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U.S. Internet, Hardware & Semiconductors

A Closer Look At Mega-Cap Internet Capex & Depreciation Trends

INDUSTRY UPDATE

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U.S. Internet
Ross Sandler
+1 415 263 4470
ross.sandler@barclays.com
BCI, US

U.S. Semiconductors
Blayne Curtis
+1 617 342 4101
blayne.curtis@barclays.com
BCI, US

IT Hardware and Communications Equipment
Tim Long
+1 212 526 4043
tim.long@barclays.com
BCI, US

Brendan Lynch, CFA
+1 212 526 9428
brendan.lynch@barclays.com
BCI, US

U.S. Software
Raimo Lenschow, CFA
+1 212 526 2712
raimo.lenschow@barclays.com
BCI, US

Internet Key Take-Away: Capex Still Running Hot In 2022: Mega cap internet companies are having a harder time forecasting their business than in prior time periods given all the distortions in consumer behavior (mostly in favor of digital) since the beginning of the pandemic. In light of these trends, it looks to us like the largest technology players in the world are "spending through it" to make sure they have enough capacity to handle any conditions, and likely a little catch-up related spend. Based on recent disclosures, it looks like mega cap technology capex is likely to grow around 40% in 2022. Gross PP+E for categories that we think represent servers and network equipment increased 20%-35% in 2021 and appear to be ramping at a similar clip in 2022, the remaining capex from other areas. Hyperscale players are also stretching out the useful life of compute assets which is padding margins, and likely prolonging some of the capex. Outside of AMZN, we think 2022 is likely to be a year of somewhat heavy margin contraction after a strong over-earn period in 2021 (at GOOG/FB).

What Capex Trends Say About Semis in 2022: Even after a robust '20/21, we see multiple drivers spurring additional growth through '23 and potentially '24 as hyperscale companies upgrade after a period of capacity digestion in 2019. This was a function of delays in spending due to Intel's roadmap issues and a slower transition to nexgen optical interconnects. One area driving much of the growth in the Data Center is AI, where workloads continue to increase across nearly every vertical, creating a cycle of investment as the transition to digital technologies generates an exponential amount of data in new areas. While much of the semiconductor market is facing a cyclical correction, we believe the Data Center should continue to grow, which makes this area our favorite end market this year.

What Cloud Capex Trends Say About IT Hardware: The Cloud market has been a focal point for the networking stocks, now representing ~20% of revenues for the group. ANET, JNPR and CIEN are most exposed to the large cloud players, and CSCO is ramping faster in the vertical. Each company is seeing outsized order growth, partially because of component supply, but also based on growing bandwidth needs. We are OW on CSCO, JNPR, CIEN and EW on ANET.

Growing Data Volume, Growing DC Capex: Data center operators have steadily increased capex to keep pace with data storage needs (IDC projects a 19.2% CAGR from 2020-2025). Several of the largest contracts in the 20-year history of the industry were signed in 2H21, indicating demand remains strong. DC construction and operations have gained efficiencies overtime resulting in deflationary pricing; we anticipate demand will remain strong, but pricing competitive in 2022.

Overall Hyperscale Capex Growth Rates In 2022 Look Solid

Large cap technology players are increasing their capex just shy of 40% in 2022 based on preliminary guidance and our estimates. Some of this capex is likely directed at land, construction in progress, and office space following two years of WFH, but a huge percentage for each company is also likely for network equipment and servers.

For AMZN, mid 40%'s reflects re-acceleration in AFN unit volumes but lapping some heavy retail build post-pandemic, combined with low-to-mid 40%'s usage growth at AWS. GOOGL is seeing steady engagement across its various O+O properties, likely in the low-to-mid-teens growth range, and is also seeing well north of 40% growth at GCP and still acquiring businesses. Finally, FB is cranking up its capex on the ad system rebuild, steady albeit low engagement growth across its O+O apps, and heavy double-down at Reality Labs (we don't think FB is likely to maintain its current capex growth rate beyond 2022 given the slowing engagement at Blue).

FIGURE 1

Capex Plans For 2022 Look Robust In Mega Cap Tech

($bn)	2018	2019	2020	2021	2022E
AMZN	26.4	29.1	52.6	73.7	106.9
% Y/Y Growth		*10%*	*81%*	*40%*	*45%*
% of Gross Profit	*28%*	*25%*	*34%*	*37%*	*44%*
GOOGL	25.1	23.5	22.3	24.6	30.0
% Y/Y Growth		*(6%)*	*(5%)*	*11%*	*22%*
% of Gross Profit	*33%*	*26%*	*23%*	*17%*	*17%*
MSFT	11.6	13.9	15.4	20.6	23.1
% Y/Y Growth		*20%*	*11%*	*34%*	*12%*
% of Gross Profit	*16%*	*17%*	*16%*	*18%*	*17%*
FB	14.0	15.1	15.4	18.6	32.3
% Y/Y Growth		*8%*	*2%*	*21%*	*74%*
% of Gross Profit	*30%*	*26%*	*22%*	*19%*	*31%*

Source: Barclays Research, Company Documents

For AMZN Capex includes cash capex, lease capex, excluding sales & incentives

Google

A popular trend in cloud infrastructure over the past few years has been updating the accounting policy around useful life of servers and network equipment. Google did this in 2021 (changing the server useful life from 3 years to 4 years and for network equipment from 4 years to 5 years). The aggregate impact from this change was minor given GOOGL's margin expansion in the core ads business. Figure 2 below illustrates that this change boosted operating margins by 123bps y/y and accounted for just 13% of the overall margin expansion at the company. Combine this small one-time benefit with what we believe could be a much more material deceleration in desktop search revenue growth in 2022, accelerating headcount growth, and you can start to see how the old "mix shift to lower margin areas" could have a negative impact on margins, a factor that we think the street is under-appreciating. Like other pandemic beneficiaries, Google likely over-earned in 2021 based on strong desktop search growth and the change in accounting, both of which are reversing in 2022.

FIGURE 2

Margin Expansion from Useful Life Change in 2021

	2020	2021	2021 Without Useful Life Change
Net Revenue	149,749	212,071	212,071
Depreciation & Amortization	13,697	12,441	15,041
D&A as % of Net Sales	*9.1%*	*5.9%*	*7.1%*
Operating Income	41,224	78,714	76,114
Operating Margin	*27.5%*	*37.1%*	*35.9%*
Y/Y Margin Expansion		*9.6%*	*8.4%*
Margin Expansion from Useful Life Change (bps)			*123 bps*
% of OI Margin Expansion From Useful Life Change			12.8%

Source: Barclays Research, Company Documents

Ironically, Google previously decreased information and technology asset useful life in 2018 to "3-5 years, specifically 3yrs for servers, and 3-5yrs for network equipment" vs. "up to 7 years" for these assets in 2017, which was a margin hit. Google commented on the recent call that they expect capex to grow "meaningfully" which we interpret as 20%-25%% in 2022, with most of the spend in technical infrastructure to support ongoing demand for machine learning as well as for Cloud, Search, Ads, and YouTube (i.e. – mostly servers and to a lesser degree land and offices). Land/buildings and information technology assets continue to represent the lion's share of the PP+E (around 40% for each of those two categories) and continue to increase each year.

Looking at the details of the 10-K, depreciation expense drove 320bps of operating margin expansion in 2021 for Google. This amounts to 33% of the overall operating margin expansion for overall Alphabet in 2021.

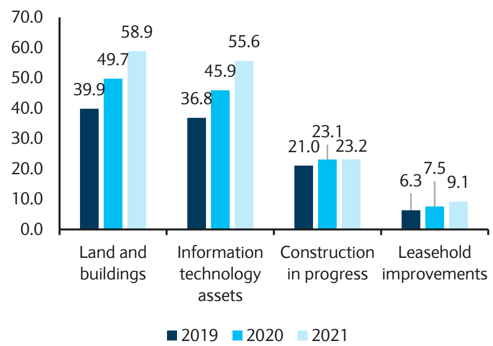
FIGURE 3

Depreciation Leverage Accounted For 1/3 Of Google's Margin Expansion In 2021

	2018	2019	2020	2021
Net Revenue ($B)	$110.1	$131.8	$149.7	$212.1
Depreciation & Impairment ($B)	$8.2	$10.9	$12.9	$11.6
Depreciation & Impairment as % of Net Revenue	7.4%	8.2%	8.6%	5.4%
Y/Y Incremental Boost on Operating Margin	-0.6%	-0.8%	-0.4%	3.2%
Alphabet GAAP EBIT Margin	25.0%	26.0%	27.5%	37.1%
Y/Y Margin Expansion	-4.3%	1.0%	1.6%	9.6%
% of Margin Expansion From D&A				33.1%

