650 GROUP
MARKET INTELLIGENCE RESEARCH

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AI Networking: What do scaleup and scaleout really mean for networking demand

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Setting the Stage for AI/ML

AI Waves

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Wave 1
Academic Research

- Pre 2022
- <$10B in equipment spend

Wave 2
Foundational Models and Content Creation

- 2022 - 2025
- $300B in equipment spend

What is $1T of equipment spend to support AI really mean?

- $1T = ~$1M a minute in spend
- 300 DC Switch ports shipping a minute
- 200,000 Tb of bandwidth shipping each minute

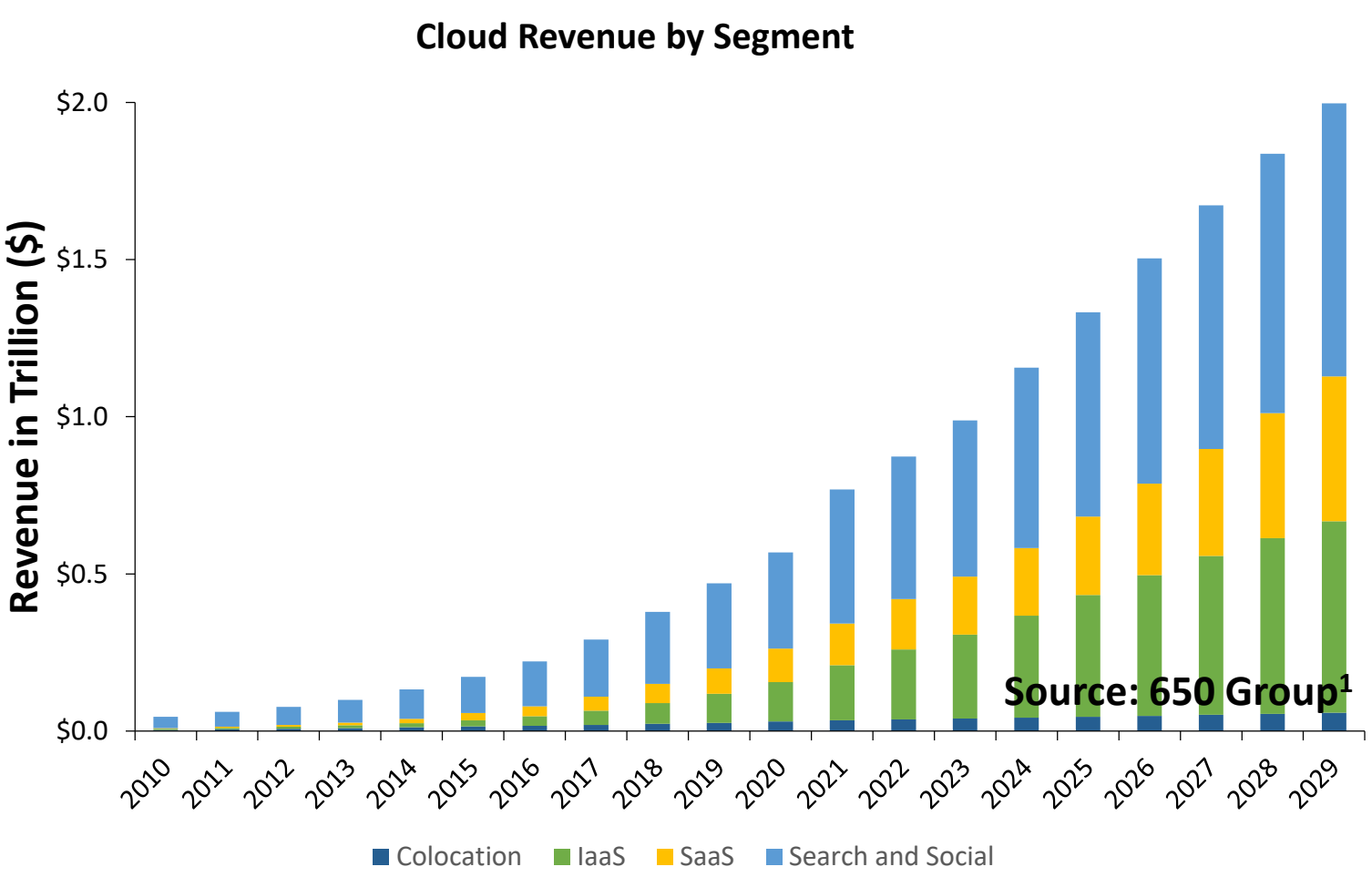
Wave 3
AI Agents

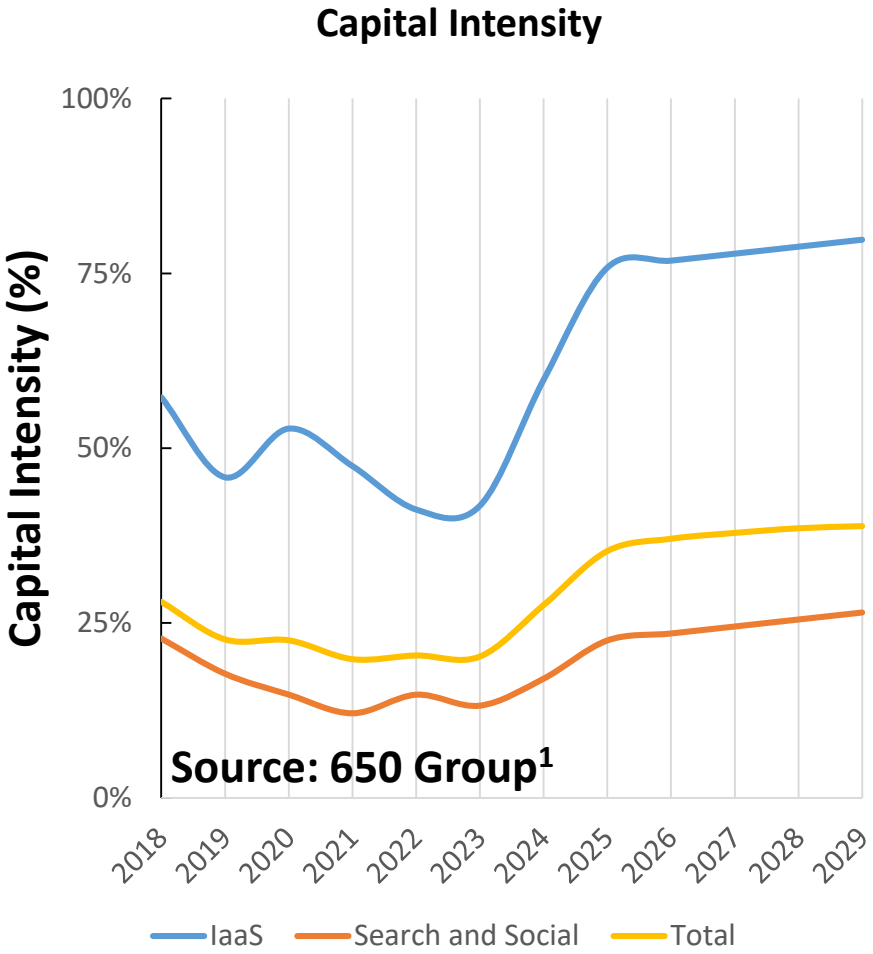
- 2025-2028
- ~$1T in equipment spend

Wave 4
Autonomous Transportation and Robots

- 2027-2035
- >~1T in equipment spend

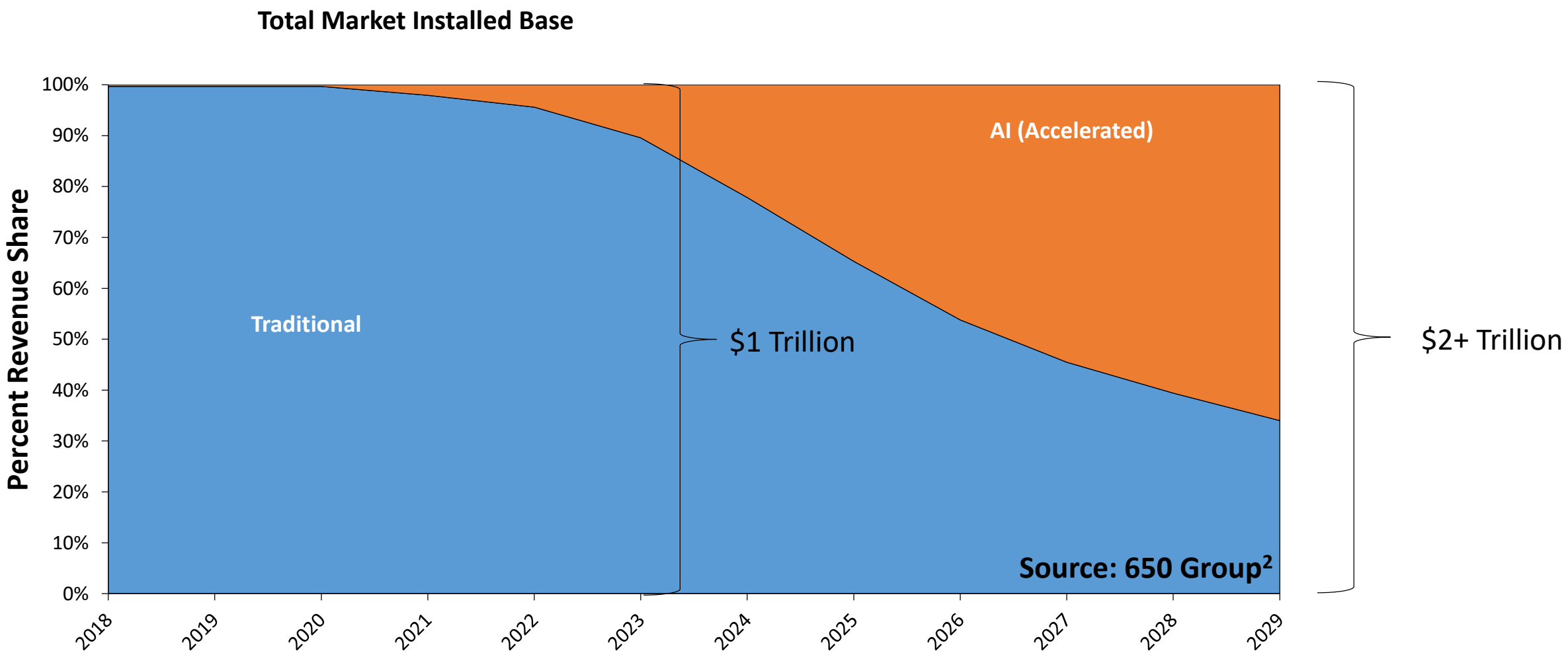
Cloud Report: Capital Intensity





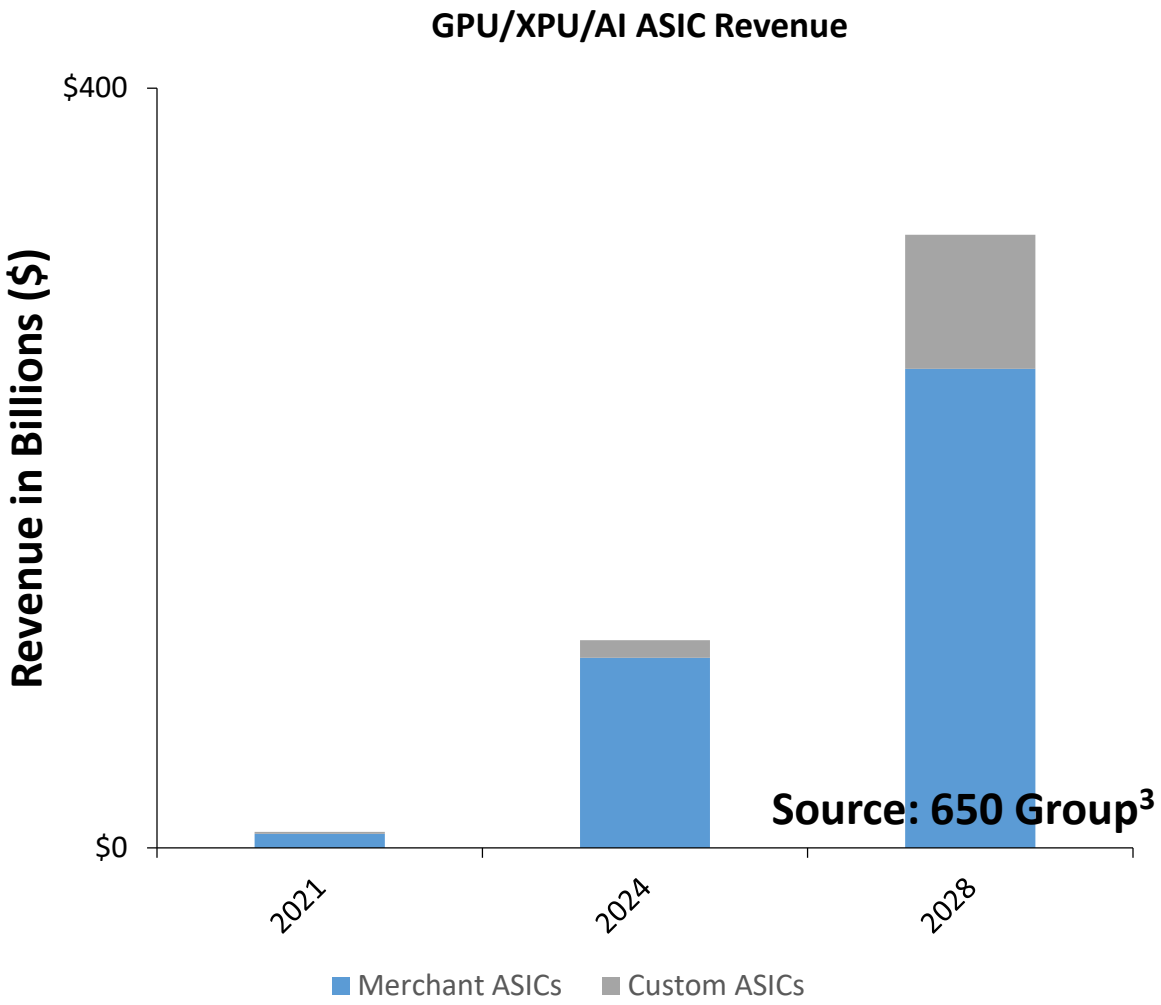
*Using Cloud CAPEX to exclude things like Amazon warehouses, Apple manufacturing, and Google's Waymo

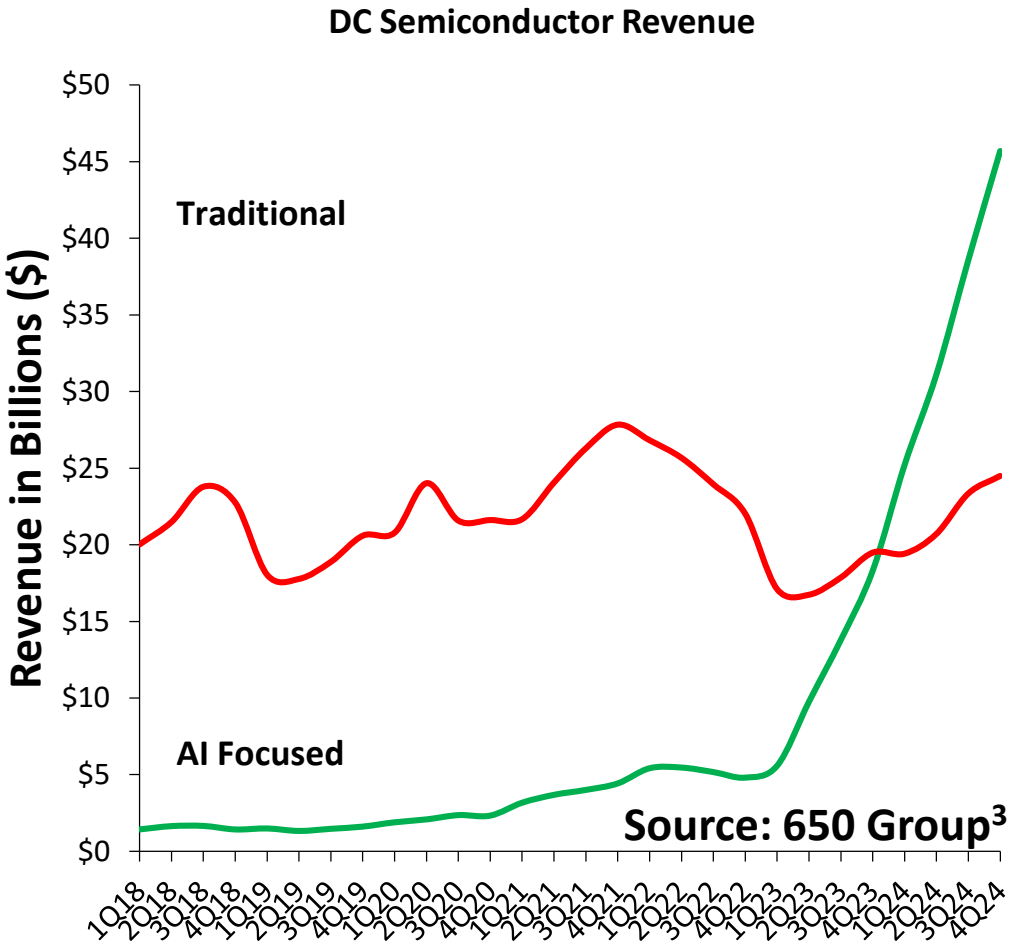
Total Data Center (IT) Equipment: Total Market Installed Base



