

Morgan Stanley

Equity Research Spring Training

Technology, Media & Telecom Teach-In

FRIDAY, APRIL 30, 2021



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Stock recommendations, disclosures, and stock prices in this report are as of the dates shown on the first page of each report section, unless otherwise noted.

April 2021

Technology, Media & Telecom Spring Training Teach-In

2021 Spring Training Live Event

Sector overviews, key investment debates,
top picks, and Q&A

Thursday, April 29 - Thursday, May 6

[Click here to see all the Spring Training Videos](#)

April 2021

Technology, Media & Telecom Spring Training Teach-In

Agenda

Agenda

Friday, April 30, 2021

| | | | |
|-------------------------|---|------------------------|---|
| 8:00 a.m. – 8:05 a.m. | Welcome & Opening Remarks David Adelman, <i>Managing Director, North America Equity Research</i> | 12:30 p.m. – 1:10 p.m. | Morgan Stanley IT Panel “Lunch” Moderated by Keith Weiss, <i>Managing Director</i> |
| 8:10 a.m. – 8:35 a.m. | Software Keith Weiss, <i>Managing Director</i> | | <ul style="list-style-type: none"> • Al Furman, <i>Managing Director, Enterprise Tech & Services</i> • Alisha Lehr, <i>Executive Director, Transformation</i> • Trevor Brosnan, <i>Distinguished Engineer, Managing Director, Enterprise Tech & Services</i> • Yunchi Nam, <i>Distinguished Engineer, Managing Director, Enterprise Tech & Services</i> |
| 8:35 a.m. – 9:00 a.m. | Morgan Stanley Software Panel Moderated by Keith Weiss, <i>Managing Director</i> | 1:20 p.m. – 2:00 p.m. | Telecom Services & Communications Infrastructure Equity and Credit Research Simon Flannery, <i>Managing Director</i> David Hamburger, <i>Executive Director</i> |
| | <ul style="list-style-type: none"> • Hamza Fodderwala, <i>Vice President</i> • Josh Baer, <i>Vice President</i> • Meta Marshall, <i>Executive Director</i> • Sanjit Singh, <i>Executive Director</i> • Stan Zlotsky, <i>Executive Director</i> | 2:10 p.m. – 2:40 p.m. | Media, Cable & Satellite Ben Swinburne, <i>Managing Director</i> |
| 9:10 a.m. – 9:40 a.m. | Telecom & Networking Equipment Meta Marshall, <i>Executive Director</i> | 2:50 p.m. – 3:20 p.m. | Internet Brian Nowak, <i>Managing Director</i> Lauren Schenk, <i>Executive Director</i> |
| 9:50 a.m. – 10:20 a.m. | IT Hardware Katy Huberty, <i>Managing Director</i> | 3:30 p.m. – 4:00 p.m. | Internet, Media & Telecom Q&A Panel Moderated by Sean Diffley, <i>Executive Director, Institutional Equity Division</i> |
| 10:30 a.m. – 11:00 a.m. | Semiconductors Joseph Moore, <i>Executive Director</i> Craig Hettenbach, <i>Executive Director</i> | | <ul style="list-style-type: none"> • Ben Swinburne, <i>Managing Director</i> • Brian Nowak, <i>Managing Director</i> • Lauren Schenk, <i>Executive Director</i> • Simon Flannery, <i>Managing Director</i> |
| 11:10 a.m. – 11:40 a.m. | IT Services & Payments James Faucette, <i>Managing Director</i> | 4:10 p.m. – 4:50 p.m. | Investment Banking Panel Moderated by Brian Nowak, <i>Managing Director</i> |
| 11:50 a.m. – 12:20 p.m. | Technology Q&A Panel Moderated by Thomas Wigg, <i>Executive Director, Institutional Equity Division</i> | | <ul style="list-style-type: none"> • Ashley MacNeill, <i>Managing Director, GCM - Joint Venture</i> • Lauren Cummings, <i>Managing Director, GCM - Joint Venture</i> • Mike Wyatt, <i>Managing Director, Investment Banking Division</i> |
| | <ul style="list-style-type: none"> • James Faucette, <i>Managing Director, IT Services & Payments</i> • Joseph Moore, <i>Executive Director, Semiconductor Capital Equipment & Semiconductors</i> • Katy Huberty, <i>Managing Director, IT Hardware</i> • Keith Weiss, <i>Managing Director, Software</i> • Meta Marshall, <i>Executive Director, Telecom & Networking Equipment</i> | | |

Biographies



Keith Weiss

Software

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Keith leads the U.S. Software Research effort at Morgan Stanley, managing a group of 5 covering analysts with a coverage group of 57 stocks. Primary coverage responsibilities for Keith entails the large cap software names (market cap >\$15 billion), including Adobe, Atlassian, Autodesk, Akamai, Check Point, Citrix, Intuit, Microsoft, Palo Alto Networks, Salesforce, ServiceNow, Slack, Workday and VMWare. In his over 15 years at Morgan Stanley, Keith has led efforts around broad technology reports in Big Data, Cloud Computing, Cyber Security and Quantum Computing.

Prior to Morgan Stanley, Keith worked in the CFO's Office at Mercator Software, a publicly traded software company in the Enterprise Application Integration space. Keith has also covered software and technology firms in the research departments of UBS/PaineWebber and Prudential Securities prior to working in the industry. In total, he has 20 years of experience in sell-side research and two years working in the software industry. Keith holds a BS in economics from William & Mary and has earned the Charter Financial Analyst designation.

When not at work, Keith can most often be found playing with his two children in Prospect Park or using his frequent flier miles to explore the world.



Meta Marshall

Communication Systems & Applications

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Meta Marshall is an Executive Director covering Telecom & Networking Equipment as well as Communication Software stocks since 2014. Prior to Morgan Stanley, she was a Vice President in the Technology Investment Banking group at BofA Merrill Lynch, based on the West Coast. Before business school, she was a consulting pension actuary at Towers Watson. Meta attended the NYU Stern School of Business, where she graduated with distinction. She holds a BA in Economics from Northwestern University.

Biographies

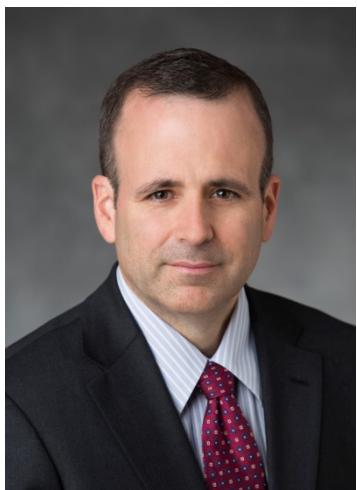


Katy Huberty

IT Hardware

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In her role as a managing director covering the IT Hardware industry, Katy Huberty has established herself as a thought leader on the Data Era and its increasing importance across an ever-widening swath of the economy. Her influential work demonstrates how information technology can increasingly differentiate companies and re-accelerate global productivity. On Apple, Katy leads the market debate on the evolution to Services-led growth as the global smartphone market matures. Katy is a member of the Institutional Investor All-America Research team and has been featured in Barron's 100 Most Influential Women in U.S. Finance list, The New York Times, The Wall Street Journal, and Forbes, and on Bloomberg Television and CNBC, among other prominent venues. She joined Morgan Stanley Equity Research in 2000 as a research associate on the Enterprise Hardware team. She graduated with honors from the University of Wisconsin-Madison with a BBA in finance, investment, and banking, and holds the Chartered Financial Analyst designation. Katy also chairs the board of directors of the non-profit organization Reach the World.



Joseph Moore

Semiconductor Capital Equipment & Semiconductors

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Joe Moore is an Executive Director covering the Semiconductors industry. He joined Morgan Stanley in late 2011 with 18 years of investment industry experience. Joe spent two years as an applications engineer at National Semiconductor, then eight years at Goldman Sachs covering semiconductors on the sell side. He then spent ten years on the buy side, investing in the technology sector, first at Citadel Investments, then at Goldman Sachs in various internal investment funds. He holds an MBA from Dartmouth and a BS in computer engineering from UC San Diego.

Biographies



Craig Hettenbach

Semiconductors

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Craig Hettenbach is an Executive Director covering the Semiconductors industry. He joined Morgan Stanley in 2013 and has 22 years of investment research experience, including 17 years covering tech. Within Semiconductors, Craig focuses on the analog and microcontroller segments and also covers connector and sensor companies. Prior to joining Morgan Stanley, he worked at Goldman Sachs for five years covering analog semiconductors and the IT Supply Chain (EMS, distribution, components). Craig holds a bachelor of science degree in finance from the McIntire School of Commerce at the University of Virginia..



James Faucette

IT Services & Payments

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James Faucette leads the US Fintech and Payments research team; he has experience covering a number of sectors within technology. James joined Morgan Stanley from Pacific Crest Securities, and also worked at Deutsche Bank (London) as a European tech strategist and at ING Barings (Santiago, Chile) as part of the Latin American electrical utilities team. He holds an International MBA from the University of Chicago and a BS in business economics from the University of Arizona.

Biographies



Simon Flannery
Telecom Services

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Simon Flannery is a Managing Director covering the North American Telecom Services and Communications Infrastructure industries within Equity Research. He has consistently ranked among the leading analysts in the Telecom sector and has been recognized in a variety of investor polls. He joined Morgan Stanley in 1999 from JP Morgan where he had covered the US and Latin American Telecom sectors. He followed the European Telecom and Media sectors for JP Morgan from London, before moving to New York in 1993. Simon has been analyzing the Telecom industry for some 30 years. Before joining JP Morgan, Simon worked at Price Waterhouse. Simon holds a BA in Economics from Trinity College, Dublin, and an MBA from Cass Business School, London. He is also a Chartered Accountant..



David Hamburger
Fixed Income Research: Telecom, Cable and Media
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David Hamburger is an Executive Director in Fixed Income Research, covering investment-grade and high-yield companies in the Telecom, Cable, and Media industries. He joined Morgan Stanley in 2012 as part of the Corporate Credit Analytics team. Prior to joining Morgan Stanley, David spent more than six years as a sell-side credit analyst at BNP Paribas and Citigroup. Before that, he was a credit analyst at Moody's Investors Service for more than seven years. David has a BA in History and History of Culture from the University of Wisconsin-Madison and a master's degree in Public Affairs from Princeton University.

Biographies



Benjamin Swinburne

Cable/Satellite & Media

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Benjamin Swinburne is a Managing Director at Morgan Stanley Research covering the Media, Entertainment, Advertising, and Cable/Satellite industries, areas he has followed for over a decade. He has consistently ranked among the leading analysts in multiple media sectors and been recognized in a variety of investor polls. Prior to joining Morgan Stanley as a member of the media research team in 1999, he worked at Lucent Technologies as an analyst in the mergers and acquisitions division. Benjamin holds a B.A. in public policy with a concentration in finance from Washington & Lee University and an M.S. in accounting from Babson College. He also holds the Chartered Financial Analyst designation.



Brian Nowak

Internet

Brian.Nowak@morganstanley.com, (212) 761-3365

Brian Nowak is a Managing Director at Morgan Stanley Research covering the US Internet industry. He has been named to the Institutional Investor All America Research team multiple times, including #1 in Large Cap Internet. Prior to Morgan Stanley, he worked at Susquehanna Financial Group and Nomura Securities, also covering the US Internet space. Prior to Nomura, he worked at Sanford C. Bernstein & Co. as part of a four-time II #1-ranked US Media research team. Brian began his career at PricewaterhouseCoopers LLP after graduating from the University of Michigan with a Bachelor's degree in Business and a Master's in Accounting. He also holds the Chartered Financial Analyst designation.

April 2021

Technology, Media & Telecom Spring Training Teach-In

Biographies



Lauren Schenk

Internet: Small and Midcap

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Lauren Schenk is an Executive Director in Morgan Stanley Research covering the Small and Mid-Cap Internet industry. She previously had lead coverage of the US Footwear industry and was part of the No. 2-ranked Specialty Retail & Department Store team. Lauren covered the Apparel & Footwear industries broadly for more than seven years, after joining Morgan Stanley in 2012. Lauren graduated with honors from the Carroll School of Management at Boston College, with a Bachelor of Science in Finance and Economics.

TMT Spring Training Teach-In

What's Different This Time?

Understanding Growth in Software

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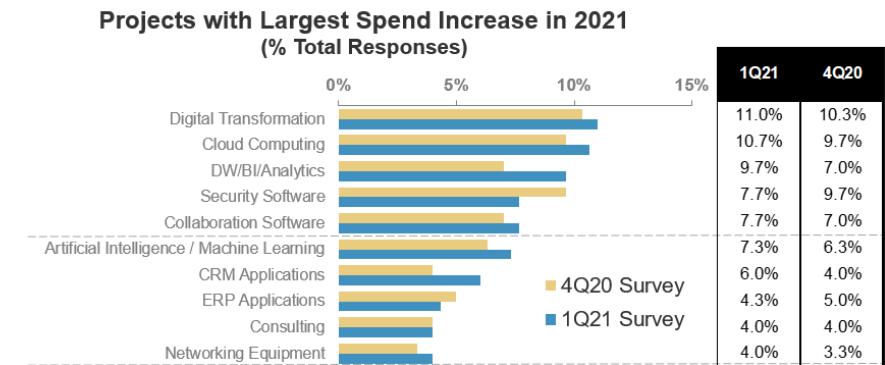
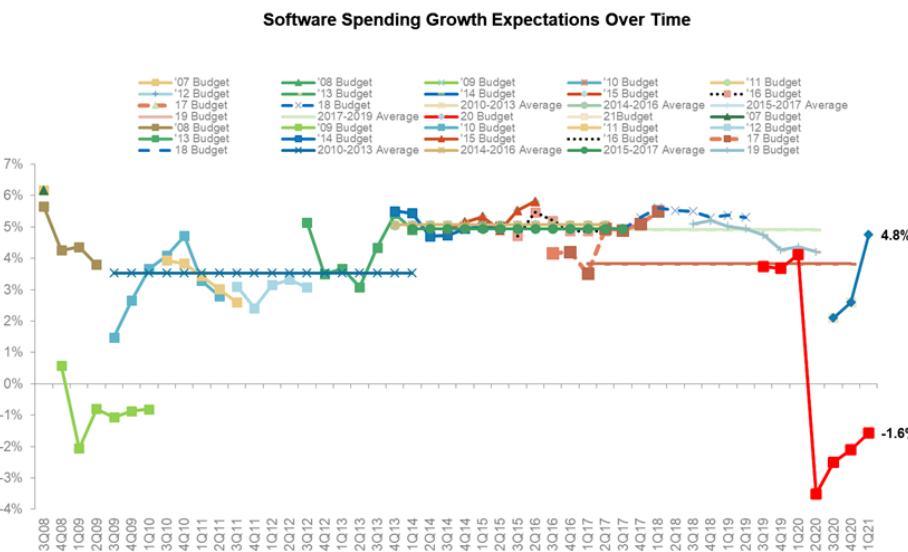
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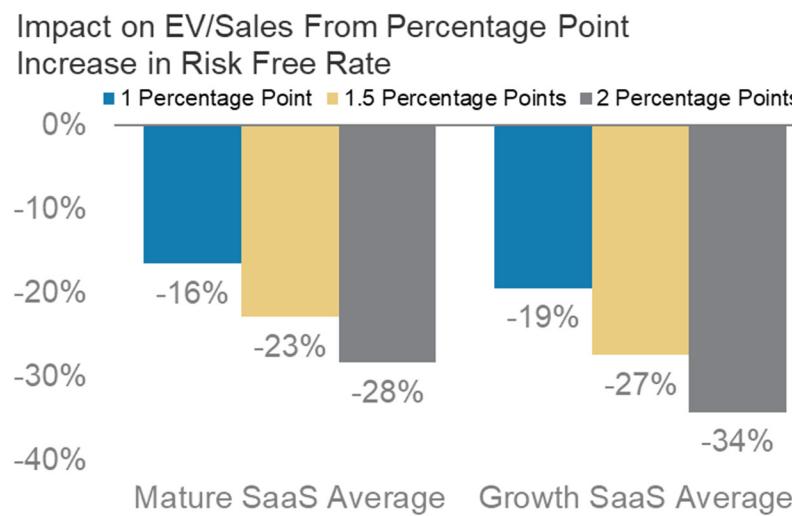
March 2021 — Upgraded Software Industry View to Attractive

1. Digital Transformations Driving an Accelerating Spending Environment

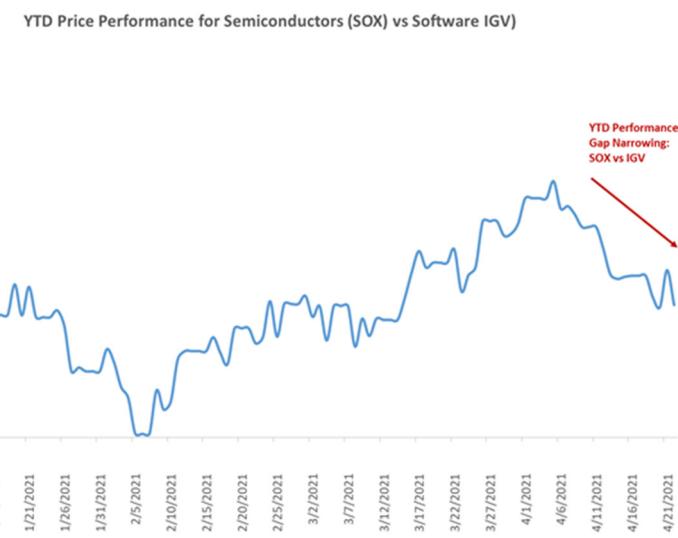


March 2021 — Upgraded Software Industry View to Attractive

1. Digital Transformations Driving an Accelerating Spending Environment
2. Software Multiple Risks (Interest Rates, Sector Rotation) In the Price

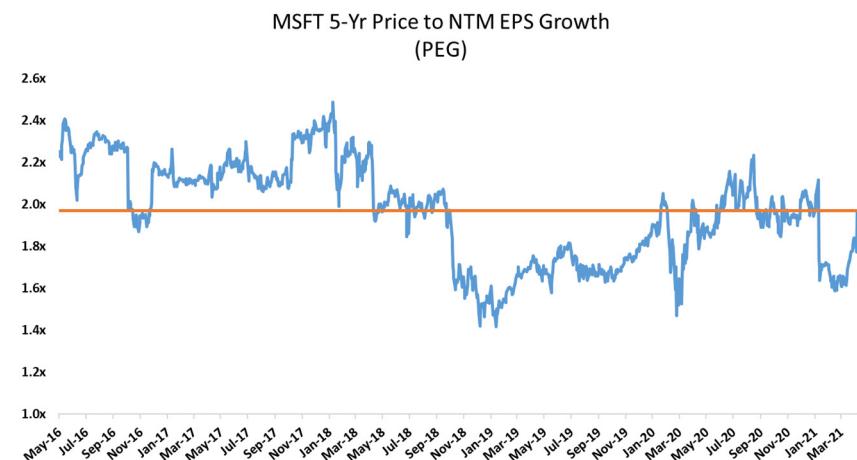
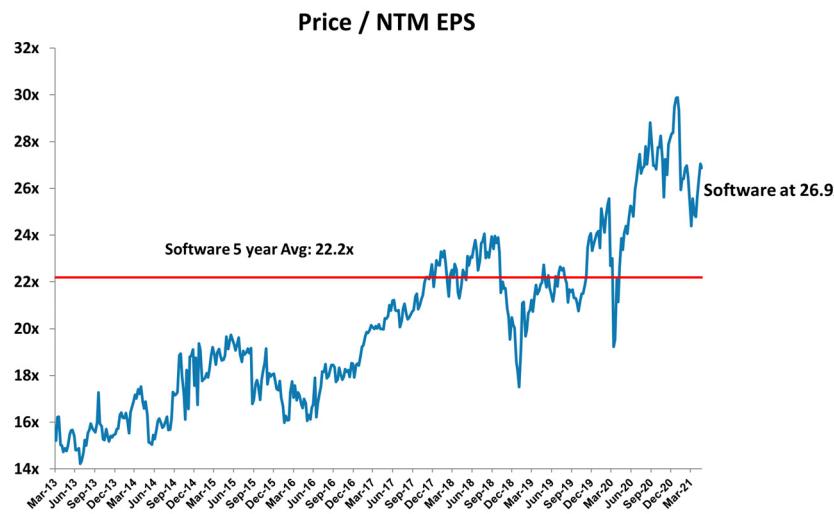


Source: Morgan Stanley Research. Mature SaaS = CRM, HUBS, NOW, WDAY, VEEV. Growth SaaS = DDOG, MDB, NET, OKTA, ZS. Analysis assumes change in 10-yr interest rate, holding other WACC AND DCF inputs constant



March 2021 — Upgraded Software Industry View to Attractive

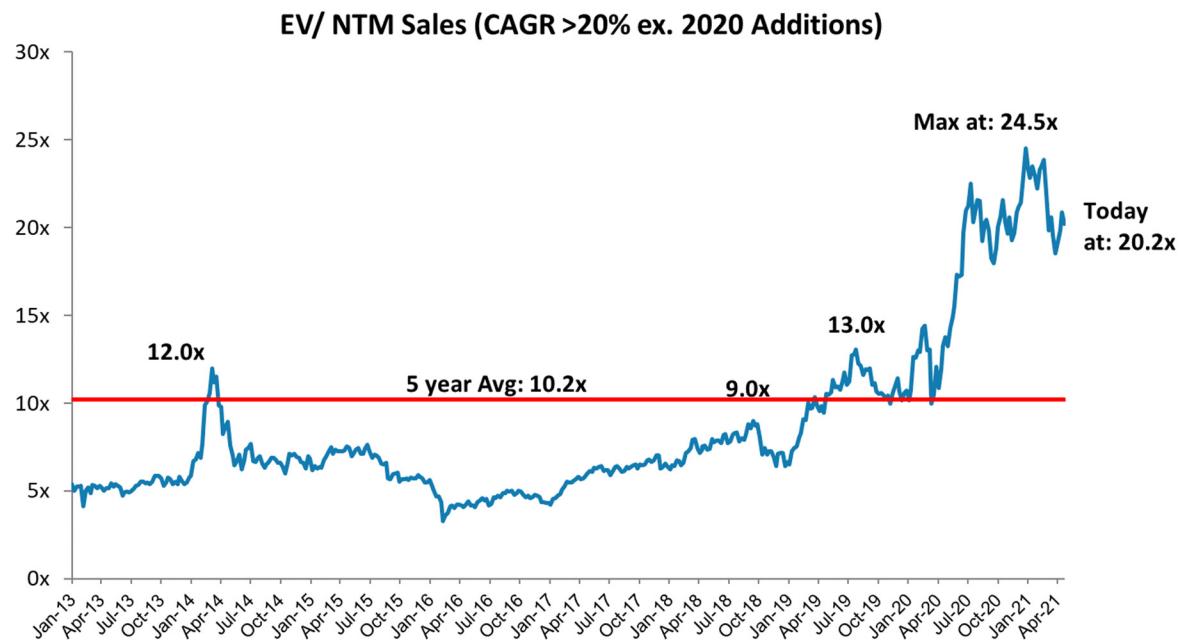
1. Digital Transformations Driving an Accelerating Spending Environment
2. Software Multiple Risks (Interest Rates, Sector Rotation) In the Price
3. GARP Software Attractively Priced at Current Levels



April 2021

March 2021 — Upgraded Software Industry View to Attractive

Investor Feedback: Software Still Looks Expensive



What's Different This Time?

Big Valuations Require...

1. Very Large Market Opportunities
2. Business Models Enabling Rapid Growth
3. Unit Economics Supporting High Long-term Margins

Several Software Companies Have Checked These Boxes in the Past...



Microsoft



Adobe



...Which Are the Future Winners?



What If We Invested in the 3 Horseman at these Levels?

| | | CY22 Revs | EV/S | EV/S/G |
|------------|------|-----------|-------|--------|
| Zoom | ZM | \$4,342 | 23.4X | 0.8X |
| Atlassian | TEAM | \$2,684 | 22.0X | 1.0X |
| Veeva | VEEV | \$2,074 | 21.3X | 1.1X |
| Okta | OKTA | \$1,398 | 27.6X | 0.9X |
| Datadog | DDOG | \$1,136 | 25.8X | 0.7X |
| Coupa | COUP | \$879 | 24.3X | 0.9X |
| MongoDB | MDB | \$994 | 21.3X | 0.7X |
| Zscaler | ZS | \$1,065 | 25.0X | 0.6X |
| Palantir | PLTR | \$1,915 | 28.5X | 0.9X |
| Snowflake | SNOW | \$1,790 | 44.3X | 0.6X |
| Twilio | TWLO | \$2,951 | 19.3X | 0.7X |
| Cloudflare | NET | \$786 | 34.2X | 1.0X |
| Average | | 26.4X | 0.8X | |

| | | CY17 Rev | High Growth | Implied EV CY16 | Current EV CY21 | Implied CAGR |
|------------|------|-----------|-------------|-----------------|-----------------|--------------|
| Workday | WDAY | \$ 2,143 | 26.4X | \$56,602 | \$65,514 | 3% |
| ServiceNow | NOW | \$ 1,918 | 26.4X | \$50,671 | \$114,318 | 18% |
| Salesforce | CRM | \$ 10,540 | 26.4X | \$278,381 | \$209,640 | -6% |

| | | CY16-18 | High Growth | Implied EV CY16 | Current EV CY21 | Implied CAGR |
|------------|----------|-----------|-------------|-----------------|-----------------|--------------|
| | CY17 Rev | Growth | Growth | CY16 | CY21 | |
| Workday | WDAY | \$ 2,143 | 34% | 0.8X | \$59,998 | 2% |
| ServiceNow | NOW | \$ 1,918 | 37% | 0.8X | \$58,607 | 14% |
| Salesforce | CRM | \$ 10,540 | 26% | 0.8X | \$224,731 | -1% |

What Do Big Valuations Imply?

| | | EV | CY22 Revs | EV/Rev | Op Margins |
|------------|------|-------------|-------------|--------|------------|
| Microsoft | MSFT | \$1,927,316 | \$196,929.5 | 9.8X | 42.8% |
| Oracle | ORCL | \$268,151 | \$41,795.3 | 6.4X | 46.0% |
| Adobe | ADBE | \$249,830 | \$17,790.0 | 14.0X | 46.2% |
| SAP | SAPG | € 145,148 | € 28,292 | 5.1X | 29.0% |
| Salesforce | CRM | \$209,640 | \$31,233.3 | 6.7X | 18.9% |
| Average | | | 8.4X | 36.6% | |

Expected annual investment return:

15%

10-Years Out

| | | EV | CY22 Revs | EV/Rev | EV/Sales | EV | Revs | CAGR | OM % |
|------------|------|-----------|-----------|--------|----------|-----------|------------|------|-------|
| Zoom | ZM | \$101,639 | \$4,341.9 | 23.4X | 8.4X | \$411,188 | \$48,848.3 | 31% | 29.0% |
| Atlassian | TEAM | \$59,086 | \$2,683.8 | 22.0X | 8.4X | \$239,036 | \$28,396.9 | 30% | 32.0% |
| Veeva | VEEV | \$44,184 | \$2,073.9 | 21.3X | 8.4X | \$178,748 | \$21,234.9 | 29% | 46.2% |
| Okta | OKTA | \$38,569 | \$1,398.4 | 27.6X | 8.4X | \$156,031 | \$18,536.1 | 33% | 25.0% |
| Datadog | DDOG | \$29,256 | \$1,136.1 | 25.8X | 8.4X | \$118,357 | \$14,060.6 | 32% | 25.7% |
| Coupa | COUP | \$21,360 | \$879.2 | 24.3X | 8.4X | \$86,414 | \$10,265.8 | 31% | 21.0% |
| MongoDB | MDB | \$21,196 | \$993.9 | 21.3X | 8.4X | \$85,749 | \$10,186.8 | 30% | 32.0% |
| Zscaler | ZS | \$26,606 | \$1,065.4 | 25.0X | 8.4X | \$107,638 | \$12,787.1 | 32% | 35.0% |
| Palantir | PLTR | \$54,490 | \$1,914.9 | 28.5X | 8.4X | \$220,443 | \$26,188.1 | 34% | 36.0% |
| Snowflake | SNOW | \$79,347 | \$1,789.8 | 44.3X | 8.4X | \$321,002 | \$38,134.4 | 40% | 31.5% |
| Twilio | TWLO | \$56,835 | \$2,951.0 | 19.3X | 8.4X | \$229,928 | \$27,314.9 | 28% | 18.0% |
| Cloudflare | NET | \$26,904 | \$785.7 | 34.2X | 8.4X | \$108,840 | \$12,930.0 | 37% | 29.6% |
| Average | | | | | 8.4X | | | 32% | |

Big Valuations Necessitate a Big TAM

Top Down — Existing Spending in Software

Primary Market

Applications
\$315B
3-year CAGR = 9.0%

Leading Vendors

MSFT
SAP
CRM

**Infrastructure &
App. Deployment**
\$282B
3-year CAGR = 8.6%

MSFT
ORCL
IBM

Big Valuations Necessitate a Big TAM

Top Down — Existing Spending in Software

| Primary Market | Secondary Market 2020 vendor revenue, 3-yr CAGR | Vendors |
|--------------------------------------|--|----------------------------|
| Applications \$315B | ERM Applications = \$78B, +7% | SAP, INTU, MSFT, WDAY |
| | Production Apps = \$57B, +1% | FIS, CSU, SAP |
| | Content Workflow & Mgmt Apps = \$66B, +12% | MSFT, ADBE, OTEX |
| | CRM Applications = \$66B, +11% | CRM, ORCL, SAP |
| | Engineering Applications = \$22B, +6% | DSY, SNPS, SIE, ADSK |
| | Collaborative Applications = \$22B, +20% | ZM, MSFT, WORK, GOOG, TEAM |
| | Supply Chain Management Apps = \$11B, 5% | ORCL, SAP, JDA Software |

Big Valuations Necessitate a Big TAM

Top Down — Existing Spending in Software

Primary Market

Infrastructure &
App. Deployment
\$282B

Secondary Market

2020 vendor revenue, 3-yr CAGR

Vendors

| | |
|---|---------------------------------|
| Data Management Software = \$68B, +9% | ORCL, MSFT, IBM |
| Analytics & Artificial Intelligence = \$27B, +9% | MSFT, ORCL, SAP |
| Physical & Virtual Computing = \$40B, +5% | MSFT, VMW, CTXS |
| Application Platforms = \$17B, +8% | IBM, ORCL, CRM |
| Integration/Orchestration Middleware = \$14B, +12% | IBM, ORCL, ACI Worldwide |
| System & Service Management = \$27B, +12% | NOW, MSFT, BMC Software |
| Application Development Software = \$6B, +3% | SAP, CRM, TEAM |
| Storage Software = \$19B, +3% | Dell, IBM, Veritas |
| Software Quality & Life Cycle Tools = \$8B, +11% | MSFT, CA Tech, Planview |
| Network Software = \$4B, +10% | CSCO, ANET, JNPR |
| Security Software = \$45B, +12% | PANW, AVGO, McAfee |

Big Valuations Necessitate a Big TAM

How Much TAM Needs to be Captured to Justify a >20x Sales Multiple?