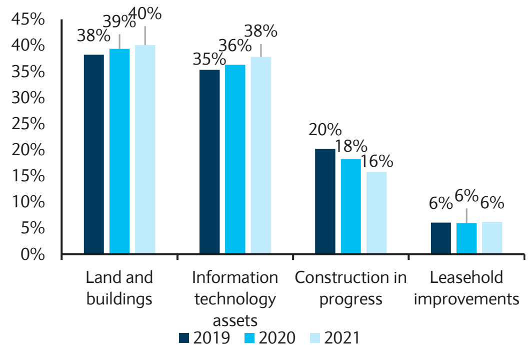
Source: Barclays Research, Company Reports

FIGURE 4
Gross PP&E ($B)



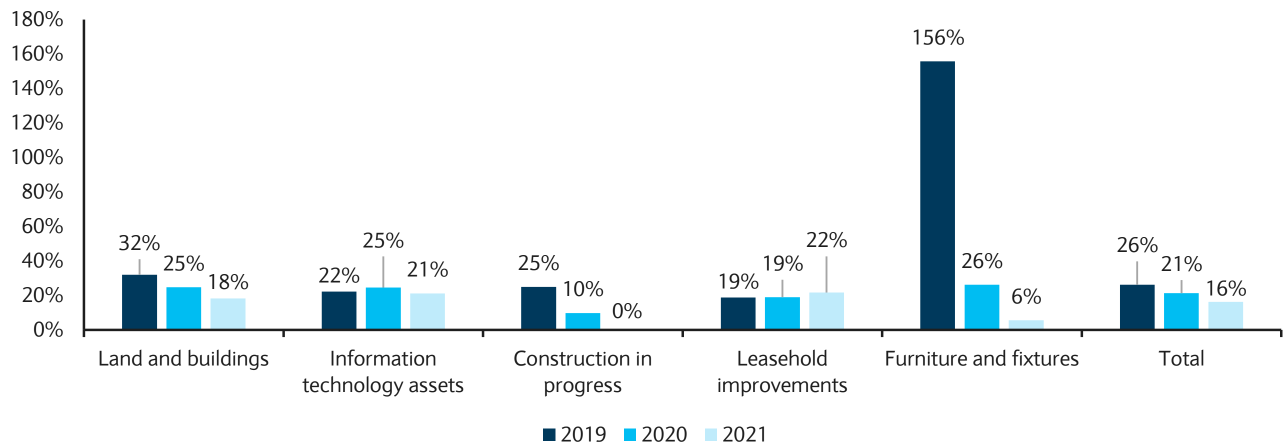
Source: Barclays Research, Company Reports

FIGURE 5
Gross PP&E Mix



Source: Barclays Research, Company Reports

FIGURE 6
Gross PP&E Y/Y Growth

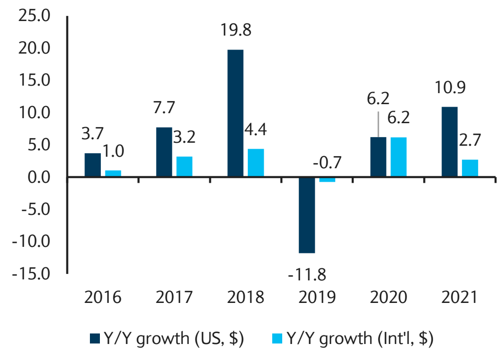


Source: Barclays Research, Company Reports

An analysis of Google's long-lived assets suggests that it spent ~$11B in the US in 2021 (Figure 7), up from ~$6B spent in 2020. Additionally, in 2021 GOOGL invested broadly the same across US and international geos, both up low-double-digits to mid-teens Y/Y.

FIGURE 7

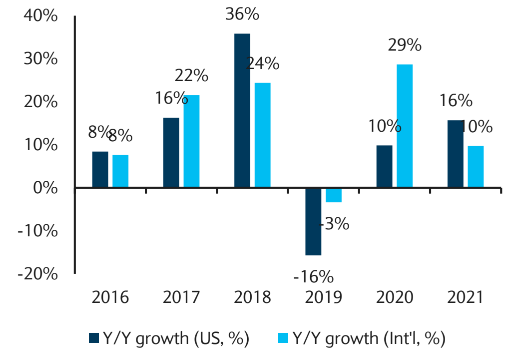
Long-lived Assets- Y/Y Growth by Geo (in $B)



Source: Barclays Research, Company Reports. Starting in 2020 long-lived assets by geographic area only include "Property and Equipment, Net" and "Operating Lease Assets" (Shown in FY19-21)

FIGURE 8

Long-lived Assets- Y/Y Growth by Geo (in %)



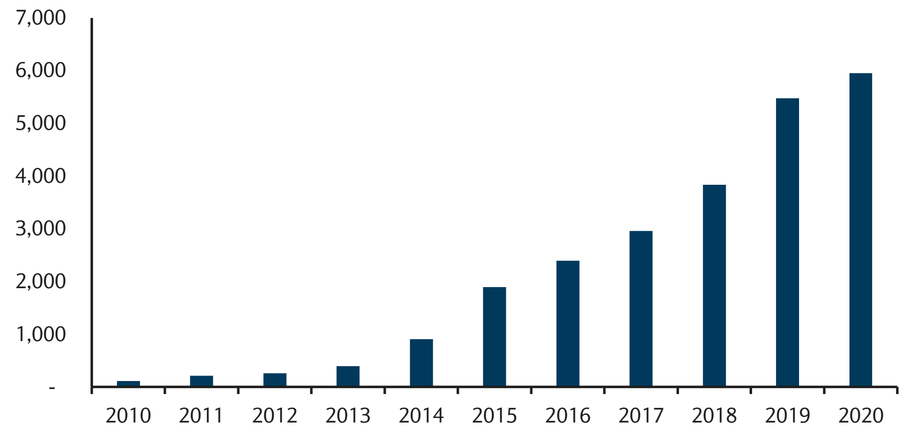
Source: Barclays Research, Company Reports. Starting in 2020 long-lived assets by geographic area only include "Property and Equipment, Net" and "Operating Lease Assets" (Shown in FY19-21)

GOOGL has been aggressively investing in green energy since the company launched an initiative in 2007 to be 100% carbon-neutral. They became the first company of their size to match their entire annual electricity consumption with renewable energy, making GOOGL the largest corporate buyer of renewable energy in the world. Since 2010, GOOGL has signed 55+ renewable energy agreements—translating to ~6 GW of renewable energy (Figure 9). This represents a roughly $4bn commitment through 2034. GOOGL's newest goal is to run all operations on renewable energy 24/7 by 2030. This is an ambitious and capital-intensive goal, but GOOGL has stated that 67% of data center electricity use was matched with regional carbon-free energy sources in 2020. They are on the way to that goal, but they need to invest a lot more for that to become a reality.

In 2020, GOOGL raised $5.75bn by issuing sustainability bonds, the largest raise of sustainability-inspired bonds ever. As of the end of FY20, $3.47bn of the $5.75bn was allocated to green initiatives and investments, which equates to roughly 16% of FY20 capex investments. This is exclusive of any other "green" investments during the year, so the amount of capex invested in this area is likely higher. With GOOGL committing to more and more capital-intensive sustainability initiatives, it's likely we'll see more capital (and a higher % of capex) invested into these goals, ultimately accelerating capex growth in the coming years.

FIGURE 9

Cumulative Capacity of Google's Renewable Energy Portfolio



Source: Barclays Research, Company Reports

Amazon

AMZN disclosed for the first time that its ongoing capex mix is weighted at 40% data centers and compute infrastructure, 30% warehouses, 25% transportation, and 5% office and stores. That is the breakdown of the massive $74B in cash and lease capex for 2021 (which we estimate grows to $107B in 2022).

Historically, most of the incremental growth in PP&E dollars (and hence likely mix of capex) has gone into Equipment over the past several years ($17B in 2019, $26B in 2020, $31B in 2021), followed by Land and Buildings ($7B in 2019, $18B in 2020, $24B in 2021). Equipment makes up 54% of gross PP&E (vs. 56% in 2020) followed by Land at 34%.

Consistent with the trend noted above for Google in 2021, AMZN recently announced on their 4Q21 earnings call that they are increasing the useful life of servers from 4 years to 5 years starting in January 2022, which gives AMZN a benefit of around $3B+ in OI for FY22. With the incremental dollars of PP&E shifting more towards shorter-life assets, depreciation increased as a percent of revenue from 2.0% in 2020 to 2.8% in 2021. Retail margins are starting to show stabilization in 2022 and continued mix shift to higher margin business units like AWS and Ads, we see upward estimate revisions as likely this year.