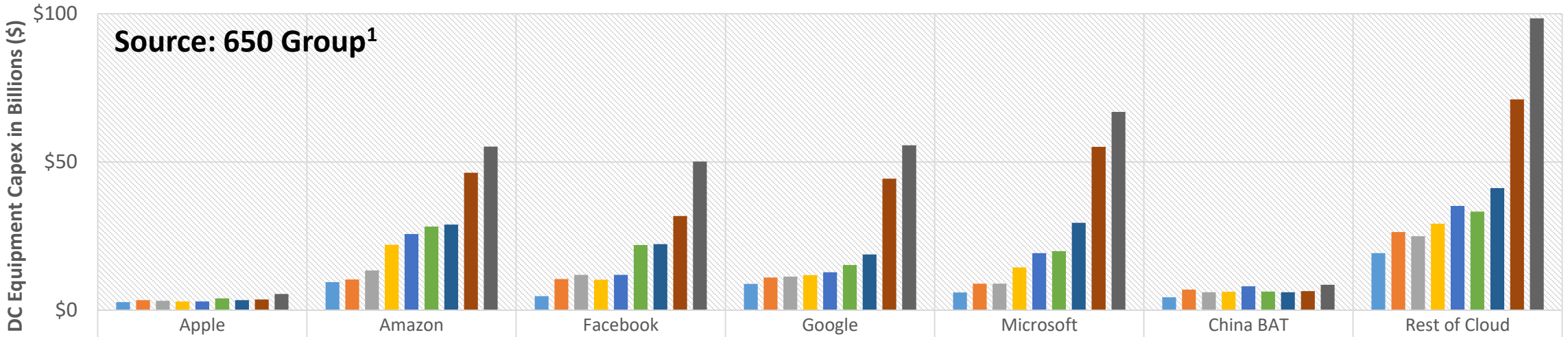
*Including Compute, Storage, and Networking. Excluding Security, ADCs, and Cabling

DC Semiconductors: GPU/ASIC Growth is Significant





Cloud Report:
DC Equipment CAPEX



	Apple	Amazon	Facebook	Google	Microsoft	China BAT	Rest of Cloud
2017	$2,702	$9,476	$4,692	$8,860	$5,952	$4,362	$19,251
2018	$3,360	$10,310	$10,493	$10,980	$8,947	$6,947	$26,321
2019	$3,120	$13,385	$11,875	$11,296	$8,902	$6,014	$24,933
2020	$2,948	$22,084	$10,285	$11,795	$14,436	$6,203	$29,186
2021	$2,952	$25,707	$11,880	$12,811	$19,272	$8,049	$35,144
2022	$3,996	$28,219	$21,961	$15,252	$19,906	$6,264	$33,241
2023	$3,375	$28,867	$22,287	$18,828	$29,434	$6,060	$41,169
2024	$3,636	$46,367	$31,776	$44,365	$55,096	$6,400	$71,133
2025E	$5,467	$55,174	$50,135	$55,634	$66,898	$8,600	$98,501

Meta CAPEX:
DC Equipment CAPEX

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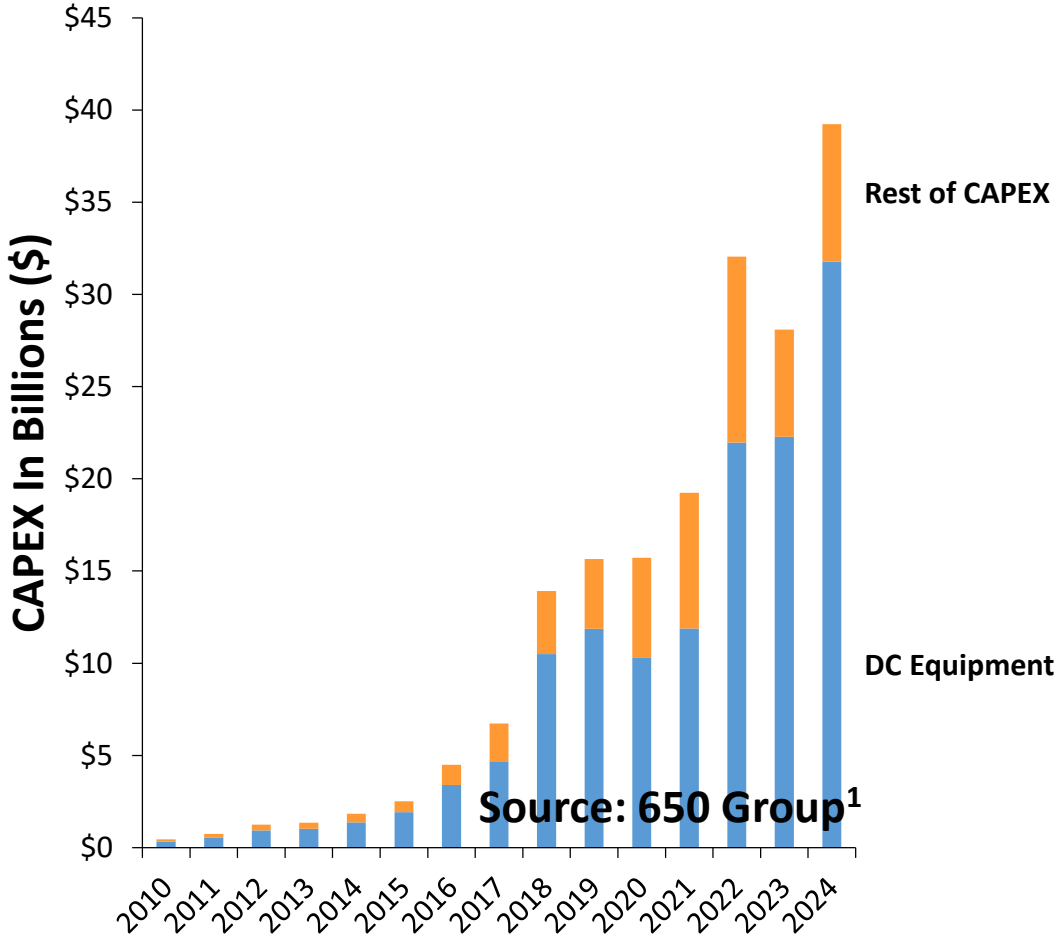
Meta's CAPEX Contribution