- Currently, this cohort of high-fliers hold ~4% average share of current spend in their respective categories as of CY21e
- Current valuations imply average market share grows to ~32% by CY31
- These valuations likely imply a move into new markets in addition to penetrating existing markets
- Valuations based on penetrating new markets = Higher risk

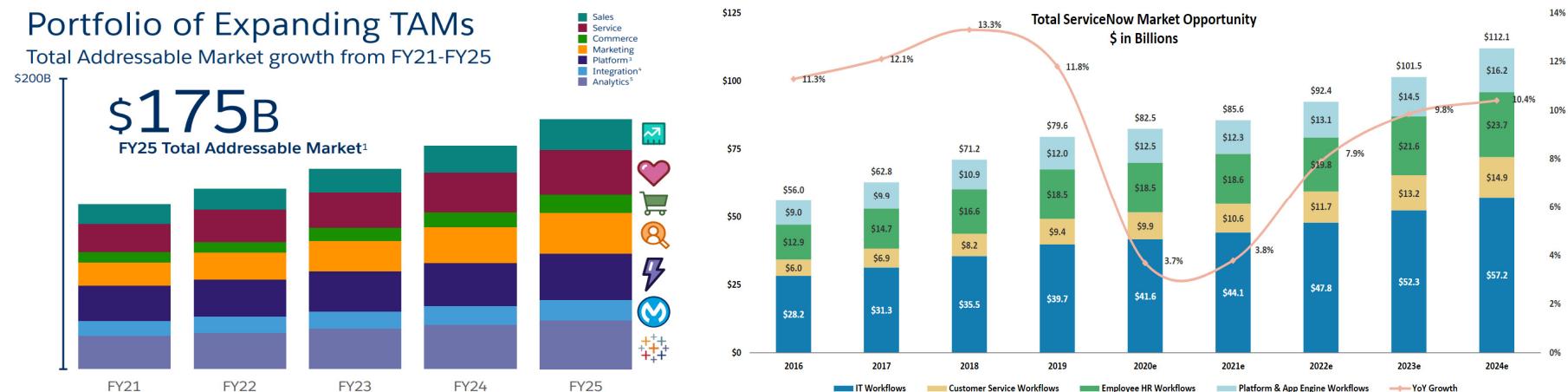
| Company Data and Estimates | | | | | | Top-Down Market Spend Estimates | | | | |
|----------------------------|--------|----------|------------------|---------|-------------------|---------------------------------|------------------------|---------------------------|----------------------------|------------------------|
| Company | Ticker | EV (\$B) | CY21e Revs (\$B) | EV/Revs | CY31e Revs* (\$B) | Category Spend CY21e (\$B) | % Share of CY21e Spend | 10 Yr Category CAGR (MSe) | Category Spend CY31e (\$B) | % Share of CY31e Spend |
| Zoom | ZM | \$102 | \$3.8 | 27.0X | \$49 | \$50 | 8% | 8% | \$108 | 45% |
| Atlassian | TEAM | \$59 | \$2.1 | 27.9X | \$28 | \$33 | 6% | 8% | \$67 | 42% |
| Veeva | VEEV | \$44 | \$1.8 | 25.0X | \$21 | \$29 | 6% | 14% | \$44 | 48% |
| Okta | OKTA | \$39 | \$1.1 | 35.4X | \$19 | \$9 | 12% | 10% | \$24 | 79% |
| Datadog | DDOG | \$29 | \$0.8 | 34.6X | \$14 | \$18 | 5% | 8% | \$39 | 36% |
| Coupa | COUP | \$21 | \$0.7 | 31.6X | \$10 | \$20 | 3% | 5% | \$33 | 32% |
| MongoDB | MDB | \$21 | \$0.8 | 27.7X | \$10 | \$61 | 1% | 9% | \$144 | 7% |
| Cloudflare | NET | \$27 | \$0.6 | 45.5X | \$13 | \$43 | 1% | 8% | \$92 | 14% |
| Palantir | PLTR | \$54 | \$1.5 | 37.0X | \$26 | \$172 | 1% | 8% | \$358 | 7% |
| Twilio | TWLO | \$57 | \$2.4 | 23.7X | \$27 | \$62 | 4% | 10% | \$161 | 17% |
| Snowflake | SNOW | \$79 | \$1.1 | 71.7X | \$38 | \$63 | 2% | 8% | \$135 | 28% |
| Zscaler | ZS | \$27 | \$0.8 | 34.8X | \$13 | \$23 | 3% | 5% | \$37 | 34% |
| Average | | | 35.2X | | | | 4% | | | 32% |

*CY31e revenues implied by 15% annual investment return

Big Valuations Necessitate a Big TAM

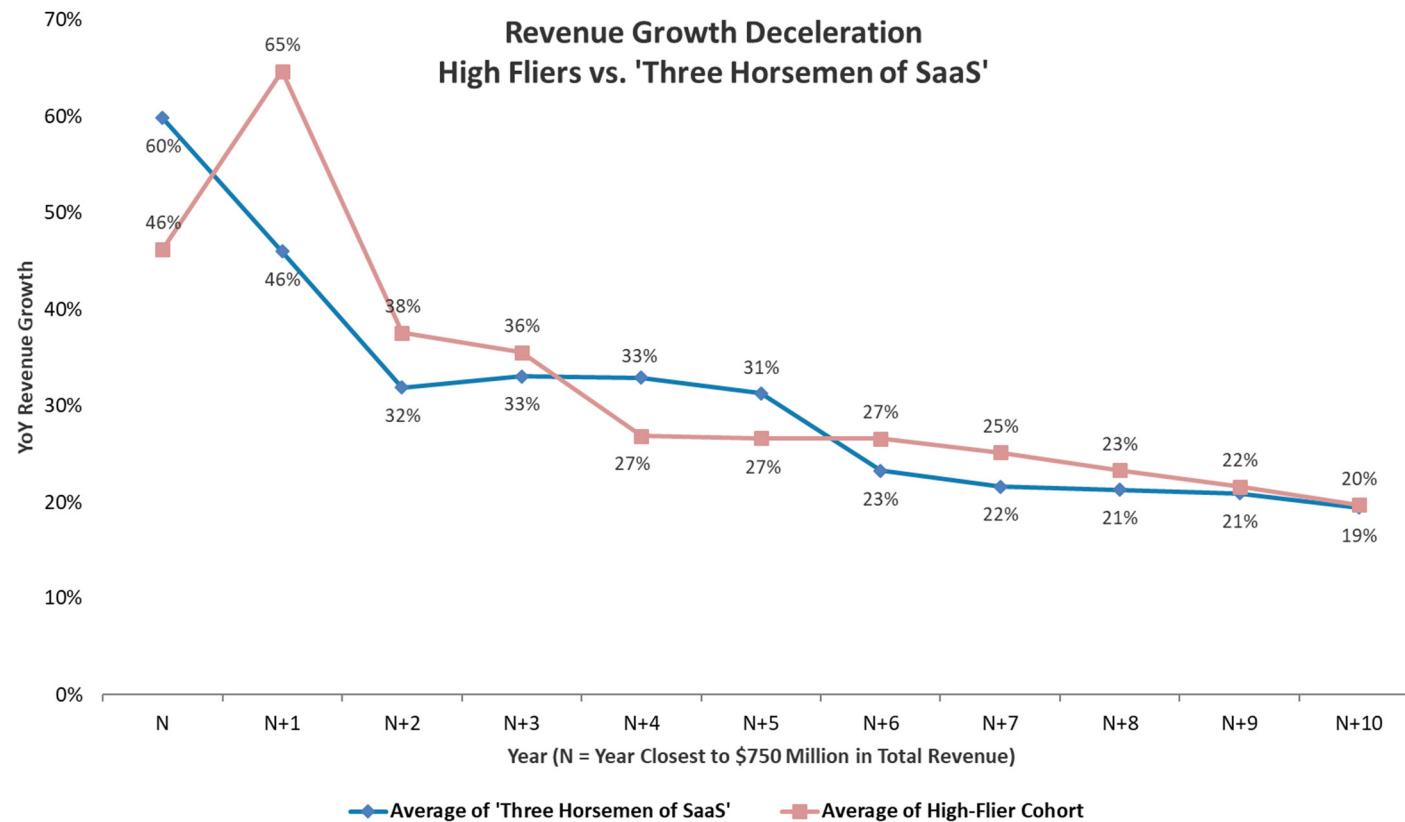
Shifts to the Cloud Expands TAMs

- As markets shift towards Cloud Delivery, TAMs Expand
- Cloud-based services encompass a broader value proposition, displacing hardware, datacenter and administrative spend
- Cloud-based services innovate faster, driving a stronger value proposition over time



Models Enabling Rapid Growth

Scaling Ahead of the ‘Three Horsemen of SaaS’?

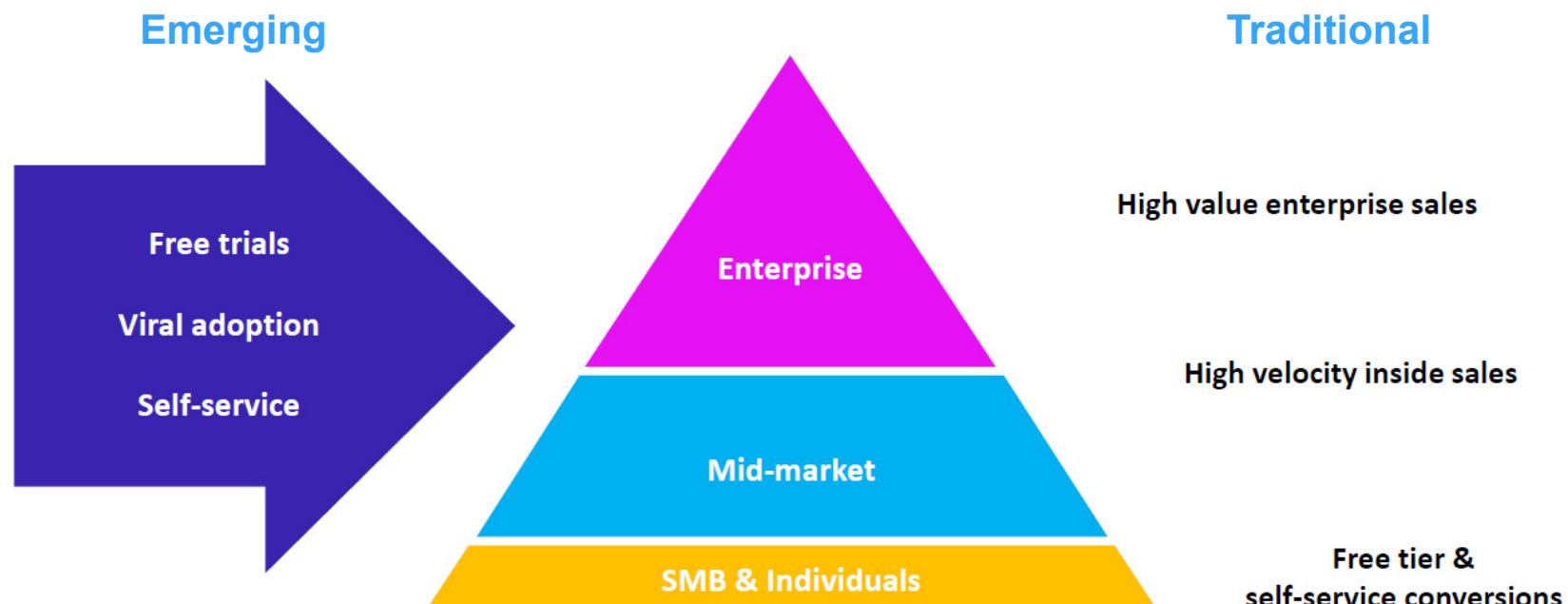


Source: Company Data, Morgan Stanley Research. Note: Year N = Year Closest to \$750M in revenue. ‘Three Horsemen of SaaS’ = CRM, NOW, WDAY. High-Fliers = ZM, TEAM, VEEV, OKTA, DDOG, COUP, MDB, ZS, NET, PLTR, TWLO, SHOP, SNOW.

Models Enabling Rapid Growth

New Viral Distribution Models Enabling Companies to Get Big Faster

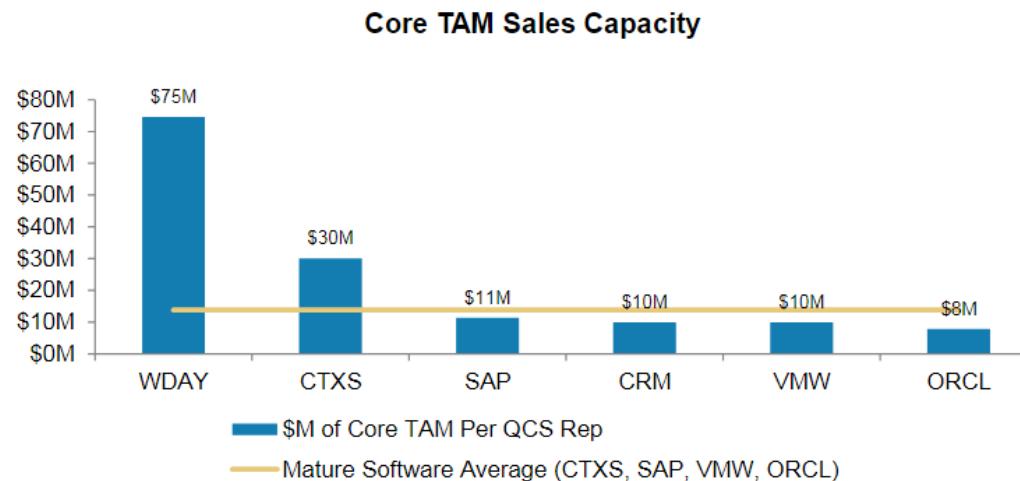
- Product driven distribution – Self Service, Easy to Use, Fast Time to Value
- Free-to-Paid Licensing models



Models Enabling Rapid Growth

Direct Field Sales – Expansion of Salesforce a Key Limiter on Growth

- “Software is Sold, Not Bought” – Sales relationship with decision makers and procurement officer (CIO, CISO, etc.)
- Works well for large scale complex software projects
- Typically long sales cycle given the nature of the software and size of the deal
- Imposes limitations on the rate of growth



Source: Morgan Stanley Research, Company Data, Gartner. Note: QCS rep figures are MSe. Core TAM figures for CTXS, SAP, CRM, VMW, and ORCL calculated by compiling Gartner estimates for any market where the company had >5% of revenue in CY16.

Models Enabling Rapid Growth

Indirect Channels – Disintermediate the End Customer Relationship

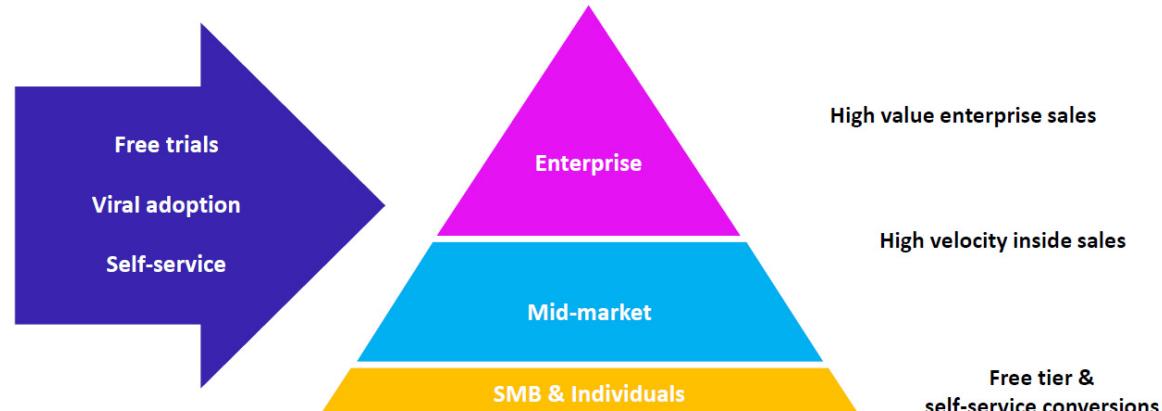
- Helps remediate the issue of sales rep capacity for software companies
- Global reach of the largest partners can assist with customer sourcing
- In addition to re-selling the software, also provide value-add and implementation services
- Does **not** solve the issue of long sales cycles or relationship with procurement officer
- Risks disintermediating the relationship between customer and vendor



Models Enabling Rapid Growth

Product Driven Sales — Innovation Sustains Velocity

- “The Product Sells Itself”
 - Vendor has a relationship with the end user – understands usage better
 - End user within the organization becomes the ‘sales person,’ thereby driving viral adoption
- Works best for software that is:
 - **Lower complexity** – less sales effort needed to land in the customer base
 - **Easy to try and inexpensive** – free trials, self service, no professional services required
 - **Fast time to value** – drives customers quickly expand usage and adopt in adjacent areas



Models Enabling Rapid Growth

The New Software Model – Consumption Pricing

Per Seat Pricing

“Pay for everyone touching the software”

- As additional users are needed, more licenses are added
- However, potentially limits demand
 - “Why purchase another license if an employee only uses the software every once in a while?”
 - “What if we only need this software occasionally as an organization?”
- Also at risk in downturns when organizations lay off employees

Consumption Pricing

“Pay for what you use”

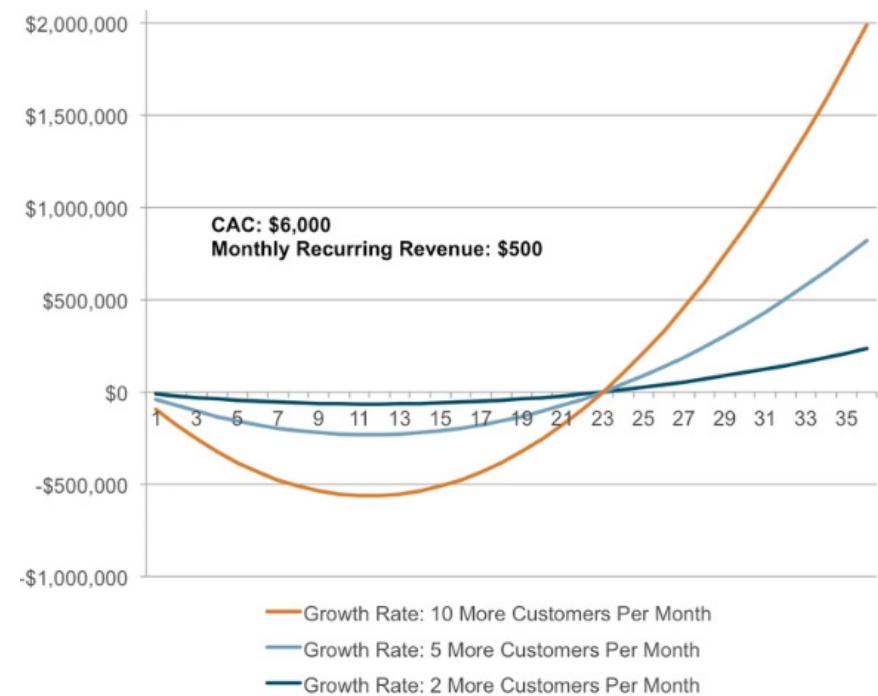
- **Unlocks more demand** as organizations can:
 - Scale up or down more easily
 - Test use cases in different parts of the organization with different users without committing to licenses for those users
- While also at risk in a downturn, to the extent customers are still using the software, less susceptible to downsized spend compared to per seat pricing

Models Enabling Rapid Growth

Unlocking Demand with Subscriptions to Grow Faster

- Lower upfront pricing and constant innovation = greater demand with subscription models
- Expensive to sell, but higher customer lifetime value (LTV)

| Recurring Revenue Mix | | |
|-----------------------|------|-------|
| | 2018 | Today |
| Mean | 57% | 85% |
| Median | 51% | 89% |



Models Enabling Rapid Growth

High Flier Models Tend to be Highly Recurring, But Fall Across the Product-Led Growth Continuum

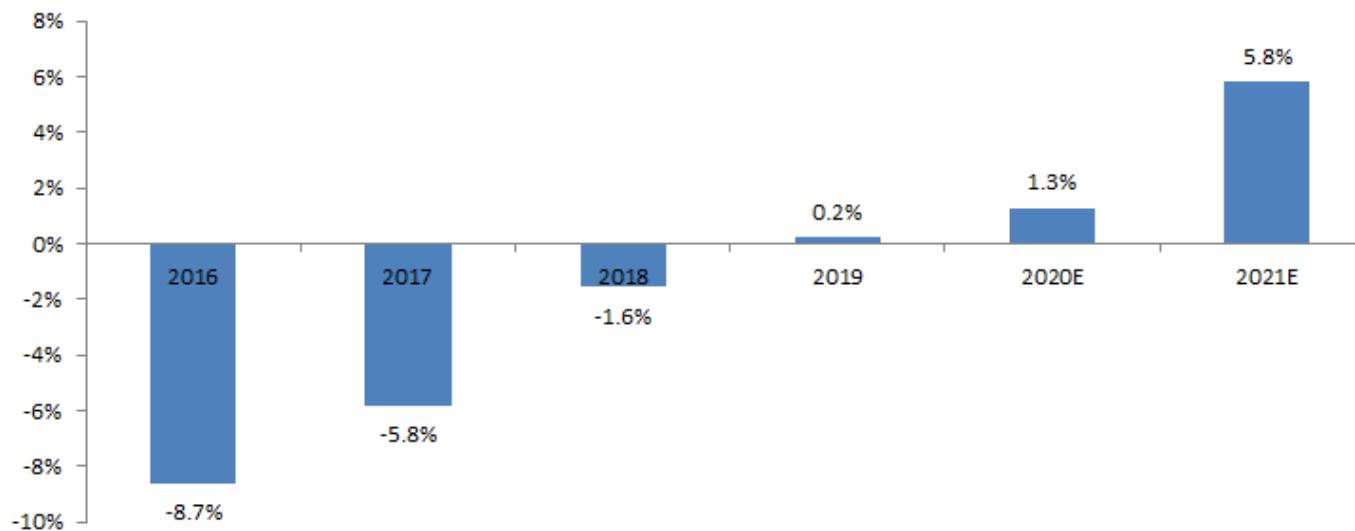
| Company | Ticker | EV (\$B) | 2022 Revs (\$B) | EV/Revs | Model |
|------------|--------|----------|-----------------|---------|--|
| Zoom | ZM | \$102 | \$4.3 | 23.4X | Freemium Model, Viral Adoption, Product-Led Growth, Sales Engagement as Licenses Grow, 100% Recurring Revenue, Priced per Host |
| Atlassian | TEAM | \$59 | \$2.7 | 22.0X | Product-Led Growth, Low Initial Price Points with Annual Price Increases, ~85% Recurring Revenue, Priced per User |
| Veeva | VEEV | \$44 | \$2.1 | 21.3X | Direct Sales Model, Enterprise Focused with Large Deal Sizes, ~81% Recurring Revenue, Priced per Seat and Data Volume |
| Okta | OKTA | \$39 | \$1.4 | 27.6X | Field Sales / Channel Led Model, Tied to Digital Transformation in the Enterprise with ~20-30% SMB Exposure, ~94% Recurring, Priced per User |
| Datadog | DDOG | \$29 | \$1.1 | 25.8X | Product-Led Growth, High Velocity Inside Sales Combined with High-Value Enterprise Sales, 100% Recurring Revenue, Priced per Host/Node/Volume |
| Coupa | COUP | \$21 | \$0.9 | 24.3X | Direct Sales Model, Enterprise Focused with Large Deal Sizes, ~89% Recurring Revenue, Priced per User |
| MongoDB | MDB | \$21 | \$1.0 | 21.3X | Hybrid Go-to-Market (~22% self-service / ~78% direct sales), ~93% Recurring Revenue, Mix of consumption and contracted based pricing per node |
| Zscaler | ZS | \$27 | \$1.1 | 25.0X | Field Sales / Channel Led Model, Enterprise Focused with Large Deal Sizes, ~99% Recurring Revenue, Priced per Seat |
| Palantir | PLTR | \$54 | \$1.9 | 28.5X | Customer acquisition relied on intervention from senior management and account-based sales force; majority subscriptions and maintenance fees. |
| Snowflake | SNOW | \$79 | \$1.8 | 44.3X | Direct sales team driving increased usage with the largest 250 customers. Self-service trials available; consumption-based pricing model. |
| Twilio | TWLO | \$57 | \$3.0 | 19.3X | Developer sales model with enterprise sales team layered in. Pay-as-you-go voice pricing and per-minute intelligent service pricing. |
| Cloudflare | NET | \$27 | \$0.8 | 34.2X | Free-to-paid model consisting of self-serve solutions and a dedicated inside and field sales force. Four tiers of subscription pricing with add-ons. |

Strong Unit Economics Support Margins

Software Models are Highly Efficient, But High Growth Rates Obscure the True Margin Potential

- Traditional valuation metrics such as P/E ratios fail to reflect the value accrued in the subscription renewal base
- Other valuation metrics such as EV/Sales ignore margins and efficiency all together

Average SaaS Non-GAAP Operating Margin



Strong Unit Economics Support Margins

What Drives the Strong Unit Economics in Software?

