IT Hardware

CSPs raising capex & accelerating adoption of liquid cooling on AI server trend

Key message

1. The top four US CSPs announced positive 2024 capex guidance, with the majority of investment in AI.

2. CPU makers cite recovery of general server demand, with growing AI server demand. The firms have a positive server sales outlook in the coming quarters and years.

3. AI servers will be the key sales and earnings growth driver for ODMs and component makers in 2024-25F.

Event

Meta (US), Google (US), Amazon (US), and Microsoft (US), the top four US CSPs, announced stronger-than-expected capex plans for 2024, with AI servers being the major investment driver. Intel (US), AMD (US), and Super Micro Computer (US) cited strong AI server demand, with some component supply constraints improving, and expects general server demand recovery in the coming quarters. Furthermore, Super Micro and Vertiv (US) both highlighted liquid cooling demand is accelerating, largely for use in AI servers.

Impact

CSPs' 2024 capex guidance revised up on strong AI server demand. The US hyperscale CSPs cited strong capex plans in 1Q24, mainly driven by investment in infrastructure and AI, with all revising up full-year capex guidance. During its earnings call, Meta revised up 2024 capex guidance from US$30-37bn to US$35-40bn, up 12% YoY at the midpoint, given increasing investment in AI. Google also indicated its quarterly capex will remain at a similar level to that of 1Q24 for the next three quarters, implying full-year capex will grow over 50% YoY. Microsoft guides capex will grow significantly QoQ in 4Q FY24 (FY ends June) on seasonality, and AI demand has been higher than available capacity. Amazon guides 1Q24 capex will be the 2024 trough, and capex will meaningfully increase YoY in 2024 from US$48.1bn in 2023, driven by infrastructure to support AWS accelerating growth, including high demand for Gen AI. This implies Amazon's capex will grow over 23% YoY to more than US$59.6bn, versus consensus of 29% YoY growth to US$62bn. Given all these positives, consensus 2024 capex growth for the top four US CSPs has been revised up from 26% to 36% YoY, and will grow a further 9% YoY in 2025. We think this bright CSP capex outlook will benefit Taiwan's server supply chain sales and earnings growth in 2024-25.

AMD's 2Q24 cloud server guidance is more positive than that of Intel, but both expect solid growth in 2H24. Intel's 1Q24 data center & AI (DCAI) sales fell 24% QoQ and 18% YoY, in line with consensus. The firm guides DCAI sales will arrive flat QoQ in 2Q24, 8% below consensus, due to slow seasonality. However, Intel guides DCAI sales will improve in 2H24 on general server demand recovery from enterprise and CSP. In addition, management guides AI GPU sales of over US$500mn in 2H24 on the ramp-up of Intel Gaudi 3, which will keep increasing in 2025. In contrast, AMD's 1Q24 data center sales beat consensus, up 80% YoY, and shared positive guidance for data center business. The firm guides 2Q24 data center sales will grow by double-digits QoQ and likely two-fold YoY, driven by MI300 sales growth, which will further strengthen in 2H24. Management guides data center sales growth by strong double-digits, with AI GPU sales target of US$4.0bn in 2024 (versus previous target of US$3.5bn), and server CPU sales growth of double-digits YoY on market share gains. Coupled with the launch of Turin CPU in 2H24, it expects data center sales to continue growing in 2025. We think resumption of general server demand, which is expected by CPU giants and Super Micro, as well as AI server demand growth, will benefit the new CPU platform supply chain, including socket, DDR5, and PCIe Gen 5 plays such as Lotes (3533 TT, NT$1,440, OP) and Argosy (3217 TT, NT$161.5, NR). Furthermore, both Super Micro Computer and Vertiv highlighted accelerating liquid cooling adoption for AI servers, benefiting the thermal supply chain.

Stocks for Action

As we think server shipments bottomed in 2023, down 19% YoY, and will grow in 2024-25 on general server demand recovery and rising AI server adoption, we maintain our positive outlook for the server supply chain and expect decent 2024-25 EPS growth. Despite server shipments declining in 2023, total vendor revenue increased 3% YoY, mainly due to a 26% YoY rise in ASP, soaring from US$8,971 in 2022 to US$11,334 in 2023, boosted by AI server ramp-up. In addition, ODM-direct server shipments for CSPs declined 15% YoY in 2023, while enterprise shipments dropped 20% YoY. We expect ODM-direct shipments to continue to outgrow the server market in 2024-25. We favor firms with higher CSP exposure and product content value growth driven by AI servers, namely Quanta Computer (2382 TT, NT$261, OP), Wiwynn (6669 TT, NT$2,275, OP), Wistron (3231 TT, NT$114.5, OP), Asia Vita Components (3017 TT, NT$656, OP), Auras Technology (3324 TT, NT$821, OP), and Lotes.

Risks

Weak demand; AI server overbooking by CSPs.

Figure 1: Top four US CSP capex outlooks – Positive growth, with better-than-expected guidance

Company	Time	Actual & Guidance
Microsoft	1Q24	• Capex grew 80% YoY and 22% QoQ to $14bn to support cloud demand, inclusive of the need to scale AI infrastructure
	2Q24F	• Expect capex to grow materially QoQ, driven by cloud and AI infrastructure investments and seasonality
		• BBG consensus: US$13.1bn (+ 20% QoQ)
	2024F	• Guide capex to grow YoY in FY25F (year end June), to meet the growing demand signal for cloud and AI products.
		• BBG consensus: US$50.32bn (+43% YoY)
Google	1Q24	• 1Q24 capex rose 91% YoY to US$12bn, beating consensus by 17%, driven overwhelmingly by investment in technical infrastructure with the largest component for servers followed by data centers, especially for AI
	2Q24F	• Guide capex in 2Q24-4Q24 to be roughly at or above the Q1 level. That's it, 2024F capex will grow over 50% YoY to above US$48bn, beating consensus forecast by 6% (US$45bn, up 40% YoY)
		• Capex will be largely used for technical infrastructure in 2024, while investment in offices will be flat YoY, accounting for less than 10% of total capex in 2024
Meta	1Q24	• 1Q24 capex was US$6.4bn, down 7% YoY and 17% QoQ, below consensus by 9%, driven by investments in servers, data centers, and network infrastructure.
	2024F	• Revise up 2024 capex guidance by 12%, up from US$30-37bn to US$35-40 (up 33% YoY at midpoint), beating consensus forecast by 9% as Meta continues to accelerate infra investments to support AI roadmap
	2025F	• Expect capex to grow YoY in 2025F as the company invests aggressively to support AI research and product development efforts
		• BBG consensus: $40.9bn (+11% YoY)
amazon	1Q24	• Capex was US$14.9bn, up 5% YoY and 2% QoQ, in line with consensus
	2024F	• Expect capex to meaningfully increase YoY in 2024, driven by infrastructure to support AWS's reaccelerating growth including high demand for gen AI
		• Expect 1Q24 capex to be the lowest quarter of 2024F, implying full-year capex will increase YoY to over $59.6bn (over 23% YoY), ahead of consensus
		• Consensus forecast 2024F capex of $62.05bn (+29% YoY)