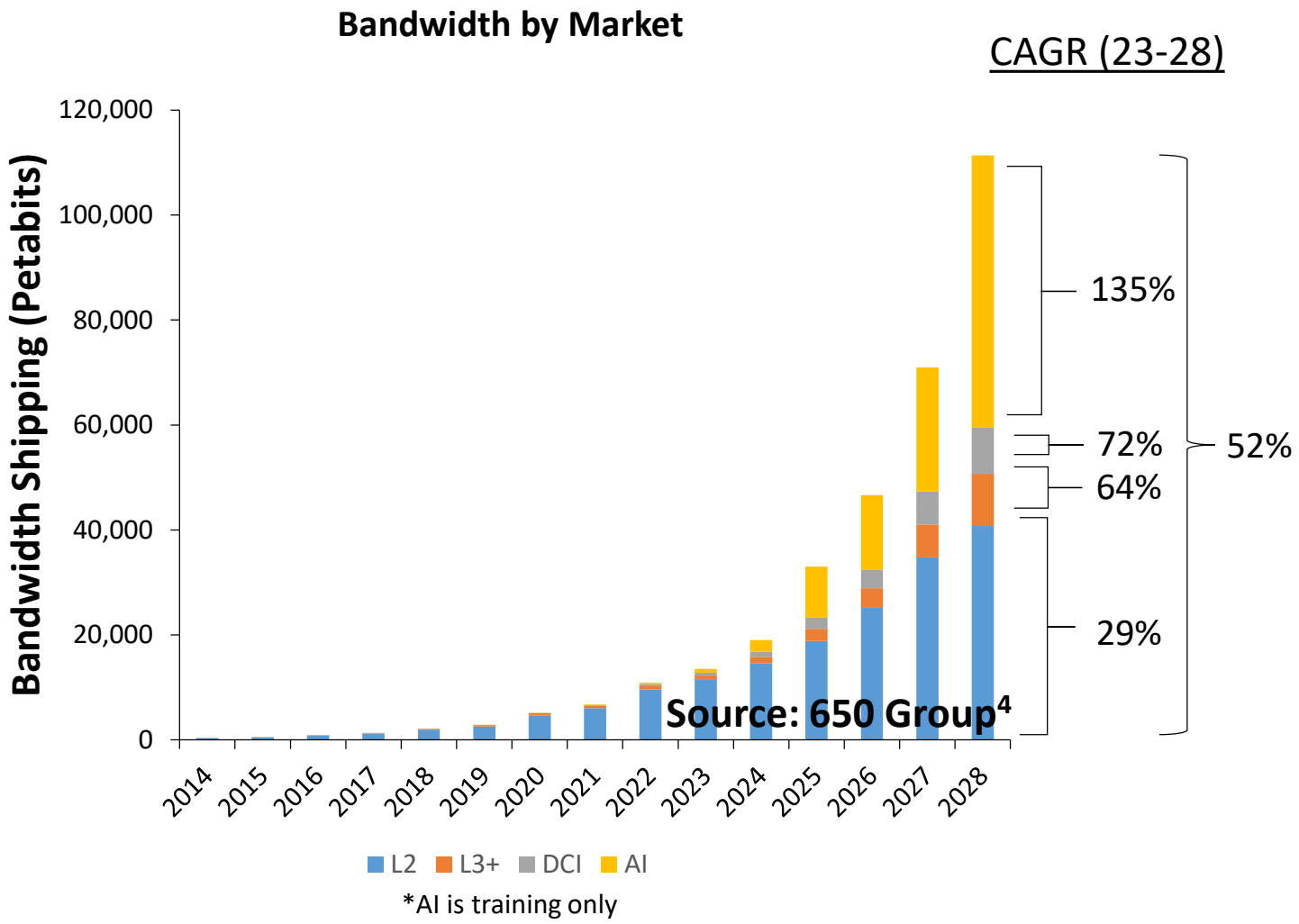
Meta Company CAPEX Guide vs. Reality

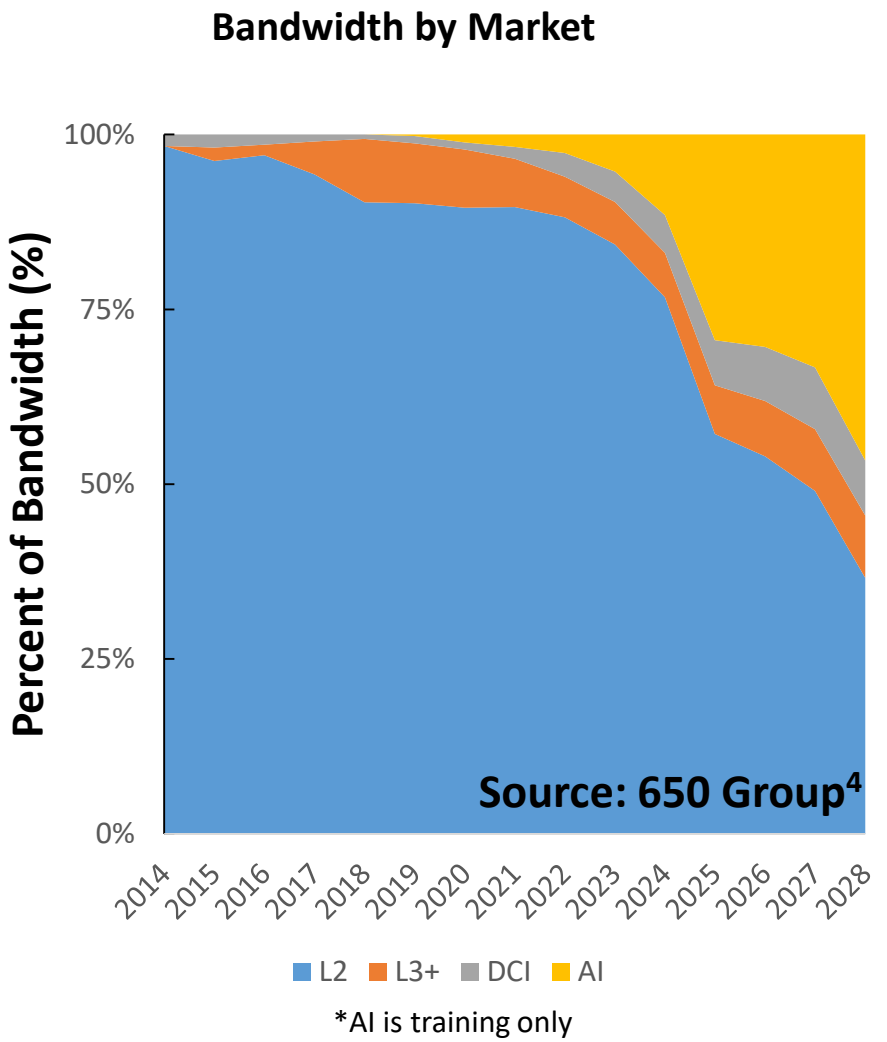
	Original Guide	Final	Miss (Peak)
2019	$19 B	$15.6 B	-18%
2020	$17-19 B	$15.7 B	-17%
2021	$21-23 B	$19.2 B	-18%
2022	$29-34 B	$32 B	~correct
2023	$34 B	$28.1 B	-17%
2024 E	$30-37 B	$39.2	+6%

*Facebook historically guides much higher than final yearly CAPEX number.

Ethernet Switch - Data Center

Merchant Silicon – Data Center Switching: Bandwidth Shipping by SERDES speed





End Markets – Data Center Networking: : AI and HPC Networking Transitions

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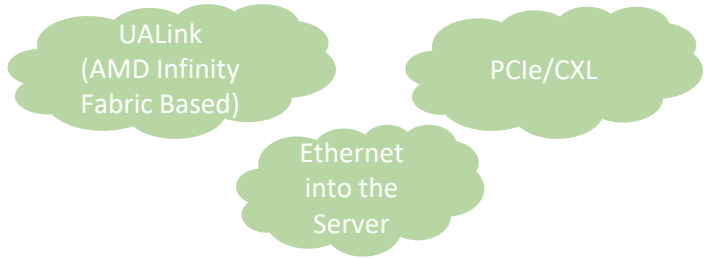
2022 (x56) -> 2024 (x112) Traditional Cloud Server			
Location	Bandwidth	Technology	Cabling
NIC	25-100G	Ethernet	DAC
Top-of-Rack	100-400G	Ethernet	DAC
Aggregation	100-400G	Ethernet	Fiber

2024 (x56) -> 2024 (x112) Nvidia AI Cloud Server			
Location	Bandwidth	Technology	Cabling
NIC	400-800G	Ethernet	DAC/Active Copper
Top-of-Rack	400-800G	Ethernet	DAC/Active Copper
Aggregation	400-800G	Ethernet	Fiber
NIC	400G-3.2T	InfiniBand	DAC/Active Copper
Top-of-Rack	400G-3.2T	InfiniBand	DAC/Active Copper
Aggregation	400G-3.2T	InfiniBand	Fiber
Embedded	400-900G	NVLink	Copper
Switch	400-900G	NVLink	Rack – Copper Fiber – Multi-rack