FIGURE 10

Margin Expansion From Useful Life Change in 2020 A Case Study For 2022

	2019	2020	2020 Without Useful Life Change
Net Sales	280,522	386,064	386,064
Depreciation & Amortization	21,789	25,251	27,951
D&A as % of Net Sales	*7.8%*	*6.5%*	*7.2%*
Operating Income	14,540	22,899	20,199
Operating Margin	*5.2%*	*5.9%*	*5.2%*
Y/Y Margin Expansion		*0.7%*	*0.0%*
Margin Expansion from Useful Life Change (bps)			*70 bps*
% of OI Margin Expansion From Useful Life Change			93.5%

Source: Barclays Research, Company Documents

FIGURE 11

Last Year Depreciation De-Leveraged A Bit, Weighing On The Overall Margin Contraction At AMZN

	2018	2019	2020	2021
Revenue ($B)	$232.9	$280.5	$386.1	$469.8
Depreciation ($B)	$4.8	$5.0	$7.7	$13.0
Depreciation as % of Revenue	2.1%	1.8%	2.0%	2.8%
Y/Y Incremental Drag on Operating Margin	-0.1%	0.3%	-0.2%	-0.8%
AMZN Operating Margin	5.3%	5.2%	5.9%	5.3%
Y/Y Margin Compression	3.0%	-0.1%	0.7%	-0.6%
% of Margin Compression From D&A				121.5%

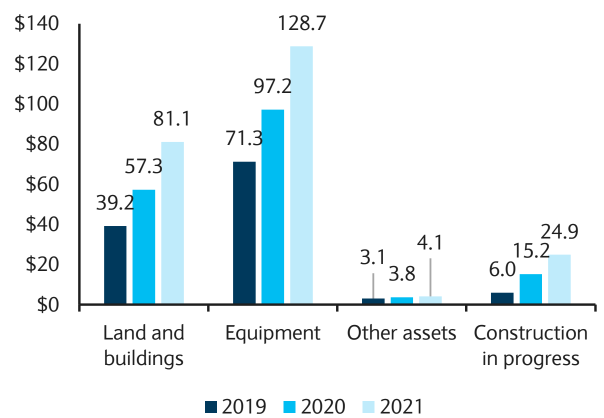
Source: Barclays Research, Company Documents

The change in useful life back in 2020 amounted to almost all of the operation margin expansion realized at AMZN system wide, which we highlight above in Figure 10. There were obviously mix impacts that played a role in 2020 with the heavy increase in retail investments and the margin uptick at AWS (which was boosted by the accounting change).

We expect a similar dynamic in 2022 but with much more organic increase in retail operating margin as the company laps some of the huge increases in 2021 around Covid costs and related inefficiencies.

FIGURE 12

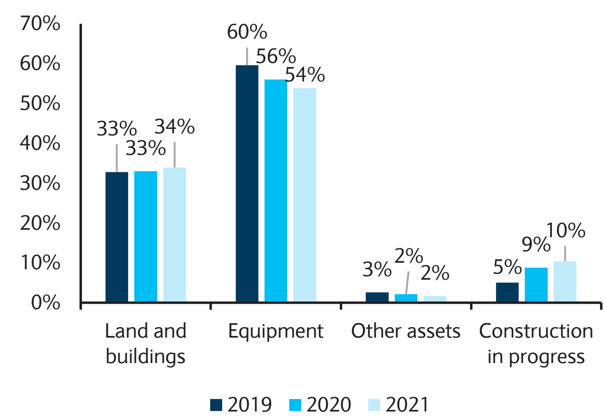
Gross PP&E ($B)



Source: Barclays Research, Company Reports

FIGURE 13

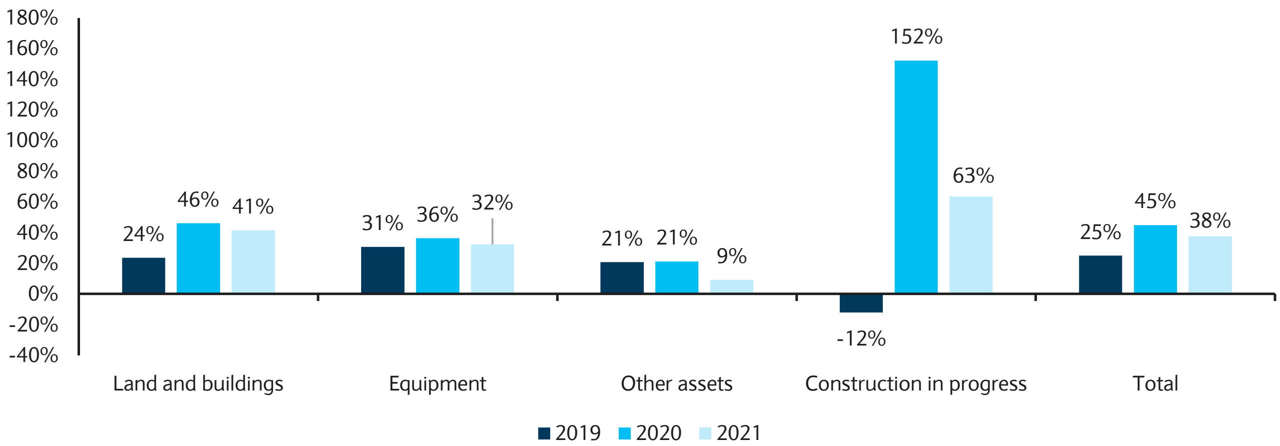
Gross PP&E Mix



Source: Barclays Research, Company Reports

FIGURE 14

Gross PP&E Y/Y Growth



Source: Barclays Research, Company Reports

On a segment basis, net additions to PP&E (not gross) increased 26% y/y in Retail in 2021 (vs. a whopping 152% y/y increase in Retail 2020), while AWS increased 33% y/y in 2021 (vs. 27% in 2020) trending in a similar direction with revenue growth minus infrastructure efficiency gains.

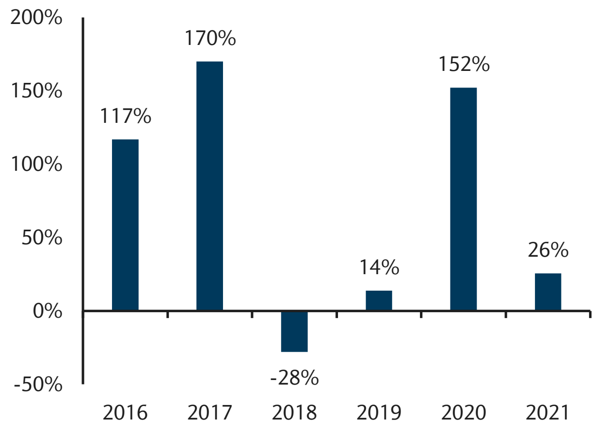
FIGURE 15

Net Additions to PP&E, 2015-21

$bn	2015	2016	2017	2018	2019	2020	2021	2021 y/y
Retail Net Additions to PP&E								
Cash	2.0	4.5	12.6	8.2	10.0	29.7	38.5	30%
Capital Leases	0.9	1.5	2.9	2.0	3.8	5.6	3.6	(36%)
Financing	0.2	0.8	2.9	3.0	1.3	2.7	5.6	107%
Total Retail Net Additions to PP&E	3.1	6.8	18.4	13.2	15.1	38.0	47.7	26%
AWS Net Additions to PP&E								
Cash	0.9	1.1	1.8	1.1	2.5	8.7	18.5	113%
Capital Leases	3.7	4.0	7.3	8.4	10.6	7.7	3.5	(55%)
Financing	0.1	0.1	0.1	0.2	0.0	0.1	0.1	(61%)
Total AWS Net Additions to PP&E	4.7	5.2	9.2	9.8	13.1	16.5	22.0	33%

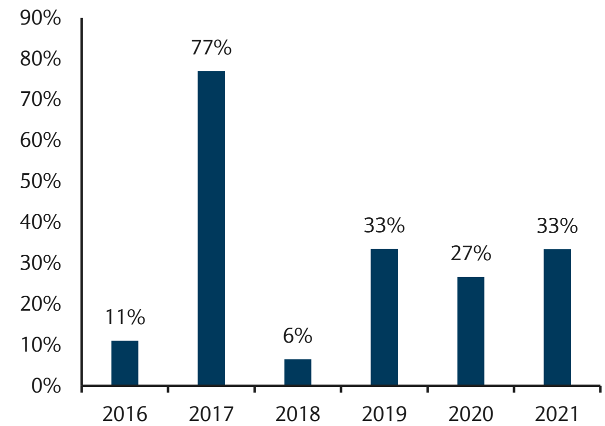
Source: Barclays Research, Company Reports

FIGURE 16
Retail- Net Additions to PP&E- Y/Y Growth



Source: Barclays Research, Company Reports

FIGURE 17
AWS- Net Additions to PP&E- Y/Y Growth



Source: Barclays Research, Company Reports

Facebook

Facebook's capex growth of nearly 75% in 2022 was a bit of a head scratcher for some in the investment community (ie – well above what was expected). Core blue is seeing flattening DAU growth and engagement declines in the younger demographics, but the other mega apps are all growing nicely. FB likely is doubling down on investments in the Reality Labs (VR/AR/other) business unit.

