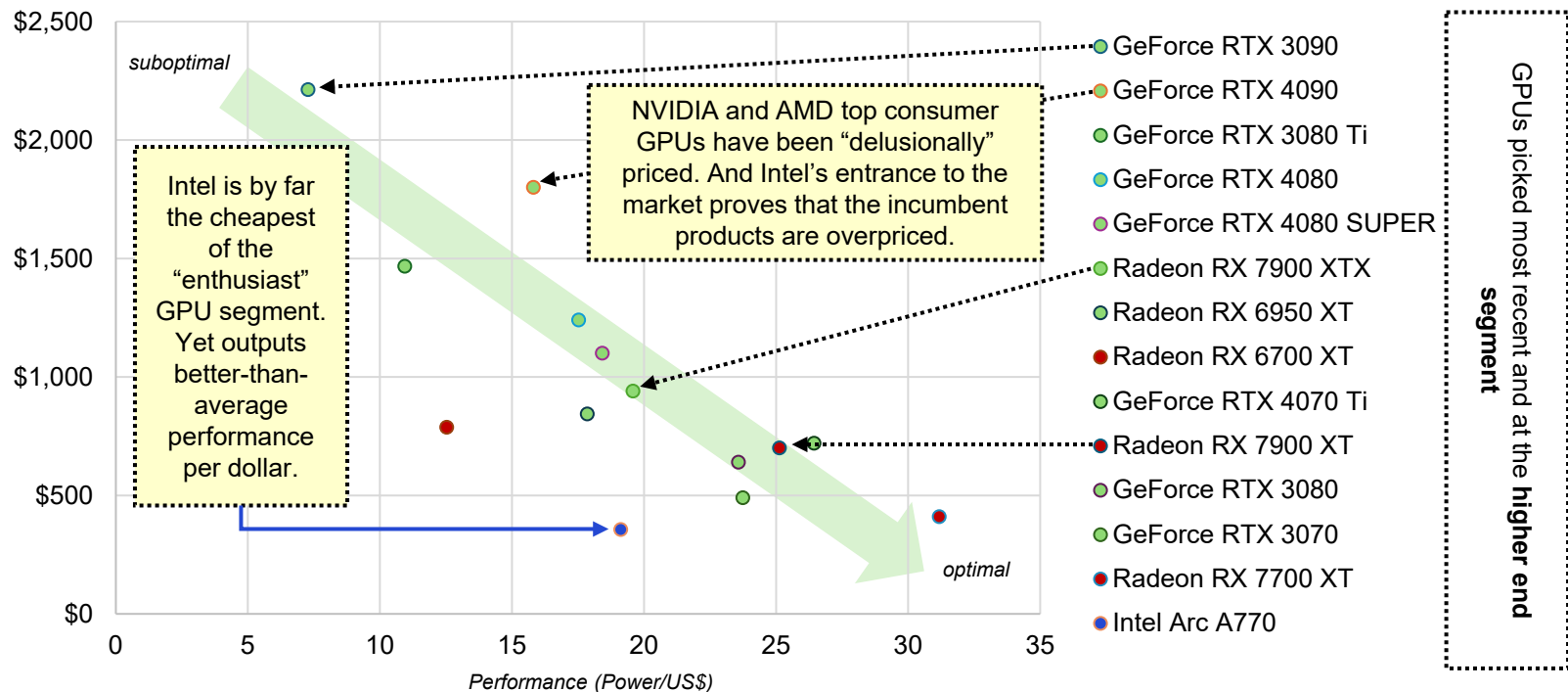
---

# Expanding into new product categories..

Intel has embarked on an expansion into the GPU segment through its Arc lineup and Falcon Shores campaign. This move aims to compete directly with AMD's MI400X and Nvidia's next-generation graphics architecture.

The Arc GPUs, in conjunction with Falcon Shores, seek to fortify Intel's Client Computing Group (CCG) by delivering potent PC graphics capabilities at a significantly lower cost compared to competitors' offerings.

By providing high-performance graphics computing at a fraction of the price demanded by rivals, Intel intends to disrupt the consumer GPU market and capture a substantial share. Intel plans to release the consumer GPU Battlemage line this year. **Aiming to rival with top of the line NVIDIA and AMD card, for half the price.**