2022 (x56) -> 2024 (x112) Ethernet AI Cloud Server			
Location	Bandwidth	Technology	Cabling
NIC	400-800G	Ethernet	DAC/Active Copper
Top-of-Rack	400-800G	Ethernet	DAC/Active Copper
Aggregation	400-800G	Ethernet	Fiber
NIC	400G-3.2T	Ethernet	DAC/Active Copper
Top-of-Rack	400G-3.2T	Ethernet	DAC/Active Copper
Aggregation	400G-3.2T	Ethernet	Fiber



Source: 650 Group[4]

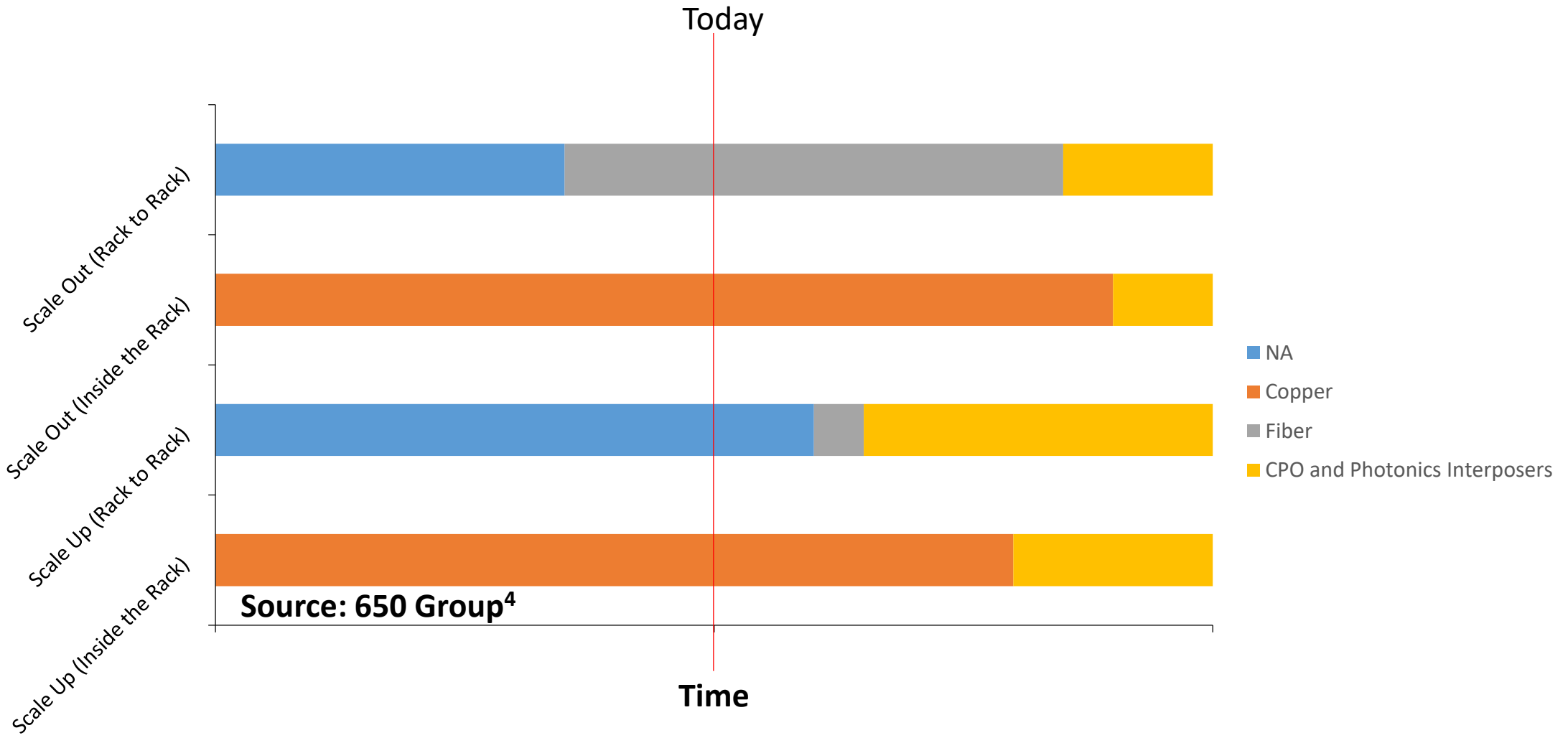
Frontend (External) (1X)

Backend (Internal Scale-Out) (10 X)

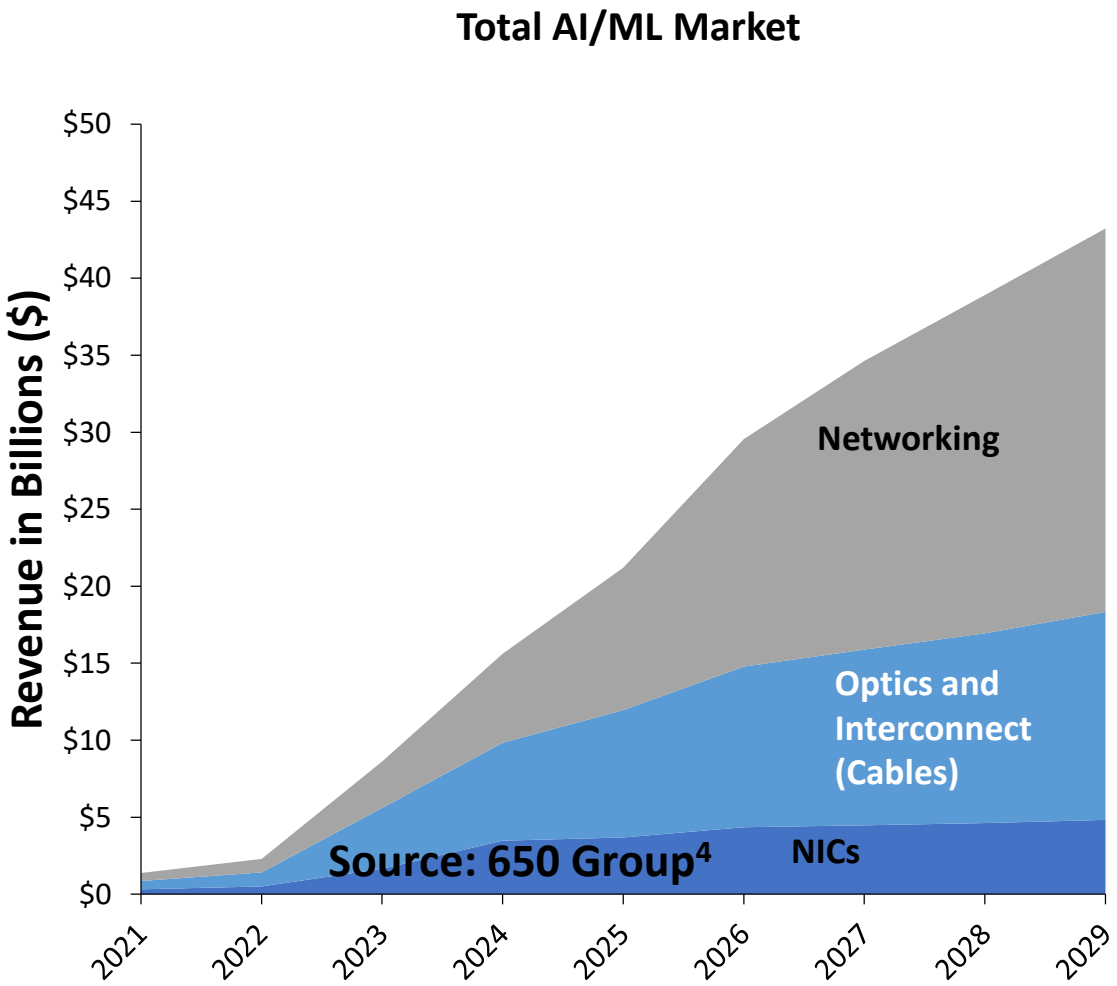
Backend (Internal Scale-Up) (100X)