Looking at what played out last year a little more closely, depreciation expense drove 160bps of operating margin expansion in 2021 (vs. 20bps of compression in 2020). Depreciation provided a whopping 96% of the overall GAAP operating margin expansion for FB in 2021, but the margins were obviously impacted by other mix effects like the heavy investments (and associated losses in Reality Labs and spikey G+A).

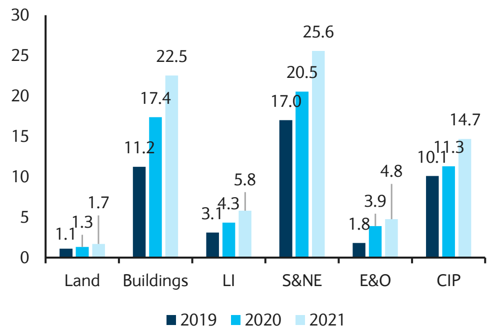
The company's largest dollar additions to gross PP&E have been shifting to Servers & Network Assets (~33% of total) and also Buildings (~30%) and Construction in Progress (~20% of total). FB's 10-K isn't clear around what assets specifically are included in the Servers & Network Assets category, but we assume it covers most technology-related capex.

FIGURE 18
D+A Leverage Accounted For The Bulk Of FB's Margin Expansion In 2021

	2018	2019	2020	2021
Revenue ($)	$55.8	$70.7	$86.0	$117.9
Depreciation ($B)	$3.7	$3.8	$4.8	$4.7
Depreciation as % of Revenue	6.6%	5.3%	5.5%	4.0%
Y/Y Incremental Boost on Operating Margin	-0.9%	1.3%	-0.2%	1.6%
FB Operating Margin	44.6%	33.9%	38.0%	39.6%
Y/Y Margin Expansion	-5.1%	-10.7%	4.1%	1.6%
% of Margin Expansion From Depreciation				96.2%

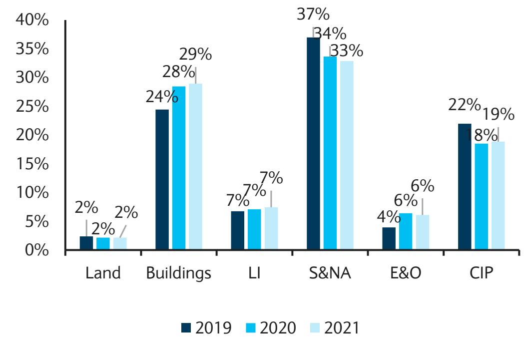
Source: Barclays Research, Company Reports

FIGURE 19
Gross PP&E ($B)



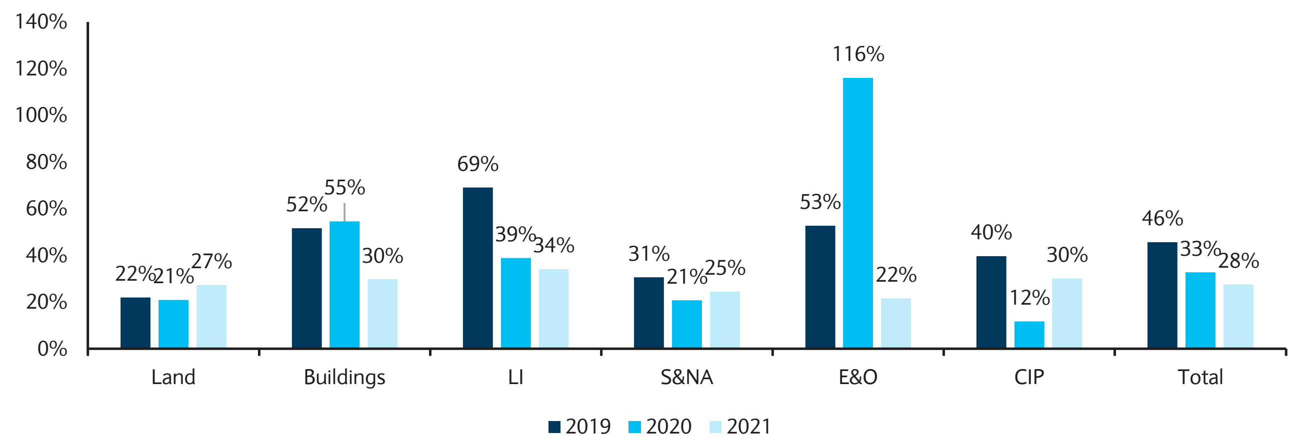
Source: Barclays Research, Company Reports. "LI": Leasehold Improvements, "NE": Network Equipment, "CS,OE,&O": Computer Software, Office Equipment, & Other, "CIP": Construction in Progress

FIGURE 20
Gross PP&E Mix



Source: Barclays Research, Company Reports. "LI": Leasehold Improvements, "NE": Network Equipment, "CS,OE,&O": Computer Software, Office Equipment, & Other, "CIP": Construction in Progress

FIGURE 21
Gross PP&E Y/Y Growth by Asset Type



Source: Barclays Research, Company Reports. "LI": Leasehold Improvements, "NE": Network Equipment, "CS,OE,&O": Computer Software, Office Equipment, & Other, "CIP": Construction in Progress

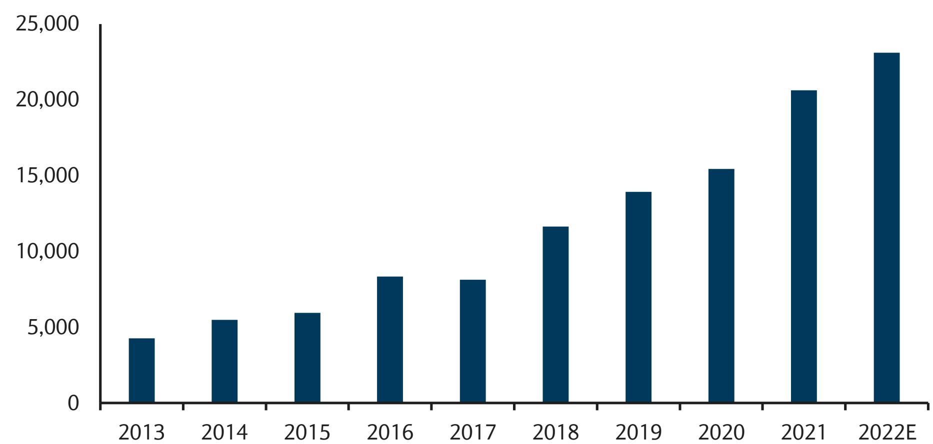
Microsoft

Microsoft goes in waves of building out data center shells, and then filling those shells with computer equipment and software. The company has been pretty aggressive in the build out of its global data center footprint, currently covering more than 60 regions and 140 countries. Since bottoming at 44% in FY19, computer and equipment software (at cost) has increased back to ~48% over the last two years. We expect this should remain elevated given the desire of Microsoft to continue to ramp its spend on equipment.

We estimate that Microsoft's Azure business gross margin is currently ~63%, a substantial improvement from ~52% in FY20. We note that Azure gross margin has benefitted from an accounting change, but excluding this impact margins have still continued to improve. Since FY18, Microsoft capex as a % of revenue has increased into the low double digits, driven in part by the increased demand for cloud resources. We expect this trend to continue in the coming years, as demand is evidenced by the healthy growth rate (46% cc last quarter).

FIGURE 22

Microsoft Capex ($M)



Source: Barclays Research, Company Reports

Semiconductor Thoughts: Multi-Year Acceleration Set To Continue

FIGURE 23

Cloud Service Provider Equipment Capex vs. Semiconductor Revenue

Change in Equipment Assets ($M)	2015	2016	2017	2018	2019	2020	2021	2022E	2023E
AMZN - Equipment	4,204	7,572	16,255	12,347	16,719	25,914	31,459		
y/y growth	*-15%*	*80%*	*115%*	*-24%*	*35%*	*55%*	*21%*		
GOOG - Information Technology Assets	2,727	2,439	5,345	8,690	6,721	9,066	9,700		
y/y growth	*50%*	*-11%*	*119%*	*63%*	*-23%*	*35%*	*7%*		
FB - Servers & Network Assets	613	1,546	2,819	5,019	3,987	3,540	5,040		
y/y growth	*-8%*	*152%*	*82%*	*78%*	*-21%*	*-11%*	*42%*		
MSFT - Computer Equipment and Software	2,182	3,779	4,023	6,219	6,190	7,438	9,989		
y/y growth	*0%*	*73%*	*6%*	*55%*	*0%*	*20%*	*34%*		
Total Growth in Equipment Assets	$9,726	$15,336	$28,442	$32,275	$33,617	$45,958	$56,188		
y/y growth	*1%*	*58%*	*85%*	*13%*	*4%*	*37%*	*22%*		
Total Capex	28,263	36,663	50,122	77,134	81,606	105,743	137,559	192,299	212,923
y/y growth	*1%*	*30%*	*37%*	*54%*	*6%*	*30%*	*30%*	*40%*	*11%*