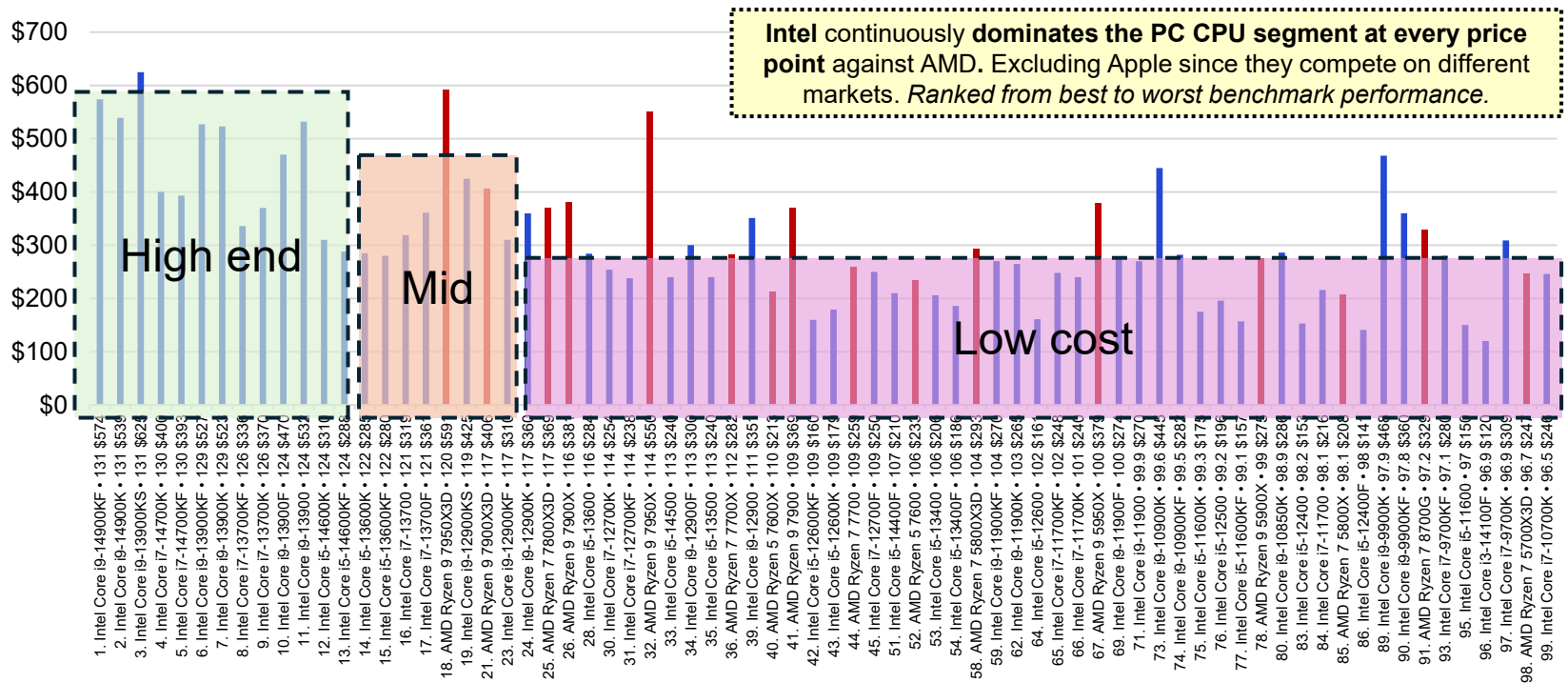


# Intel dominates CPUs in the CCG segment..

Despite the hype around AMD, driven by enthusiast fanboys portraying it as the better CPU choice, Intel continues to dominate the PC CPU market across all price points.

**Intel still delivers superior overall compute power for productivity and gaming workloads.**

While AMD is acknowledged for offering better energy efficiency, especially in the laptop segment, Intel maintains an edge in total performance for most use cases. The narrative painting AMD as the universally better option oversimplifies the complex trade-offs between performance, efficiency, and pricing in the CPU landscape.

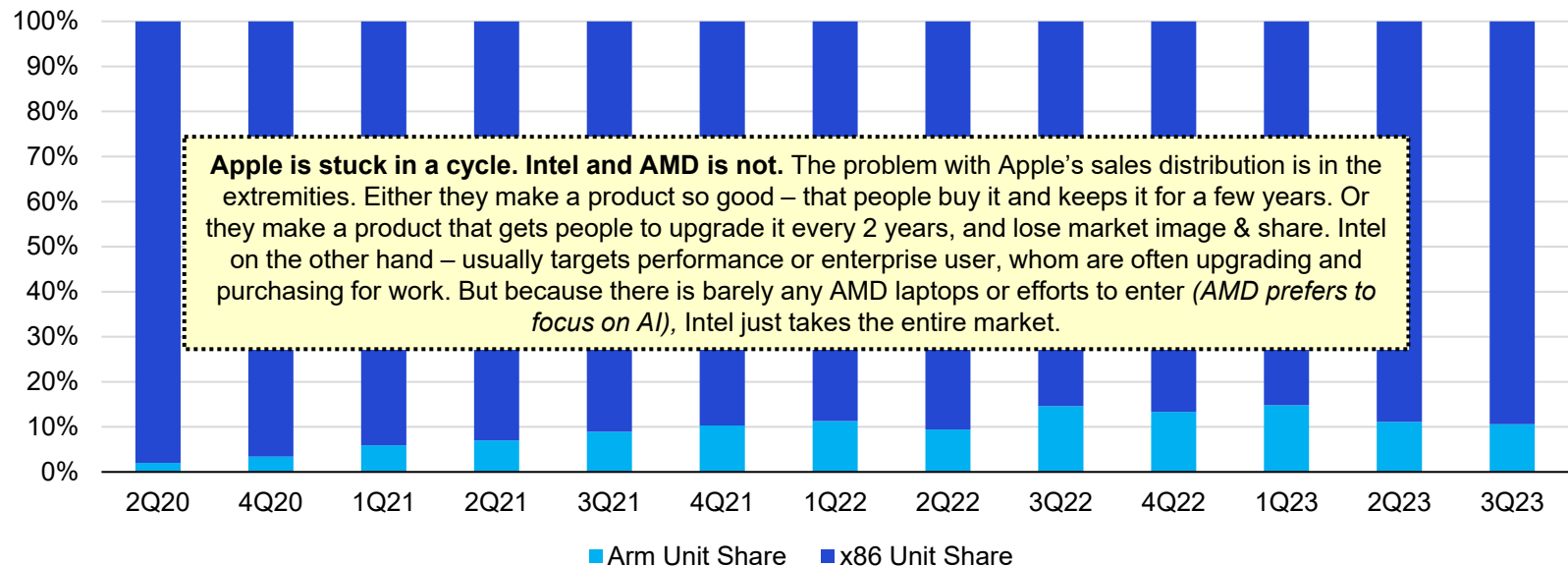


# ARM has yet to threaten x86..

While Apple's M-series chips offer impressive energy efficiency for laptops and its desktop ecosystem, research suggests they have yet to substantially displace Intel and Microsoft.