Source: Company data, Bloomberg, KGI Research

Figure 2: Top four US CSP cloud business outlooks

Company	Time	Actual & Guidance
Microsoft	1Q24	• Intelligent Cloud revenue was $26.7bn, up 21% YoY and 3% QoQ, beating both the company guidance ($26-26.3bn) and the consensus ($26.2bn)
		• Azure and other cloud service revenue growth of 31% YoY in cc, beating both the consensus and the company's guidance of 28%
	2Q24F	• Guides Azure sales to grow 30-31% YoY, ahead of consensus of 28% YoY
	FY24F	• Consensus expects Intelligent Cloud sales to grow 19% YoY in FY2024
		• Consensus expects Azure sales to grow 28% YoY in cc in FY2024
Google	1Q24	• Google Cloud sales rose 28% YoY and 4% QoQ to $9.5bn, ahead consensus by 2%, driven by demand for GCP infrastructre and solutions
	2024F	• Consensus expects Google Cloud sales to grow 25% YoY in 2024F
amazon	1Q24	• AWS revenue grew 17% YoY and 3% QoQ to US$25bn in 1Q24, beating consensus by 4%
		• Witnessed growth in both Gen AI and non-Gen AI workloads across a diverse group of customers and across different industries, since companies are migrating more workloads to the cloud, while signing up for longer deals, making bigger commitments.
	2024F	• The company continues to see the impact of cost optimization diminishing, causing customers turning their attention to newer initiatives and re-accelerating existing
		• Consensu AWS sales growth of 15% YoY to $104bn

Source: Company data, Bloomberg, KGI Research

Figure 3: CPU vendor server business outlooks

Company	Time	Actual & Guidance
intel	1Q24	• Data center & AI (DCAI) sales was US$3.03bn, down 24% QoQ and 18% YoY, in line with market consensus, driven by higher Xeon ASPs and improved enterprise demand.
		• More than 5 million AI PCs have shipped since the launch of Intel Core Ultra processors.
	2Q24F	• Guides 2Q24F DCAI sales will be flat QoQ at the low-end of seasonality, shy of consensus by 7%.
		• Expect to release the 1.0 PDK for Intel 18A in 2Q24F.
	2024F	• Guides sales growth across all segments in 2H24, led by improving demand for general servers from both cloud and enterprise customers
		• Expects sales to grow by QoQ throughout 2024F and into 2025F, driven by 1) the beginnings of an enterprise refresh cycle and growing momentum for AI PCs, 2) a datacenter recovery with a return to more normal CPU buying patterns and ramping of accelerator offering.
		• Consensus DCAI sales growth of 8% YoY to $13.7bn in 2024
		• Granite Rapids (Birch Stream) will launch in 3Q24, and Clearwater Forest (Birch Stream) will launch in 2025F.
AMD	1Q24	• Data center sales grew 2% QoQ and 81% YoY to $2.3bn, beating consensus by 1% and prior guidance of flat QoQ, driven by the ramp up of MI300 and double-digit YoY server CPU sales growth, partially offset by a seasonal decline in server CPU sales.
		• MI300 total sales passed $1bn in less than two quarters.
	2Q24F	• Guides double-digit QoQ data center sales growth double and significant YoY growth, driven by the continuing ramp up of MI300 and market share gains for EPYC processor.
		• AMD saw early signs of recovery in the enterprise, and some large customers started to refresh programs.
	2024F	• Raise data center GPU sales guidance from $3.5bn to exceed $4bn in 2024F, implying over 30% sales weighting of data center sales in 2024F.
		• Guides double-digit YoY data center sales growth in 2024, versus consensus of $12.2bn (up 87% YoY)
		• Positive on traditional server outlook in 2024 and beyond thanks to server CPU replacement cycle and the launch of Turin CPU in 2H24

Source: Company data, Bloomberg, KGI Research

Figure 4: Capex of top four US CSPs fell 2% YoY in 2023, but will grow 36% YoY in 2024F (upward revised from last forecast of 26% made in 3 months ago)