Semiconductor Data Center Revenue	2015	2016	2017	2018	2019	2020	2021	2022E	2023E
INTC	$15,981	$17,236	$19,064	$22,991	$23,481	$26,103	$25,821	$28,323	$30,089
y/y growth	*11%*	*8%*	*11%*	*21%*	*2%*	*11%*	*-1%*	*10%*	*6%*
NVDA (Pro Forma)	$987	$1,687	$2,796	$4,021	$4,314	$7,125	$10,613	$15,744	$19,141
y/y growth	*33%*	*71%*	*66%*	*44%*	*7%*	*65%*	*49%*	*48%*	*22%*
AMD	$171	$231	$328	$577	$1,024	$1,763	$3,749	$6,406	$9,494
y/y growth	*12%*	*35%*	*42%*	*76%*	*78%*	*72%*	*113%*	*71%*	*48%*
MRVL (Pro Forma)	$369	$410	$675	$571	$582	$950	$1,961	$2,637	$3,491
y/y growth	*27%*	*11%*	*64%*	*-15%*	*2%*	*63%*	*106%*	*35%*	*32%*
Total DC Semi Spend	$17,508	$19,565	$22,863	$28,160	$29,401	$35,941	$42,144	$53,110	$62,216
y/y growth	*12%*	*12%*	*17%*	*23%*	*4%*	*22%*	*17%*	*26%*	*17%*

Source: Barclays Research, Company Reports

Capex trends clearly accelerated during the pandemic but to us this was driven by multiple secular drivers off the soft 2019 vs. the demand bubble we saw in many consumer markets. Capex for the four major cloud vendors (see Figure 23) were up 30% in both 2020 and 2021, while Data Center revenues for relevant semi names were up 22% and 17% in 2020 and 2021, respectively (+66% in both years excluding INTC). We see cloud capex continuing to increase across all major hyperscale customers through 2023 and potentially 2024. Our note from last week (*A Deeper Dive into Ethernet & Fronthaul Trends, 3/2/22*) sizes the robust growth expected for Ethernet transceivers at speeds of 200G+ as top cloud companies move to 200/400G from 100G (FB for instance may increase its 200G+ Ethernet transceiver deployment by >3x).

For INTC, Data Center revenue is seeing much more muted growth (10% y/y in 2022 following a slight decline last year) given share losses to AMD, which hit the cloud segment first. We expect continued share losses despite new product releases and clear demand tailwinds (expect another 4-5 points lost in Client and Server vs. AMD this year). After more than doubling its Data Center revenue in 2021, we model another 70% in 2022. Moving to NVDA, we see another very strong year of Data Center growth in 2022 (+48% y/y) amid continued deployment of Ampere architecture with Hopper starting in 2H. Lastly, we forecast MRVL Data Center revenue to grow 35% y/y in 2022 after more than doubling last year driven by a dominant share in PAM4 DSPs, which are included in all 200/400G connections. These trends should also drive strong growth amongst the component vendors (MTSI, LITE).

Positive Takeaways From IT Hardware

The Cloud market has been a focal topic for both investors and management within our Networking coverage and an important growth driver, particularly in the context of accelerating shift of workloads from on-premise infrastructure. We view the networking cloud vertical as very strong, and more of a tailwind than headwind despite investors' concerns about white box solutions, with several of our companies benefitting. In Networking, ANET, JNPR and CIEN are most exposed to the large cloud players, and CSCO is ramping faster in the hyperscale vertical. In 2021, we saw accelerated growth at almost all of the vendors. CSCO announced on its most recent earnings call that Cloud orders grew 70% Y/Y in the Jan quarter, and were up over 100% in the TTM period. ANET saw Cloud Titans demand as better than expected with more upside coming in 2022, while JNPR pointed to strong double digit growth in Cloud orders. We believe that a component of the recent 2.5x+ book/bill at CIEN as partially driven by large cloud players. The extending of useful life of networking equipment is likely not that impactful since traffic volume and bandwidth growth generally drive new purchases. Changes in server and storage have little impact on our group as 99% of that equipment is white box. We are OW on CSCO, JNPR, CIEN and EW on ANET…

FIGURE 24

Cloud Service Provider Equipment Capex vs. IT Hardware Revenue

Change in Equipment Assets ($M)	2013	2014	2015	2016	2017	2018	2019	2020	2021
AMZN - Equipment	3,046	4,939	4,204	7,572	16,255	12,347	16,719	25,914	31,459
y/y growth		*62%*	*-15%*	*80%*	*115%*	*-24%*	*35%*	*55%*	*21%*
GOOG - Information Technology Assets	1,377	1,824	2,727	2,439	5,345	8,690	6,721	9,066	9,700
y/y growth		*32%*	*50%*	*-11%*	*119%*	*63%*	*-23%*	*35%*	*7%*
FB - Network Equipment	439	669	613	1,546	2,819	5,019	3,987	3,540	5,040
y/y growth		*52%*	*-8%*	*152%*	*82%*	*78%*	*-21%*	*-11%*	*42%*
MSFT - Computer Equipment and Software	1,944	2,188	2,182	3,779	4,023	6,219	6,190	7,438	9,989
y/y growth		*13%*	*0%*	*73%*	*6%*	*55%*	*0%*	*20%*	*34%*
Total Growth in Equipment Assets	$6,806	$9,620	$9,726	$15,336	$28,442	$32,275	$33,617	$45,958	$56,188
y/y growth		*41%*	*1%*	*58%*	*85%*	*13%*	*4%*	*37%*	*22%*
Arista Cloud Titan Revenue					$380	$780	$1,012	$872	$973
y/y growth						*105%*	*30%*	*-14%*	*12%*
Juniper Cloud Revenue			$1,021	$1,322	$1,315	$1,050	$1,060	$1,081	$1,228
y/y growth				*29%*	*-1%*	*-20%*	*1%*	*2%*	*14%*
CSCO Cloud Revenue					$886	$948	$1,108	$1,794	$2,374
y/y growth						*7%*	*17%*	*62%*	*32%*
CIEN Cloud Revenue						$547	$779	$760	$784
y/y growth							*42%*	*-2%*	*3%*

CSCO cloud revenue estimate in 2021 is organic growth, ex-ACIA

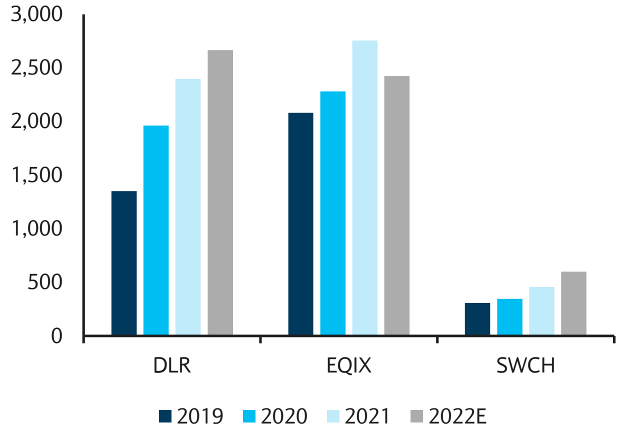
Source: Barclays Research, Company Documents

Data Center Capex

The data center industry has been ramping construction spending for years, and with limited exceptions, we expect this to continue in 2022. Research from IDC suggests the amount of data created and stored will increase at a 19.2% CAGR between 2020-2025, which should keep demand for data center capacity robust. Demand from enterprises remains steady, but several of the largest hyperscale contracts ever were signed in 2H21, contributing to incremental capex plans for 2022. The secular growth in data is attracting additional capital to the DC market, while the cost of construction per MW continues to decline; we anticipate supply and pricing to remain competitive in 2022.