**Many legacy systems, long-time Microsoft ecosystem users, and servers face significant hurdles in abruptly switching to macOS** or commercial ARM. Mainstream software like Excel and PowerPoint still lack full native functionality on Apple's M-series chips. Additionally, high-performance gaming and many commercial systems/software heavily utilized on x86 Linux distributions are not yet natively supported on the M-series architecture.

The lack of comprehensive software compatibility, especially for productivity, gaming, and enterprise workloads accustomed to the x86 ecosystem, impedes the immediate widespread adoption of Apple's ARM-based M-series chips beyond their current consumer-focused use cases.







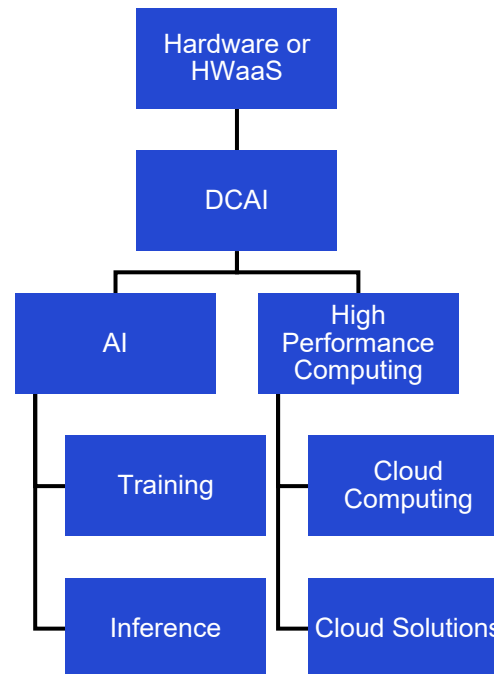
# Data Center & AI – Networking

---

# The Data Center market in a nutshell..

In the data center AI (DCAI) market, Intel and vendors operate under two primary business models. Some sell the hardware outright, which includes CPUs, GPUs, and specialized chips like Gaudi or Tensor Core L series designed for specific tasks. Alternatively, vendors can leverage their own hardware designs to offer cloud computing services, forgoing hardware sales.

This cloud model proves even more lucrative than selling hardware once the initial infrastructure investments break even, as subsequent usage translates directly into pure profit after covering electricity costs. By providing AI computing as a service, vendors circumvent their customers' need to invest in expensive hardware deployments.