- Superior Gross Margins – Best of Breed Vendors at ~85%, Average in the High-70%
- Highly Recurring Renewal Base
- Constant innovation under a SaaS model drives value for customers and pricing power and durability
 - Vertical software vendors may have more pricing power → Higher margin potential
 - Infrastructure software vendors may have less pricing power → Lower margin potential
- S&M leverage is the largest driver of margin improvement over the long-term

| Margin Medicine Operating Margin % Drivers | | | | |
|--|-------|-------|---------------|------------------------------|
| | 2017 | 2022 | Terminal Year | Improvement: 2017 to Term Yr |
| Total Margin Medicine Group Op Margins | 0.4% | 18.2% | 30.9% | 30.5% |
| S&M % | 38.7% | 30.5% | 24.3% | 14.4% |
| Gross Margin% | 72.0% | 75.1% | 78.0% | 6.0% |
| R&D % | 19.4% | 16.8% | 14.4% | 5.0% |
| G&A % | 12.5% | 9.0% | 7.8% | 4.6% |
| Renewal Rate | 90.1% | 90.7% | 90.9% | 0.8% |

What's Different This Time?

Evolving business models should enable more durable growth from current crop of high growth software vendors:

- 1) Expanding market opportunities and well positioned vendors**
- 2) Hybrid sales models – incorporating self-service model, inside sales, and field sales motions**
- 3) Consumption models**

Combination of self-service distribution models and consumption pricing creates a high power net dollar expansion rate potential that can drive durable growth over time

What Do We Like in Software?

Increasing stability in interest rates, shifting market dynamics toward expansion phase, and improvements in demand environment represent potential positive catalysts for the group

Priority List of Software Picks

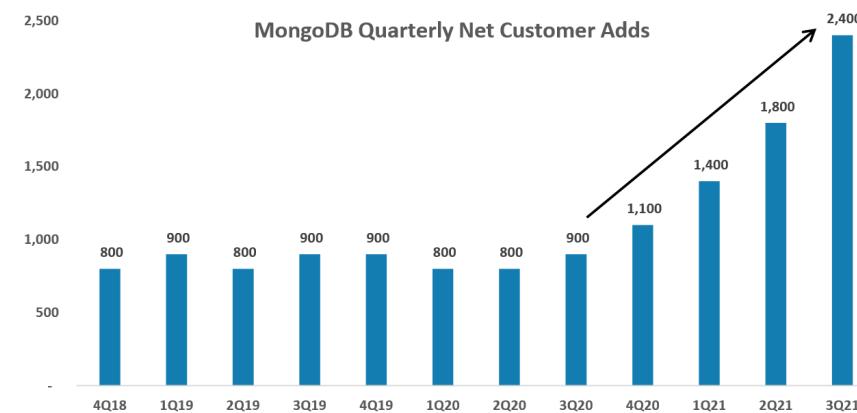
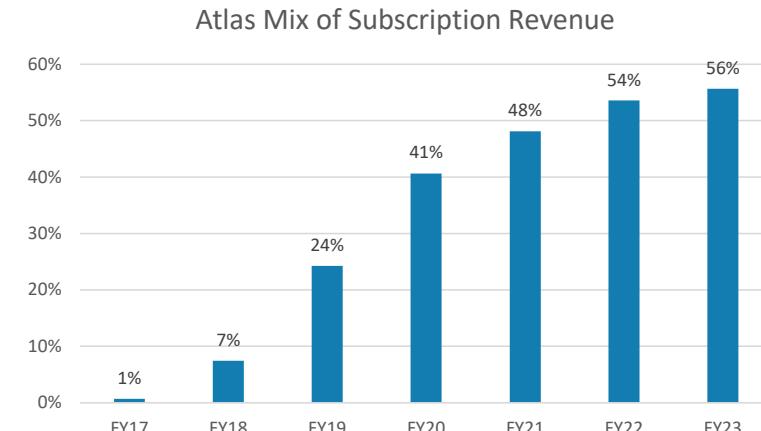
- **GARP At Valuation Below Historical Levels** – Exposure to durable secular growth trends, but now trading at a discount to historical levels given sector rotation out of Software.
 - Buying **MSFT, INTU, PANW**
- **Durable Growth Franchises At Reasonable Valuation** – Solid growth franchises seeing multiples return to levels inline with historical averages given the recent pullbacks, opening up opportunities to build positions in core franchises
 - Buying **ADBE, WDAY, NOW, DOMO, VEEV, ZI**
- **Secular Growth Stories with Multiples Reflective of Rising Rates** – Building exposure to top secular growth stories despite valuations at above historical levels, as improving demand environment sets up potential for upward revisions
 - Buying **PLAN, TEAM, COUP, DOCU, MDB**
- **Sharpening our Pencils** — Solid growth stories with recent pullbacks, but looking for 1) more upside to PT and 2) more conviction on the durability of FCF growth
 - Watching **CRM, SNOW, SHOP, NET, DDOG, FROG**

Views from the Broader Team

Views from the Broader Team

MDB - The Road to Durable 30%+ Growth

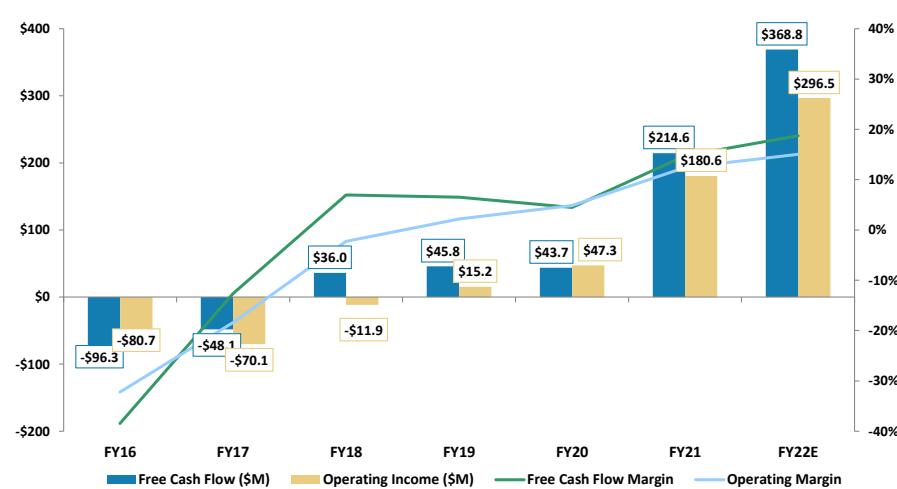
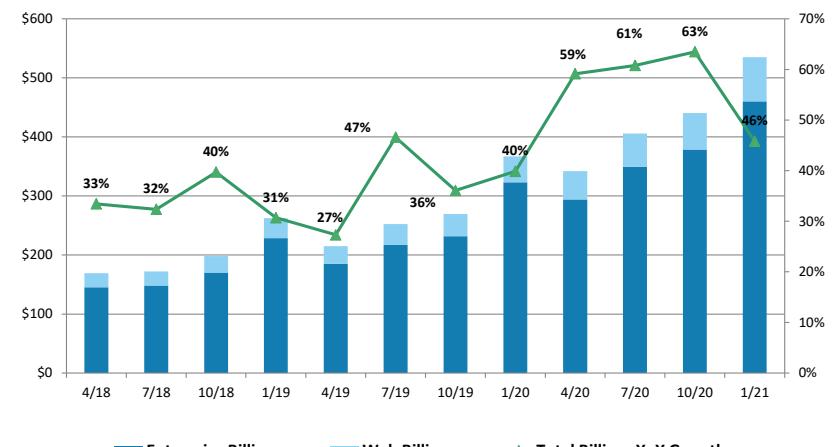
- Into CY21, MongoDB is seeing two key inflections that gives us confidence in 30%+ growth for the next several years
- **Key Inflection #1:** Business is set to be majority cloud, increasing exposure to the fastest growing market segment, where MDB is seeing the best share gains and also extends its tech lead
- **Key Inflection #2:** Accelerated pace of customer acquisition during the downturn positions MDB for growth as these customers expand into meaningful revenue contributors



Views from the Broader Team

DOCU – Strong Fundamentals with COVID Tailwinds

- Market leading technology with sustained billings growth and strong operating and FCF margins.
- Durable COVID tailwinds drives strong new customer acquisition and healthy renewal rates / upsell potential
- With shares trading at 0.6x growth-adjusted EV/S inline with SaaS peers, we see plenty of room for multiple expansion and positive revisions

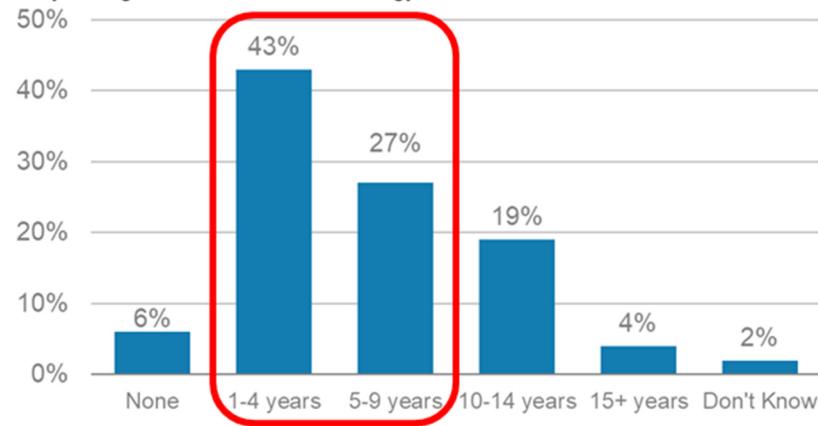


Views from the Broader Team

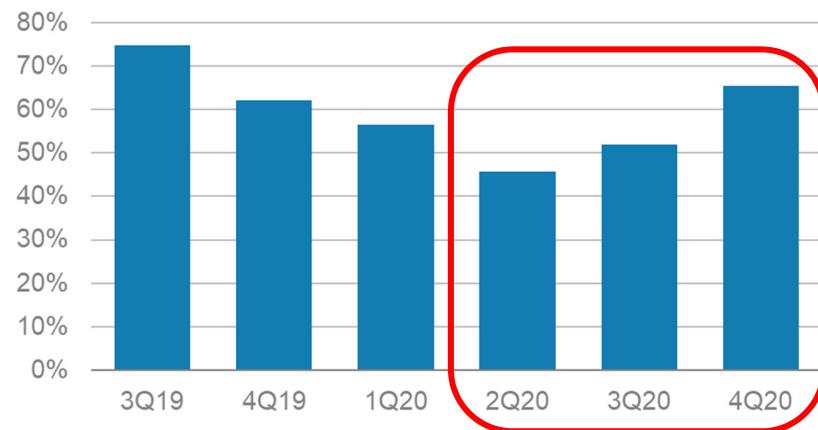
TWLO – Top Play in Digital Transformation Theme

- Digital transformation efforts accelerated by ~6 years due to COVID and remains #1 priority for CIOs moving forward
- Twilio best investment in theme given leadership position with broadest platform and largely untapped TAM
- Moves into customer engagement and IoT applications point to enabling organizations with tools and helping them figure out how to use

About how many years has COVID-19 accelerated the schedule for your digital communications strategy?



TWLO Y/Y Growth Acceleration Post-COVID

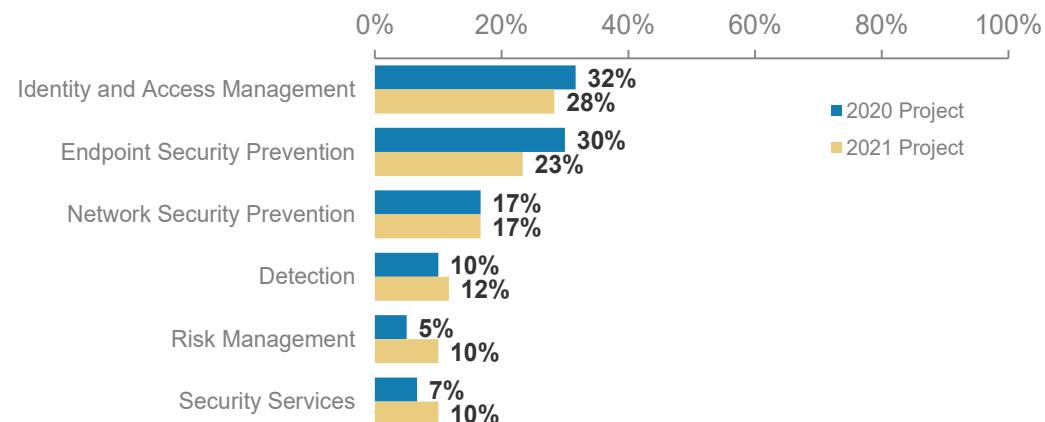


Views from the Broader Team

SAIL – Growing Secular Tailwinds + SaaS Transition

- An increasingly cloud-based and distributed workload is shifting security demand towards Identity Management.
- SailPoint is accelerating share gains against legacy competitors (IBM, CA, ORCL).
- A revamped go-to market and SaaS transition drives durable 30%+ ARR growth over the next few years with room for multiple expansion as SAIL trades at a >50% discount to SaaS Security (OKTA, CRWD, ZS)

Security Software Project with Largest Increase in Spending

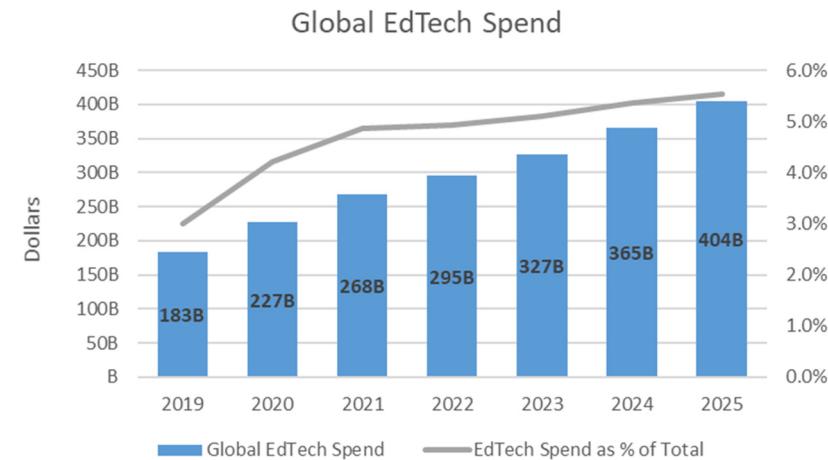


Views from the Broader Team

COUR – Durability of Growth Currently Undervalued

25%+ 10-Yr CAGR not reflected in shares

- Learning platform enabling transformation in education
- Large market opportunity
- Attractive ESG asset
- Near-term upside from monetization of new learners and institutions attracted to platform during covid
- Long-term, consumer flywheel drives competitive differentiation and positively impacts higher margin Enterprise & Degrees Segments

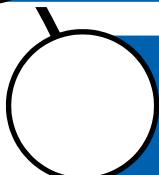


Team Software



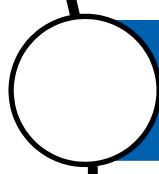
Keith Weiss, Team Leader

- Coverage focus: Large Cap (>\$15B)
- Tickers: ADBE, AKAM, ADSK, CHKP, CRM, INTU, MSFT, NET, ORCL, PANW, PLTR, NOW, SYMC, TEAM, VMW, WDAY, WORK, XM, ZS



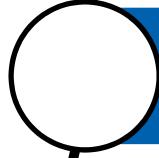
Stan Zlotsky, ED

- Coverage focus: Smid Cap SaaS (<\$15B)
- Tickers: ASAN, AVL, BIGC, COUP, DOCU, HUBS, PLAN, PRO, RAMP, SMAR, SPT, VEEV, VERX, WK, YEXT, ZEN, ZI, ZUO



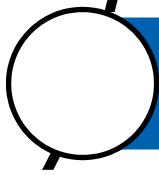
Sanjit Singh, ED

- Coverage focus: Smid Cap BI/Analytics (<\$15B)
- Tickers: AI, APPN, AYX, CLDR, CTXS, DDOG, DOMO, FROG, MDB, MSP, NEWR, NICE, NUAN, PD, SUMO, SWI



Josh Baer, VP

- Coverage focus: Smid Cap Vertical Software (<\$15B)
- Tickers: BOX, COUR, CDK, CHGG, DOCN, LSPD, PS, SABR, TWOU



Hamza Fodderwala, VP

- Coverage focus: Smid Cap Security Software (<\$15B)
- Tickers: CYBR, FEYE, MCFE, NLOK, PFPT, QLYS, RPD, SAIL, SCWX, TENB, VRNS



Elizabeth Elliott, ED

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Peggy Yu, Associate

April 2021

Technology, Media & Telecom Spring Training Teach-In

Telecom & Networking Equipment Communication Software

Whenever You Want Me, I'll Be There

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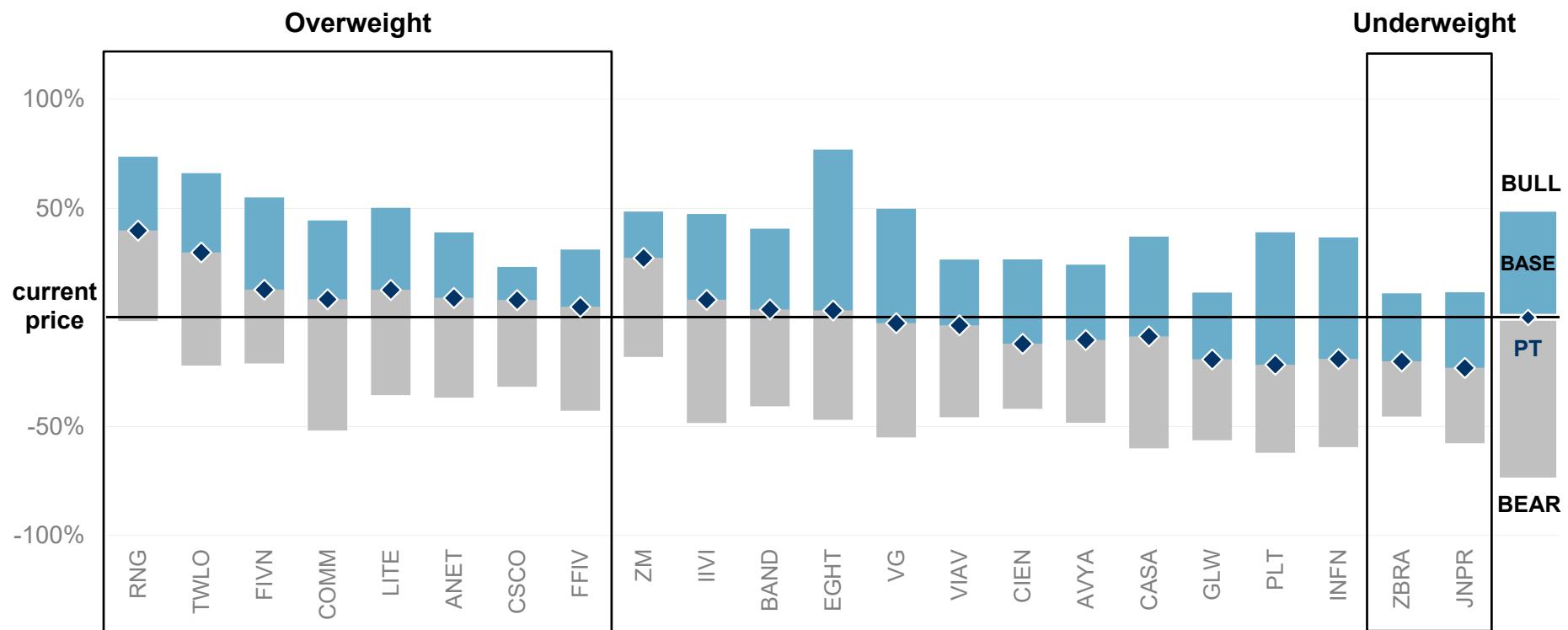
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Disclosures in this report are as of April 26, 2021; stock recommendations and stock prices as of April 23, 2021, unless otherwise noted.

Risk Reward Across Coverage Universe



Coverage Universe Spans Networking and Communication Software
AKA
 Equipment and Applications that Optimize Packet Transport

Major Themes in 2021

COVID

1 **Return to Work and Investment in Hybrid Work Kicking Off Delayed Spend**

Investment Cycle

2 **Digital Transformation Moves Beyond a Buzzword**

Share Shifts

3 **5G is Finally Here**

4 **Hyperscale Data Centers Upgrade Networking Equipment**

5 **Cloud Communication Software Competition Heats Up**

6 **New Networking Architectures Create Opportunities**

Return to Work / Investment in Hybrid Work Kicking Off Delayed Spend

COVID IMPACTED

Return to Work Investment Beginning to Take Place

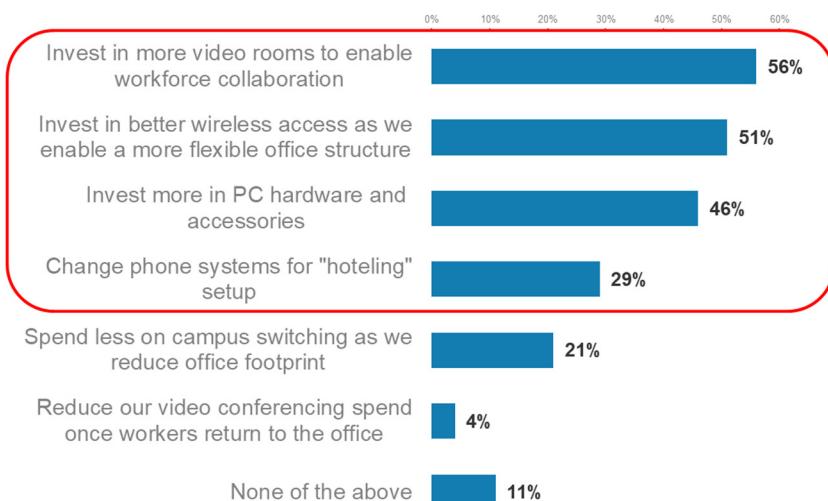
In office investment saw a pause in 2020 as work from home (WFH) enablement became top priority

Our recent CIO and Return to Work (RTW) survey pointing to a resurgence of spend, with added tailwind of hybrid work enablement

Video, connectivity top priorities, a tailwind for the networking / communication software space

Upwards of 6% increase in spend over NTM for new office enablement

In-Office Technology Investment Plans in N12M
(Among Total)



Positively Impacted: CSCO, ZM, PLT, RNG

Legs for In-Office Investment as Hybrid Work Models Finalized

We expect that this investment will have multi-quarter to multi-year duration as high % of CIOs are still making decisions

Additionally, with full return to work a summer / fall event, all of the pauses to investment have not yet released (18% still have paused investment as of Q1 CIO survey)

Return to Work Layout Plan

Yes, we are moving to a hoteling setup

8%

Yes, we are leaving setup as is, but cutting space for increased work from home

32%

No, we are still in process of developing

60%

CSCO Best Way to Play Reopening of Office in Networking

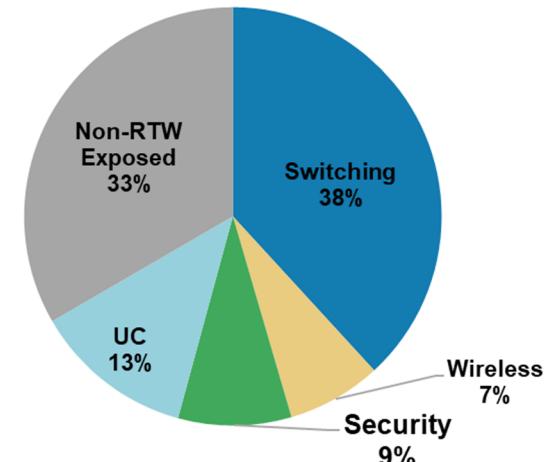
**100 of the Fortune 100 buy Cisco,
broadest reach of any IT organization**

**60% of exposure enterprise or
commercial, with spend largely paused
during 2020**

**Participate in resurgence in spend
through:**

- WiFi equipment
- Security software / hardware
- Video conferencing equipment / software
- Hoteling phones / cloud telephony
- Campus switching

CSCO RTW Spend Exposure (Product Rev.)



Historical CSCO vs. S&P NTM Multiple



April 2021

Technology, Media & Telecom Spring Training Teach-In

Digital Transformation Moves Beyond a Buzzword

COVID IMPACTED

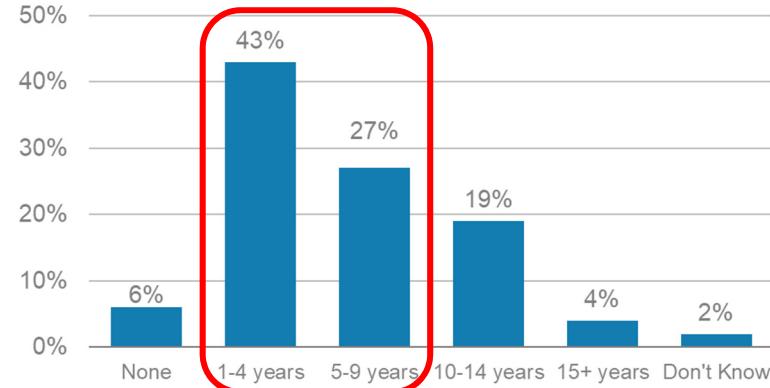
Acceleration of Digital Transformation Efforts Due to COVID

Digital transformation efforts were advanced by upwards of 6 years due to lack of in-person commerce

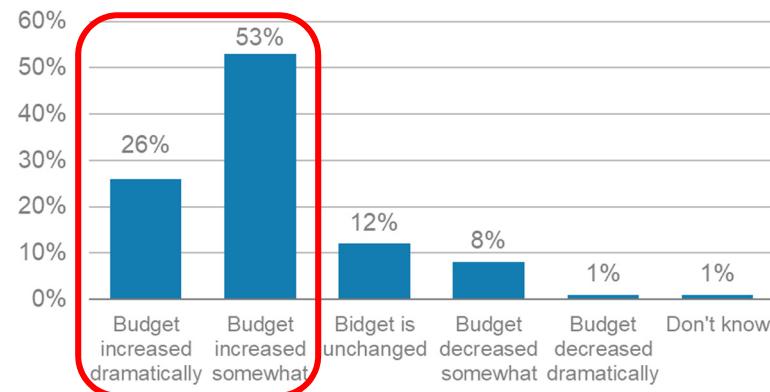
2020 examples of acceleration:

- Curbside pickup
- E-Commerce
- Telemedicine
- Online education
- COVID tracing
- Phone continuity w/ WFH
- QR code menus

About how many years has COVID-19 accelerated the schedule for your digital communications strategy?



How has COVID-19 affected your budget for digital transformation?