FIGURE 25

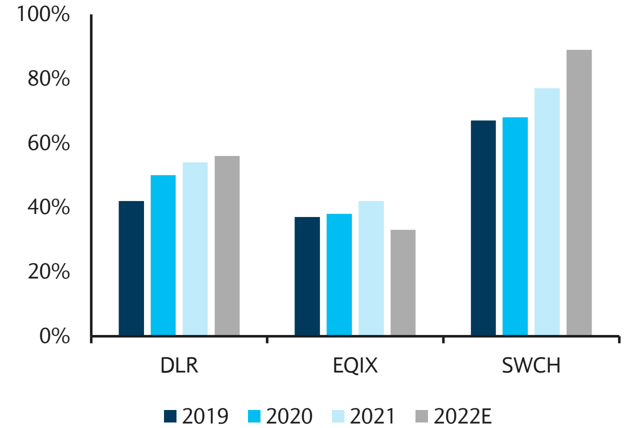
Total Data Center Capex ($M)



Source: Company documents, Barclays Research

FIGURE 26

Total Data Center Capex as a Percent of Annual Revenue



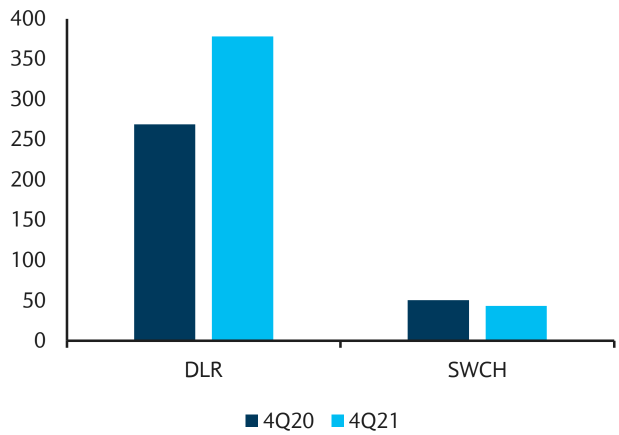
Source: Company documents, Barclays Research

SWCH: Of the three data centers in our coverage, we anticipate SWCH will have the largest y/y increase in capex in 2022 at 32%. The company's backlog currently reflects 7% of the $600m in spending we project this year, a reduction from 11% a year ago. This reflects an uptick in risk, all else equal. However, our sense is customers are indicating interest in space up to 24 months in advance, a much longer time horizon than in the past, contributing to a shadow backlog. We think SWCH has a good line-of-sight on demand, and increased its capex budget accordingly (the November 2021 Investor Day called for average annual capex of ~$500m, but 2022 guidance implies $580m at the mid-point).

DLR: The company continues to have a robust development pipeline, skewed toward EMEA. We project an 11% increase in capex y/y in 2022, a deceleration from 22% growth in 2021 and 45% in 2020. DLR has recently entered several new markets (including South Africa via the pending Teraco acquisition in 1Q22) and the list of major markets where it does not have exposure is fairly short. We anticipate development spending will still increase over the next several years albeit at a slowing pace, as the company is less inclined to stretch for geographic coverage than in the past. With 4Q21 backlog representing 14% of our 2022E capex projection (up from 11% in 2020), we think DLR's spending plans are prudent.

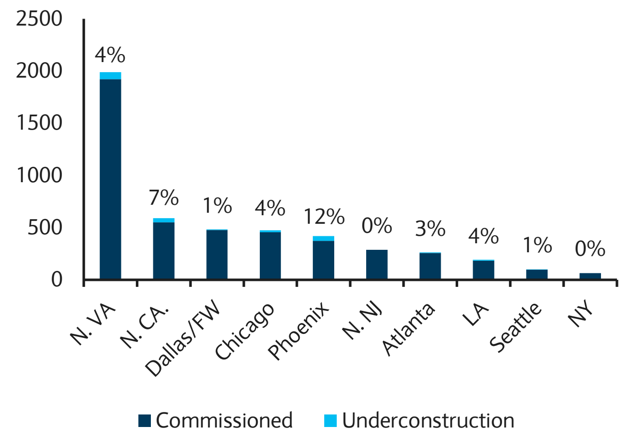
EQIX: We project EQIX will buck the prevailing trend, and reduce capex 12% y/y in 2022, following a 10% increase in 2020 and 21% increase in 2021. Despite the decline, our model still projects $2.4b in spending, with about two-thirds directed to new retail exposure, and on-third for xScale projects. Like DLR, our sense is the company is generally content with its market exposure, and will expand within its existing footprint more so than in the past. Further, more than any other players in the industry, we think EQIX also has the best opportunity to extract revenue from its existing client base through value-added services. This is in contrast to the many commoditized offerings, that can only generate revenue via space/power expansion, which is increasingly competing on price.

FIGURE 27
Backlog ($M) and Backlog as a Percent of Total Capex



Source: Company documents, Barclays Research

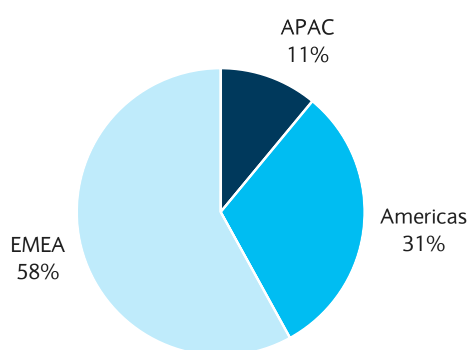
FIGURE 28
New Construction Relative to Base Supply



Source: Company documents, Barclays Research

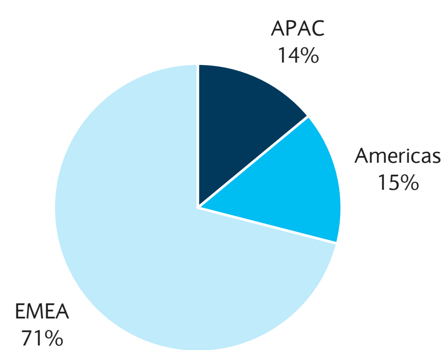
Tight supply, but weak pricing. Capital from infrastructure funds, pension funds, SWFs, and other institutional investors is contributing to strong supply growth, that has been met with equally strong demand. However, construction costs have trended down over the past two decades (current supply chain pressures aside), resulting in deflationary pricing. As reflected in Figure 28, absorption has limited excess inventory in top domestic markets, yet we think pricing pressures remain. Providing incremental services and cultivating a diverse network ecosystem are ways to combat pricing pressure, in our view.

FIGURE 29
DLR Regional Distribution of Capex



Source: Company documents, Barclays Research

FIGURE 30
EQIX Regional Distribution of Capex



Source: Company documents, Barclays Research

EMEA focused. Both global players, EQIX and DLR, view N. America as fairly saturated, and have reduced capex in that market. Regulations and data sovereignty laws in Europe have created a fragmented market, necessitating distributed workloads for many enterprises. DC operators are still striving to capitalize on this opportunity, while also looking to increase exposure in developing markets. EQIX and DLR have both recently expanded in India, Africa, and East Asia.

Appendix- Gross PP&E By Asset Type

FIGURE 31
Google

PP&E ($m)	2015	2016	2017	2018	2019	2020	2021
Land and buildings	$16,518	$19,804	$23,183	$30,179	$39,865	$49,732	$58,881
% of Total PP&E	*41%*	*42%*	*39%*	*37%*	*38%*	*39%*	*40%*
% Y/Y Growth	*24%*	*20%*	*17%*	*30%*	*32%*	*25%*	*18%*
($) Y/Y Growth	*$3,192*	*$3,286*	*$3,379*	*$6,996*	*$9,686*	*$9,867*	*$9,149*
Information technology assets	$13,645	$16,084	$21,429	$30,119	$36,840	$45,906	$55,606
% of Total PP&E	*34%*	*34%*	*36%*	*37%*	*35%*	*36%*	*38%*
% Y/Y Growth	*25%*	*18%*	*33%*	*41%*	*22%*	*25%*	*21%*
($) Y/Y Growth	*$2,727*	*$2,439*	*$5,345*	*$8,690*	*$6,721*	*$9,066*	*$9,700*
Construction in progress	$7,324	$8,166	$10,491	$16,838	$21,036	$23,111	$23,171
% of Total PP&E	*18%*	*17%*	*18%*	*20%*	*20%*	*18%*	*16%*
% Y/Y Growth	*12%*	*11%*	*28%*	*60%*	*25%*	*10%*	*0%*
($) Y/Y Growth	*$769*	*$842*	*$2,325*	*$6,347*	*$4,198*	*$2,075*	*$60*
Leasehold improvements	$2,576	$3,415	$4,496	$5,310	$6,310	$7,516	$9,146
% of Total PP&E	*6%*	*7%*	*8%*	*6%*	*6%*	*6%*	*6%*
% Y/Y Growth	*38%*	*33%*	*32%*	*18%*	*19%*	*19%*	*22%*
($) Y/Y Growth	*$708*	*$839*	*$1,081*	*$814*	*$1,000*	*$1,206*	*$1,630*
Furniture and fixtures	$83	$58	$48	$61	$156	$197	$208
% of Total PP&E	*0.2%*	*0.1%*	*0.1%*	*0.1%*	*0.1%*	*0.2%*	*0.1%*
% Y/Y Growth	*5%*	*-30%*	*-17%*	*27%*	*156%*	*26%*	*6%*
($) Y/Y Growth	*$4*	*($25)*	*($10)*	*$13*	*$95*	*$41*	*$11*
Total	**$40,146**	**$47,527**	**$59,647**	**$82,507**	**$104,207**	**$126,462**	**$147,012**
% Y/Y Growth	*23%*	*18%*	*26%*	*38%*	*26%*	*21%*	*16%*