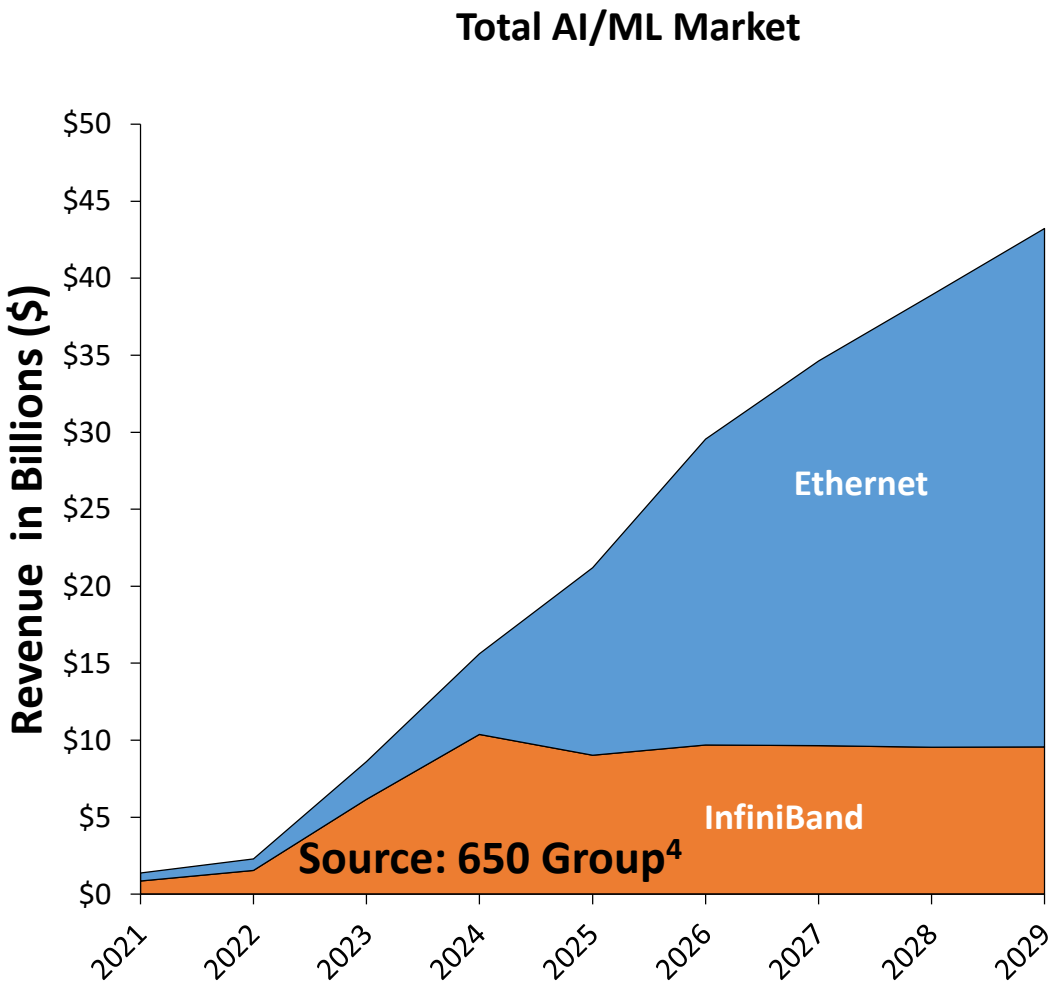
*Optimal fiber required

End Markets – Data Center Networking: : AI and HPC Networking Transitions



Ethernet Switch – Data Center: Total Market Revenue





Ethernet Switch – Data Center: AI Networking Market Revenue

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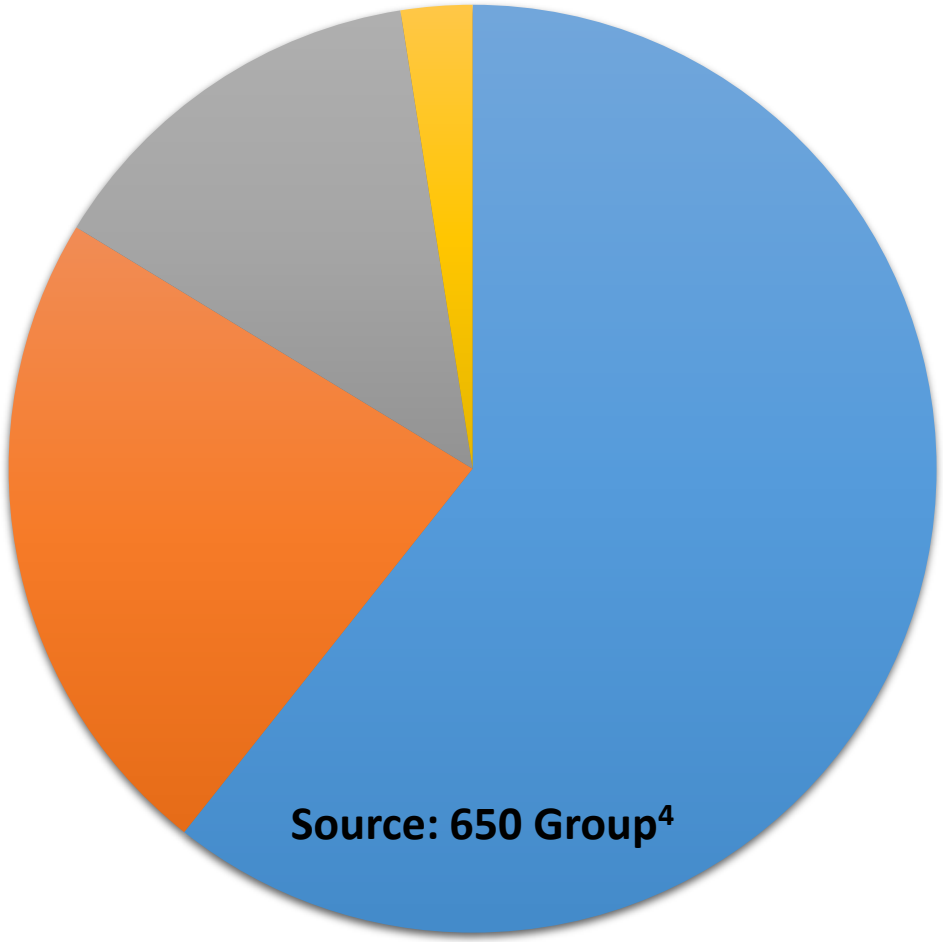
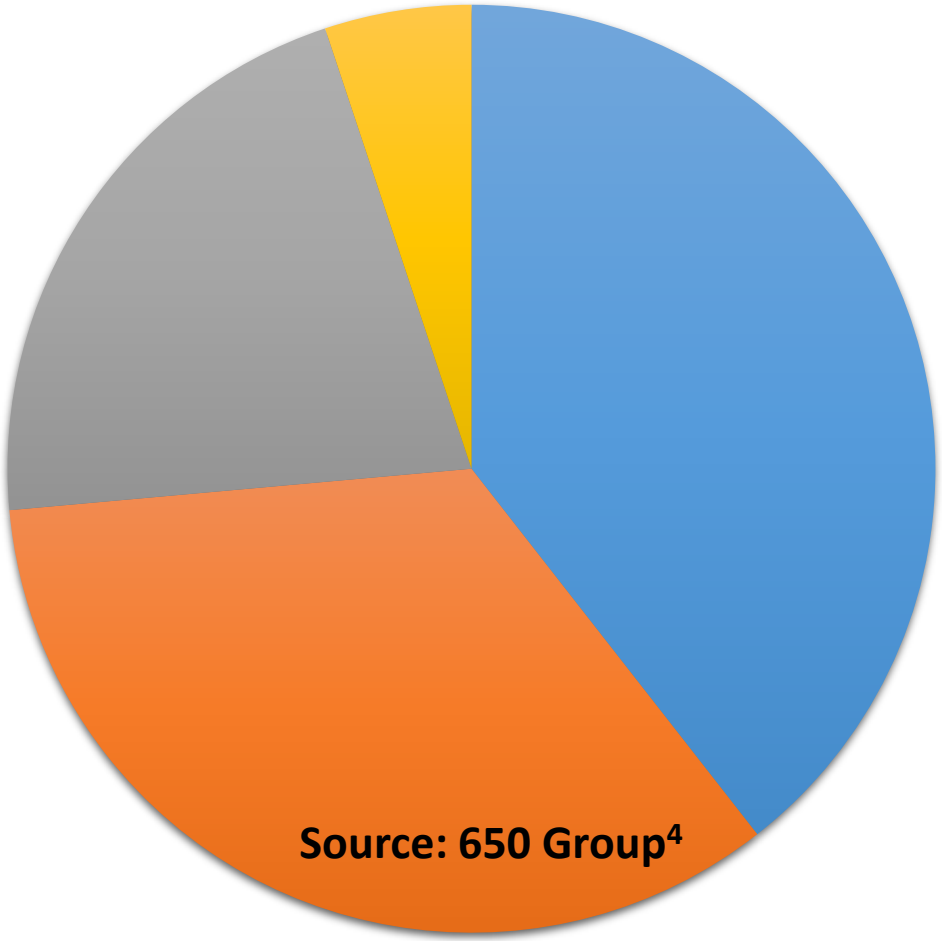
2023 - $8.6B