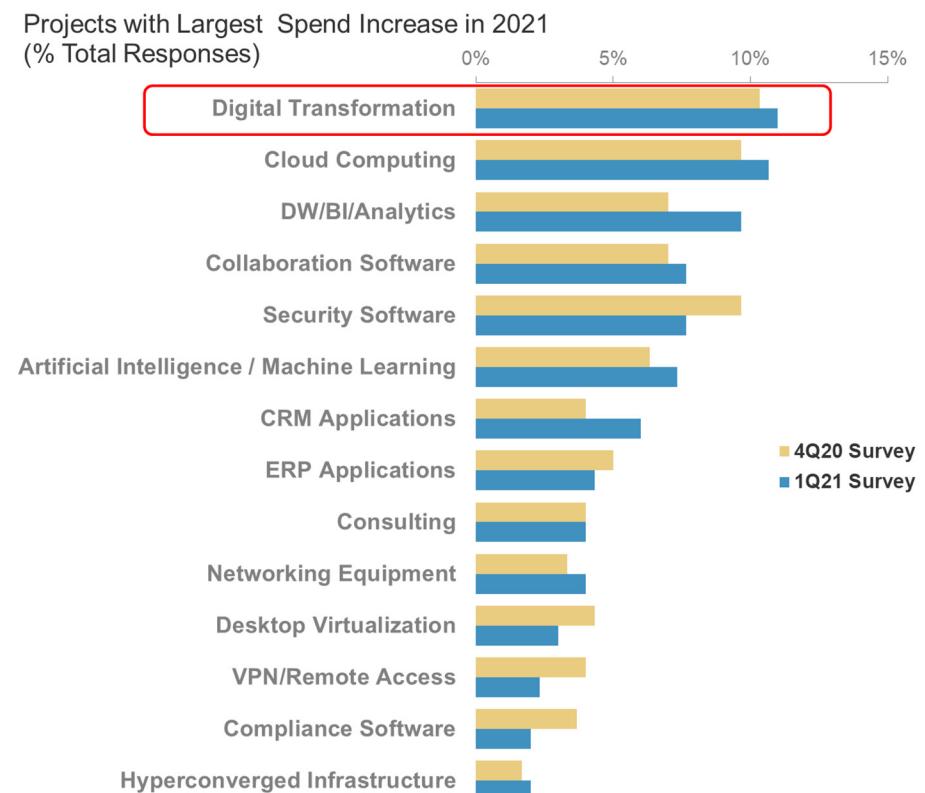
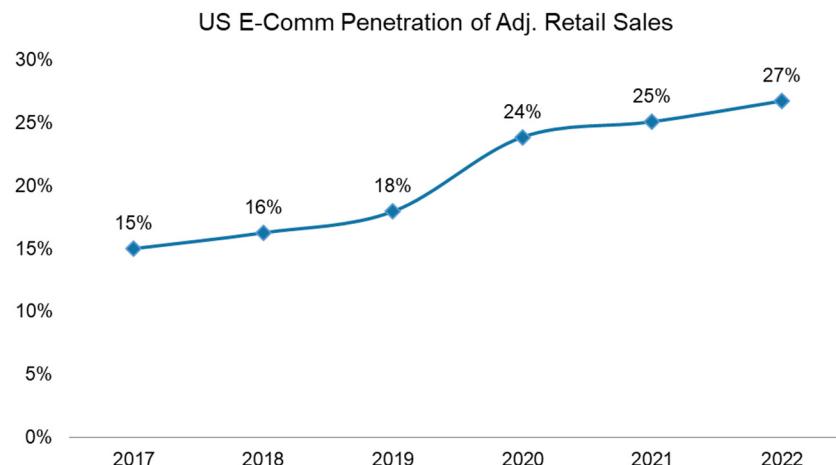


Positively Impacted: TWLO, FIVN, ZBRA
Negatively Impacted: AVYA, CSCO (Incumbents)

No Going Back to Previous Models

Digital transformation remains a number #1 priority of organizations as they look to compete

While we will go back to more in-person shopping, eCommerce still expected to grow



Digital Transformation is Not Just E-Commerce

Retail

- Omni-channel Customer Service
- Employee Devices with Smarter Inventory / Pricing Data
- Better Scheduling Software

Healthcare

- Telemedicine
- Digital Patient Communication
- In-hospital notification systems

Industrial

- Internet of Things (IoT)

Transportation & Logistics

- Route Optimization
- Cargo Optimization

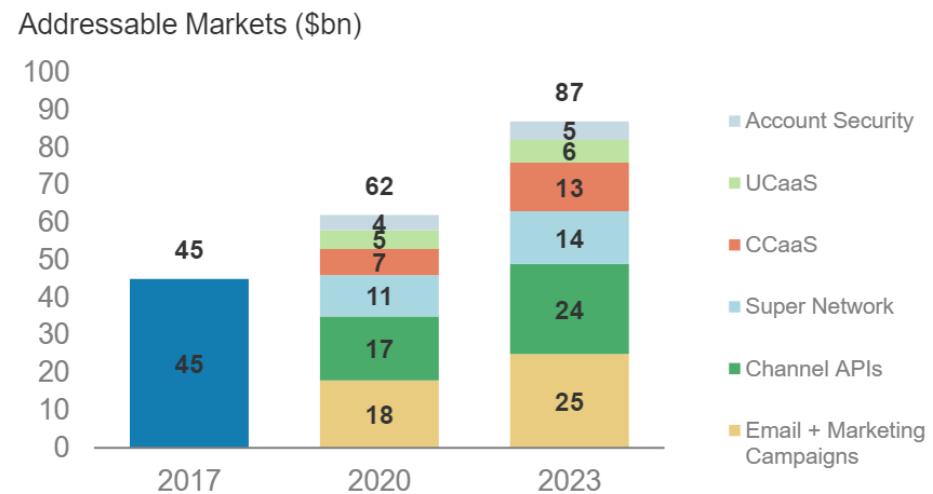
Twilio Best Way to Invest in Theme

Company expected to grow 30%+ CAGR over the next 4 years, to at least \$4bn in revenue

Remain the leading player with broadest platform and largely untapped TAM

Moves into customer engagement and IoT applications point to not just enabling organizations with the tools, but helping them figure out how to use

Fastest growing name in competitive universe, extending lead on the competition



5G Investment Finally Here

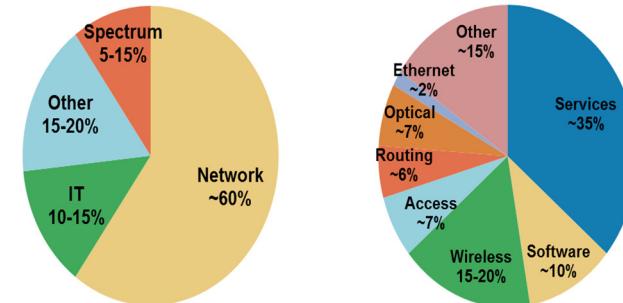
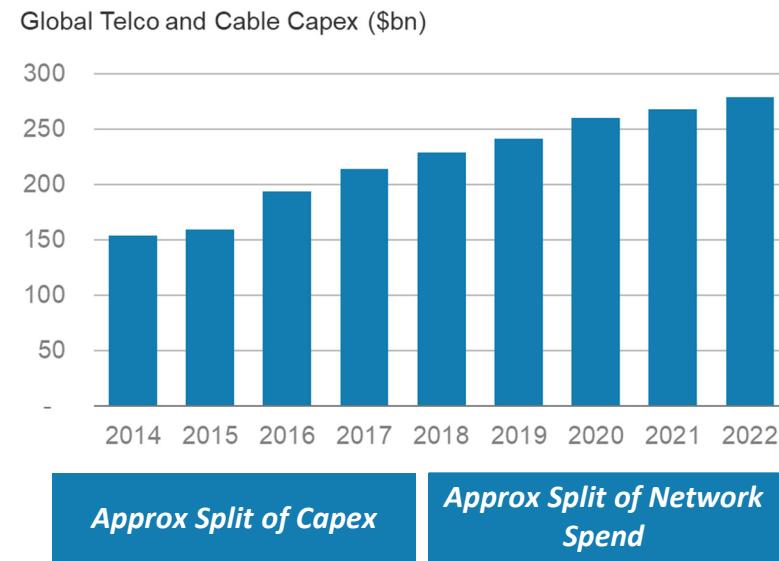
INVESTMENT CYCLE

Mid-Band Spectrum Triggers 5G Investment Bump

Mid-band spectrum had been a hang-up to further 5G investment

Spectrum availability allows for feasible business cases like fixed wireless

Expect incremental investment in 5G buildouts over next couple of years, starting in 2H'21



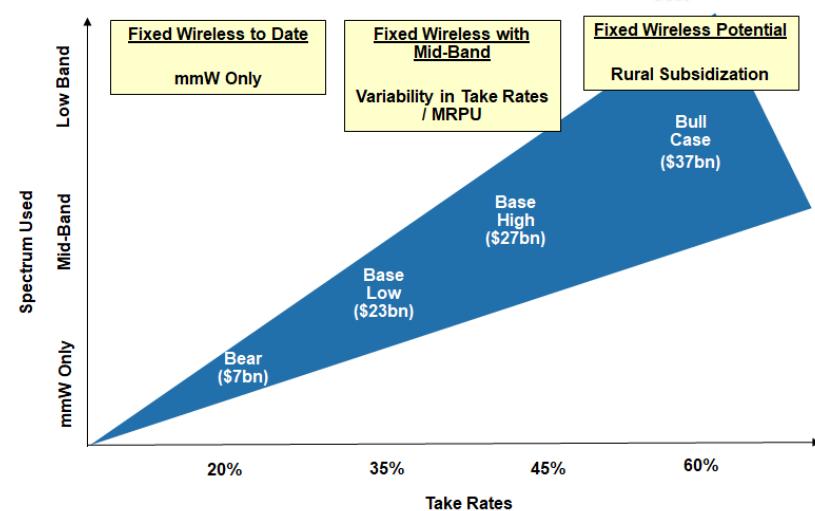
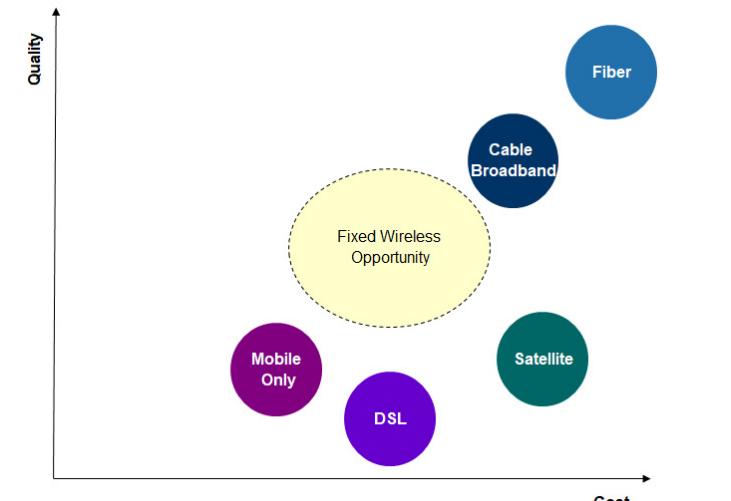
Positively Impacted: COMM (++) , CIEN (++) , CASA, INFN, GLW, CSCO, JNPR, LITE, IIVI

Fixed Wireless a Key 5G Investment Area

Fixed Wireless most significant incremental use case for 5G – base case opportunity of \$23-27bn

Expect incremental \$6-12bn in carrier capex over next 3-5 years

Benefits wireless / cable infrastructure names given ~40% of FWA cost comes from network equipment



5G Relative Exposures

| Sector | What are they providing? | Company | ~Rev % from Carrier or 5G | 2021e | |
|-------------------------|--------------------------------|----------------|---------------------------|------------|-----------|
| | | | | Revenue | EBIT |
| Wireless Equipment | Wireless RAN | Ericsson | 90% | \$28,300 | \$3,375 |
| | Wireless RAN / Infrastructure | Nokia | 85% | \$25,330 | \$1,868 |
| | -- | Huawei | 40% | ~\$137,000 | ~\$11,000 |
| | -- | ZTE | 65% | \$17,876 | \$1,263 |
| Fiber | Fiber / Antennas / Small Cells | CommScope | 40% | \$8,562 | \$1,148 |
| | Fiber | Corning | 35% | \$13,198 | \$2,472 |
| Other Carrier Equipment | General Infrastructure | Cisco | 25% | \$50,094 | \$16,856 |
| | -- | Juniper | 40% | \$4,605 | \$723 |
| Optical | Infrastructure for Backhaul | Ciena | 70% | \$3,646 | \$572 |
| | -- | Lumentum | 50% | \$1,881 | \$602 |
| | -- | II-VI | 35%-40% | \$3,250 | \$660 |
| | -- | Infinera | 80% | \$1,433 | \$43 |
| Semiconductor | Technology / Modem Chips | Qualcomm | 90% | \$31,591 | \$10,369 |
| | Chips for Radios | Xilinx | 15%-20% | \$3,371 | \$893 |
| | ASIC Baseband | Marvell | 50% | \$3,449 | \$981 |
| | Analog and Millimeter Wave | Analog Devices | 20% | \$6,624 | \$2,757 |
| Software | Network Management Software | VMware | 10% | \$12,654 | \$3,607 |

CommScope Best Way to Invest in Theme

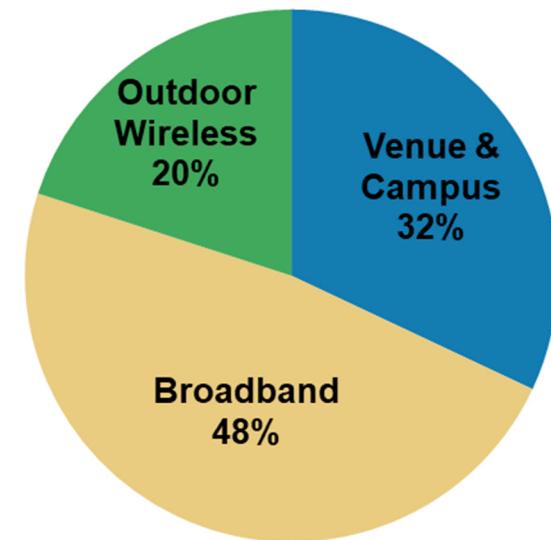
Strong competitive positioning ahead of 5G ramp as release of new spectrum necessitates accessibility upgrades

Key enabler and leading network equipment provider of FWA deployments

Also can capture investment from cable as they try to defend moat

In combination with opportunity to delever, COMM sets up best within equipment space over NTM

CommScope Vertical Exposure Post Spin-Off



Hyperscale Data Centers Upgrade Networking Equipment

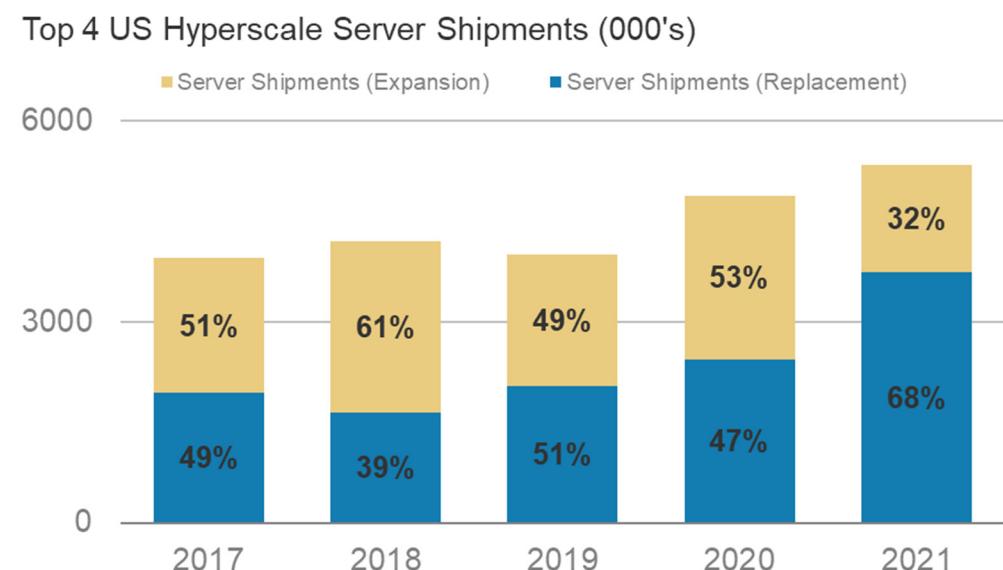
INVESTMENT CYCLE

Upgrade Cycles Driving More Cloud Capex Investment

The biggest question we get from investors is why doesn't networking spend track to cloud capex

Reason is that networking refresh cycles and server refresh cycles are not aligned

With growing amount of spend being replacement, more focused on cycles



Positive Impact: ANET, CIEN Mixed Impact: CSCO, JNPR, INFN

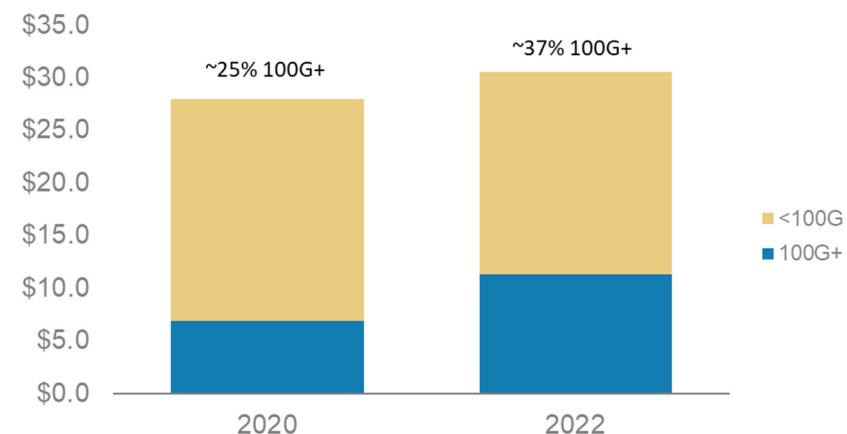
Multiple Investment Cycles in 2021

Replacement cycles on both networking and optical side in 2021

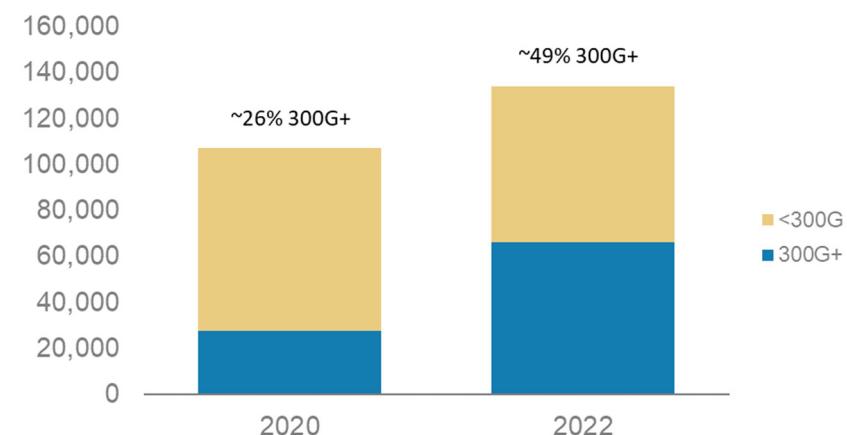
FB / MSFT start with 200G/400G switching cycle upgrades in 2021

Also 600G/800G upgrades happening in 2021 on the optical side

Ethernet Switch Market Revenue by Speed



DCI # of Wavelengths by Speed



Arista Best Way to Invest in Theme

Overhang on ANET is that they are losing share within FB / ANET

However, still going to be overwhelming share leader within those names as upgrade cycles begin

Combined with enterprise / campus share growth, a name that we like into 200G / 400G refresh cycle

Vendor Positioning at Major Cloud SPs (2019)

| | ToR | Leaf | Spine | DCI |
|------------------|---------------|-------------------|----------------------|----------------------|
| <u>Google</u> | WB | WB | WB | WB |
| <u>Amazon</u> | WB | WB | WB | Juniper |
| <u>Microsoft</u> | Cisco/Dell | Cisco/Dell | Arista | Arista |
| <u>Facebook</u> | WB | Arista/WB | Arista/WB | Arista/WB |
| <u>Baidu</u> | WB | Huawei/H3C | Huawei/H3C | Huawei/H3C |
| <u>Alibaba</u> | H3C/WB/Ruijie | H3C/Ruijie | H3C/Cisco | H3C/Cisco |
| <u>Tencent</u> | H3C/WB/Ruijie | H3C/Huawei/Ruijie | H3C/Huawei/Cisco | H3C/Huawei/Cisco |
| <u>Apple</u> | Arista/WB | Arista/WB | Arista/Cisco?/Nokia? | Arista/Cisco?/Nokia? |

Note: Vendors in order of share at each cloud SP.

What is the Next Innovation in Data Center

Co-Packaged Optics

- Once capacity of the switch exceeds 25 Tbps, harder to remove capacity with traditional optical equipment (too much heat, not enough room on the face plate)
- Need to move optics onto the switch
- **Challenge:** optics (in particular, lasers) more faulty than traditional switching silicon, innovation needs to take place on switching silicon side
- **Timing:** 2023+

400ZR+

- 400ZR markets reach of up to 80km, but in application is likely <25km
- Not worth the hassle given architecture shift required
- 400ZR+ could achieve most metro reaches, making it far more applicable
- **Challenge:** no standard yet, would likely be priced at 40% less than traditional 1RU boxes, challenging the market
- **Timing:** 2023+

Positive Benefits: CSCO Mixed Impacts: CIEN, INFN, JNPR, ANET

Cloud Communication Software Competition Heats Up

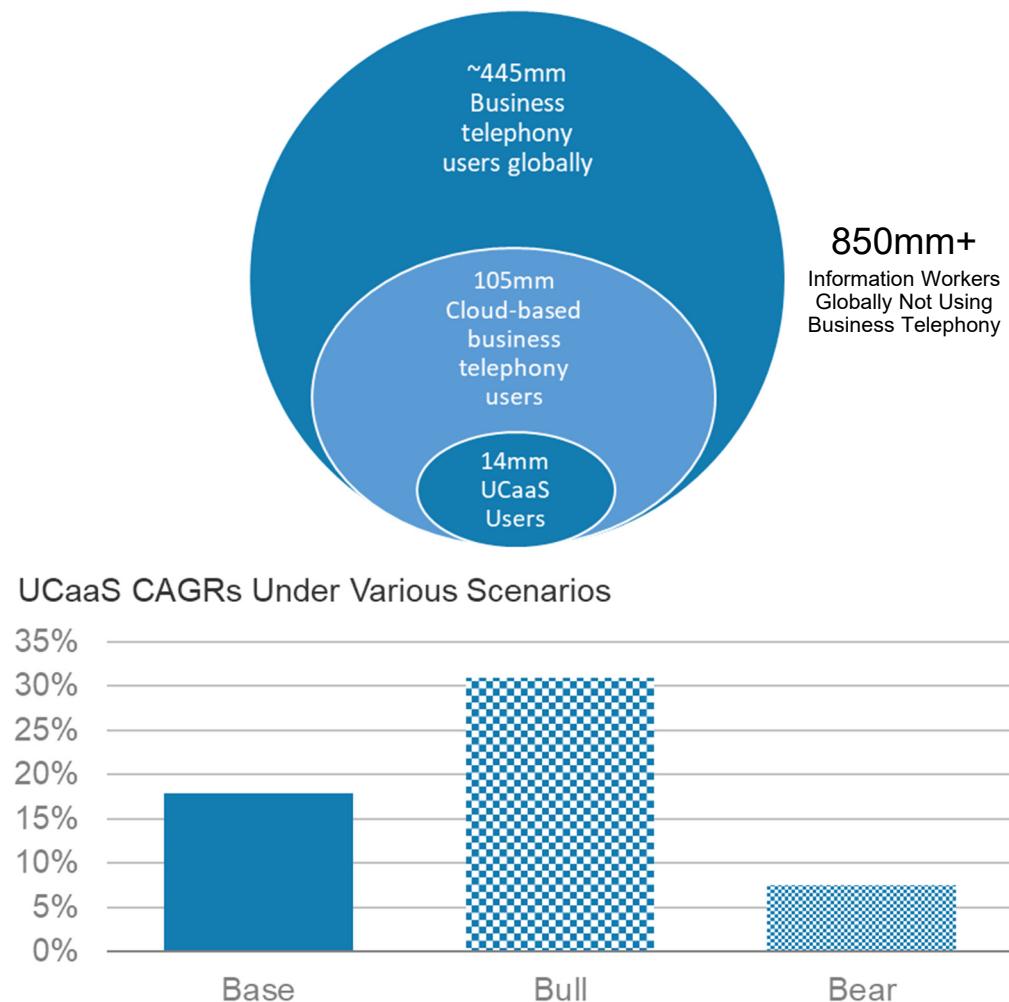
SHARE SHIFTS

Remains a Key Investment Area In Early Days of Transition

Space is only ~15mm of the way through a cloud transition on a 400mm+ installed base

Base case of industry growth model has industry growing at high teens, with market leaders growing in the 30's

Contact center market in similar early days of transition



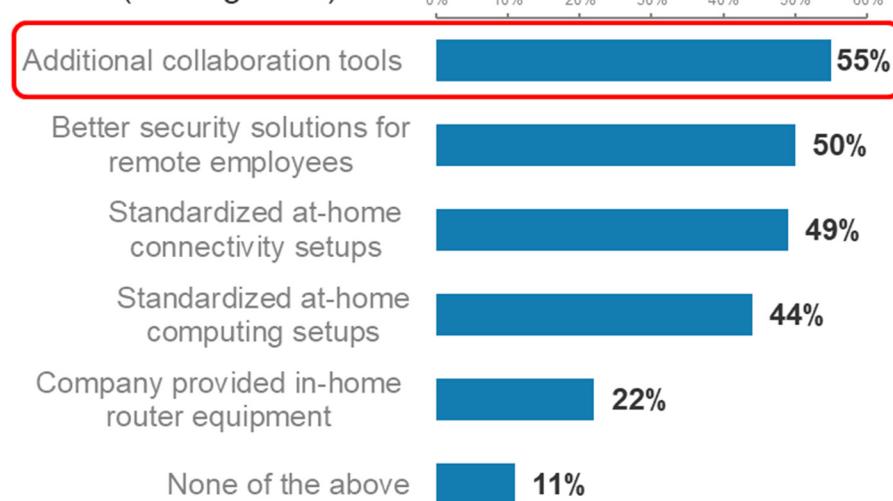
Standardization Upon Return to Office a Battleground

CIO / Return to Work surveys highlight expectations to standardize solutions upon a hybridized return to office

Roughly half of employers note investing in standardized at home set-ups (connectivity & computing) over NTM