| Capex (US$mn)	1Q21	2Q21	3Q21	4Q21	1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23	4Q23	1Q24	2019	2020	2021	2022	2023	2024F	2025F
Meta (Facebook)	4,272	4,612	4,313	5,370	5,441	7,572	9,375	9,043	6,842	6,216	6,543	7,665	6,400	15,102	15,115	18,567	31,431	27,266	36,769	40,968
Amazon	12,082	14,288	15,748	18,935	14,951	15,724	16,378	11,268	14,207	11,455	12,479	14,588	14,925	16,861	35,044	55,396	58,321	48,133	62,051	66,962
Microsoft	5,089	6,452	5,810	5,865	5,340	6,871	6,283	6,274	6,607	8,943	9,917	9,735	10,952	13,546	17,592	23,216	24,768	35,202	50,320	57,031
Google	5,942	5,496	6,819	6,383	9,786	6,828	7,276	7,595	6,289	6,888	8,055	11,019	12,012	23,548	22,281	24,640	31,485	32,251	45,225	47,461
US hyperscale subtotal	27,385	30,848	32,690	36,553	35,518	36,995	39,312	34,180	33,945	33,502	36,994	43,007	44,289	69,057	90,032	121,819	146,005	142,852	194,365	212,422
YoY (%)	1Q21	2Q21	3Q21	4Q21	1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23	4Q23	1Q24	2019	2020	2021	2022	2023	2024F	2025F
Meta (Facebook)	20.1	41.7	16.9	16.4	27.4	64.2	117.4	68.4	25.7	(17.9)	(30.2)	(15.2)	(6.5)	8.0	0.1	22.8	69.3	(13.3)	34.9	11.4
Amazon	77.8	91.6	42.3	27.7	23.7	10.1	4.0	(40.5)	(5.0)	(27.1)	(23.8)	29.5	5.1	25.6	107.8	58.1	5.3	(17.5)	28.9	7.9
Microsoft	35.1	36.0	18.4	40.5	4.9	6.5	8.1	7.0	23.7	30.2	57.8	55.2	65.8	(4.8)	29.9	32.0	6.7	42.1	42.9	13.3
Google	(1.0)	1.9	26.1	16.5	64.7	24.2	6.7	19.0	(35.7)	0.9	10.7	45.1	91.0	(6.3)	(5.4)	10.6	27.8	2.4	40.2	4.9
US Hyperscale subtotal	36.1	48.0	30.4	25.7	29.7	19.9	20.3	(6.5)	(4.4)	(9.4)	(5.9)	25.8	30.5	3.4	30.4	35.3	19.9	(2.2)	36.1	9.3
QoQ (%)	1Q21	2Q21	3Q21	4Q21	1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23	4Q23	1Q24	2019	2020	2021	2022	2023	2024F	2025F
Meta (Facebook)	(7.4)	8.0	(6.5)	24.5	1.3	39.2	23.8	(3.5)	(24.3)	(9.1)	5.3	17.1	(16.5)							
Amazon	(18.5)	18.3	10.2	20.2	(21.0)	5.2	4.2	(31.2)	26.1	(19.4)	8.9	16.9	2.3							
Microsoft	21.9	26.8	(10.0)	0.9	(9.0)	28.7	(8.6)	(0.1)	5.3	35.4	10.9	(1.8)	12.5							
Google	8.5	(7.5)	24.1	(6.4)	53.3	(30.2)	6.6	4.4	(17.2)	9.5	16.9	36.8	9.0							
US Hyperscale subtotal	(5.9)	12.6	6.0	11.8	(2.8)	4.2	6.3	(13.1)	(0.7)	(1.3)	10.4	16.3	3.0							

Source: Company data; Bloomberg; KGI Research

Figure 5: CSP capex growth accelerates to over 30% YoY in 2024F

Capex, US$mn	2019	2020	2021	2022	2023	2024F	2025F
Meta	15,102	15,115	18,567	31,431	27,266	36,769	40,968
Amazon	16,861	35,044	55,396	58,321	48,133	62,051	66,962
Microsoft	13,546	17,592	23,216	24,768	35,202	50,320	57,031
Google	23,548	22,281	24,640	31,485	32,251	45,225	47,461
Baidu	931	738	1,689	1,586	1,687	1,659	1,734
Alibaba	6,517	6,379	8,311	5,014	5,286	6,019	6,241
Tencent	3,927	5,719	4,808	4,611	4,371	5,651	5,490
Hyperscale subtotal	**80,432**	**102,867**	**136,627**	**157,216**	**154,196**	**207,694**	**225,887**
Apple	9,247	8,702	10,388	11,692	9,564	11,464	11,382
IBM	2,286	2,618	2,062	1,346	1,488	1,720	1,934
Oracle	1,591	1,833	3,118	6,678	6,935	9,636	9,965
Paypal	704	866	908	706	759	814	946
eBay	508	463	444	420	455	478	494
Salesforce	643	710	717	798	813	739	821
Netflix	253	498	525	408	349	428	465
Uber	588	616	298	252	238	322	363
Enterprise subtotal	**15,820**	**16,306**	**18,460**	**22,300**	**20,601**	**25,601**	**26,369**
Total	**96,793**	**119,173**	**155,086**	**179,516**	**174,797**	**233,294**	**252,255**
YoY growth, percent	**2019**	**2020**	**2021**	**2022**	**2023**	**2024F**	**2025F**
Meta	8.5	0.1	22.8	69.3	(13.3)	34.9	11.4
Amazon	25.6	107.8	58.1	5.3	(17.5)	28.9	7.9
Microsoft	6.0	29.9	32.0	6.7	42.1	42.9	13.3
Google	(6.3)	(5.4)	10.6	27.8	2.4	40.2	4.9
Baidu	(29.9)	(20.7)	129.1	(6.1)	6.3	(1.6)	4.5
Alibaba	(11.9)	(2.1)	30.3	(39.7)	5.4	13.9	3.7
Tencent	17.0	45.6	(15.9)	(4.1)	(5.2)	29.3	(2.8)
Hyperscale subtotal	**4.0**	**27.9**	**32.8**	**15.1**	**(1.9)**	**34.7**	**8.8**
Apple	(26.7)	(5.9)	19.4	12.6	(18.2)	19.9	(0.7)
IBM	(32.7)	14.5	(21.2)	(34.7)	10.5	15.6	12.4
Oracle	8.4	15.2	70.1	114.2	3.8	38.9	3.4
Paypal	(14.5)	23.0	4.8	(22.2)	7.6	7.1	16.2
eBay	(22.0)	(8.9)	(4.1)	(5.3)	8.2	5.0	3.4
Salesforce	8.1	10.4	1.0	11.3	1.8	(9.1)	11.1
Netflix	45.5	96.8	5.4	(22.3)	(14.5)	22.9	8.7
Uber	5.4	4.8	(51.6)	(15.4)	(5.6)	35.3	12.7
Enterprise subtotal	**(22.0)**	**3.1**	**13.2**	**20.8**	**(7.6)**	**24.3**	**3.0**
Total	**(1.3)**	**23.1**	**30.1**	**15.8**	**(2.6)**	**33.5**	**8.1**

Source: Company data; Bloomberg; KGI Research

Figure 6: CSP enjoy rising cloud sales
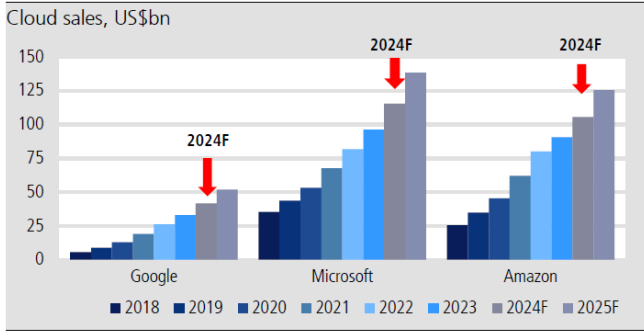
Cloud sales, US$bn