Hyperscaler Rest of Cloud Enterprise SP

2029 - $43.2B



Hyperscaler Rest of Cloud Enterprise SP

Ethernet Switch – Data Center: AI/ML Port Speeds and SERDES Shipments

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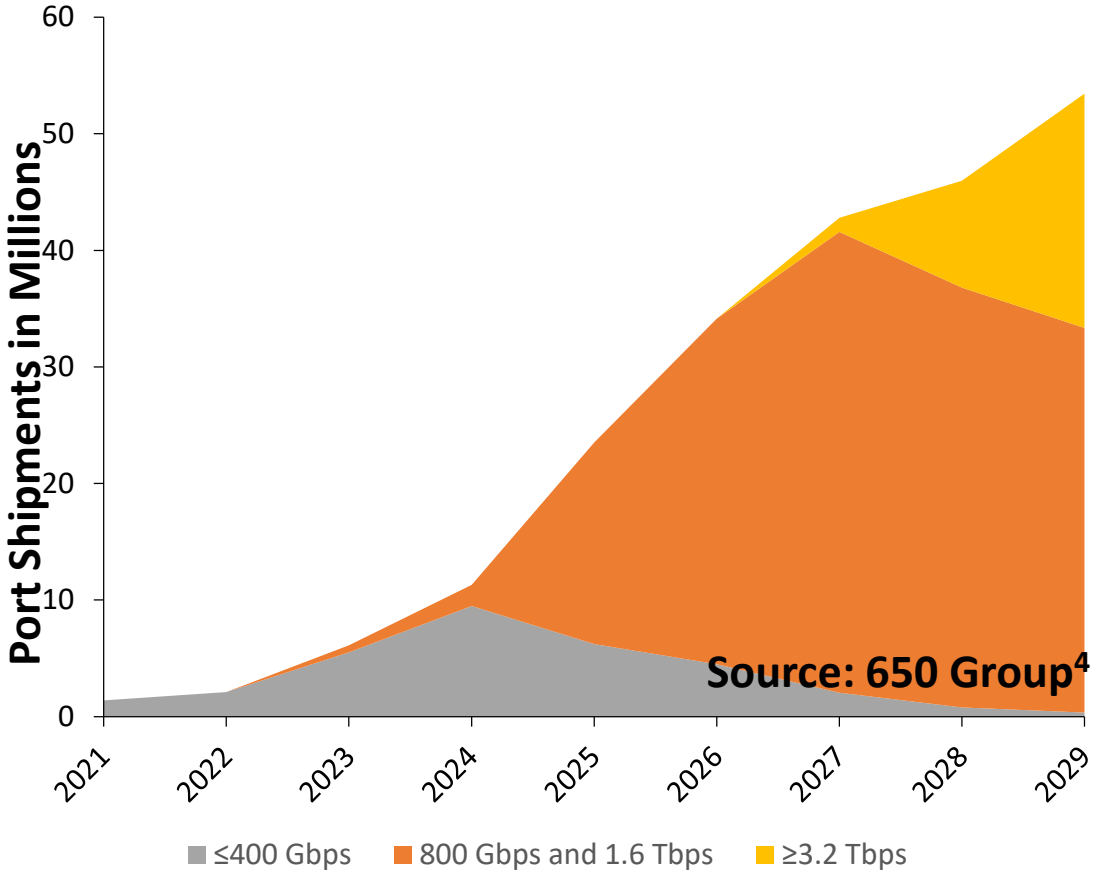
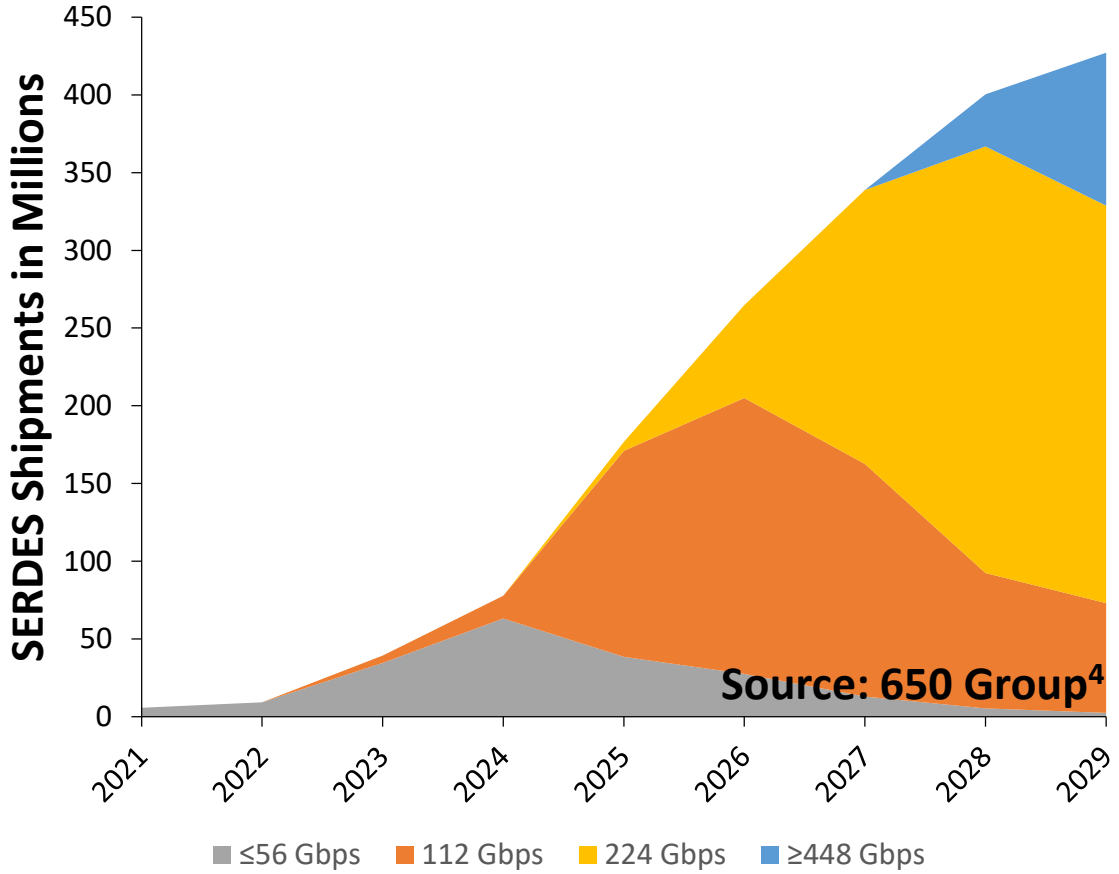
Ethernet AI/ML