78% of CIOs have already or plan to standardize their video solution

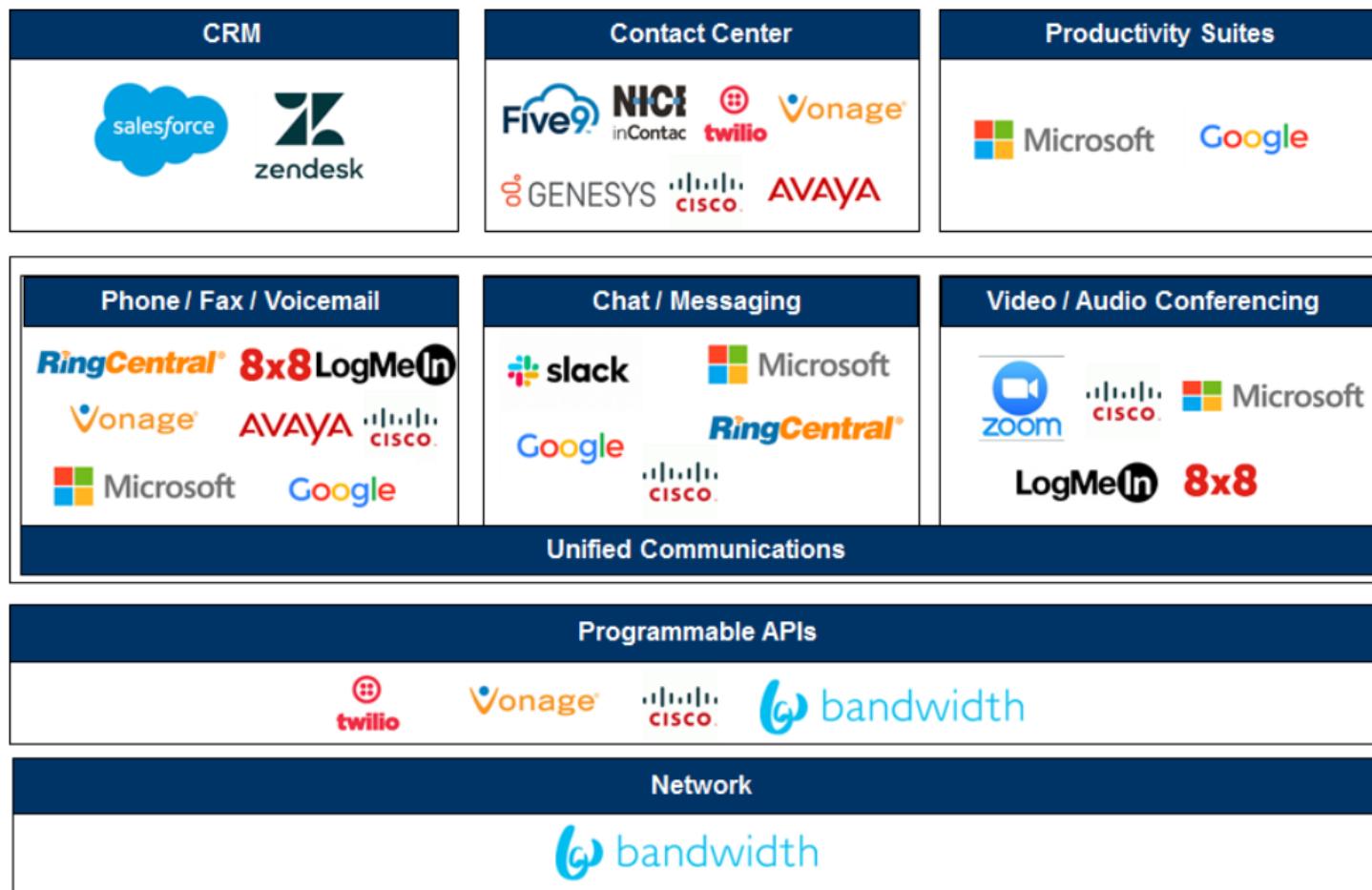
At-Home Technology Investment Plans in N12M (Among Total)



Positive Impact: *RNG, FVN, ZM, EHT, VG*
Mixed to Next Impact: *CSCO, AVYA*

Unified Communication Landscape

Competitors Moving Into Multiple Sectors to Increase Defensibility/Elongate Growth Period



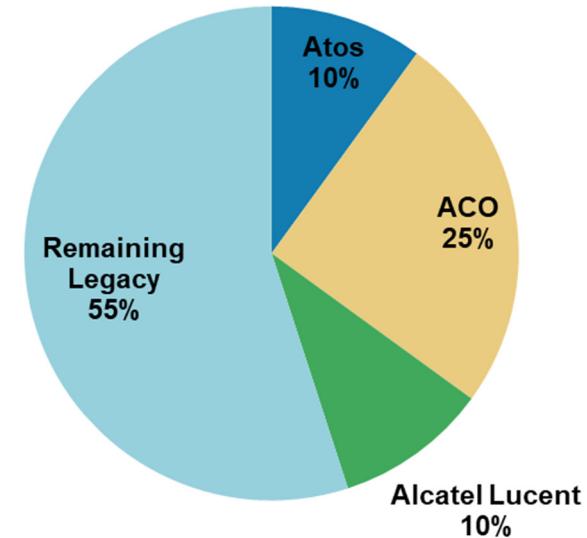
RingCentral Best Way to Invest in Theme

RingCentral is the share leader in fast growing UCaaS market

Have partnerships with 45% of the installed base and deepest relationship with the channel

Set to accelerate on \$1bn+ scale in 2021 on partnerships ramping

RNG Share of Legacy Installed Base (~400-450mm seats)



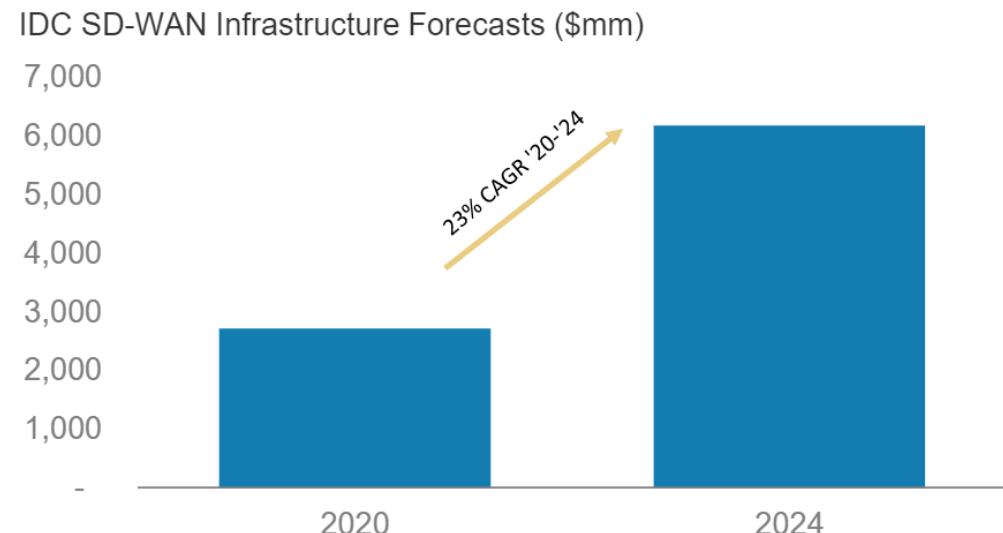
New Networking Architectures Create Opportunity

SHARE SHIFTS

With Great Bandwidth Comes Great Opportunity

Faster Network and More Distributed Data Creating Opportunities in:

- **SD-WAN**
- **SASE**
- **Private LTE / 5G**
- **Multi-cloud management**



Industry Primer

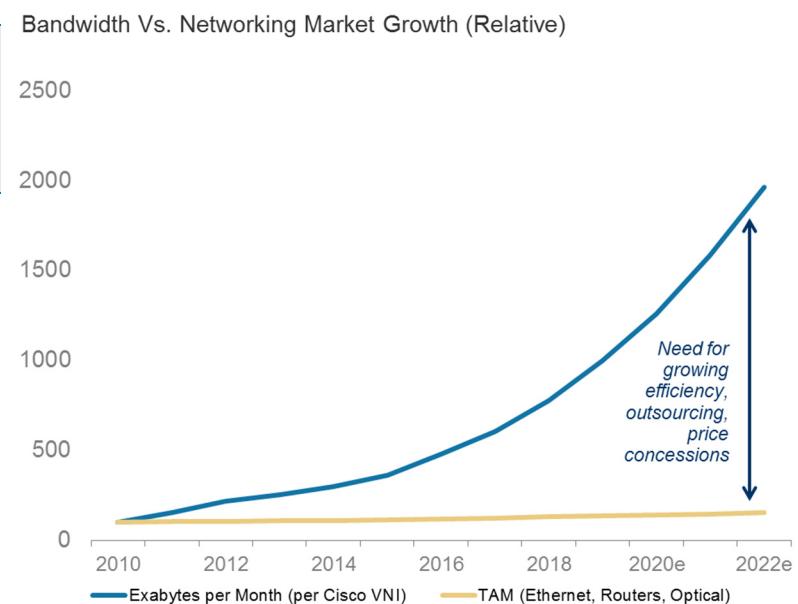
Industry Thesis: Maturity, and the Steps That Got Us Here

- 1 Increase in bandwidth demand not accompanied by increases in revenue, keeping TAM of space relatively flat**

- 2 Creates opportunity for those with next-generation technology (e.g. optical, comm. software) and challenges those with legacy exposure (e.g. routing)**

- 3 Without technology advantage, those with cash flow in best position to adapt**

- 4 Result is stocks primarily move on more mature drivers, with some bias towards next-generation technology**



Stock Appreciation Drivers Within Industry View

Attractiveness of Exposures

- Cloud, enterprise exposures most attractive given growth and profitability characteristics
- Service provider exposures least attractive given lumpiness and profitability pressures

Not fully appreciated:

ANET, FFIV, CIEN, IIVI, VIAV

Cash Flow to Adapt

- Those with enterprise exposures tend to have better cash flow generation
- Ongoing cash flow gives companies flexibility to acquire companies or return cash to shareholders

Not fully appreciated:

CSCO, FFIV

Deleveraging / Consolidation Story

- Consolidation taking place amongst pressured service provider names
- Difficult, large integrations can present meaningful opportunities as leverage levels come down

Not fully appreciated:

COMM, IIVI

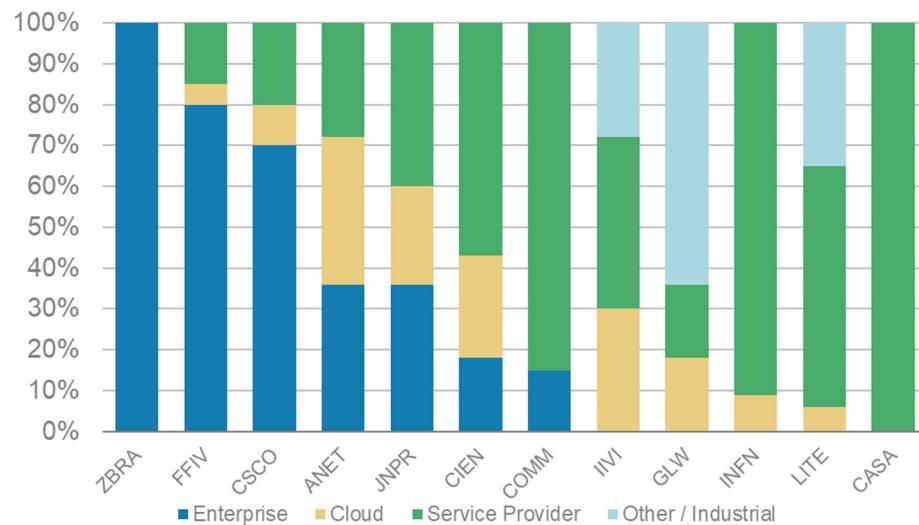
Upcoming Catalysts

- Refresh / investment cycles create pockets of growth
 - Enterprise: Move to Cloud
 - Cloud: 400G/400ZR
 - Service Provider: 5G

Not fully appreciated:
CSCO, ANET, FFIV, INFN, IIVI, COMM, CASA, GLW, AVYA

Attractiveness of Exposures

End Market Exposures



CY '22 P/E



Enterprise + Cloud Revenue %

The more exposure to enterprise and cloud, the better for valuations

Stock Appreciation Checklist

| | CSCO (OW) | JNPR (UW) | ANET (OW) | FFIV (OW) | CIEN | INFN | LITE (OW) | IIVI | COMM (OW) | CASA | GLW | ZBRA (UW) | VIAV | PLT | AVYA |
|--|--------------|--------------|--------------|--------------|------|------|--------------|------|--------------|------|-----|--------------|------|-----|------|
| Attractiveness of Exposures | ✓ | ✓ | ● | ● | ● | ✓ | ✓ | ● | ✓ | ✓ | ✓ | ✓ | ● | ✓ | ✓ |
| Cash Flow to Adapt / Return Cash to Shareholders | ● | ✓ | ✓ | ● | ■ | ✗ | ✗ | ✗ | ✓ | ✗ | ✓ | ✓ | ✓ | ✗ | ✓ |
| Upcoming Catalyst | ● | ✓ | ● | ✓ | ✓ | ● | ✓ | ■ | ● | ● | ● | ✓ | ✓ | ✓ | ● |
| Deleveraging Story | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ | ✓ | ● | ■ | ✗ | ✗ | ✓ | ✗ | ✓ | ✓ |

Networking Stock Appreciation Checklist

| Legend | |
|--------|--|
| ■ | Still to be done; not built into expectations / estimates / valuation |
| ● | In process, and at least partially built into expectations / estimates / valuation |
| ✓ | Done and built into estimates and stock |
| ✗ | Unrealistic / not likely to be attempted |

Enterprise Market

Description: Equipment and applications that creates the backbone of connecting computers and other connected devices with the internet, servers and storage devices. Encompasses Ethernet switching, WiFi, certain network security equipment and other data center appliances.

Market Size / Growth: \$48bn / 3% CAGR.

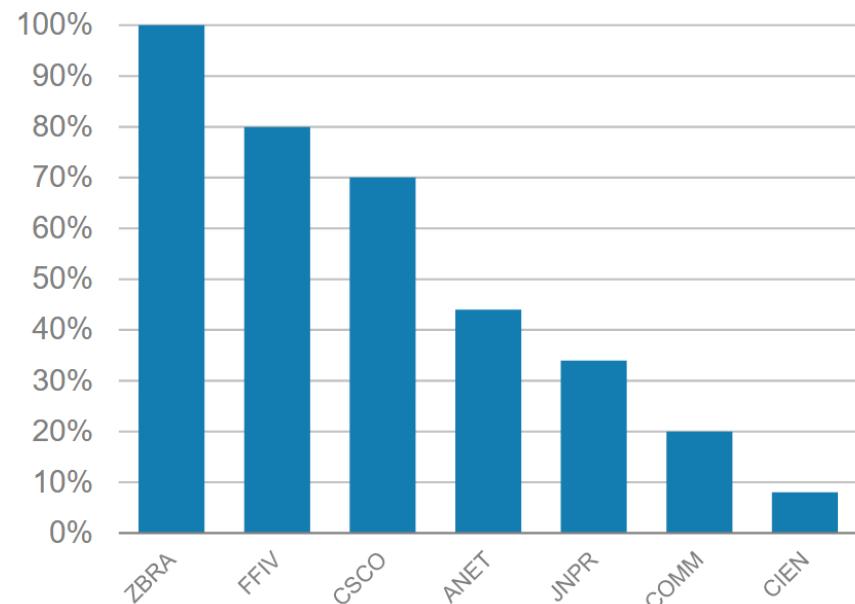
Biggest Misconception: This entire market is facing headwinds as workloads move to the cloud. While certainly can create a headwind for data center equipment, need for more reliable / secure connections to the internet acts as tailwinds for campus switching, WiFi, SD-WAN markets.

Biggest Opportunity: Utilize cash flow this installed base generates to find more applications to sell (either through R&D or M&A).

How we assess health of spend: Reseller checks, CIO / VAR surveys.

Most exposed: CSCO, FFIV, ANET, JNPR, ZBRA (primarily retail/industrial market hardware).

Enterprise End Market Exposures



Cloud Market

Description: Equipment used for connecting servers and storage from hyperscale data centers to internet or other data centers. Encompasses Ethernet switching, data center interconnect (DCI), routing. ~85% of traffic flows east-west, or within a data center or cluster of data centers, only ~15% of traffic flows north-west or towards the consumer / internet.

Market Size / Growth: \$9.6bn / 14% CAGR

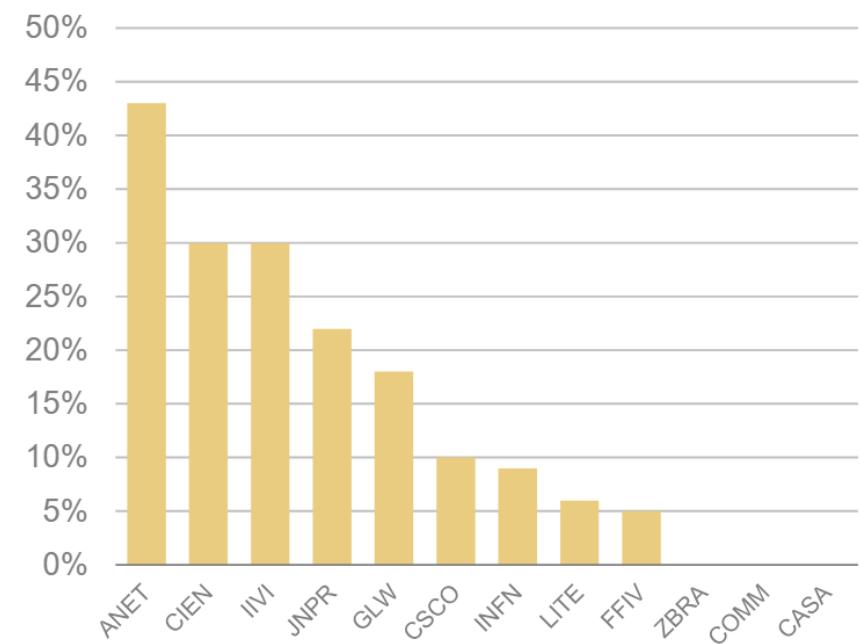
Biggest Misconception: All this equipment will eventually move towards white box. In general, networking equipment is <10% of overall data center spend, so potential for cost savings from white box vs. staffing of network engineers needed does not support the tradeoff.

Biggest Opportunity: Hyperscale customers investing in cutting edge technology. In areas like optical, provides a chance for vendors to leap frog each other or exploit R&D differentials.

How we assess health of spend: Cloud capex commentary, timing around release of bottleneck equipment (e.g. optical pricing, 400ZR).

Most exposed: ANET, CIEN, IIVI, JNPR, GLW, CSCO.

Cloud End Market Exposures



Service Provider Market

Description: Equipment used for building wireless and wired networks of service providers and MSOs. Includes transport, routers, broadband access, fiber, and mobile radio access (NOK, ERIC covered by Dominik Olszewski).

Market Size / Growth: \$144bn / 2% CAGR

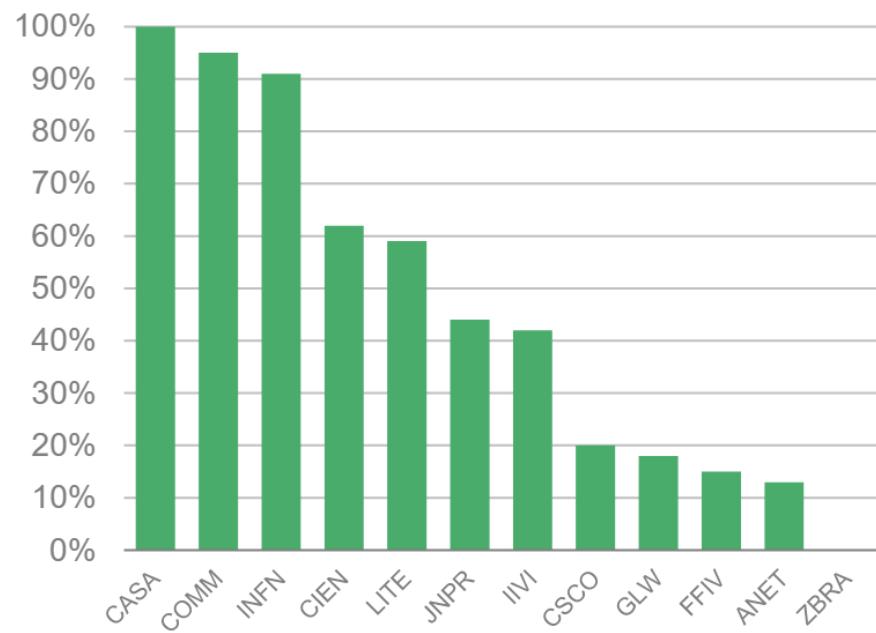
Biggest Misconception: There are incremental dollars to be spent at 5G. In general, carrier capex pools are flat, with spending moving between categories as generations evolve.

Biggest Opportunity: Help create differentiated services for carriers (e.g. cable cost advantages for broadband, private LTE/CBRS). Let service providers utilize service organizations to increase software content within networks (a slow process).

How we assess health of spend: Commentary from service providers around timing of investments and health of capex spend, M&A in space, dividend commitments.

Most exposed: CASA, COMM, INFN, CIEN, LITE, JNPR, IIIVI, CSCCO.

Service Provider End Market Exposures



Enterprise Themes

Mega Themes

Networking the New Normal

5G Networks Finally Here

Software Business Model Shifts

Enterprise Themes

Campus Spend Returns

SD-WAN Remains High Priority

Competition for Campus

WiFi 6 vs. Private LTE

Service Provider Themes

Fixed Wireless

China 5G Investment Tailwinds
vs. Huawei Investment Tailwinds

Could Open Line
Systems Be Realistic?

Cloud Themes

Upgrades Get Underway

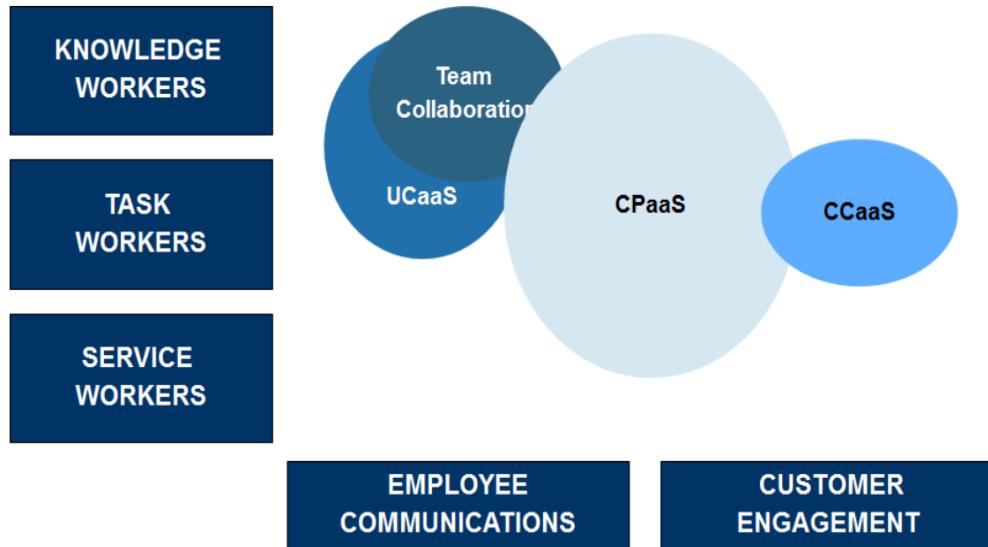
Upgrades vs. New Builds
Favors Longer Cycle

Co-Packaged Optics
on the Horizon

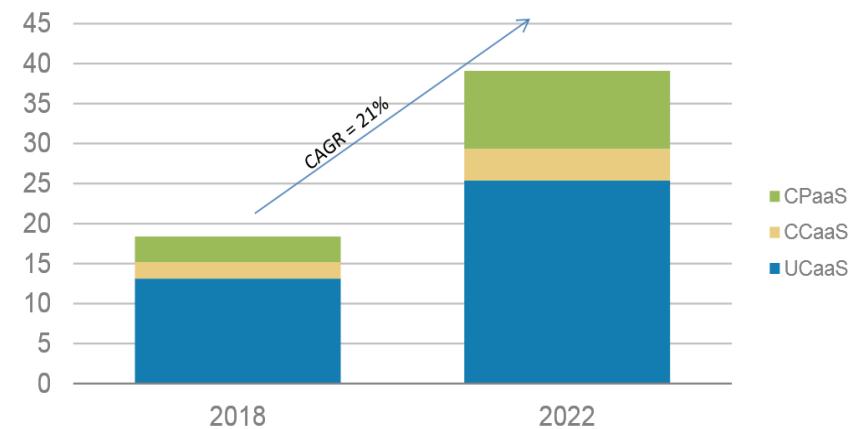
Communication Software

Unified Communications Ecosystem

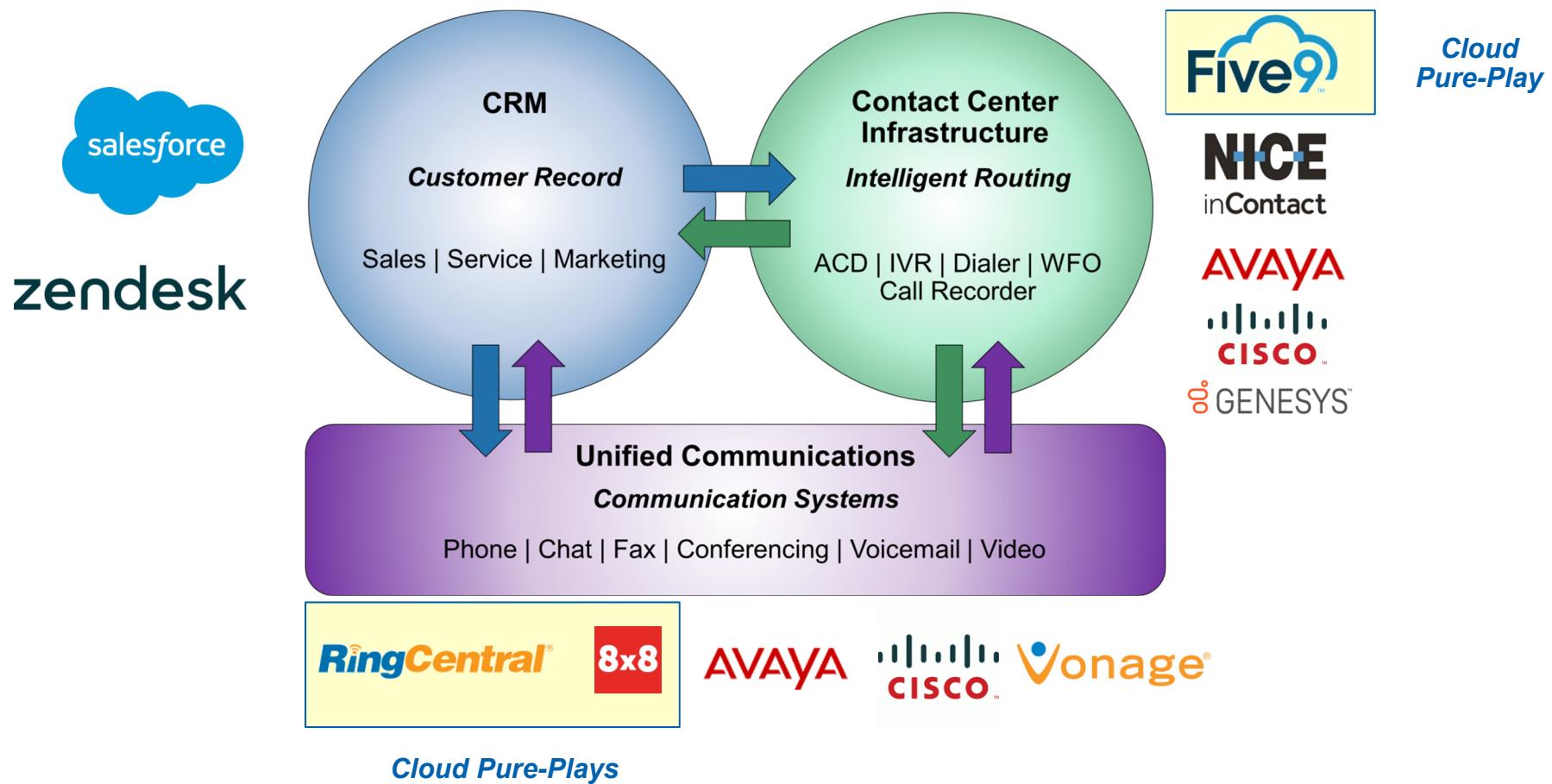
Communication software market growing 21%, poised to be \$40bn in size



Next-Gen Communications Market



Communication Software Ecosystem Overview



UCaaS (Unified Communication as a Service)

Description: Software that enables users to communicate via voice, messaging, and video over the internet, replacing needs for more legacy desk phone and PBX equipment to accomplish telephony use cases.