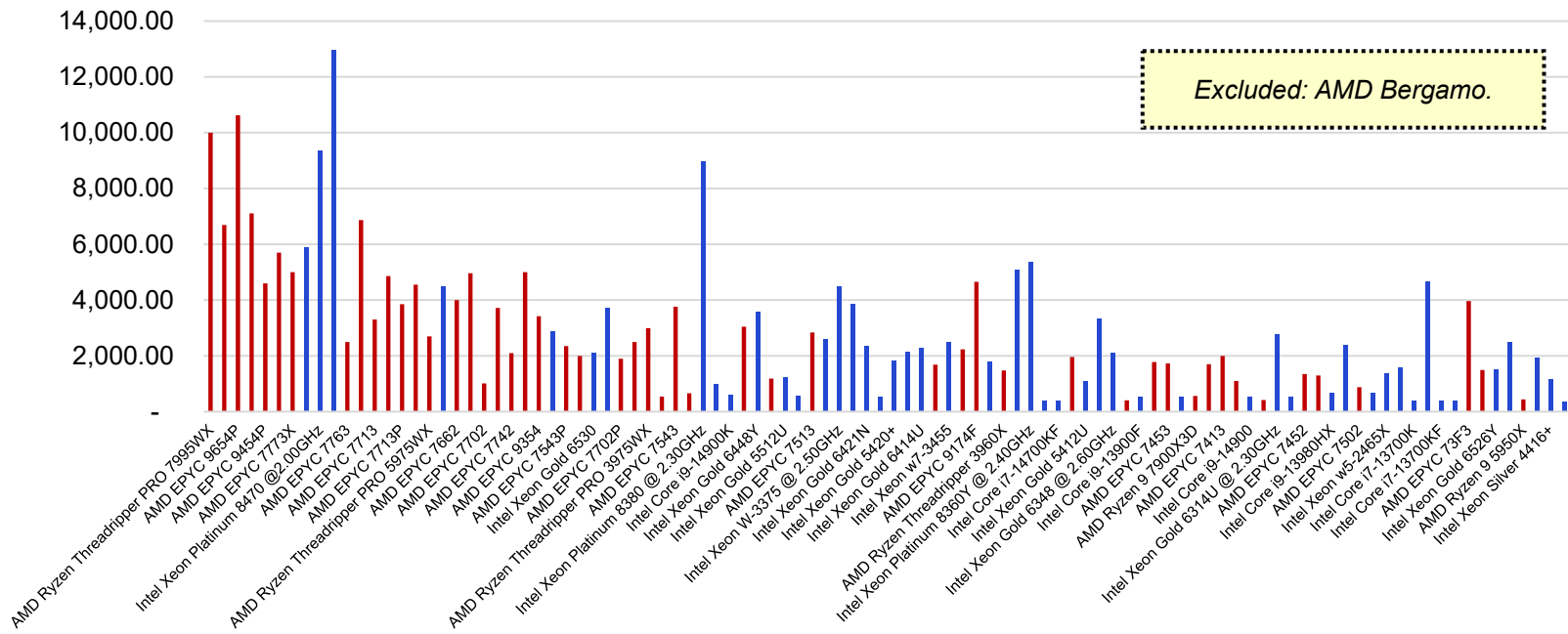


And the cycle repeats itself.  
Hardware-as-a-Service or  
HWaaS is essentially a Cloud  
Solution.

# Intel in the Data Center CPU market..

Intel's previous leadership and internal politics caused it to lag in the lucrative data center AI (DCAI) market, despite dominating server CPU sales across price segments. Key DCAI players like Meta, Google, Lambda, Anthropic, and OpenAI prioritized top performance that Intel failed to deliver when they were willing to pay premium prices. Now, Intel has serious catching up to do.

While the market segments AI/high-performance computing from storage workloads, allowing lower-performing chips for cloud storage or value-oriented compute, it's unacceptable for Intel's offerings to underperform older AMD server CPUs like Bergamo, while being 6% more expensive and power-hungry. Regaining competitiveness in this critical DCAI space is an urgent priority for Intel's turnaround efforts.





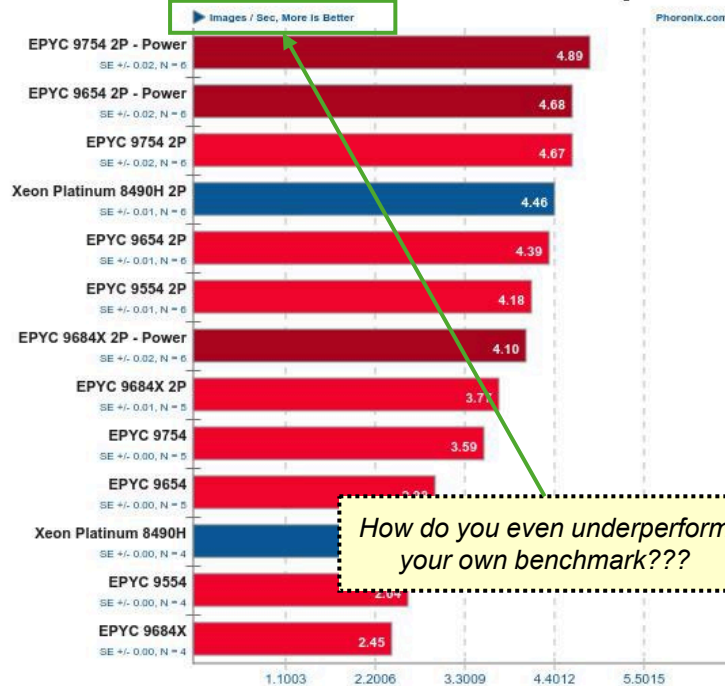
# Intel Xeon MAX against EPYC Bergamo..

## Intel Open Image Denoise 2.1

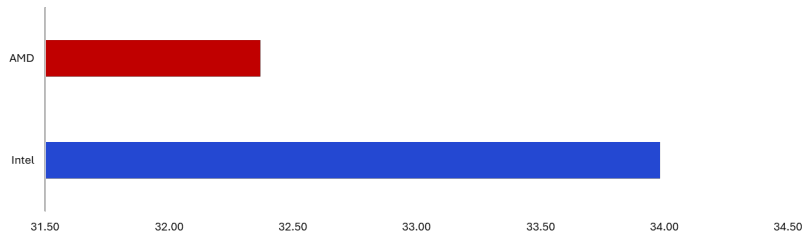
Run: RT.Ldr\_alb\_nrm.3840x2160 - Device: CPU-Only

pts

Phoronix.com



Commercial CPU Performance/MSRP



While benchmarks from Phoronix indicate Intel can deliver the necessary performance for AI model training and HPC, the company's offerings lack energy efficiency.

As the AI market matures and providers prioritize long-term sustainability, eliminating unnecessary costs like excessive electricity usage will become crucial for viable business models – *not just competitive rebates*.

Intel must address this energy efficiency gap to remain competitive, as AI workloads demand both high performance and optimal power consumption to maximize operational longevity and profitability.

If Intel fails to address its energy efficiency shortcomings, the lucrative AI model training workloads and associated big spending will gravitate towards AMD and Nvidia's more power-efficient offerings.

If Intel fails to address its energy efficiency gap, the company risks being relegated to lower-margin businesses like government contracts, cloud storage, and legacy system maintenance - missing out on the lucrative, high-growth AI market opportunities. Although Intel's aggregated CPU performance per dollar is higher, AMD has strategically focused its resources on AI and HPC. This approach has enabled AMD to deliver compelling solutions, with its EPYC CPU line and MI300X GPU serving as a viable alternative to NVIDIA's Hopper GPU and Grace CPU.