Source: Bloomberg; KGI Research estimates

Figure 7: Major CSP's cloud sales to grow over 10% YoY in 2023-25F

YoY, percent
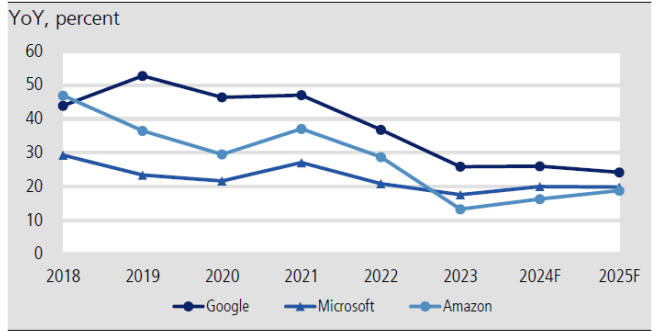
Source: Bloomberg; KGI Research estimates

Figure 8: Training server shipments to grow from 191k units in 2023F to 572k units in 2024F

Global training server shipments, '000 units (LHS); YoY, percent (RHS)
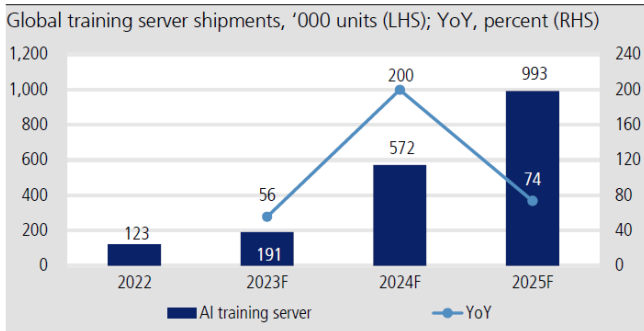
Source: Gartner; KGI Research estimates

Figure 9: AI server training & inference business to boost server revenue growth

Global general & AI server shipments, mn units
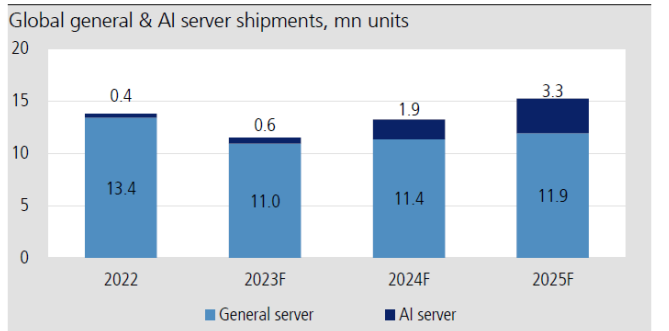
Source: Gartner; KGI Research estimates

Figure 10: AI weighting of server shipments to expand from 5% in 2023F to 22% in 2025F

Shipment weighting, percent
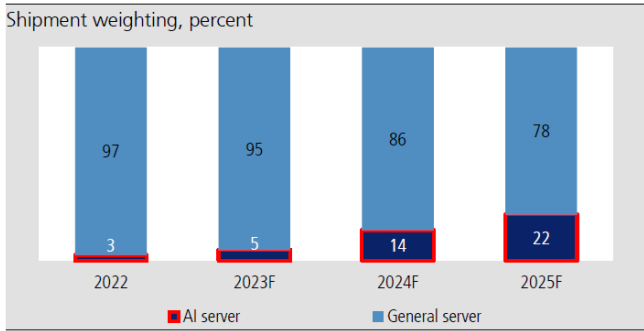
Source: Gartner; KGI Research estimates

Figure 11: AI server sales growth to be higher than that of general server sales in 2023-25F

YoY growth of server shipments, percent
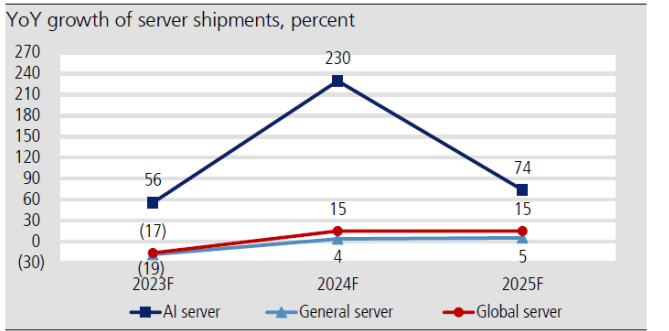
Source: Gartner; KGI Research estimates

Figure 12: Server demand declined in 2023, but will resume growth in 2024-25F

Global server shipments, mn units (LHS); YoY growth, percent (RHS)
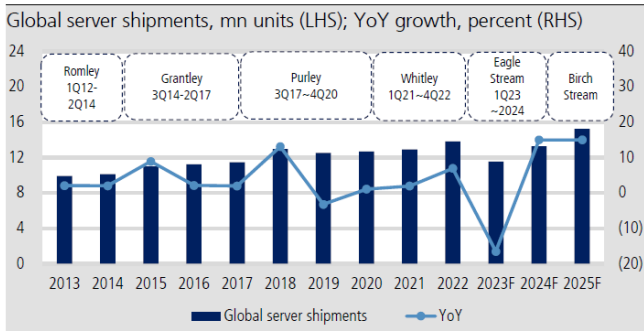
Source: Gartner, KGI Research estimates

Figure 13: Server ASP uptrend on computing performance upgrades & high AI server demand

Global server shipments, mn units (LHS); server ASP, US$ (RHS)
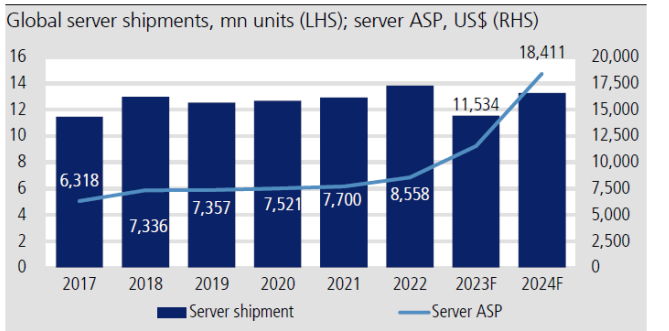
Source: Gartner, KGI Research estimates