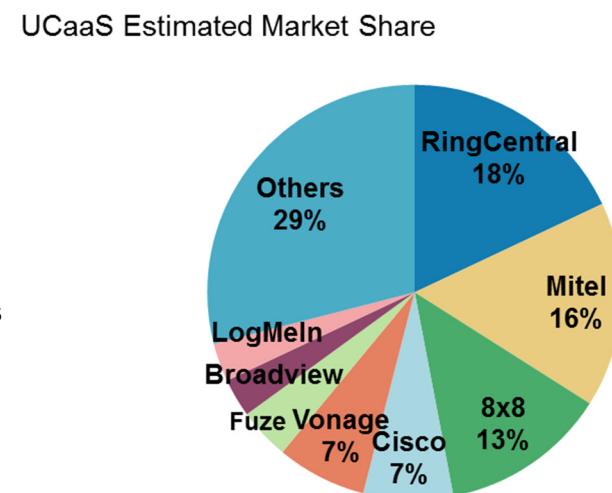
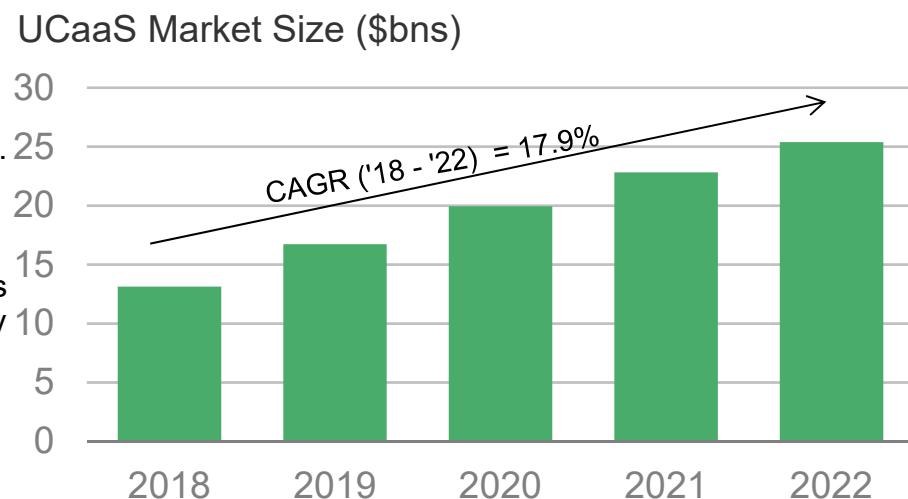
Market Size / Growth: \$16bn / 18% CAGR

Biggest Misconception: The pace at which enterprises move to cloud based software offerings will meaningfully accelerate. Overall, while we believe cloud migration is inevitable, the pace at which enterprises evaluate cloud is likely to remain indexed towards replacement cycles given relatively low cost to operate on premise equipment over lifecycle.

Biggest Opportunity: Capturing enterprise migrations. UCaaS providers have traditionally been most effective in capturing opportunity in SMB/SME customer bases, more of a greenfield opportunity for communications platforms. Moves up market highlight opportunity to capture larger, stickier customers.

How we assess health of spend: Reseller / master agent checks, CIO and VAR survey trends, partnerships and product developments.

Most exposed: RNG, EGHT, VG, ZM, AVYA, CSCO



Videoconferencing

Description: Software and equipment enabling users to communicate via video meetings, conferences and host / participate in webinars and other virtual events.

Market Size: Traditionally ~\$6bn

Biggest Misconception: Video conferencing has been around for a long time and has never become the standard over a phone call - this will not materially change. Video buyers will be sensitive to price and look for options bundled with existing vendors. On both points, we think video products that are more easily used and perform seamlessly have an opportunity to increase usage.

Biggest Opportunity: Increasing use cases for video beyond limited use cases in more traditional enterprise meetings, expanding user base and focus on quality of product and platform over cost.

How we assess health of spend: Reseller and master agent checks, CIO and VAR surveys, usage rate data and video prioritization initiatives.

Most exposed: ZM, CSCO, PLT, RNG, EGHT, AVYA.



CCaaS (Contact Center as a Service)

Description: Software that powers organizations customer inbound and outbound contact center efforts, enabling agents to better and more efficiently serve customer needs.

Market Size / Growth: \$2.5bn / 18% CAGR

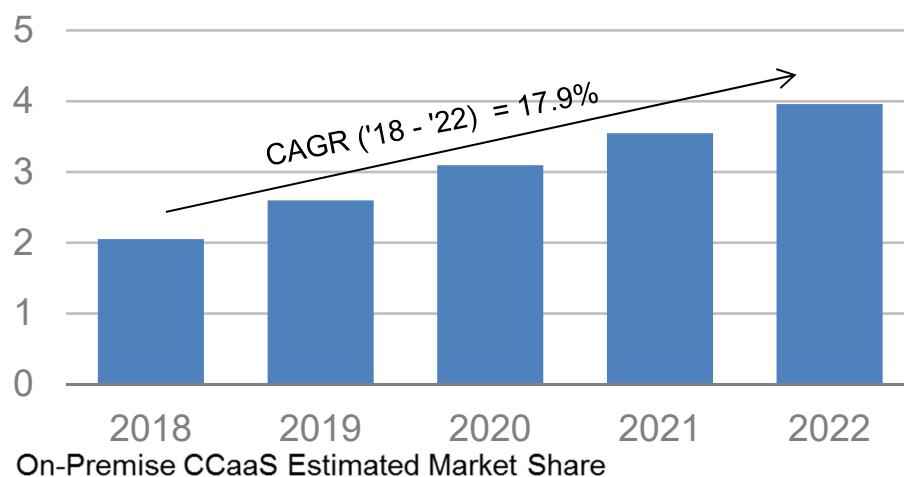
Biggest Misconception: Moves to cloud contact center platforms will accelerate on back of COVID-19 with faster sales cycles. For our part, we see potential in accelerated adoption of cloud seats, but we believe complete contact center overhauls are complex projects and sales cycles will remain elongated, even if projects are prioritized.

Biggest Opportunity: Monetizing AI opportunities. The contact center presents one of the most tangible use cases for AI as efficiency of inbound contact center agents can be significantly improved with AI satisfying more trivial tasks, freeing agent time for higher value customer satisfaction.

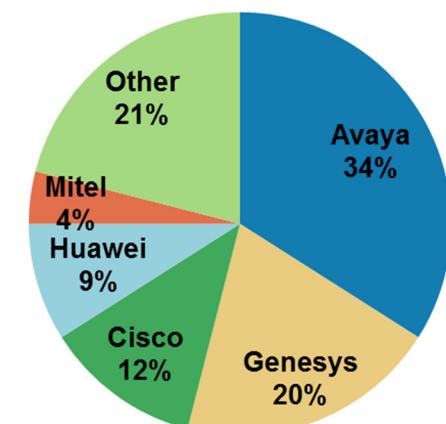
How we assess health of spend: Reseller / master agent checks, CIO and VAR surveys, product developments.

Most exposed: FIVN, NICE, TWLO, AVYA, CSCO, VG, RNG, EGHT.

CCaaS Market Size (\$bns)



On-Premise CCaaS Estimated Market Share



CPaaS (Communication Platform as a Service)

Description: Customizable communications API software that enables organizations to tailor specified usage of communications technology (voice, email, video, messaging) without need for specialized in house communications developers. Costs generally incurred by usage rates vs. specific monthly licensing.

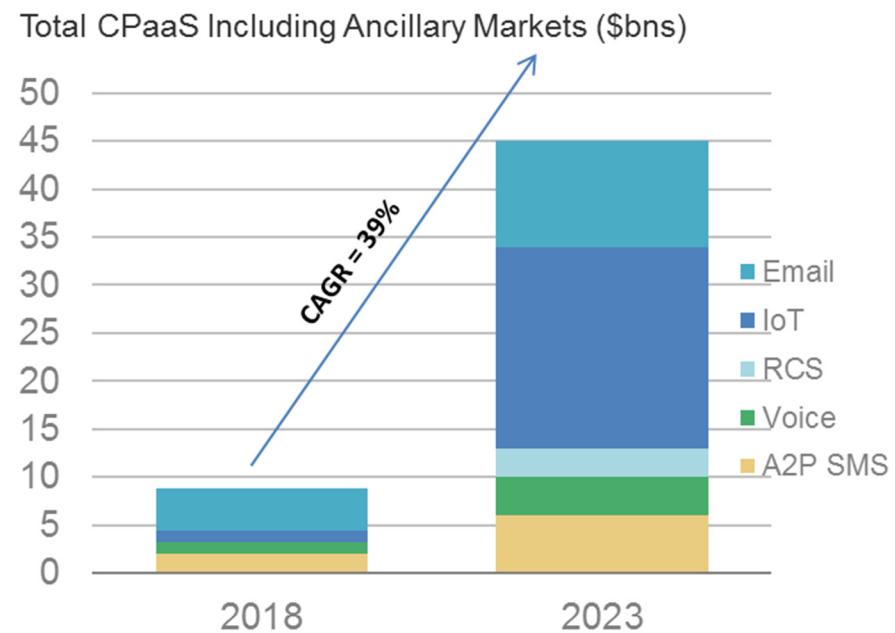
Market Size / Growth: \$9bn / 39% CAGR

Biggest Misconception: CPaaS will increasingly become a commoditized market as vendors offer relatively similar services that is kept behind the scenes, customers will look towards vendors offering best price as they grow usage of products.

Biggest Opportunity: To become the center of customer engagement efforts with robust product and solution offerings, capturing spend across different software needs within organizations.

How we assess health of spend: Partner developments, reseller feedback, trends in customer engagement efforts, usage catalyst monitoring.

Most exposed: TWLO, VG, BAND, AVYA, CSCO.



Valuation Methodology and Risks

CSCO

Our \$57 price target is 16x CY22e EPS. 16x is a 3-4x discount to the MSe S&P earnings target (20.25x NTM earnings), in-line with 10-year average discount to the S&P. Key risks to achieving our price target include federal spending disruption or prolonged macro downturn causing lack of recovery in networking spend or security sales materially decelerating given disruption in leadership.

ANET

Our \$345 PT is 30x FY22e EPS, a premium to networking equipment peers given higher growth potential, in-line with profitable large cap software peers on a growth adjusted basis. Key risks to achieving our price target include customer concentration (specifically Microsoft), difficulties growing international business (particularly with Chinese cloud providers), and new products (400G, campus) struggling to gain traction.

JNPR

Our \$20 PT is 12x FY22e P/E, a 2-3x discount to the networking universe, reflecting secular risks and company maturity. Key risks to achieving our price target include continued push out of service provider spend or no share insertion at 400G or a prolonged macro downturn.

FFIV

Our \$220 price target is ~21x FY22e P/E or 15x FY22e EV/FCF, a meaningful discount to mature large cap software peers on a growth adjusted basis given hardware to software transition challenges, but a premium to networking peers given software growth opportunities. Key risks to achieving our price target include a prolonged macro downturn, disappointing product revenue growth, new product announcements by large competitors, or challenges optimizing new acquisitions.

GLW

Our \$37 price target is 18x FY22e PE, a discount to the S&P 500 but at the high end of networking and optical peers given exposure to industrial growth markets. Key risks to achieving our price target include pricing discipline dissipating in display, a prolonged macro downturn, changes in FTTH deployment plans, and replacement cycles lengthening.

ZBRA

Our \$410 price target is 24x our FY22e EPS or 19x FY22e EBITDA, relatively in-line with the S&P 500 trading ~24x P/E and at a premium to networking names given secular growth profile. Key risks to achieving our price target include macro downturn impacting technology spend in target verticals, major customer spend turning volatile, or software solutions disintermediating specialized hardware products.

CASA

Our \$8 price target is 16x P/E base case EPS (\$0.50), in-line to below growth / profitability adjusted comparables until more demonstrated predictability of results, particularly given leverage, though credits double digit growth expectations. Key risks to achieving our price target include Q/Q volatility in customer spend causing expectations miss, limited sizeable traction in wireless, architectural transitions taking longer than expected, or a prolonged macro deterioration.

PLT

Our \$31 price target is 10x 22e P/E (10x EV/EBITDA), a discount to networking peers on a growth-adjusted basis given leverage. Key risks to achieving our price target include macro downturn challenging ability to meet debt payments, execution challenges continuing, or hardware spend becoming more challenged as IT budgets are revised.

Valuation Methodology and Risks

COMM

Our \$18 price target is ~9.5x FY22e EBITDA or 8x '22 EPS, in-line with comparables, given leverage. Key risks to achieving our price target include carriers continuing to pressure capex, wireless investment in 5G more lightweight, further deterioration in ARRS CPE business, leverage staying above 6x, and macro downturn causing liquidity crunch.

VIAV

Our \$16 price target is ~20x CY22e EPS (\$0.79) a slight discount to T&M comps on account of margin, a slight premium to networking comps on account of growth. Key risks to achieving our price target include not seeing margin expansion as NSE business transformation proves difficult and share losses continue, 3D sensing opportunity mostly growing in ToF, or macro conditions weaken NSE customer spend and smartphone sales.

CIEN

Our \$50 price target is 15x FY22e EPS (cash tax adjusted); ~18x FY22e (non-GAAP). Some premium to traditional trading range, gives company some credit for long term earnings power and positive thematic exposure. Trades at a slight discount to S&P on account of above S&P earnings growth, but accounting for some customer concentration risk. Key risks to our call are share losses in hyperscale, optical investments seeing a pause as spend shifts to wireless, the pricing environment becomes more aggressive, or an extended macro downturn.

LITE

Our \$105 price target ~16x CY22 P/E (~\$6.5), a premium to historical average of 13x given attractiveness of exposures and potential for more margin stability. Key risks to achieving our price target include insourcing in China, macro weakness extending challenging telecom revenue, 3D sensing competitors ramping quicker than expected, disappointing AAPL sales, and the elimination of 3D sensing module at Apple.

INFN

Our \$8 price target is 16x Normalized Base Case EPS (~\$0.5), in-line with optical averages. Key risks to achieving our price target include CenturyLink trailing off faster than expected, being unable to meet development timelines, liquidity risk within a macro slowdown, and lower volumes restricting gross margin acceleration.

IIVI

Our \$88 price target is 22x CY22e EPS (cash-tax adjusted), a premium to optical averages and more in-line with IIVI historical averages given industrial laser exposure and outperformance (laser names trade around 20-24x). Key risks to achieving our price target include minimal Sherman share gains, the market for silicon carbide getting too competitive, industrial slowdown, or industrial lasers business struggling given China exposure

Valuation Methodology and Risks

TWLO

Our \$500 price target is 23-24x EV/22e Rev assuming ~40% growth CAGR, in-line with software peers on a growth adjusted basis assuming a 10% discount for GMs (0.59 EV/Rev/g vs. 0.65x EV/Rev/g relative comparables). Supported by DCF. Assumes ~\$200mm contribution from Segment in 2021 / implied share dilution from acquisition. Key risks to achieving our price target include messaging volumes faltering as COVID-related engagement wanes, travel vertical taking longer to come back, use cases failing to expand, or challenges to net expansion rates.

AVYA

Our \$26 PT is ~6x base case EBITDA or ~7-8x EPS, a discount to comparables given challenges in cloud transition, aggressiveness of competitors and lack of appetite for leverage. Key risks to achieving our price target include continued installed base contraction, struggling to gain traction in SMB market, and lingering cash flow conversion.

VG

Our \$13 PT is 2x EV/22e Applications Rev & 4x EV/22e API Rev, a discount to comparables given below market growth & API margin dynamics. ~30% credit for consumer business. Key risks to achieving our price target include product integration taking longer than expected, macro downturn causing churn / leverage concerns, and enterprise vendors becoming more aggressive in UC.

EGHT

Our \$35 price target is ~5.5x EV/22e Subscription Revenue; backed up by DCF. Key risks to achieving our price target include a prolonged macro downturn causing slowing enterprise traction and higher churn, larger players prioritizing cloud telephony, or difficulty showing gross margin leverage.

BAND

Our \$140 price target is 8x EV/22e CPaaS Revenue; supported by DCF and long term achievable earnings (assumes 20-22% operating margins at \$700mm in revenue reachable in 5 years). 8x EV/22e CPaaS revenue is a discount to growth adjusted UCaaS / CPaaS comps given long term margin potential, while giving credit for growth from international / new share from large customers. Key risks to achieving our price target include a prolonged macro downturn limiting usage growth and slowing enterprise sales traction or gross margins showing little leverage.

FIVN

Our \$200 price target is 19x EV/22 Rev (assuming 30% growth; 0.65x EV/Sales/g) - backed up by DCF. Key risks to achieving our price target include macro downturn impacting CC upgrades, enterprise newcomers causing prolonged evaluation cycles, or competitive focus increases towards middle of CCaaS market with new entrants.

RNG

Our \$455 price target is ~22x EV/22e Subscription Revenue (assuming 33-35% CAGR over the next couple of years) or 0.65x/Rev/g, in-line with SaaS median. Key risks to achieving our price target include a recession slowing UC upgrades, large webscale / enterprise software vendor becoming more competitive, move upmarket causing lumpier revenue, and partnerships failing to show traction.

ZM

Our \$420 price target is ~25x EV/FY23 Sales (assuming a 35-40% CAGR) or 0.65x-0.7x EV/S/g and ~29x EV/FY23e Street Rev. 27x EV/discounted FY33 FCF. Key risks to achieving our price target include a prolonged macro downturn, WFH wanes post COVID, a rise in interest rates or larger competitors turning more aggressive.

April 2021

Technology, Media & Telecom Spring Training Teach-In

IT Hardware: Can Outperformance Continue in 2021?

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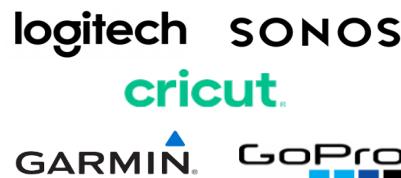
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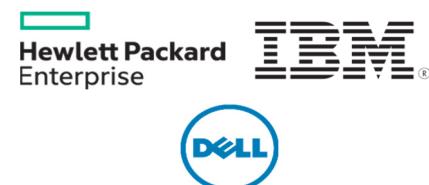
Disclosures in this report are as of April 26, 2021; stock recommendations and stock prices as of April 22, 2021, unless otherwise noted.

IT Hardware Overview

Consumer Electronics



Diversified Enterprise IT Providers



Storage Vendors



Smartphone Vendor



Printing Vendors



Smart Home Vendors



Omni Channel Solution Provider



Data Warehousing & Analytics

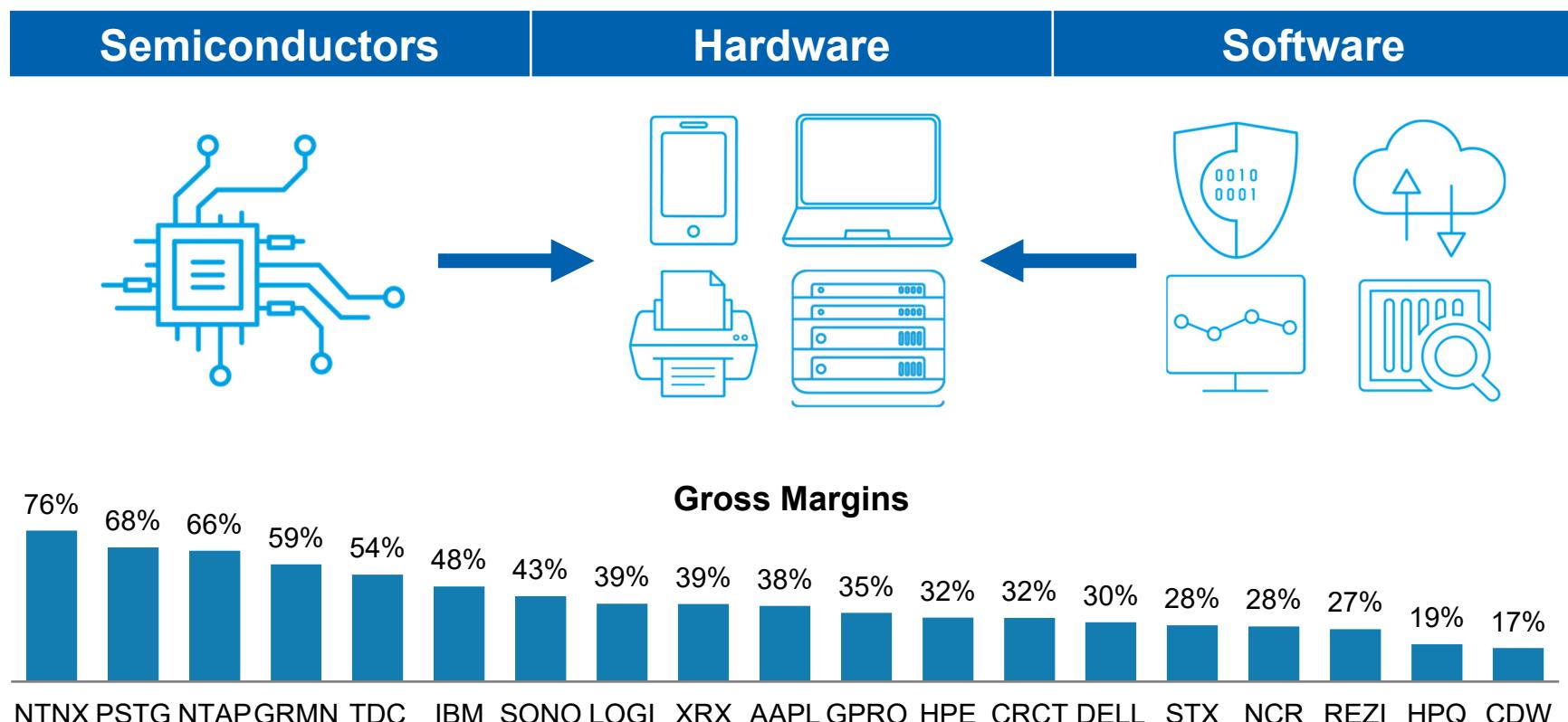


Integrated IT Distributor

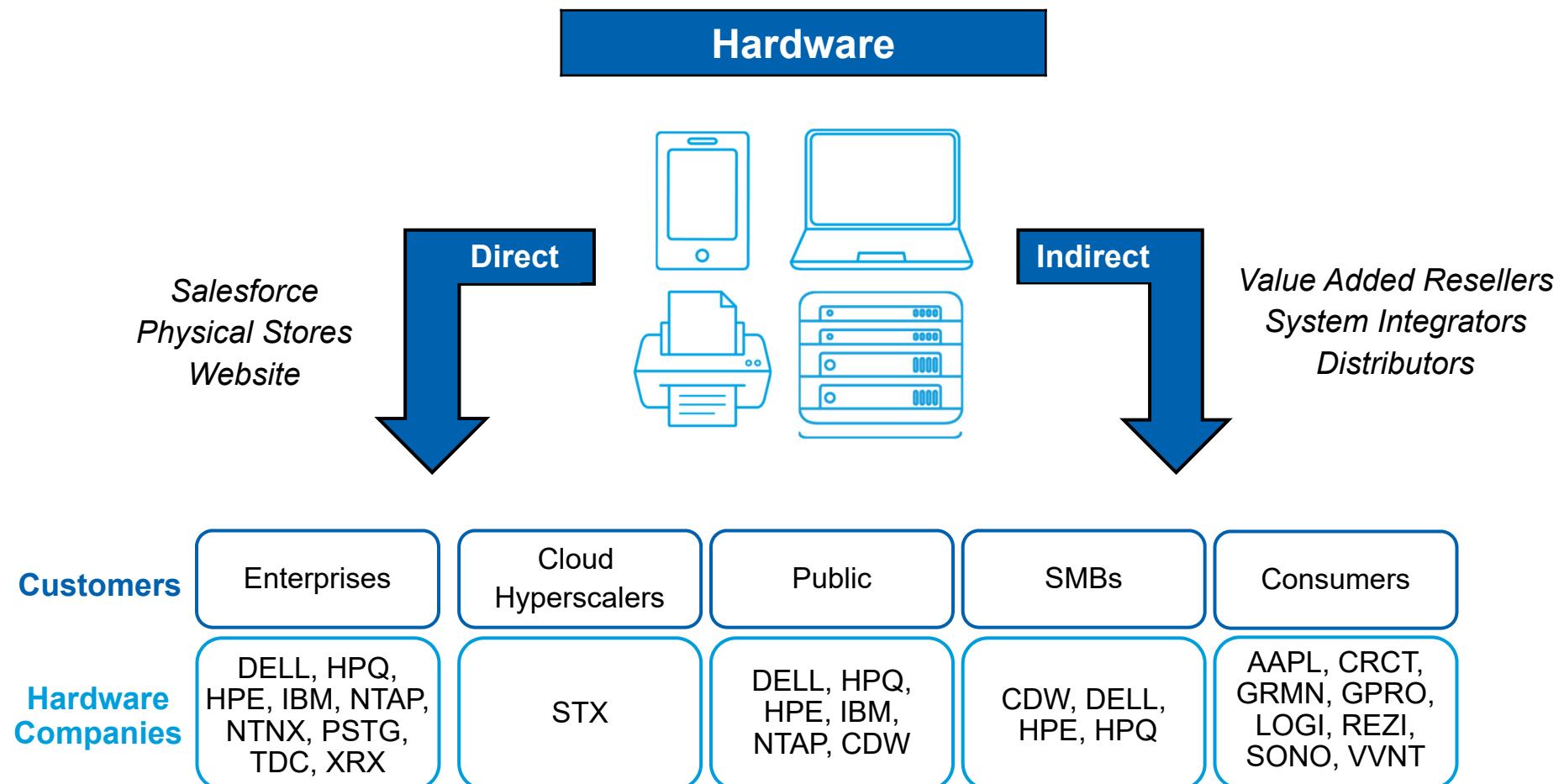


Technology Systems Food Chain

Hardware companies wrap semiconductors components in various form factors (i.e. phones, computers, servers) and often pre-install software. The semiconductors and software tend to come from third parties, contributing to hardware commoditization. Companies with semiconductor and software expertise can fight off commoditization and generate higher margins.