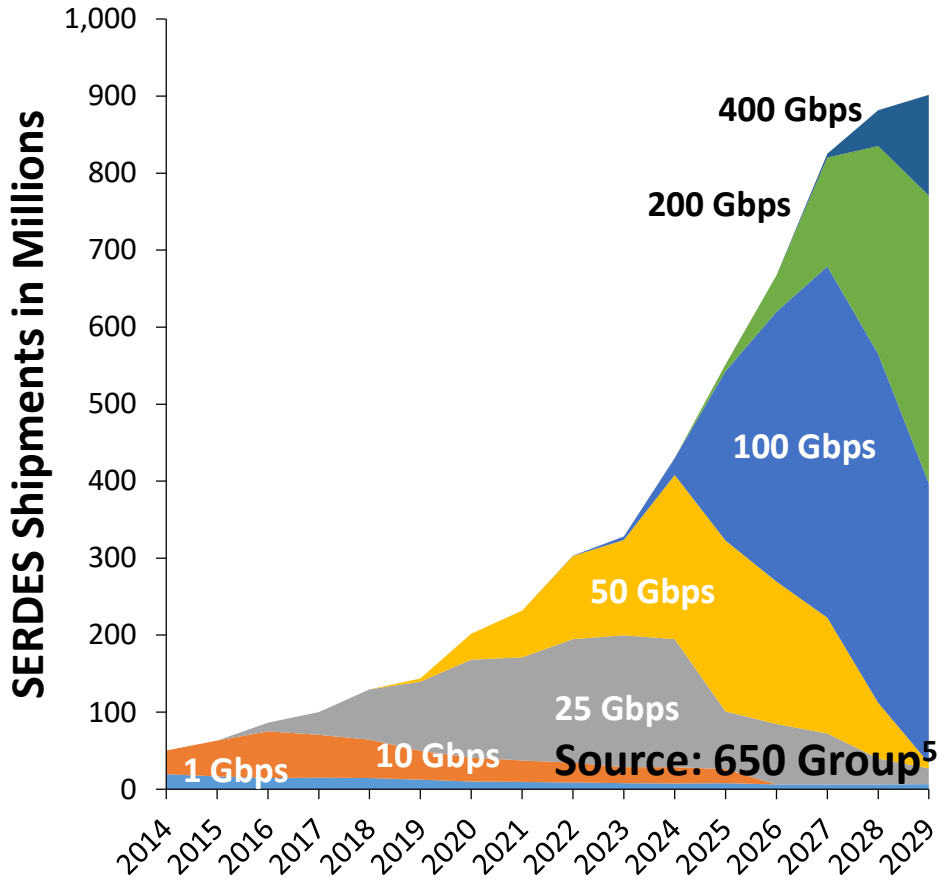


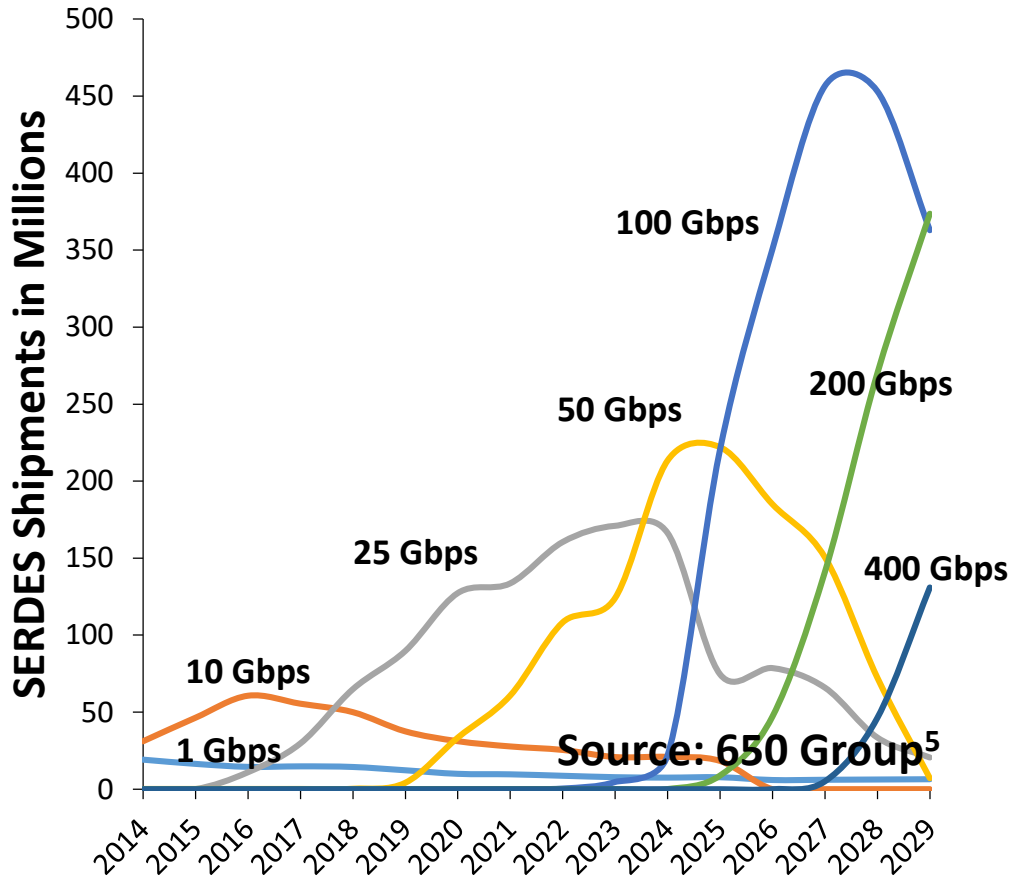
Ethernet AI/ML SERDES Shipments



Merchant Silicon – Data Center Switching

Merchant Silicon – Data Center Switching: Total SERDES Shipments





Merchant Silicon – Data Center Switching: ASIC Usage in the Tier 1 Cloud

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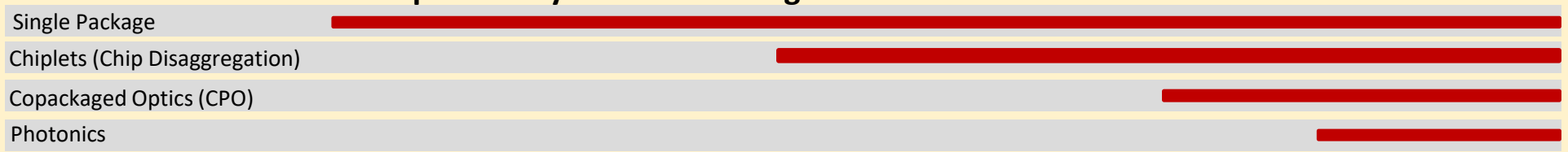
Merchant Silicon's product cycles accelerating in the Cloud



ASIC Size	Process Node	SERDES Technology	Leaf Port Speed	Spine/Core Port Speed
1.3 Tbps	65/40nm	10 Gbps	10 Gbps	10/40 Gbps
3.2 Tbps	28nm	25 Gbps	25/50 Gbps	100 Gbps
6.4 Tbps	16nm	25 Gbps	25/50 Gbps	100 Gbps
12.8 Tbps	16nm	50 Gbps	50/100 Gbps	200/400 Gbps
25.6Tbps	7nm	100 Gbps	100/200 Gbps	200/400 Gbps
51.2 Tbps	5nm	100 Gbps	400/800 Gbps	400/800 Gbps
102.4 Tbps	3nm	200 Gbps	800 G / 1.6 T	1.6 Tbps
204.8 Tbps	2nm	400 Gbps	1.6 T / 3.2 T	3.2 Tbps

Source: 650 Group[5]

- Two waves of 1.6 Tbps
  - 16 X 100 Gbps
  - 8 X 200 Gbps

- Pace of Innovation Increasing
  - Three major silicon cycles in five years
  - Some technologies will get orphaned

2025 to 2028 Data Center Switch Stats

2025	Volume/Size
Yearly Switch Port Volume	110-120 M
DC Switch Installed Base	400+ M
Switch Size	51.2T
Power per Rack	100 kW

2028	Volume/Size
Yearly Switch Port Volume	160+ M
DC Switch Installed Base	700+ M
Switch Size	204.8T
Power per Rack	1 MW

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Thank You!

Sources:
1. 4Q24 Cloud Revenue and CAPEX Report
2. 4Q24 DC Switching, Server, and Storage Reports
3. 4Q24 DC Semis Report
4. 4Q24 AI Networking (Ethernet and InfiniBand) Report
5. 4Q24 Networking Merchant Silicon Report

Methodology: We gather public information about companies, perform detailed analyses of products and services, and then calculate and present market share comparisons in our syndicated publications.