# Current state of the market..

---

The current market heavily focuses on AI development hype, though artificial general intelligence remains distant and will likely require vastly more computing power than today's capabilities. This implies significant growth potential in the total addressable market (TAM) for AI hardware going forward.

Currently, NVIDIA and AMD are fiercely competing with their GPU offerings for AI workloads, while Intel is playing catch-up with its Gaudi 3 AI accelerator. Despite launching later than NVIDIA's H100 but outperforming it, the Gaudi 3 represents a huge leap from Intel's disastrous Gaudi 2.

Looking ahead, Intel aims to compete directly with its next-generation Falcon Shores GPU platform in 2025 as it works to regain competitiveness in the AI hardware race.

Despite AMD's impressive MI300X GPU performance and high-memory nature, Intel holds a slight advantage as AMD's recent quarterly earnings highlight the market's preference for NVIDIA's extensive technology stack over AMD's ROCm.

However, Intel's oneAPI serves as a key differentiator, enabling the deployment of AI models across hardware platforms from NVIDIA, AMD, and Intel itself. By only requiring code compilation once for execution on all systems, oneAPI unlocks the ability to seamlessly leverage AI hardware agnostic of vendor, granting Intel an edge over AMD in the AI deployment landscape. This open, cross-platform capability of oneAPI positions Intel favorably against its competitors in the rapidly evolving AI hardware ecosystem.



The screenshot shows a Reuters news article. At the top is the Reuters logo and a navigation bar with links: World, Business, Markets, Sustainability, Legal, Breakingviews, Technology, and Investigations. Below the navigation bar is the word 'Technology'. The main headline is 'AMD, Super Micro tumble as earnings fall short'. Below the headline is the byline 'By Harshita Mary Varghese' and the date 'May 1, 2024 4:18 PM PDT · Updated 2 days ago'. At the bottom right of the article preview are three icons: a bookmark, a text size selector (Aa), and a share icon.

# Intel's Valuation Assumptions..

The most accurate valuation of a company is derived by closely following the insights and guidance provided by management during earnings calls. Valuations should be based on the aggregate of hints, reports, interviews, news, and credible rumors that emerge directly from the leadership team. Piecing together these various information sources from those at the helm offers the clearest view into a company's true standing and prospects, enabling a well-informed valuation assessment.

Our discussion covered Intel's key revenue drivers: Client Computing Group (CCG), Data Center AI (DCAI), and Intel Foundry Services (IFS). We have provided conservative assumptions in our valuation to build a margin of safety. By identifying an attractive entry price point, we can determine the opportune moment to wager on Pat Gelsinger's ability to successfully execute Intel's turnaround strategy. This prudent approach allows us to invest in Intel's potential resurgence while mitigating downside risk through a disciplined valuation process focused on the company's core business segments and realistic growth projections.


In its strategic revitalization, Intel is set to enhance its Client Computing Group (CCG) through the introduction of a new Consumer and Entertainment Graphics unit. This initiative is expected to boost the group's performance and bolster its competitiveness. Additionally, Intel is poised to maintain its market share within the CPU segment, where it continues to lead in terms of performance and value, reinforcing its dominance over competitors like AMD and NVIDIA in this area.

While the projections for Intel's Data Center Artificial Intelligence (DCAI) and Network and Edge divisions remain conservative, the Gaudi 3 processor is proving to be a strong competitor to NVIDIA's H100 (which surpasses the MI300X). Despite this competition, Intel is expected to maintain stable revenue streams due to its extensive client base among data center operators and through the utilization of its own data centers.

Year	2023	2024	2025	2026	2027	2028	2029
<i>Segment Growth</i>							
Client Computing Group	10%	10%	10%	10%	10%	10%	10%
Data Center and AI	2%	5%	5%	5%	5%	5%	5%
Network and Edge	2%	2%	2%	2%	2%	2%	2%
MobilEye	8%	2%	2%	2%	2%	2%	2%
Accelerated Computing and Graphics	15%	15%	15%	15%	15%	15%	15%

# IFS Assumptions..

Pat Gelsinger has positioned Intel to invest \$100 billion in constructing and upgrading a total of six fabrication plants. This significant investment aims to propel Intel into the global arena of high-end wafer fabrication and chip manufacturing, sectors currently dominated by TSMC and Samsung. Intel has distinguished itself as the first company globally to acquire High-NA EUV machines from ASML and has already commenced training and developing techniques for their use.



$$\text{TAM} \times \text{IFS Dealflow} = \text{IFS Revenue}$$

## Global Manufacturing Capacity

TAM	146,500.00	156,755.00	167,727.85	179,468.80	192,031.62	205,473.83	219,857.00
Growth %	7%	7%	7%	7%	7%	7%	7%