Sales Channels & End Markets

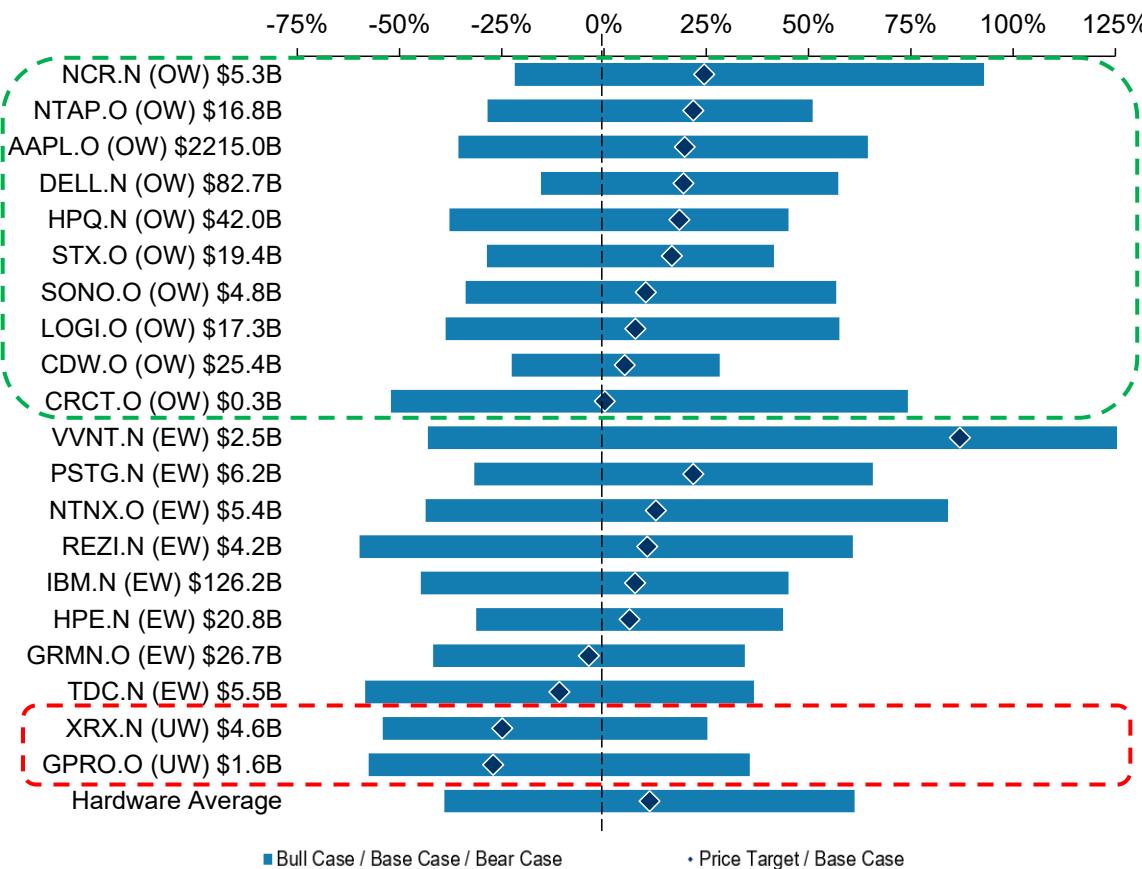


Industry-Specific Drivers

| | |
|---|--|
| Industry Analyst Shipment, Pricing & Spend Forecasts | IDC, Gartner, Dell'Oro, CAICT (China Smartphone Data) |
| Sell-Out Data | NPD, GfK |
| Supply Chain Production Forecasts & Earnings Results | Publicly Available, Monthly Taiwan Sales Data |
| Smartphone Activation Data | Wireless Carriers, Jiguang, App Developers |
| China Air Quality | Aqistudy.cn, Iowa State University, Iowa Environmental Mesonet |
| App Store Data | Sensor Tower |
| Online Search Data | Google, Baidu |
| Smartphone Secondary Market Pricing | WeChat, uSell, Gazelle |
| Lead Time Trackers | Company Websites, Online Retailers, etc. |
| AlphaWise Product Demand Trackers | Proprietary to Morgan Stanley |
| AlphaWise CIO Surveys | Proprietary to Morgan Stanley |
| HDD Production Data | TSR |
| Channel Checks | GLG, Wave7 Research |
| Social Media Sentiment Data/Web Scraping | Market Psych, Google Trends |
| Channel Inventory and Pricing (HDDs, PCs & Other Products) | Proprietary to Morgan Stanley |
| Macro Data | Federal Reserve, Stock Market, Bureau of Economic Analysis, etc. |
| Sector Quant | Proprietary to Morgan Stanley Research |

IT Hardware Risk-Reward Overview

Risk Reward Profile (% Upside to Stock Price)

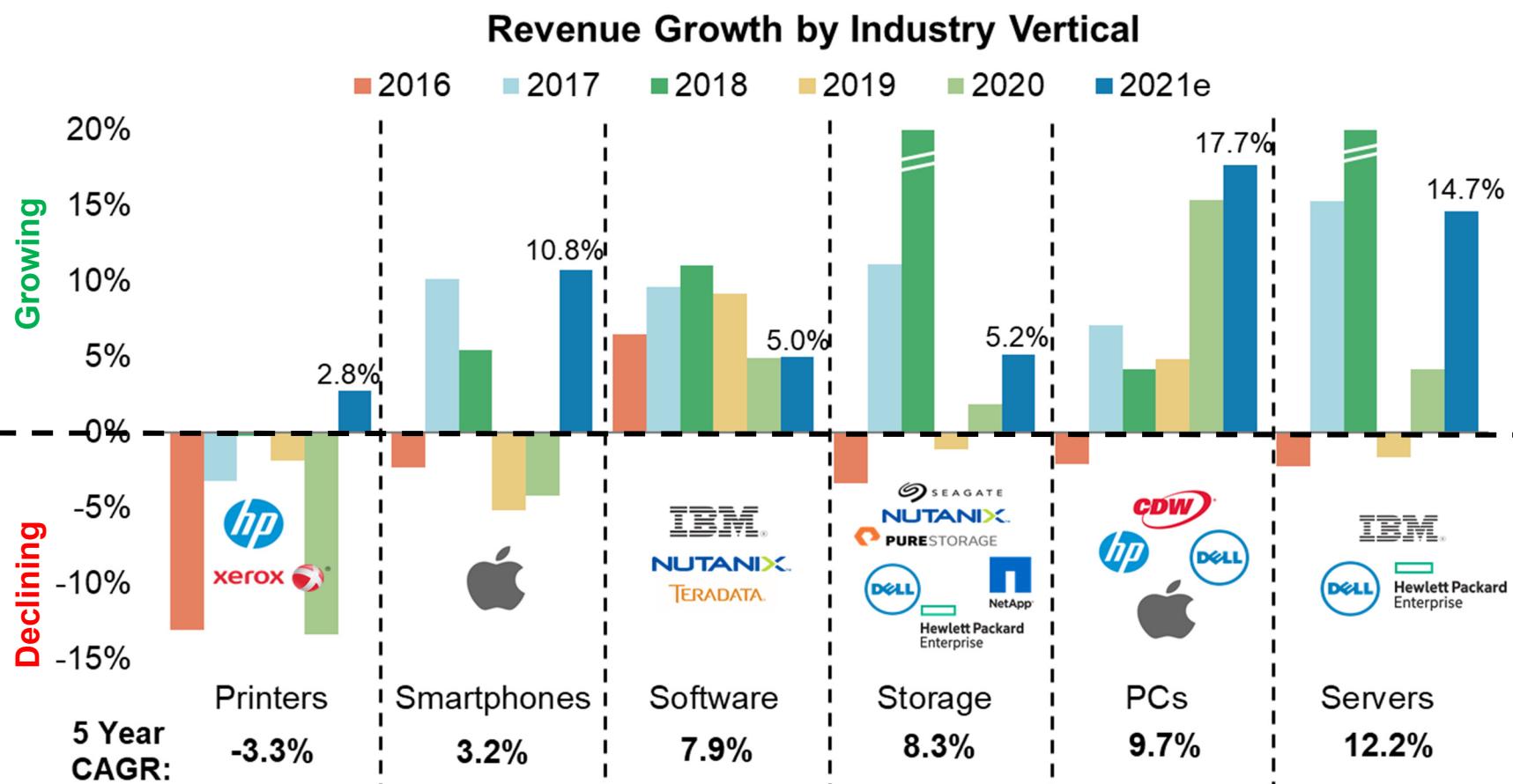


Note: The number following the stock rating (OW, EW, UW) is the firm's market capitalization

Source: Thomson Reuters, Morgan Stanley Research Estimates; Stock Prices and Price Targets as of April 22, 2021.

2021 IT Hardware Renaissance: Can Outperformance Continue?

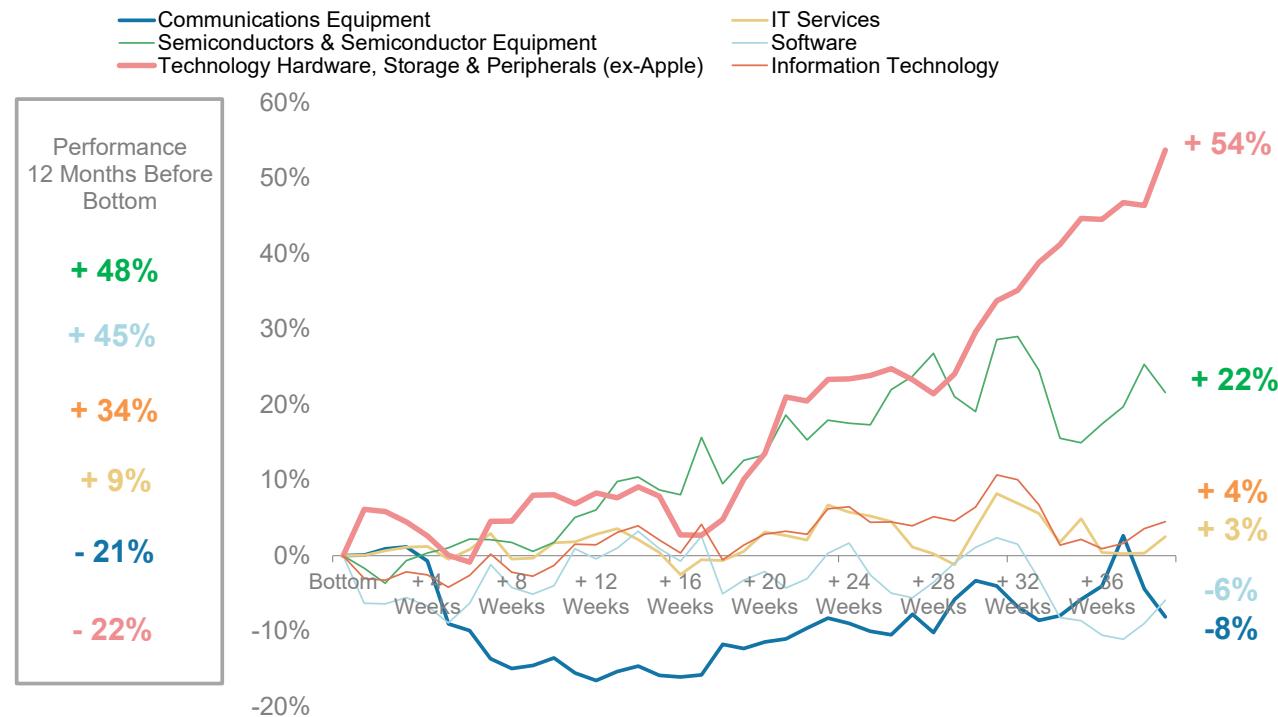
IT Hardware Growth to Accelerate in 2021



Hardware Outperforms in a Recovery

- Historically, Hardware outperforms the Tech Sector and broader market in a recovery, and we already see this playing out. Since the July 2020 IT spending bottom, Hardware outperformed the S&P 500 by 54% and is the best performing Tech group.

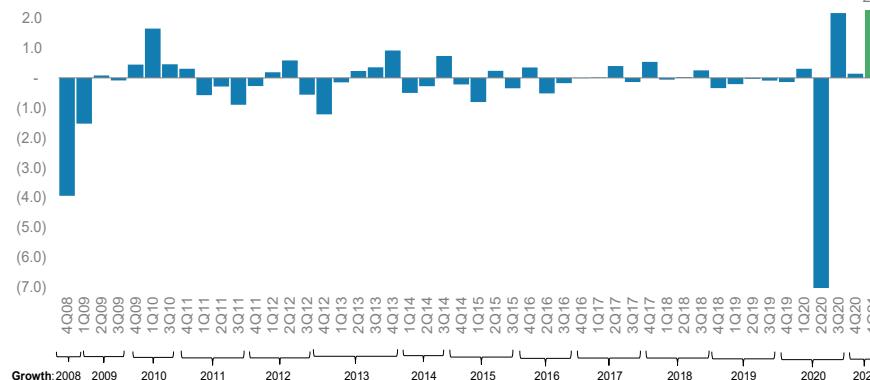
Stock Performance vs. S&P 500 (July 2020 – present)



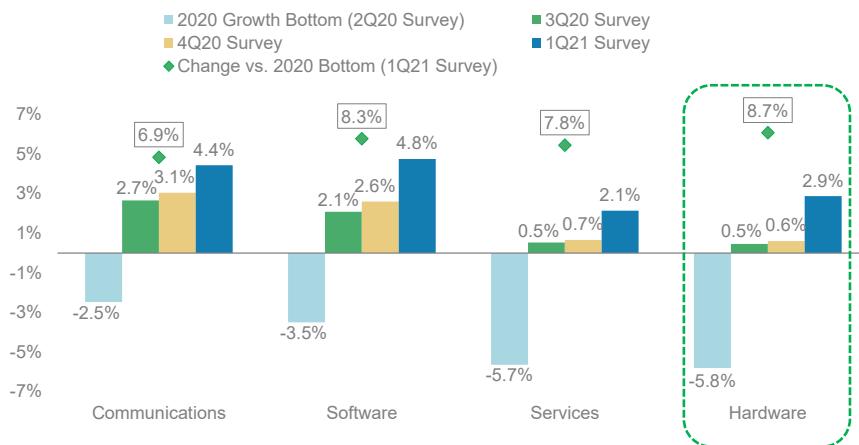
IT Hardware Leading the 2021 Demand Recovery...

- Record positive spending revisions for Hardware in 2021.** CIOs revised up 2021 budget growth expectations by 230 bps in 1Q21, the largest revision of any Tech group and the highest Hardware revision in the history of our survey. CIOs also expect Hardware to show the largest recovery off the 2Q20 IT spending trough, which reads positively for 2021 demand.

Revisions to CIO Survey Hardware Budget Growth Expectations (Q/Q, Points)



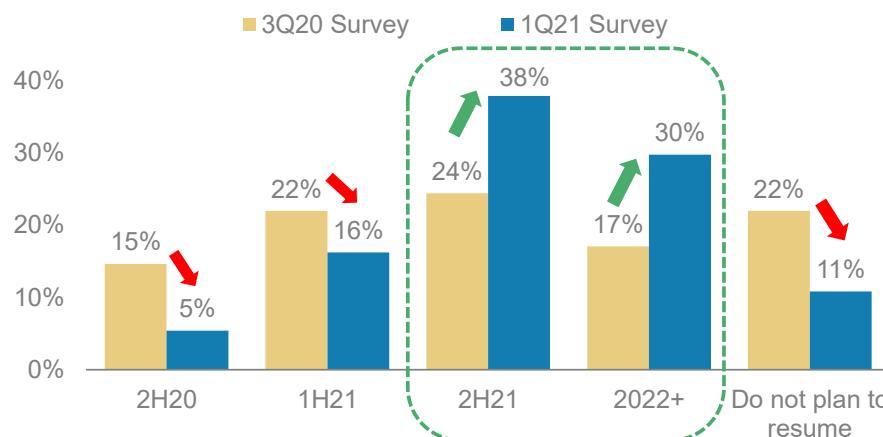
2021 External IT Spending Expectations vs. Spending Bottom



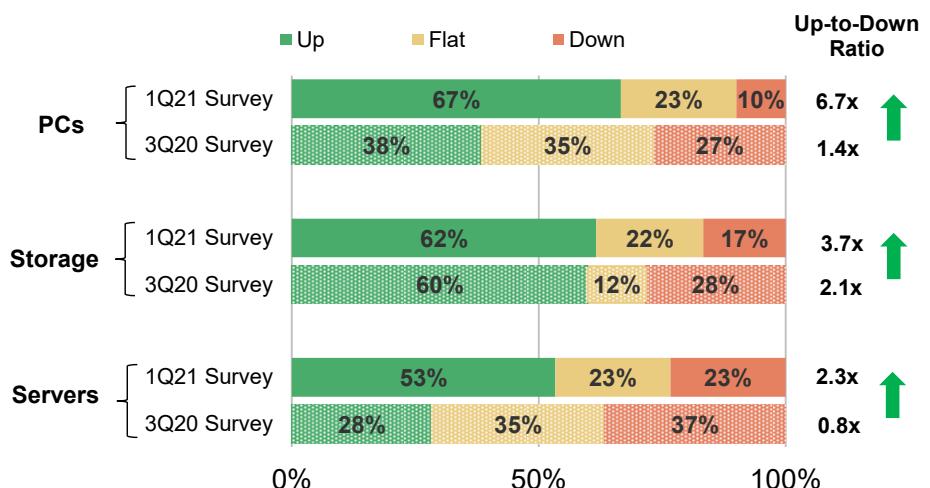
...As Paused Capex Returns, With Inflection in 2H...

- We expect a 2H-weighted recovery and spend to rebound across all categories.** PCs, storage, and servers all saw substantial upward revisions to 2021 growth expectations, giving us conviction in a broad-based demand recovery.

Hardware Domain Expert Resumption Timing of Delayed Data Center Infrastructure Refresh



CIO 2021 Spending Expectations by Category

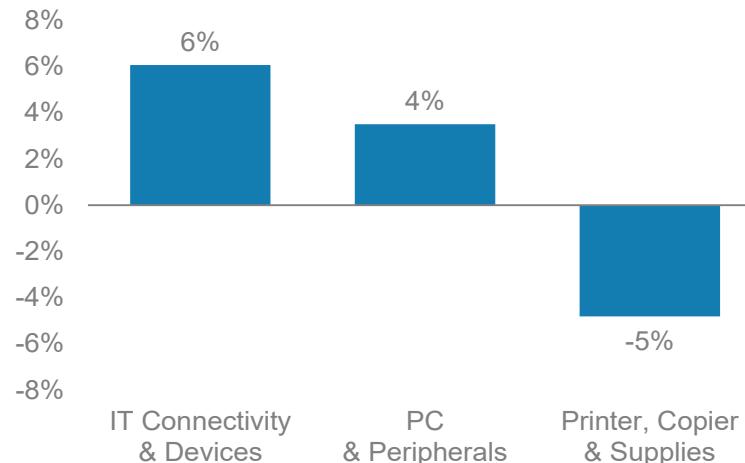


Source: AlphaWise CIO Surveys, Morgan Stanley Research.

...And Post-COVID Work Supports Higher Hardware Demand

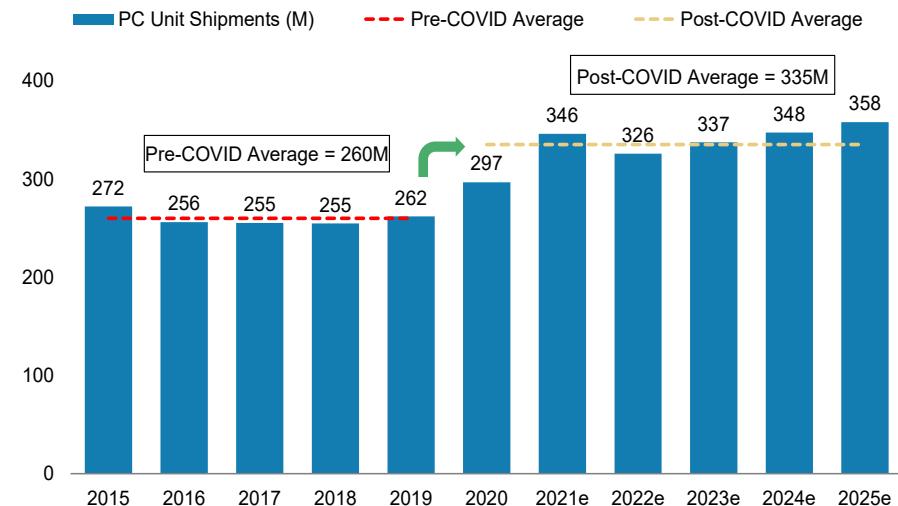
- Future of work is hybrid.** Our AlphaWise Future-of-Work Survey indicates that 32% of employees are expected to work remotely 3+ days per week post-COVID, double pre-COVID levels.
- Post-COVID work boosts PC & videoconferencing demand, but hurts printing.** To support a more distributed workforce, companies are increasing investment in PCs & videoconferencing technology, but plan to spend less on printers & supplies as employees spend less time in the office.

Expected Budget Growth in Post-COVID World



*Printer growth reflects post vs. pre-COVID spend. IT connectivity & devices and PCs reflects 2021 growth.

Pre vs. Post-COVID PC Shipments

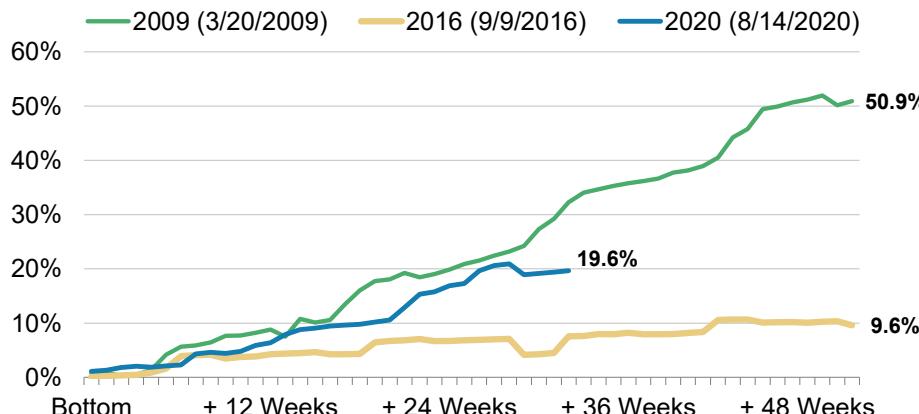


Source: AlphaWise Future of Work Survey, IDC, Morgan Stanley Research.

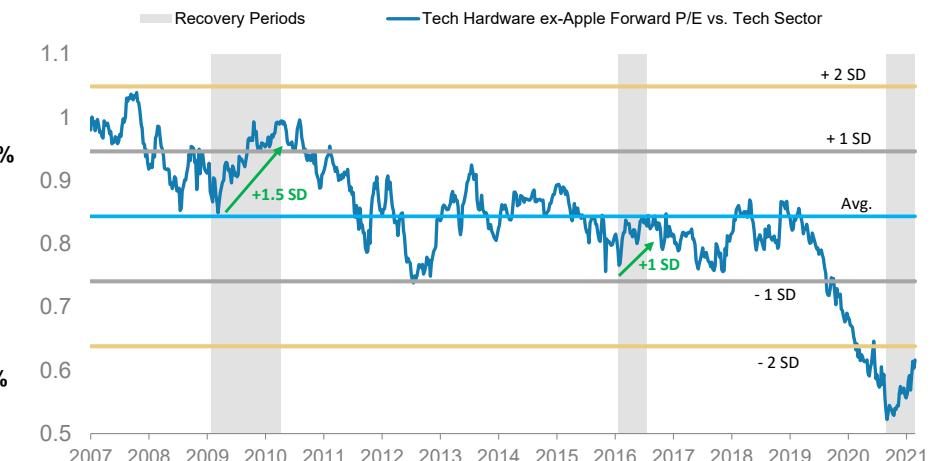
We See Room for Estimate Revisions & Multiple Expansion...

- We believe net income estimates & multiples have room to move higher.** Net income estimates have only been revised up 20%, below the 51% in 2009, and Hardware still trades over 2 standard deviations below its historical discount to the Tech Sector.

IT Hardware Net Income Revisions Post Trough (ex-AAPL)



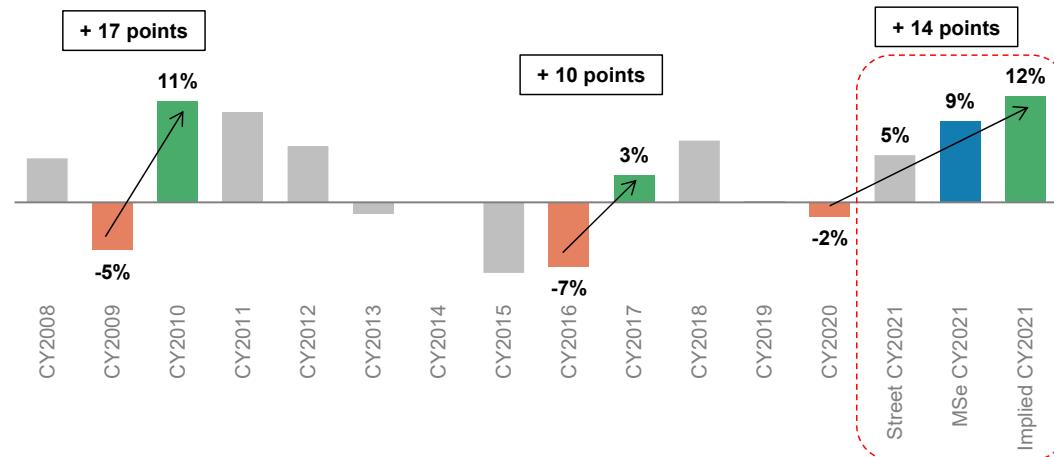
IT Hardware P/E Multiple vs. Tech Sector



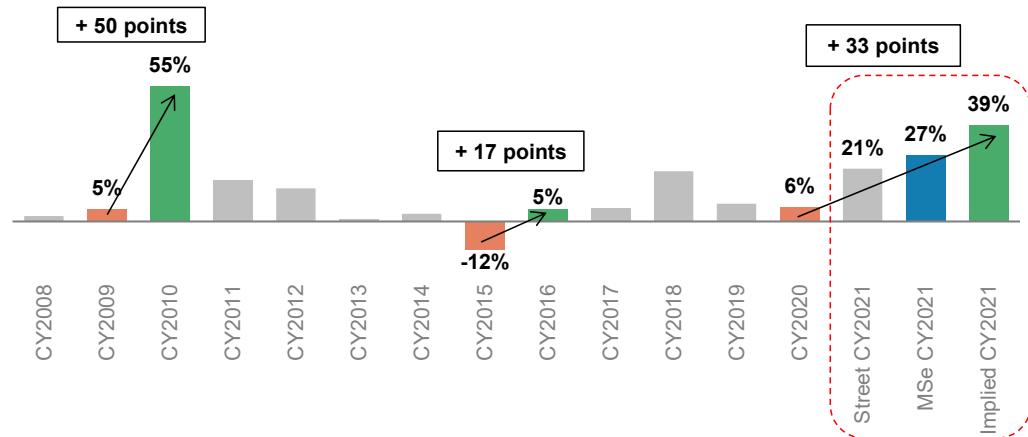
Source: FactSet, Morgan Stanley Research.

...And See Significant Upside to Street Expectations

Industry Median Revenue Growth Y/Y



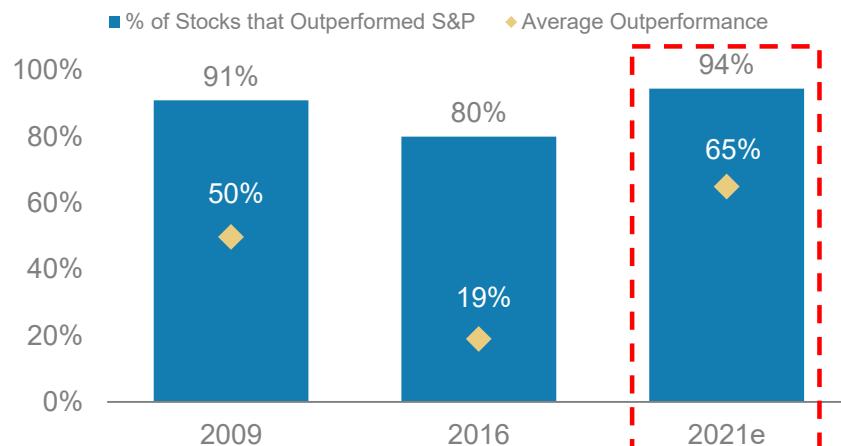
Industry Median EPS Growth Y/Y



We Believe Performance Breadth Will Continue in 2021

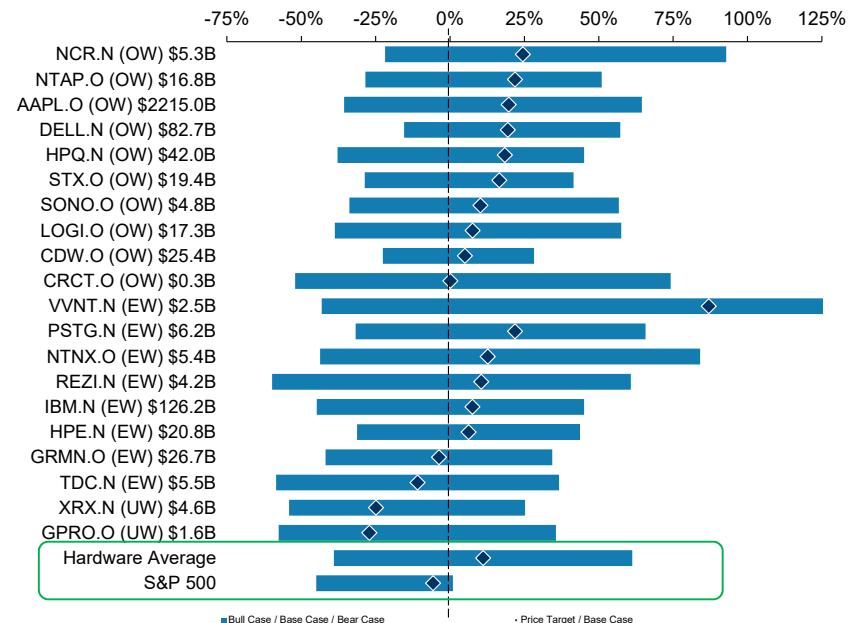
- Hardware historically shows substantial performance breadth in a recovery.** In 2009, 90% of our coverage outperformed the market. Based on the Morgan Stanley Equity Strategy team's S&P 500 forecast, we expect similar performance breadth in 2021.