Figure 14: Intel to see Eagle Stream penetration increase in 1H24 and new Birch Stream will be launched in 2H24

Platform	Intel Whitley	Intel Eagle Stream	Intel Eagle Stream	Intel Birch Stream	Intel Birch Stream	Intel Birch Stream	Intel Oak Stream
Time of launch	2Q21	1Q23	4Q23	2H24F	2H24F	1H25F	2H25F
CPU	Ice Lake	Sapphire Rapids (Intel 7)	Emerald Rapids (Intel 7)	Sierra Forest (Intel 3, E-core)	Granite Rapids (Intel 3, P-core)	Clearwater Forest (Intel 18A, E-core)	Diamond Rapids (Intel 20A, P-core)
Process	10nm	10nm	10nm++	3nm (equivalent to TSMC's 5nm node)	3nm (equivalent to TSMC's 5nm node)	1.8nm (equivalent to TSMC's 2nm node)	2nm (equivalent to TSMC's 3nm node)
CPU sockets	LGA 4189	LGA 4677	LGA 4677	LGA 7529	LGA 7529	LGA 7529	TBA
CPU cores	26	60	64	288	136	288	TBA
DRAM	8-channel DDR4	8-channel DDR5	DDR5	DDR5	DDR5	TBA	TBA
PCIe	PCIe 4.0	PCIe 5.0	PCIe 5.0	PCIe 5.0	PCIe 5.0	TBA	TBA
CPU TDP	up to 270W	up to 350W	350-400W	up to 500W	up to 500W	TBA	TBA

Source: Company data, KGI Research

Figure 15: AMD to see Genoa and Bergamo CPU penetration increase in 1H24 and will have new Turin CPU introduction in 2H24

Platform	AMD Zen 3	AMD Zen 4	AMD Zen 4c	AMD Zen 4	AMD Zen 5	AMD Zen 6
Time of launch	1Q21	4Q22	1H23	3Q23	2H24F	2H25F
CPU	Milan	Genoa	Bergamo	Siena	Turin	Venice
Process	7nm+	5nm	5nm	5nm	3nm	3nm
CPU sockets	FC LGA 4094	FC LGA 6096	FC LGA 6096	FC LGA 4844	FC LGA 6096	TBA
CPU cores	64	96	128	64	256	TBA
DRAM	8-channel DDR4	12-channel DDR5	DDR5	DDR5	TBA	TBA
PCIe	PCIe 4.0	PCIe 5.0	PCIe 5.0	PCIe 5.0	TBA	TBA
CPU TDP	225-280W	320-400W	320-400W	70-225W	480-600W	TBA