## Regional Manufacturing Capacity

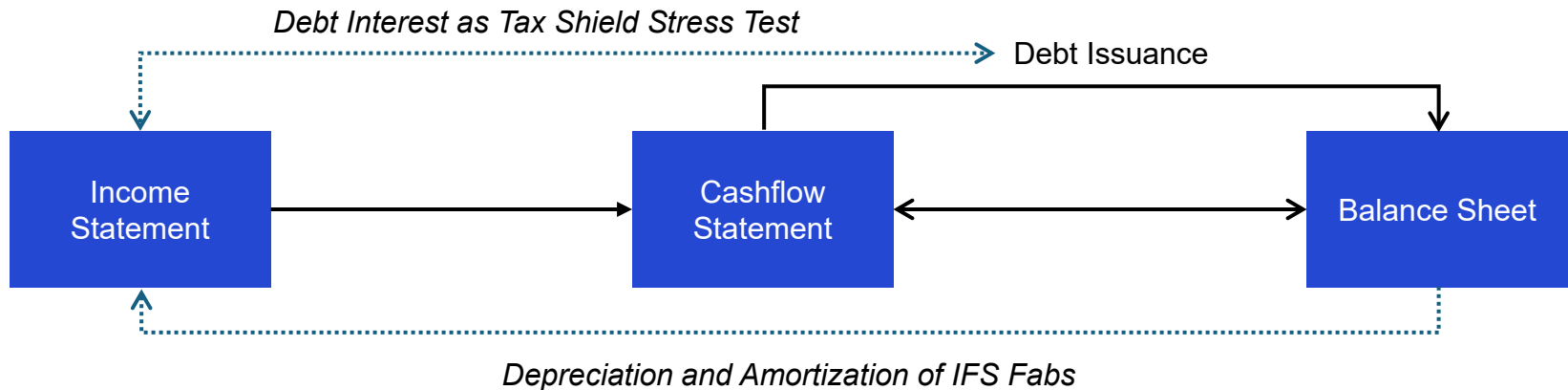
Asia	88%	87%	85%	85%	83%	82%	81%
US	5%	6%	7%	7%	8%	9%	10%
Rest of World	7%	7%	8%	8%	9%	9%	9%
Global Manufacturing Capacity	100%	100%	100%	100%	100%	100%	100%
IFS US Dealflow		2%	10%	15%	20%	30%	30%
% Growth			2%	2%	2%	2%	2%

# Financing 5 nodes in 4 years..and more..

One strategy Pat Gelsinger could employ to finance Intel's ambitious expansion while optimizing cash flow involves aggressively marketing fab contracts and Intel products to boost revenue. The goal would be to raise sufficient debt at attractive rates, beyond the convertible debt agreement with Brookfield Asset Management. Starting in 2027, Gelsinger could initiate aggressive asset depreciation to reduce income tax liabilities, potentially enhancing Intel's discounted cash flow (DCF) and share price.

Drawing inspiration from TSMC's model, which employs rapid depreciation of fab assets and low-cost debt financing supported by consistent revenue streams, Intel appears well-positioned to follow a similar path. Furthermore, Intel's financing strategy is already reinforced by a partnership with Brookfield for half of the Arizona plant's funding and a substantial \$22 billion subsidy from the CHIPS Act.

However, a critical consideration in this strategy is determining how much debt Intel can safely assume before reaching a threshold that might be considered financially risky. Balancing aggressive debt financing with prudent financial management will be key to avoiding unsustainable debt levels while achieving growth objectives.



# How much is it worth..?

My rationale for the financial analysis is to maintain consistency in the existing financial statements while implementing a reverse DCF model, adjusting only key elements to realize Pat Gelsinger's vision for Intel. This strategy involves disregarding minor accounts on the financial statement, as they contribute minimally, and instead focusing on major revenue drivers such as the Client Computing Group (CCG) and Data Center Artificial Intelligence (DCAI). Modeling the budget for constructing new fabs presents a significant challenge.

The objective is to value Intel under the most conservative assumptions possible, establishing a baseline valuation. We'll begin by assigning a modest growth rate to all revenue segments, as previously discussed. We'll also scale cost of goods sold (COGS) and capital expenditures (CAPEX) with revenue, which are currently at a historic high. This will help us test the resilience of the bottom line, ensuring there is sufficient leeway should COGS and CAPEX escalate in the short term. Fortunately, our analysis shows that the bottom line remains viable.

Reverse DCF Model							
(\$ in millions)	Year 2023	Year 2024	Year 2025	Year 2026	Year 2027	Year 2028	Year 2029
Revenue	\$54,228	\$59,929	\$77,739	\$92,424	\$108,847	\$137,455	\$147,620
% Growth Rate		10.5%	29.7%	18.9%	17.8%	26.3%	7.4%
EBIT	93	6,293	8,577	10,460	12,565	17,210	18,513
% EBIT Margin	0.17%	10.5%	11.0%	11.3%	11.5%	12.5%	12.5%
Less: Taxes	913	466	173	1,131	1,036	1,837	1,964
NOPAT	1,006	6,758	8,750	11,591	13,601	19,047	20,478
% NOPAT Margin	1.9%	11.3%	11.3%	12.5%	12.5%	13.9%	13.9%
Plus: D&A	PP&E Depreciation by 10 year	9,602	5,916	9,778	15,572	23,297	32,147
Less: Capex	Increase CapEx by % --	(24,041)	(1,358)	(19,313)	(19,313)	(19,313)	(11,250)
Less: Change in NWC		(1,811)	-	-	-	-	-
Free Cash Flow to Firm (FCFF)	(15,244)	11,317	(784)	7,850	17,586	39,944	51,350
Discount Factor		-	1.00	2.00	3.00	4.00	5.00
Present Value of FCFF		11,317	(723)	6,668	13,765	28,815	34,140

After calculating net operating profit after taxes (NOPAT) by subtracting taxes, we will reintegrate depreciation and amortization of the fabs. Depreciation and amortization are maintained at a historic high on the financial statements. Once the fabs are operational, we can activate their depreciation as a tax shield, which will then be utilized to help manage and reduce debt.