Source: Barclays Research, Company Reports

FIGURE 32
Amazon

PP&E ($m)	2015	2016	2017	2018	2019	2020	2021
Land and buildings	$9,770	$13,998	$23,896	$31,741	$39,223	$57,324	$81,104
% of Total PP&E	*33%*	*33%*	*33%*	*33%*	*33%*	*33%*	*34%*
% Y/Y Growth	*37%*	*43%*	*71%*	*33%*	*24%*	*46%*	*41%*
($) Y/Y Growth	*$2,620*	*$4,228*	*$9,898*	*$7,845*	*$7,482*	*$18,101*	*$23,780*
Equipment	$18,417	$25,989	$42,244	$54,591	$71,310	$97,224	$128,683
% of Total PP&E	*61%*	*61%*	*58%*	*57%*	*60%*	*56%*	*54%*
% Y/Y Growth	*30%*	*41%*	*63%*	*29%*	*31%*	*36%*	*32%*
($) Y/Y Growth	*$4,204*	*$7,572*	*$16,255*	*$12,347*	*$16,719*	*$25,914*	*$31,459*
Other assets	$334	$649	$2,438	$2,577	$3,111	$3,772	$4,118
% of Total PP&E	*1%*	*2%*	*3%*	*3%*	*3%*	*2%*	*2%*
% Y/Y Growth	*10%*	*94%*	*276%*	*6%*	*21%*	*21%*	*9%*
($) Y/Y Growth	*$30*	*$315*	*$1,789*	*$139*	*$534*	*$661*	*$346*
Construction in progress	$1,532	$1,805	$4,078	$6,861	$6,036	$15,228	$24,895
% of Total PP&E	*5%*	*4%*	*6%*	*7%*	*5%*	*9%*	*10%*
% Y/Y Growth	*44%*	*18%*	*126%*	*68%*	*-12%*	*152%*	*63%*
($) Y/Y Growth	*$469*	*$273*	*$2,273*	*$2,783*	*($825)*	*$9,192*	*$9,667*
Total Gross PP&E ($M)	**$30,053**	**$42,441**	**$72,656**	**$95,770**	**$119,680**	**$173,548**	**$238,800**
% Y/Y Growth	32%	41%	71%	32%	25%	45%	38%

Source: Barclays Research, Company Reports

FIGURE 33

Facebook

PP&E ($m)	2015	2016	2017	2018	2019	2020	2021
Land	$596	$696	$798	$899	$1,097	$1,326	$1,688
% of Total PP&E	*8%*	*6%*	*4%*	*3%*	*2%*	*2%*	*2%*
% Y/Y Growth	*290%*	*17%*	*15%*	*13%*	*22%*	*21%*	*27%*
($) Y/Y Growth	*$443*	*$100*	*$102*	*$101*	*$198*	*$229*	*$362*
Buildings	$2,273	$3,109	$4,909	$7,401	$11,226	$17,360	$22,531
% of Total PP&E	*29%*	*26%*	*27%*	*23%*	*24%*	*28%*	*29%*
% Y/Y Growth	*60%*	*37%*	*58%*	*51%*	*52%*	*55%*	*30%*
($) Y/Y Growth	*$853*	*$836*	*$1,800*	*$2,492*	*$3,825*	*$6,134*	*$5,171*
Leasehold Improvements	$447	$531	$959	$1,841	$3,112	$4,321	$5,795
% of Total PP&E	*6%*	*4%*	*5%*	*6%*	*7%*	*7%*	*7%*
% Y/Y Growth	*47%*	*19%*	*81%*	*92%*	*69%*	*39%*	*34%*
($) Y/Y Growth	*$143*	*$84*	*$428*	*$882*	*$1,271*	*$1,209*	*$1,474*
Servers and Network Assets	$3,633	$5,179	$7,998	$13,017	$17,004	$20,544	$25,584
% of Total PP&E	*46%*	*44%*	*44%*	*41%*	*37%*	*34%*	*33%*
% Y/Y Growth	*20%*	*43%*	*54%*	*63%*	*31%*	*21%*	*25%*
($) Y/Y Growth	*$613*	*$1,546*	*$2,819*	*$5,019*	*$3,987*	*$3,540*	*$5,040*
Equipment and Other	$248	$398	$681	$1,187	$1,813	$3,917	$4,764
% of Total PP&E	*3%*	*3%*	*4%*	*4%*	*4%*	*6%*	*6%*
% Y/Y Growth	*66%*	*60%*	*71%*	*74%*	*53%*	*116%*	*22%*
($) Y/Y Growth	*$99*	*$150*	*$283*	*$506*	*$626*	*$2,104*	*$847*
Finance Lease Right-of-Use Assets	$0	$0	$0	$0	$1,635	$2,295	$2,840
% of Total PP&E	*0%*	*0%*	*0%*	*0%*	*4%*	*4%*	*4%*
% Y/Y Growth	*--*	*--*	*--*	*--*	*--*	*40%*	*24%*
($) Y/Y Growth	*$0*	*$0*	*$0*	*$0*	*$1,635*	*$660*	*$545*
Construction In Progress	$622	$1,890	$2,992	$7,228	$10,099	$11,288	$14,687
% of Total PP&E	*8%*	*16%*	*16%*	*23%*	*22%*	*18%*	*19%*
% Y/Y Growth	*-16%*	*204%*	*58%*	*142%*	*40%*	*12%*	*30%*
($) Y/Y Growth	*($116)*	*$1,268*	*$1,102*	*$4,236*	*$2,871*	*$1,189*	*$3,399*
Total	**$7,819**	**$11,803**	**$18,337**	**$31,573**	**$45,986**	**$61,051**	**$77,889**
% of Total PP&E	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*
% Y/Y Growth	*35%*	*51%*	*55%*	*72%*	*46%*	*33%*	*28%*

Source: Barclays Research, Company Reports

* Beginning in 2019, FB reported finance lease right-of-use assets in PP&E. Beginning in 2021, FB reclassified certain segments ("Network Equipment" and "Computer Software, Office Equipment, & Other" reorganized and distributed in to "Servers and Network Assets" and "Equipment and Other)

FIGURE 34

Microsoft

PP&E ($m)	2015	2016	2017	2018	2019	2020	2021
Land	$769	$824	$1,107	$1,254	$1,540	$1,823	$3,660
% of Total PP&E	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*3%*
y/y growth	*42%*	*7%*	*34%*	*13%*	*23%*	*18%*	*101%*
y/y growth ($)	*$228*	*$55*	*$283*	*$147*	*$286*	*$283*	*$1,837*
Buildings and improvements	$10,800	$12,393	$16,284	$20,604	$26,288	$33,995	$43,928
% of Total PP&E	*33%*	*32%*	*34%*	*35%*	*37%*	*39%*	*40%*
y/y growth	*22%*	*15%*	*31%*	*27%*	*28%*	*29%*	*29%*
y/y growth ($)	*$1,933*	*$1,593*	*$3,891*	*$4,320*	*$5,684*	*$7,707*	*$9,933*
Leashold improvements	$3,577	$3,659	$5,064	$4,735	$5,316	$5,487	$6,884
% of Total PP&E	*11%*	*10%*	*11%*	*8%*	*7%*	*6%*	*6%*
y/y growth	*0%*	*2%*	*38%*	*-6%*	*12%*	*3%*	*25%*
y/y growth ($)	*$17*	*$82*	*$1,405*	*($329)*	*$581*	*$171*	*$1,397*
Computer equipment and software	$13,612	$17,391	$21,414	$27,633	$33,823	$41,261	$51,250
% of Total PP&E	*42%*	*46%*	*45%*	*47%*	*47%*	*47%*	*46%*
y/y growth	*19%*	*28%*	*23%*	*29%*	*22%*	*22%*	*24%*
y/y growth ($)	*$2,182*	*$3,779*	*$4,023*	*$6,219*	*$6,190*	*$7,438*	*$9,989*
Furniture and equipment	$3,579	$3,889	$4,044	$4,457	$4,840	$4,782	$5,344
% of Total PP&E	*11%*	*10%*	*8%*	*8%*	*7%*	*5%*	*5%*
y/y growth	*5%*	*9%*	*4%*	*10%*	*9%*	*-1%*	*12%*
y/y growth ($)	*$173*	*$310*	*$155*	*$413*	*$383*	*($58)*	*$562*
Total	**$32,337**	**$38,156**	**$47,913**	**$58,683**	**$71,807**	**$87,348**	**$111,066**
y/y growth	*16%*	*18%*	*26%*	*22%*	*22%*	*22%*	*27%*

Source: Barclays Research, Company Reports

ANALYST(S) CERTIFICATION(S):

We, Ross Sandler, Blayne Curtis, Tim Long, Brendan Lynch, CFA and Raimo Lenschow, CFA, hereby certify (1) that the views expressed in this research report accurately reflect our personal views about any or all of the subject securities or issuers referred to in this research report and (2) no part of our compensation was, is or will be directly or indirectly related to the specific recommendations or views expressed in this research report.