Source: Company data, KGI Research

Valuation

Figure 16: Peers comparison – Valuation

Sector	Company	Ticker	Market cap. (US$mn)	Share price (LCY)	Rating	Target Price (LCY)	EPS (LCY) 2023	EPS (LCY) 2024F	EPS (LCY) 2025F	EPS YoY (%) 2023	EPS YoY (%) 2024F	EPS YoY (%) 2025F	PE (x) 2023	PE (x) 2024F	PE (x) 2025F	PB (x) 2023	PB (x) 2024F	PB (x) 2025F	ROE (%) 2023	ROE (%) 2024F	ROE (%) 2025F	Cash yield (%) 2023	Cash yield (%) 2024F
ODM	Hon Hai	2317 TT	65,655	154.0	Outperform	164.0	10.25	12.16	15.09	0.4	18.6	24.1	15.0	12.7	10.2	1.4	1.3	1.3	9.6	10.8	12.7	3.5	4.2
	Inventec	2356 TT	5,792	52.5	Outperform	62.0	1.71	2.75	3.41	0.0	60.8	24.0	30.7	19.1	15.4	3.1	3.0	2.9	10.2	15.8	18.9	2.9	4.1
	Quanta	2382 TT	31,004	261.0	Outperform	310.0	10.29	13.32	17.70	37.0	29.4	32.9	25.4	19.6	14.7	5.4	5.1	4.8	22.3	26.8	33.6	3.4	4.1
	Wistron	3231 TT	10,211	114.5	Outperform	140.0	4.08	6.03	7.94	1.7	47.8	31.7	28.1	19.0	14.4	3.2	2.8	2.5	11.4	15.4	17.9	2.3	3.3
	Wiwynn	6669 TT	12,232	2,275.0	Outperform	2,600.0	68.88	103.17	133.23	(15.0)	49.8	29.1	33.0	22.1	17.1	9.4	7.3	5.8	29.7	37.4	37.9	1.8	2.5
	Gigabyte Tech	2376 TT	5,640	288.5	Outperform	355.0	7.46	12.38	16.03	(27.5)	66.0	29.5	38.7	23.3	18.0	4.9	4.5	4.1	12.9	20.2	23.9	1.6	2.6
	Asrock	3515 TT	840	224.5	Neutral	270.0	7.54	11.78	12.80	(13.2)	56.2	8.7	29.8	19.1	17.5	3.2	3.2	3.0	11.3	17.1	17.6	3.1	3.5
	Mitac Holdings*	3706 TT	1,655	44.6	Not rated	N.A.	1.48	N.M.	N.M.	(80.9)	N.A.	N.A.	30.1	N.A.	N.A.	0.9	N.A.	N.A.	2.9	N.M.	N.M.	2.9	N.A.
Socket/ Connector/cable	Lotes	3533 TT	4,834	1,410.0	Outperform	1,460.0	49.98	68.13	87.17	(14.9)	36.3	27.9	28.2	20.7	16.2	5.9	5.1	4.4	22.8	27.6	30.5	1.8	2.5
	Fit Hon Teng Ltd*	6088 HK	2,061	2.21	Not rated	N.A.	0.08	0.13	0.20	222.3	70.5	47.4	28.3	16.6	11.3	6.6	6.1	5.6	5.4	10.7	12.2	0.0	0.0
	Argosy*	3217 TT	439	158.5	Not rated	N.A.	8.11	10.70	N.M.	19.3	31.9	N.A.	19.5	14.8	N.A.	3.3	3.1	N.A.	17.9	22.3	N.M.	3.4	5.3
	Alltop	3526 TT	414	227.5	Outperform	260.0	11.68	14.10	16.67	24.1	20.7	18.2	19.5	16.1	13.6	5.3	5.3	5.3	27.4	33.0	38.9	5.1	6.2
Rail kit	King Slide Works	2059 TT	3,517	1,200.0	Outperform	1,500.0	28.38	43.40	56.59	(33.3)	52.9	30.4	42.3	27.6	21.2	7.0	6.0	5.2	16.9	23.4	26.3	1.2	1.9
Thermal module	Sunonwealth	2421 TT	946	112.5	Outperform	155.0	5.16	6.58	7.74	18.9	27.5	17.6	21.8	17.1	14.5	4.2	4.0	3.7	21.5	24.0	26.2	3.1	4.2
	Auras	3324 TT	2,233	821.0	Outperform	920.0	14.28	21.10	32.71	(2.7)	47.8	55.0	57.5	38.9	25.1	15.3	9.5	7.9	20.2	25.5	33.6	0.8	1.1
	AVC	3017 TT	7,333	656.0	Outperform	800.0	14.11	18.44	26.65	19.7	30.7	44.5	46.5	35.6	24.6	11.4	9.9	8.2	28.3	29.2	35.8	1.1	1.4
Heat spreader	Jentech*	3653 TT	4,036	932.0	Not rated	N.A.	16.59	N.M.	N.M.	(15.1)	N.A.	N.A.	56.2	N.A.	N.A.	11.4	N.A.	N.A.	21.9	N.M.	N.M.	1.1	N.A.
BBU	Simplo Tech	6121 TT	2,486	437.0	Neutral	600.0	30.67	33.37	41.58	(21.6)	8.8	24.6	14.2	13.1	10.5	2.3	2.2	2.1	16.7	17.3	20.4	5.0	5.4
	AES-KY	6781 TT	1,642	625.0	Neutral	760.0	23.04	26.03	34.79	(38.8)	13.0	33.7	27.1	24.0	18.0	4.1	3.8	3.4	15.4	16.5	20.1	1.9	2.1
Chassis	Chenbro	8210 TT	1,049	283.0	Outperform	262.0	9.03	12.93	16.15	8.5	43.2	24.9	31.3	21.9	17.5	6.2	5.4	4.7	20.8	26.3	28.8	1.8	2.4
BMC	Aspeed Tech*	5274 TT	3,641	3,130.0	Not rated	N.A.	26.66	45.99	71.24	(52.2)	72.5	54.9	117.4	68.1	43.9	30.9	26.2	21.7	24.2	44.9	57.0	0.6	1.2
Silicon photonics	Land Mark Opto	3081 TT	380	134.5	Neutral	118.0	(2.31)	0.67	7.15	N.M.	N.M.	967.2	N.M.	200.7	18.8	3.2	3.2	3.1	(5.1)	1.6	16.7	0.4	0.4
CCL	Iteq*	6213 TT	1,200	107.5	Not rated	N.A.	1.86	4.94	6.87	(62.3)	165.6	39.0	57.8	21.8	15.7	2.0	1.9	1.9	3.4	9.0	12.0	1.4	2.6
	Elite Material	2383 TT	4,448	421.5	Outperform	590.0	16.35	27.41	31.55	7.3	67.6	15.1	25.8	15.4	13.4	5.4	4.8	4.2	22.5	33.0	33.6	2.4	4.0
ABF	Unimicron Tech	3037 TT	8,349	178.0	Outperform	235.0	7.88	9.45	16.48	(60.8)	19.9	74.4	22.6	18.8	10.8	3.0	2.7	2.4	13.6	15.1	23.4	1.7	2.1
PCB	Gold Circuit	2368 TT	2,972	196.5	Outperform	275.0	7.17	13.20	17.29	(19.1)	84.1	31.0	27.4	14.9	11.4	6.3	5.2	4.1	23.8	38.4	40.5	1.8	2.8
Power	Delta	2308 TT	24,724	309.5	Neutral	297.0	12.86	13.10	15.15	2.2	1.9	15.6	24.1	23.6	20.4	4.1	3.8	3.4	17.5	16.7	17.6	2.1	2.1
	Lite-On Tech	2301 TT	7,171	99.1	Restricted	N.A.	6.75	7.90	9.04	9.0	17.0	14.4	14.7	12.5	11.0	2.6	2.4	2.3	18.2	19.9	21.3	5.0	6.1
	Chicony Power	6412 TT	2,117	172.5	Not rated	N.A.	8.27	10.37	12.32	0.6	25.4	18.8	20.9	16.6	14.0	5.0	4.1	4.0	24.9	27.7	29.0	3.5	3.8
	AcBel Polytech*	6282 TT	1,060	40.0	Not rated	N.A.	0.07	N.M.	N.M.	(94.0)	N.A.	N.A.	571.4	N.A.	N.A.	1.5	N.A.	N.A.	0.3	N.M.	N.M.	1.3	N.A.
Foundry	TSMC	2330 TT	615,735	772.0	Outperform	688.0	32.3	38.15	44.21	(17.5)	18.0	15.9	23.9	20.2	17.5	5.7	4.8	4.0	26.0	25.6	24.9	1.5	1.7
Design service	Alchip Tech	3661 TT	7,647	3,150.0	Outperform	4,900.0	45.5	83.05	113.02	77.0	82.6	36.1	69.3	37.9	27.9	12.0	9.6	7.7	21.0	30.9	33.5	0.7	1.3
	Global Unichip	3443 TT	5,667	1,375.0	Neutral	1,360.0	26.2	27.23	33.55	(5.5)	4.0	23.2	52.5	50.5	41.0	19.0	16.1	13.1	39.5	34.5	35.3	1.0	1.1
IC package/testing	Winway	6515 TT	898	840.0	Outperform	865.0	15.9	34.57	N.A.	(50.7)	117.8	N.A.	52.9	24.3	N.A.	8.2	6.7	N.A.	15.1	30.4	N.A.	1.4	3.0
	Chroma	2360 TT	3,303	252.5	Outperform	322.0	10.9	12.72	N.A.	(10.3)	16.8	N.A.	23.2	19.9	N.A.	4.7	4.4	N.A.	20.7	22.5	N.A.	2.8	3.3
Networking	Luxnet	4979 TT	511	118.0	Underperform	98.0	3.3	4.23	5.51	62.9	26.6	30.3	35.3	27.9	21.4	5.5	4.8	3.9	19.9	17.9	19.3	1.2	1.7
	Accton Tech	2345 TT	8,082	469.0	Outperform	620.0	16.0	19.34	21.94	9.2	21.0	13.4	29.3	24.3	21.4	11.1	9.6	8.4	40.4	42.3	41.7	2.1	2.8