Repayment of term debt and debt conversions	USDmm	(1,850.00)	(5,250.00)	(1,000.00)	(5,000.00)	(5,000.00)	(5,000.00)
---	-------	------------	------------	------------	------------	------------	------------

# Leveraged Build Out..?

A robust valuation effectively combines a compelling narrative with factual data. In order to avoid overextending Intel with an unrealistic amount of debt—creating a scenario akin to Icarus flying too close to the sun, where infinite fabs cover every square inch of the globe, only to lead to potential bankruptcy following a missed earnings report—I've ensured the forecast remains pragmatic and aligned with Intel's strategic roadmap. Furthermore, I've maintained a very sensible approach to debt management and preserved a healthy current ratio for Intel, positioning the company favorably should there be a need to raise additional debt.

Memo: Gross Income / Interest Expense

%

1.93

1.25

3.82

2.43

3.60

3.64

Memo: Current Ratio

%

1.39

0.84

0.88

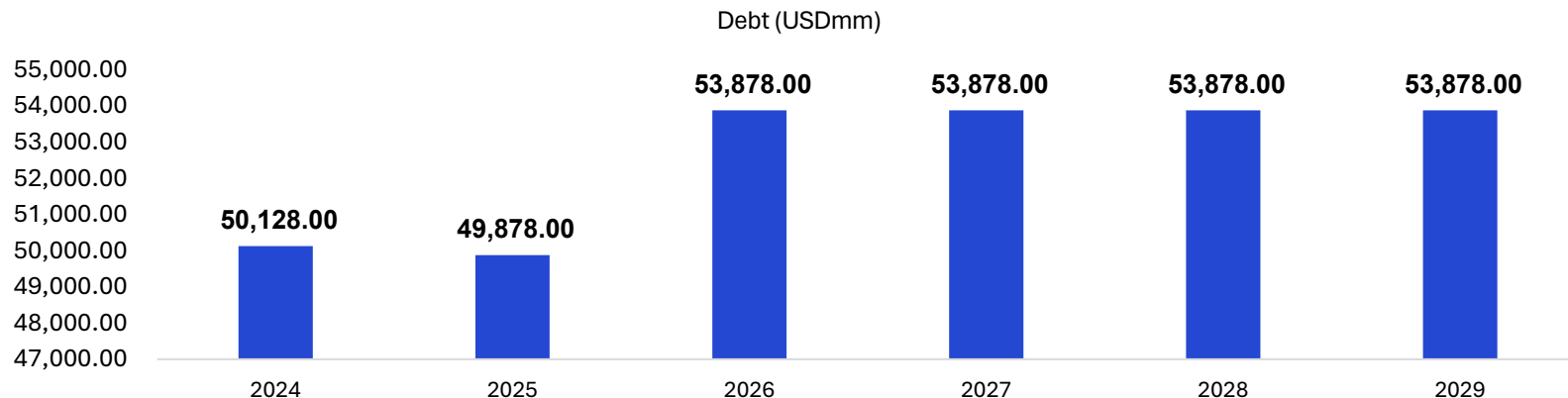
0.89

1.57

2.58

Acknowledging the concerning current ratios projected for 2025, 2026, and 2027, it's important to note that this is largely due to maintaining the levels of accounts payable, accrued compensation, and other benefits unchanged. Simultaneously, I've facilitated the financing of the fab buildout by reallocating \$17 billion from the money market securities account, opting for this internal funding method rather than increasing external borrowing.