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Materially Mentioned Stocks (Ticker, Date, Price)

Advanced Micro Devices (AMD, 08-Mar-2022, USD 105.53), Overweight/Neutral, CD/CE/J/K/M

Alphabet Inc. (GOOGL, 08-Mar-2022, USD 2542.09), Overweight/Positive, CD/CE/D/E/FB/J/K/L/M/N

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Amazon.com, Inc. (AMZN, 08-Mar-2022, USD 2720.29), Overweight/Positive, CD/CE/D/E/J/K/L/M/N

Arista Networks, Inc. (ANET, 08-Mar-2022, USD 114.60), Equal Weight/Neutral, CE/J

Ciena Corporation (CIEN, 08-Mar-2022, USD 58.22), Overweight/Neutral, CD/CE/J/K/M

Cisco Systems, Inc. (CSCO, 08-Mar-2022, USD 54.40), Overweight/Neutral, CD/CE/J

Digital Realty Trust, Inc. (DLR, 08-Mar-2022, USD 133.49), Equal Weight/Positive, A/CD/CE/D/E/J/K/L/M/N

Equinix, Inc. (EQIX, 08-Mar-2022, USD 681.42), Overweight/Positive, A/CD/CE/D/E/J/K/L/M/N

Facebook, Inc. (FB, 08-Mar-2022, USD 190.29), Overweight/Positive, CE/J/K/M

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Intel Corp. (INTC, 08-Mar-2022, USD 47.50), Underweight/Neutral, A/CD/CE/D/E/J/K/L/M/N

Juniper Networks, Inc. (JNPR, 08-Mar-2022, USD 32.88), Overweight/Neutral, CD/CE/D/E/J/K/L/M

Marvell Technology Group, Ltd. (MRVL, 08-Mar-2022, USD 64.51), Overweight/Neutral, A/CD/CE/D/J/L

Microsoft Corp. (MSFT, 08-Mar-2022, USD 275.85), Overweight/Positive, CD/CE/D/J/K/L/M/N

NVIDIA Corp. (NVDA, 08-Mar-2022, USD 215.14), Overweight/Neutral, CD/CE/J/K/M

Switch, Inc. (SWCH, 08-Mar-2022, USD 26.74), Overweight/Positive, J

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IT Hardware and Communications Equipment		
Apple, Inc. (AAPL)	Arista Networks, Inc. (ANET)	Casa Systems (CASA)
Ciena Corporation (CIEN)	Cisco Systems, Inc. (CSCO)	Corning Incorporated (GLW)
Dell Technologies Inc. (DELL)	F5 Networks, Inc. (FFIV)	Harmonic, Inc. (HLIT)
Hewlett Packard Enterprise Company (HPE)	HP Inc. (HPQ)	Juniper Networks, Inc. (JNPR)
Keysight Technologies, Inc. (KEYS)	Motorola Solutions, Inc. (MSI)	NetApp, Inc. (NTAP)
Pure Storage, Inc. (PSTG)	Samsung Electronics Co., Ltd. (005930.KS)	Ubiquiti, Inc. (UI)
U.S. Communications Infrastructure		
American Tower Corp. (AMT)	Crown Castle International Corp. (CCI)	CyrusOne, Inc. (CONE)
Digital Realty Trust, Inc. (DLR)	Equinix, Inc. (EQIX)	SBA Communications Corp. (SBAC)
Switch, Inc. (SWCH)	Uniti Group Inc. (UNIT)	
U.S. Internet		
1stDibs Inc. (DIBS)	Activision Blizzard, Inc. (ATVI)	Airbnb Inc. (ABNB)
Alphabet Inc. (GOOGL)	Amazon.com, Inc. (AMZN)	Booking Holdings Inc. (BKNG)
Chewy, Inc. (CHWY)	Compass Inc. (COMP)	Corsair Gaming, Inc. (CRSR)
DoorDash, Inc. (DASH)	Duolingo, Inc. (DUOL)	eBay, Inc. (EBAY)
Electronic Arts, Inc. (EA)	Expedia Inc. (EXPE)	Facebook, Inc. (FB)
GoDaddy Inc. (GDDY)	Groupon, Inc. (GRPN)	IAC/InterActiveCorp (IAC)
LegalZoom.com, Inc. (LZ)	Lyft, Inc. (LYFT)	Match Group, Inc. (MTCH)
MercadoLibre (MELI)	NerdWallet, Inc. (NRDS)	Nerdy, Inc. (NRDY)
Outbrain, Inc. (OB)	Peloton Interactive, Inc. (PTON)	Pinterest, Inc. (PINS)
Poshmark Inc. (POSH)	Rent the Runway, Inc. (RENT)	Revolve (RVLV)
Robinhood Markets, Inc. (HOOD)	Shopify (SHOP)	Snap, Inc (SNAP)
Spotify Technology S.A. (SPOT)	Squarespace, Inc. (SQSP)	Stitch Fix (SFIX)
Take-Two Interactive Software (TTWO)	ThredUp Inc. (TDUP)	Tripadvisor Inc. (TRIP)
Twitter, Inc. (TWTR)	Uber Technologies Inc. (UBER)	Unity Software Inc. (U)
Wix.com Ltd. (WIX)	Yelp, Inc. (YELP)	Zillow, Inc. (ZG)

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U.S. Semiconductors		
Advanced Micro Devices (AMD)	Allegro Microsystems (ALGM)	Analog Devices (ADI)
Broadcom Inc. (AVGO)	Cirrus Logic Inc. (CRUS)	Coherent Inc. (COHR)
II-VI Incorporated (IIVI)	Intel Corp. (INTC)	Lumentum Holdings Inc. (LITE)
MACOM Technology Solutions Holdings, Inc. (MTSI)	Marvell Technology Group, Ltd. (MRVL)	Micron Technology, Inc. (MU)
NVIDIA Corp. (NVDA)	NXP Semiconductors NV (NXPI)	Ouster, Inc (OUST)
Qorvo Inc. (QRVO)	QUALCOMM, Inc. (QCOM)	Seagate Technology plc (STX)
SGH (SGH)	Silicon Laboratories, Inc. (SLAB)	SiTime Corporation (SITM)
Skyworks Solutions, Inc. (SWKS)	Texas Instruments, Inc. (TXN)	Western Digital Corporation (WDC)
U.S. Software		
8x8 Inc. (EGHT)	Adobe Inc. (ADBE)	Alarm.com Holdings, Inc. (ALRM)
Alkami Technology, Inc. (ALKT)	Anaplan, Inc. (PLAN)	Ansys, Inc. (ANSS)
Appian Corporation (APPN)	AudioCodes Ltd. (AUDC)	Autodesk Inc. (ADSK)
Avaya Holdings Corp (AVYA)	Bandwidth Inc. (BAND)	BigCommerce (BIGC)
Braze Inc. (BRZE)	Ceridian HCM Holding Inc. (CDAY)	Check Point Software Technologies Ltd. (CHKP)
Citrix Systems (CTXS)	Confluent, Inc (CFLT)	Couchbase (BASE)
Coupa Software Inc. (COUP)	CrowdStrike Holdings, Inc (CRWD)	CyberArk Software (CYBR)
Datadog, Inc. (DDOG)	Datto Holding Corp. (MSP)	Definitive Healthcare Corp (DH)
Descartes Systems Group (DSGX)	DigitalOcean (DOCN)	DoubleVerify Holdings, Inc. (DV)
Duck Creek Technologies, Inc. (DCT)	Dynatrace, Inc. (DT)	Elastic N.V. (ESTC)
Everbridge, Inc. (EVBG)	EverCommerce Inc. (EVCM)	Five9, Inc. (FIVN)
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Integral Ad Science Holding Corp. (IAS)	Intuit Inc. (INTU)	Jamf Holding Corp. (JAMF)
Lightspeed Commerce Inc. (LSPD)	LivePerson, Inc. (LPSN)	Mandiant, Inc. (MNDT)
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MongoDB, Inc. (MDB)	nCino, Inc. (NCNO)	NortonLifeLock (NLOK)
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Paycom (PAYC)	Pegasystems, Inc. (PEGA)	Ping Identity Holding Corp. (PING)
PowerSchool Holdings, Inc (PWSC)	Procore Technologies, Inc. (PCOR)	PTC Inc. (PTC)
Qualtrics (XM)	Rapid7 (RPD)	RingCentral, Inc. (RNG)
Salesforce.com Inc. (CRM)	SAP SE (SAP)	SecureWorks (SCWX)
SentinelOne, Inc. (S)	ServiceNow, Inc. (NOW)	Similarweb Ltd. (SMWB)
Skillsoft Corp. (SKIL)	Snowflake Computing (SNOW)	Splunk Inc. (SPLK)
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