* Bloomberg consensus

Source: Bloomberg; KGI Research estimates

Global server shipments

Figure 17: Global server shipments by brand

Vendor	Server shipments ('000 units)																				
	1Q20	2Q20	3Q20	4Q20	1Q21	2Q21	3Q21	4Q21	1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23	4Q23	2018	2019	2020	2021	2022
Dell EMC	474	433	503	541	489	529	499	548	542	496	526	484	366	362	343	366	2,267	2,050	1,950	2,064	2,048
HPE	323	364	331	373	322	339	316	342	300	269	345	380	252	238	209	212	1,691	1,546	1,392	1,319	1,294
Inspur Electronics	238	365	323	305	231	348	356	388	343	340	348	337	212	285	333	275	1,061	1,131	1,230	1,323	1,368
Lenovo	154	190	161	196	169	202	216	186	126	197	236	216	173	152	160	150	765	755	702	773	775
Supermicro	114	147	111	125	133	157	152	171	171	208	227	217	151	120	116	161	N.A.	N.A.	496	614	823
xFusion Digital Technologies	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	154	120	136	139	144	90	114	105	135	N.A.	N.A.	N.A.	154	539
H3C	55	88	94	108	86	109	129	134	88	109	92	132	73	90	79	96	178	254	345	458	422
Cisco	53	55	60	61	55	48	46	51	40	48	40	31	35	29	36	37	280	279	228	200	160
PowerLeader	18	23	34	44	20	22	27	81	61	60	62	75	47	54	57	65	86	109	119	150	258
Fujitsu	47	42	36	44	41	42	36	31	28	23	33	37	36	26	26	24	223	212	168	150	122
Sugon	63	64	40	42	30	34	48	101	28	36	50	46	29	52	50	55	333	347	209	213	160
Huawei	136	180	190	278	141	82	66	21	8	10	13	20	19	22	25	32	898	746	784	310	50
Others	1,425	1,520	1,261	1,794	1,205	1,457	1,351	1,637	1,488	1,488	1,314	1,691	1,237	1,313	1,318	1,428	6,294	6,065	6,000	5,650	5,981
Others	1,242	1,299	1,035	1,472	1,023	1,333	1,248	1,585	1,452	1,455	1,268	1,634	1,182	1,265	1,267	1,371	5,173	5,107	5,048	5,189	5,808
Total	2,917	3,248	2,919	3,588	2,739	3,245	3,140	3,794	3,307	3,387	3,379	3,754	2,664	2,809	2,805	2,980	12,956	12,537	12,672	12,918	13,827
	YoY (%)																				
Dell EMC	(8.5)	(9.8)	(0.0)	(1.6)	3.1	22.3	(0.9)	1.3	11.0	(6.3)	5.6	(11.7)	(32.6)	(26.9)	(34.8)	(24.2)	10.9	(9.6)	(4.9)	5.8	(0.8)
HPE	(11.3)	(7.2)	(10.8)	(10.7)	(0.2)	(7.1)	(4.6)	(8.3)	(7.1)	(20.6)	9.0	11.2	(16.0)	(11.6)	(39.3)	(44.2)	(7.5)	(8.6)	(10.0)	(5.2)	(2.0)
Inspur Electronics	7.4	39.2	(7.9)	2.6	(3.0)	(4.6)	10.3	27.4	48.8	(2.3)	(2.3)	(13.2)	(38.2)	(16.2)	(4.2)	(18.5)	44.0	6.6	8.8	7.5	3.4
Lenovo	13.7	5.0	(21.0)	(16.4)	9.2	6.0	34.1	(4.9)	(25.4)	(2.4)	9.1	16.2	37.2	(22.7)	(32.3)	(30.6)	22.4	(1.3)	(7.1)	10.1	0.3
Supermicro	N.A.	N.A.	N.A.	N.A.	16.9	7.2	37.7	37.4	28.8	32.2	49.0	26.6	(12.1)	(42.3)	(48.7)	(25.7)	N.A.	N.A.	N.A.	23.8	34.1
xFusion Digital Technologies	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	(6.3)	(25.0)	(15.8)	(24.9)	(6.4)	N.A.	N.A.	N.A.	N.A.	250.5
H3C	34.5	88.7	20.8	21.6	56.6	23.6	36.4	24.3	2.4	0.4	(28.3)	(1.3)	(16.8)	(17.3)	(14.2)	(27.4)	20.2	43.1	35.7	32.6	(7.8)
Cisco	(27.6)	(17.8)	(15.1)	(11.0)	3.5	(12.4)	(23.2)	(15.4)	(27.0)	0.4	(12.4)	(39.5)	(13.4)	(39.4)	(11.7)	18.9	(11.5)	(0.6)	(18.1)	(12.4)	(20.3)
PowerLeader	(19.6)	(17.4)	22.0	44.7	7.7	(3.4)	(19.9)	84.2	206.8	171.3	126.1	(7.2)	(22.6)	(10.6)	(8.2)	(13.3)	10.7	26.4	9.6	25.9	71.4
Fujitsu	(14.8)	(15.8)	(38.3)	(11.0)	(12.8)	1.2	1.1	(29.3)	(30.9)	(44.7)	(8.5)	20.9	28.3	11.3	(20.9)	(35.4)	0.5	(5.1)	(20.6)	(10.7)	(18.7)
Sugon	(39.1)	(49.2)	(26.5)	(33.9)	(52.6)	(46.4)	19.3	137.8	(5.0)	6.0	3.9	(54.7)	4.8	43.2	(0.9)	20.3	16.4	4.3	(39.8)	1.9	(24.8)