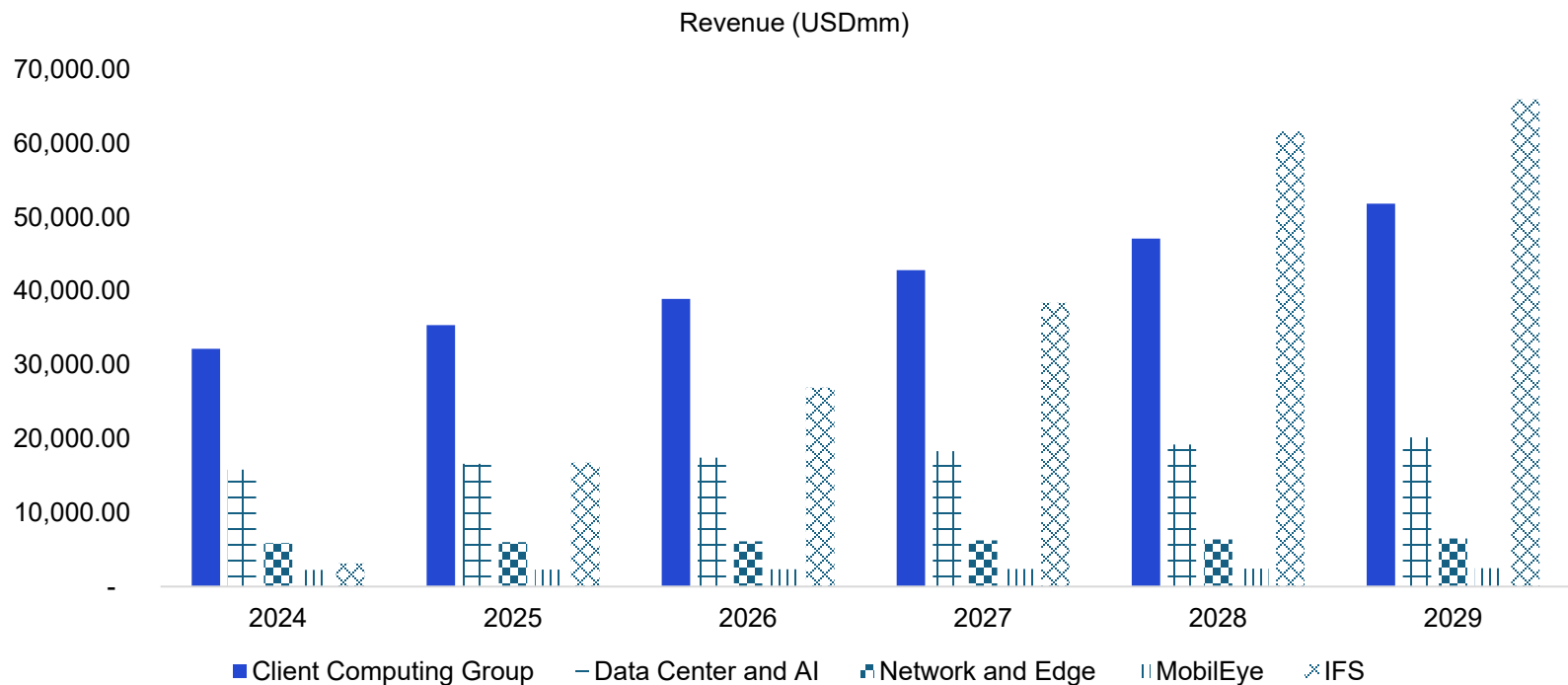
Additionally, I have maintained stable and reasonable debt levels, employing the LIFO method and prioritizing the repayment or redemption of debt whenever surplus cash becomes available on the balance sheet.





# The IDM 2.0 Strategy..

We can observe that the primary driver of revenue is coming from the IFS, reflecting what Pat Gelsinger has outlined in the IDM 2.0 business model. Meanwhile, the CCG segment is not only growing but also benefiting from Intel's foray into the consumer graphics market. Additionally, as we transition into the AI era, it is plausible that Intel will capture a share of market spending, particularly as they position themselves to compete with offerings in the DCAI product and services soon.



# Intel's Fair Value..

The DCF analysis indicates that, even with conservative growth assumptions compared to its peers, the implied DCF share price suggests that Intel is significantly undervalued. Even after applying an additional safety margin of +/- 20%, the estimated share price remains well above the current market price of \$44.

Share Price Calculation		
Diluted Shares Outstanding (mm)		4,222
Implied Share Price		\$166.20
Give or Take	-20.00%	132.9577049
Current Market Share Price		\$44.86
Implied Returns		270.5%

Intel is currently trading at a valuation multiple that is significantly lower than its peers, including manufacturers like TSMC.

	P/E			EV/Revenue			P/B			Dividends%		
	Current	2023	2022	Current	2023	2022	Current	2023	2022	Current	2023	2022
INTC	115.38x	125.26x	8.18x	4.13x	4.53x	1.81x	1.85x	2.08x	1.09x	0.87%	-0.78%	12.22%
AMD	398.83x	1285.25x	39.74x	14.94x	10.64x	4.46x	6.11x	4.33x	1.91x	0.25%	0.07%	2.52%
ARM	1698.54x	0.00x	0.00x	48.55x	0.00x	0.00x	28.94x	0.00x	0.00x	0.06%	0.00%	0.00%
NVIDIA	77.68x	53.79x	75.40x	37.78x	16.78x	24.91x	53.13x	22.59x	25.74x	1.29%	1.20%	1.33%
TSMC	23.24x	16.51x	12.39x	8.67x	0.00x	5.00x	5.56x	0.00x	4.38x	4.30%	0.00%	8.07%
GF	21.38x	26.25x	20.19x	1.48x	0.00x	1.21x	3.59x	0.00x	3.19x	4.68%	0.00%	4.95%

# To summarize..

---

In summary, Intel is positioned for a promising future under the leadership of Pat Gelsinger, whose background at a data center and cloud service provider like VMware, combined with his forthright and assertive nature, sets the stage for a dynamic and potentially rapid turnaround. This shift is expected to significantly enhance value and drive revenue growth for Intel, both internally and in the broader market.

Intel, as a seasoned developer and fabricator, holds more cash reserves than its primary competitor, AMD, and likely serves as a critical asset for government and intelligence infrastructure given its pivotal role in system infrastructure. It's reasonable to assume that the government would act to prevent Intel from going bankrupt, much unlike scenarios we've seen with companies like Chrysler. Despite concerns expressed by some online commentators about a potential downfall, it's important to note that Intel is far from the point where its debt could be considered junk status, making new debt issuance a detrimental action for Pat Gelsinger. This financial stability provides Intel with a substantial buffer before such drastic concerns could become a reality.