Huawei	(17.3)	48.7	(1.8)	4.0	3.7	(54.6)	(65.0)	(92.4)	(94.4)	(88.1)	(80.9)	(6.4)	139.9	124.8	94.1	63.7	21.9	(16.9)	5.0	(60.4)	(83.9)
Others	4.4	21.4	(5.3)	(15.3)	(15.4)	(4.2)	7.1	(8.7)	23.4	2.1	(2.7)	3.3	(16.8)	(11.8)	0.3	(15.6)	16.7	(3.6)	(1.1)	(5.8)	5.9
Others	8.4	20.1	(4.1)	(18.2)	(17.6)	2.7	20.6	7.6	41.9	9.1	1.6	3.1	(18.6)	(13.1)	(0.1)	(16.1)	16.7	(1.3)	(1.2)	2.8	11.9
Total	2.6	14.6	(2.4)	(7.2)	(6.1)	(0.1)	7.6	5.7	20.7	4.4	7.6	(1.1)	(19.4)	(17.1)	(17.0)	(20.6)	13.1	(3.2)	1.1	1.9	7.0
	QoQ (%)																				
Dell EMC	(13.7)	(8.8)	16.3	7.5	(9.6)	8.3	(5.8)	9.9	(1.0)	(8.6)	6.2	(8.1)	(24.4)	(1.0)	(5.2)	6.8					
HPE	(22.6)	12.8	(9.1)	12.6	(13.6)	5.0	(6.7)	8.2	(12.4)	(10.2)	28.1	10.4	(33.9)	(5.4)	(12.1)	1.4					
Inspur Electronics	(20.0)	53.5	(11.5)	(5.6)	(24.3)	51.0	2.3	9.0	(11.6)	(0.9)	2.3	(3.2)	(37.1)	34.4	17.0	(17.5)					
Lenovo	(34.0)	23.2	(15.2)	21.3	(13.8)	19.5	7.3	(14.0)	(32.3)	56.3	20.0	(8.4)	(20.1)	(11.9)	5.0	(6.1)					
Supermicro	N.A.	29.1	(24.7)	12.6	6.8	18.4	(3.3)	12.4	0.1	21.5	9.0	(4.6)	(30.5)	(20.3)	(3.0)	38.3					
xFusion Digital Technologies	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	(22.0)	13.1	2.8	3.3	(37.6)	26.9	(8.3)	28.7					
H3C	(37.9)	59.6	7.6	14.1	(20.1)	26.0	18.7	3.9	(34.1)	23.5	(15.2)	43.1	(44.5)	22.9	(12.1)	21.1					
Cisco	(22.7)	4.2	8.5	1.8	(10.1)	(11.7)	(4.9)	12.1	(22.4)	21.3	(17.0)	(22.7)	11.1	(15.0)	21.0	4.2					
PowerLeader	(39.8)	24.7	49.4	29.0	(55.2)	11.8	23.9	196.9	(25.4)	(1.2)	3.2	21.8	(37.8)	14.3	6.0	15.0					
Sugon	(2.7)	2.0	(36.7)	5.3	(30.3)	15.3	40.9	109.9	(72.1)	28.6	38.1	(8.4)	(35.6)	75.9	(4.4)	11.1					
Others	(32.7)	6.7	(17.1)	42.3	(32.8)	20.9	(7.3)	21.2	(9.1)	0.0	(11.7)	28.8	(26.8)	6.1	0.4	8.4					
Total	(24.6)	11.4	(10.1)	22.9	(23.7)	18.5	(3.2)	20.8	(12.8)	2.4	(0.2)	11.1	(29.0)	5.4	(0.1)	6.2					
	Global market share (%)																				
Dell EMC	16.3	13.3	17.2	15.1	17.8	16.3	15.9	14.4	16.4	14.6	15.6	12.9	13.7	12.9	12.2	12.3	17.5	16.4	15.4	16.0	14.8
HPE	11.1	11.2	11.4	10.4	11.8	10.4	10.1	9.0	9.1	7.9	10.2	10.1	9.4	8.5	7.5	7.1	13.1	12.3	11.0	10.2	9.4
Inspur Electronics	8.1	11.2	11.1	8.5	8.4	10.7	11.3	10.2	10.4	10.0	10.3	9.0	8.0	10.1	11.9	9.2	8.2	9.0	9.7	10.2	9.9
Lenovo	5.3	5.9	5.5	5.5	6.2	6.2	6.9	4.9	3.8	5.8	7.0	5.8	6.5	5.4	5.7	5.0	5.9	6.0	5.5	6.0	5.6
Supermicro	3.9	4.5	3.8	3.5	4.9	4.9	4.9	4.5	5.2	6.1	6.7	5.8	5.7	4.3	4.2	5.4	N.A.	N.A.	3.9	4.8	6.0
xFusion Digital Technologies	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	4.1	3.6	4.0	4.1	3.8	3.4	4.1	3.7	4.5	N.A.	N.A.	N.A.	1.2	3.9
H3C	1.9	2.7	3.2	3.0	3.1	3.3	4.1	3.5	2.7	3.2	2.7	3.5	2.8	3.2	2.8	3.2	1.4	2.0	2.7	3.5	3.1
Cisco	1.8	1.7	2.0	1.7	2.0	1.5	1.5	1.4	1.2	1.4	1.2	0.8	1.3	1.0	1.3	1.2	2.2	2.2	1.8	1.5	1.2
PowerLeader	0.6	0.7	1.2	1.2	0.7	0.7	0.9	2.1	1.8	1.8	1.8	2.0	1.8	1.9	2.0	2.2	0.7	0.9	0.9	1.2	1.9
Sugon	2.1	2.0	1.4	1.2	1.1	1.1	1.5	2.7	0.9	1.1	1.5	1.2	1.1	1.8	1.8	1.8	2.6	2.8	1.7	1.6	1.2
Others	48.8	46.8	43.2	50.0	44.0	44.9	43.0	43.2	45.0	43.9	38.9	45.1	46.4	46.7	47.0	47.9	48.6	48.4	47.3	43.7	43.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Gartner, KGI Research

All the above named KGI analyst(s) is SFC licensed person accredited to KGI Asia Ltd to carry on the relevant regulated activities. Each of them and/or his/her associate(s) does not have any financial interest in the respectively covered stock, issuer and/or new listing applicant.