Hardware Performance Breadth & Outperformance (18 Months from IT Spending Bottom)



*2009 & 2016 include all stocks public at the time. 2021e performance represents upside based on base case price targets and expected performance from July 2020 - Dec 2021. 2021 S&P estimate from MS Equity Strategy Team.

Risk Reward Profile (% Upside to Price)

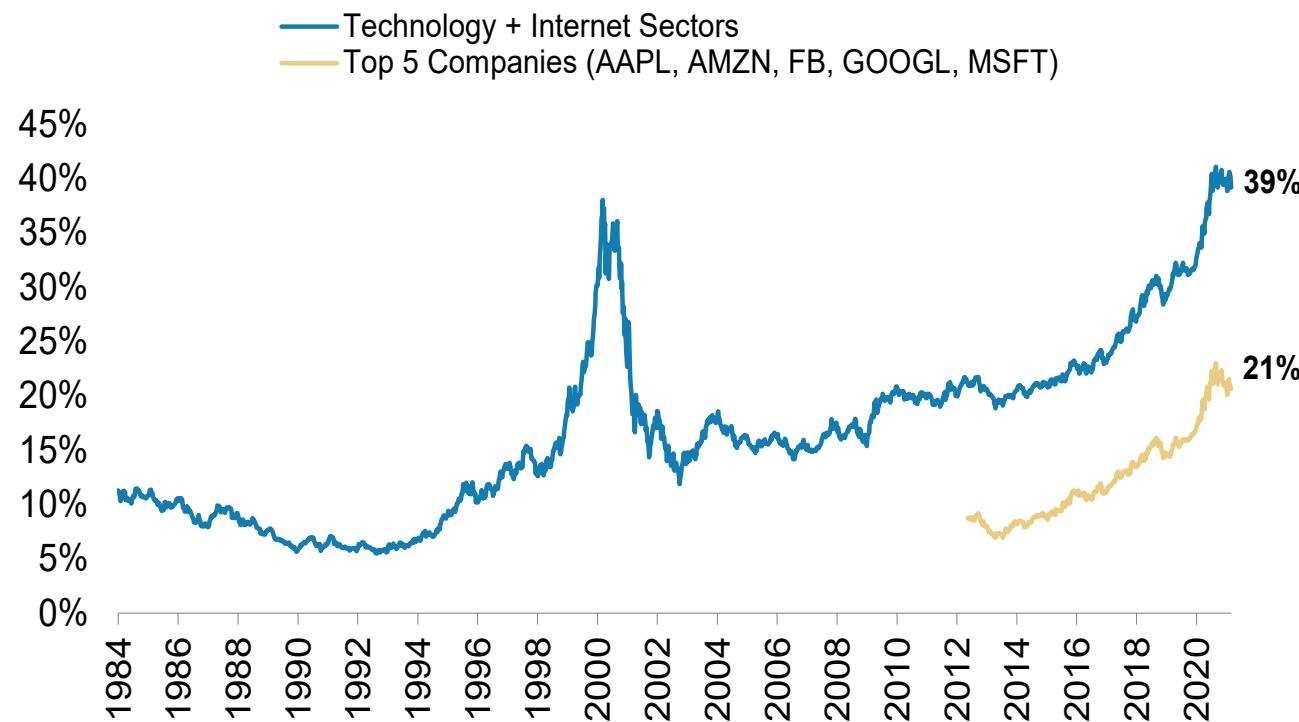


Note: The number following the stock rating (OW, EW, UW) is the firm's market capitalization
Source: Thomson Reuters, Morgan Stanley Research Estimates; Stock Prices and Price Targets as of April 22, 2021.

The Data Era: Can New Workloads Offset Cloud Risk?

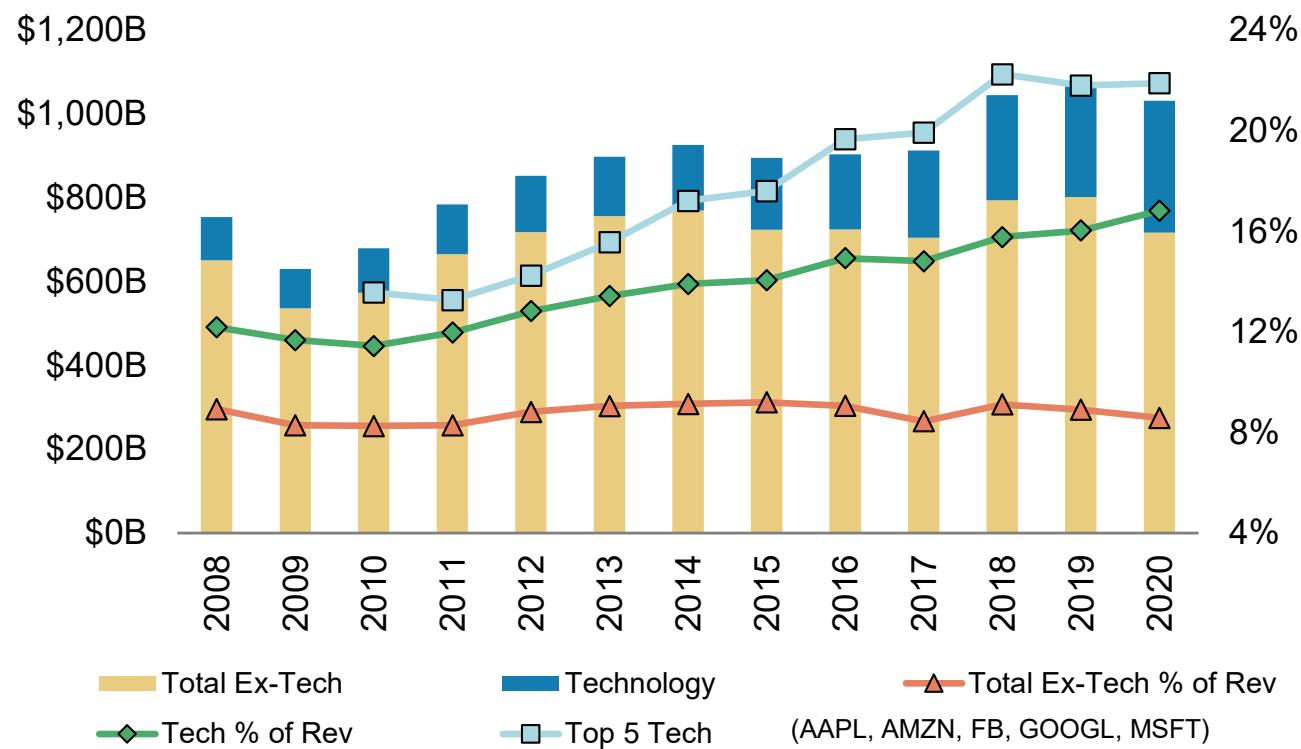
Technology is Eating the World...

Market Capitalization as % of Total US Market Capitalization



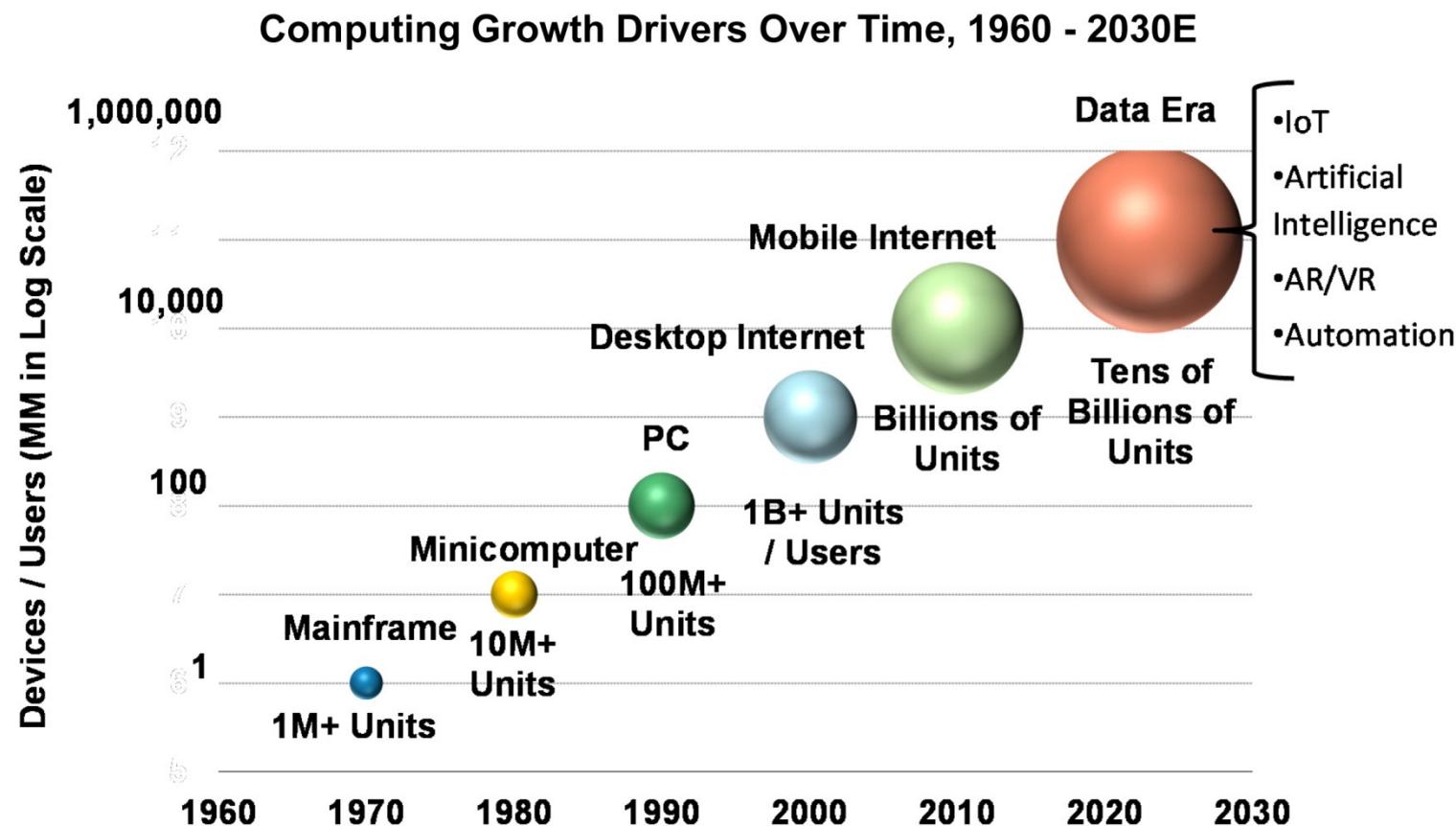
... Explained by Significant Investment Gap

TTM Capital Expenditure and R&D by Sector (\$ and % of Revenue)



Source: ClariFi, Morgan Stanley Research. Largest 500 US companies by sector (ex Financials & REITS). Adjusted to include AMZN in technology.

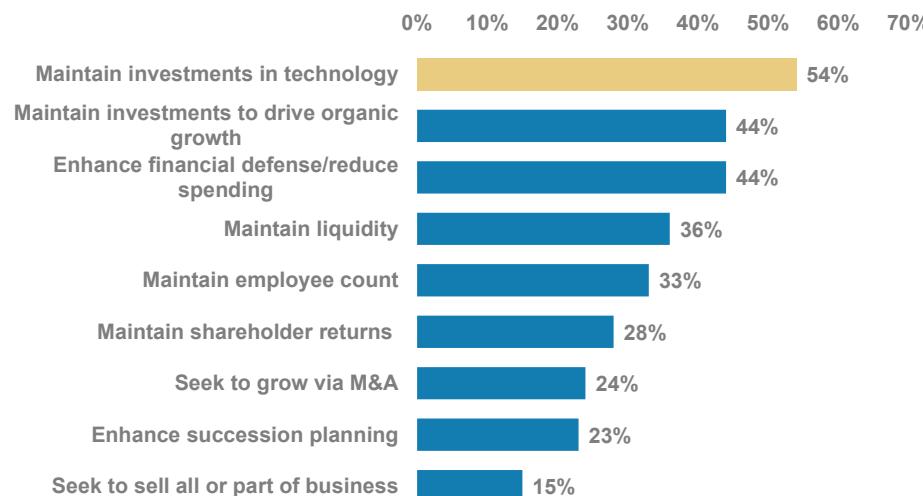
Data Technologies at the Center of the Next Computing Cycle



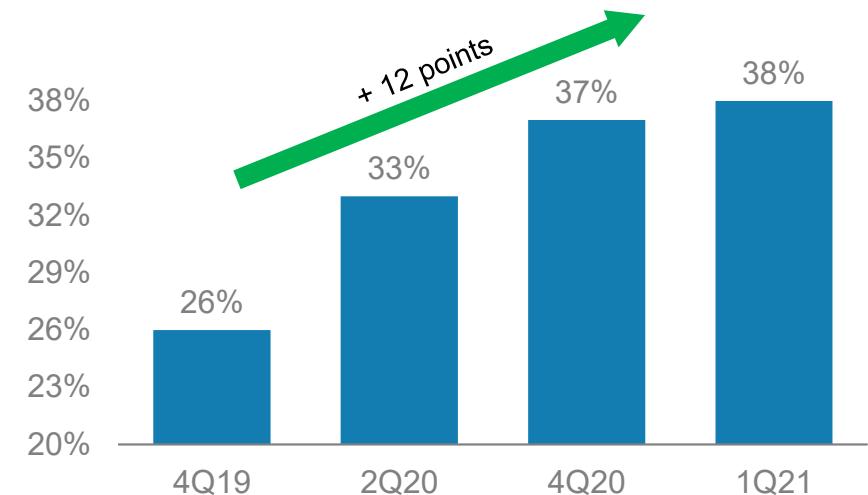
Source: Morgan Stanley Research.

Pandemic Accelerating Digital Investments

CFO/COO Top Priorities for 2H20



CIOs Expecting to Increase IT Spend as % Of Revenue Over the Next 3 Years

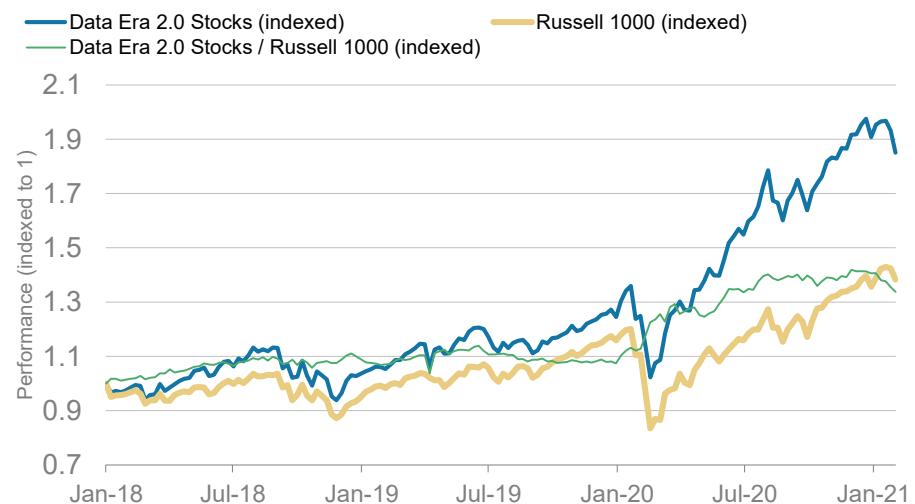


Source: AlphaWise CIO Surveys, AlphaWise CFO/COO Survey. Morgan Stanley Research.

Markets Rewarding Technology Investments

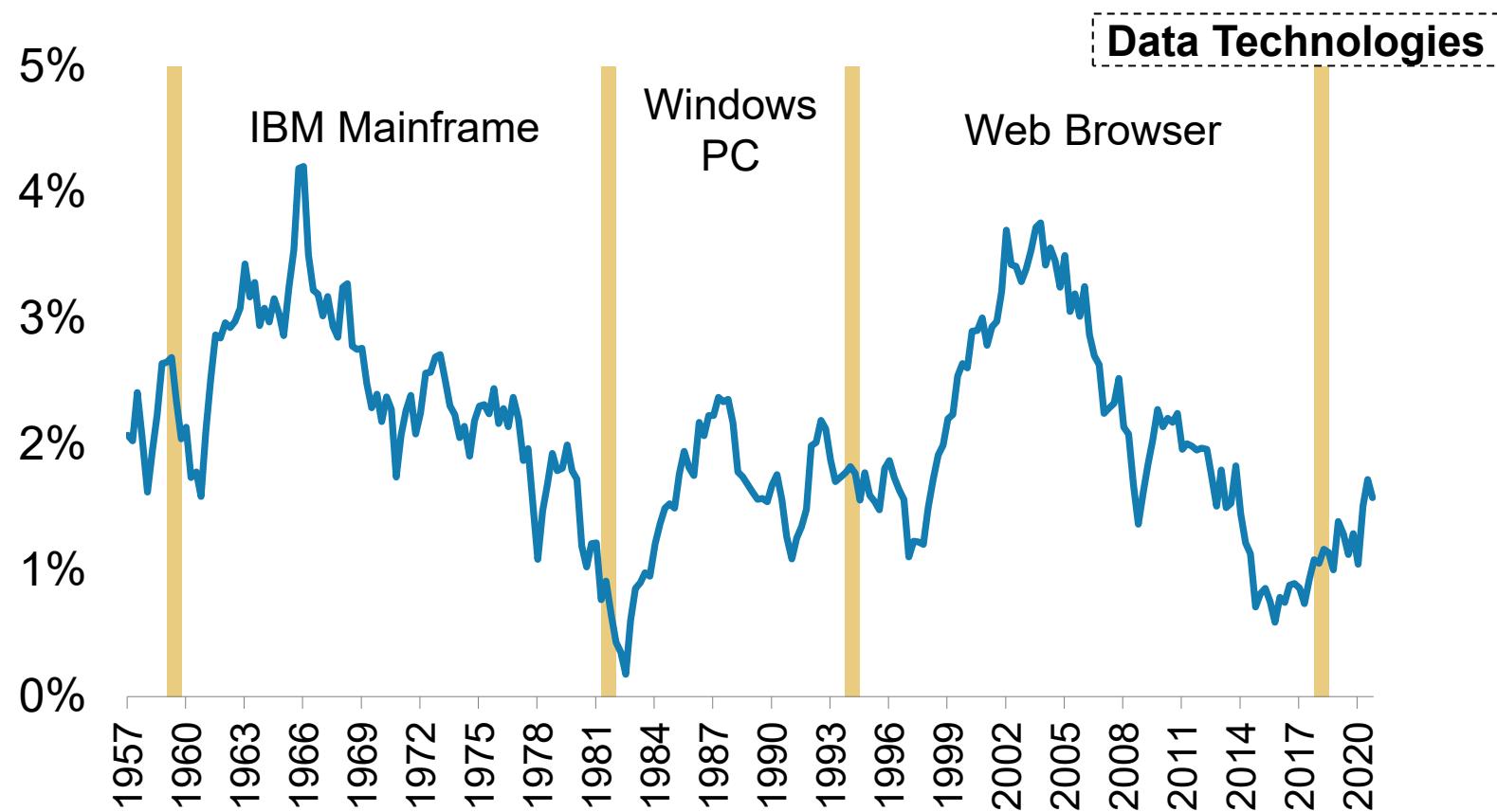
| Data Era 2.0 Stocks | |
|--------------------------------|---------------------------------|
| AES Corporation | Progressive Corporation |
| Amazon.com, Inc. | Raymond James Financial, Inc. |
| BlackRock, Inc. | S&P Global, Inc. |
| Bloom Energy Corporation | Schlumberger NV |
| Caesars Entertainment Inc | Schrodinger, Inc. |
| Citizens Financial Group, Inc. | Sherwin-Williams Company |
| Deere & Company | Spotify Technology SA |
| Domino's Pizza, Inc. | Stanley Black & Decker, Inc. |
| Estee Lauder Companies Inc. | Starbucks Corporation |
| Honeywell International Inc. | Teck Resources Limited |
| Invitation Homes, Inc. | Tesla Inc |
| Lemonade Inc | T-Mobile US, Inc. |
| Mastercard Incorporated | UnitedHealth Group Incorporated |
| Match Group, Inc. | Valero Energy Corporation |
| Netflix, Inc. | Verisk Analytics Inc |
| New Fortress Energy Inc. | Verizon Communications Inc. |
| NIKE, Inc. | Walmart Inc. |
| Northrop Grumman Corporation | Walt Disney Company |
| Penn National Gaming, Inc. | XPO Logistics, Inc. |

Data Era 2.0 Stock Performance vs. Russell 1000



Technology Drives Productivity

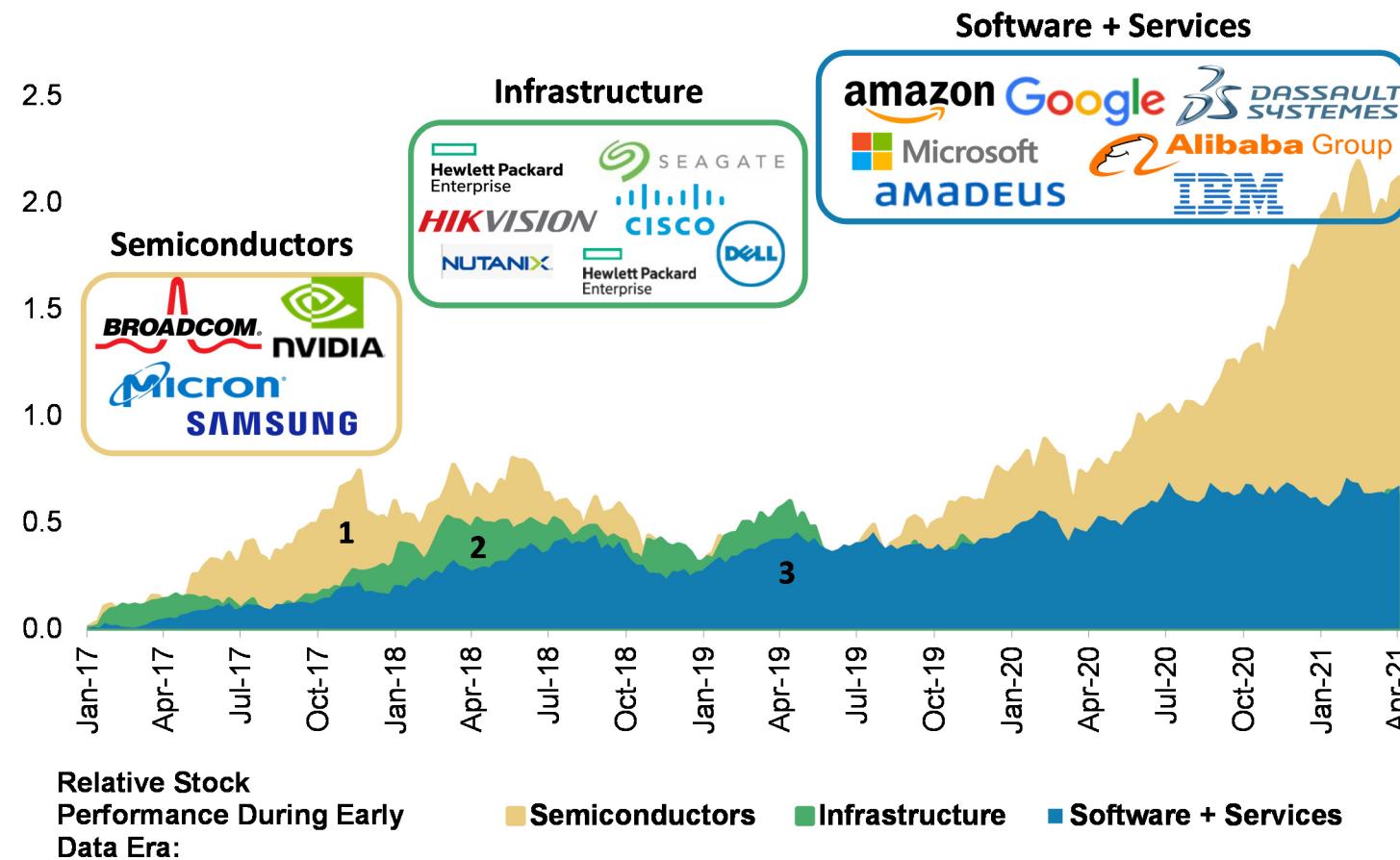
US Nonfarm Business Sector Output Per Hour (Y/Y, 5 Yr. Rolling Average)



Source: Morgan Stanley Research, U.S. Bureau of Economic Analysis as of 4Q20.

Monetization Roadmap Playing Out in Data Era

Data Era Stock Performance (Index Performance Relative to S&P 500)

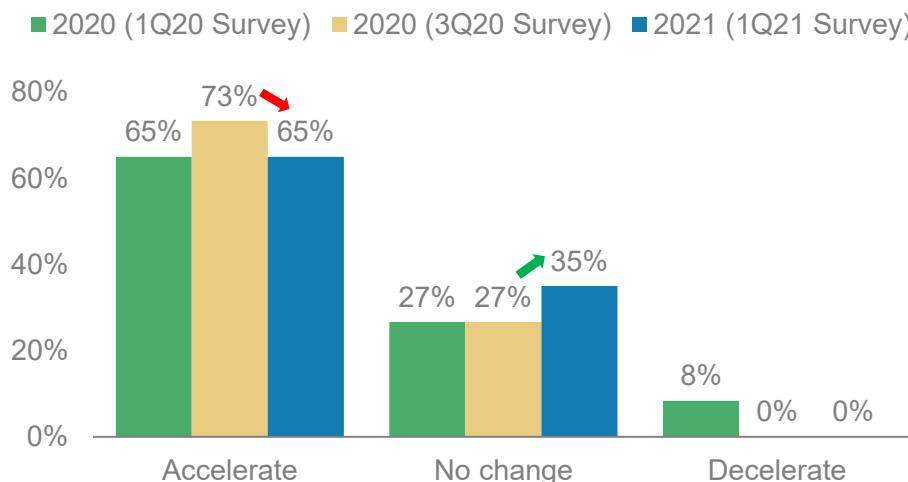


Source: Morgan Stanley Research, Thomson Reuters; Reflects performance relative to the S&P 500. Tech Sector performance reflects the Technology Select Sector Index.

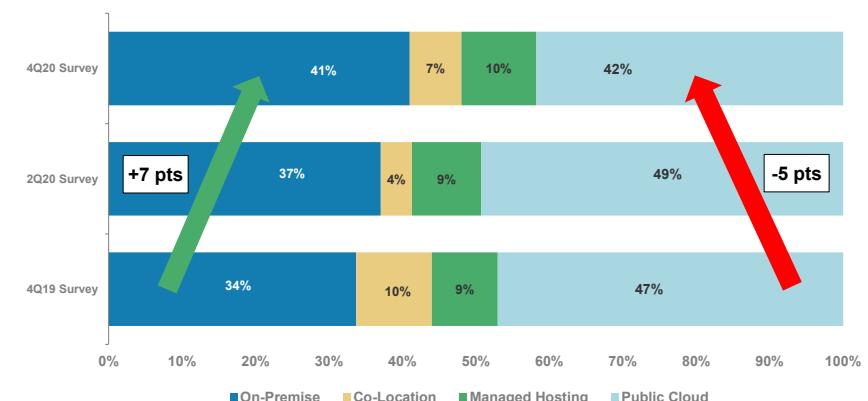
Slowing Public Cloud Adoption Benefits Hardware Near-Term...

- The expected pace of cloud adoption is slowing, and CIO Survey results show more workloads are expected to reside on-prem in 2023 than before. This not only benefits on-prem Hardware vendors but also provides an opportunity for Data Era tailwinds to more than offset cloud risk.

Hardware Domain Expert Expected Pace of Cloud Adoption in 2021



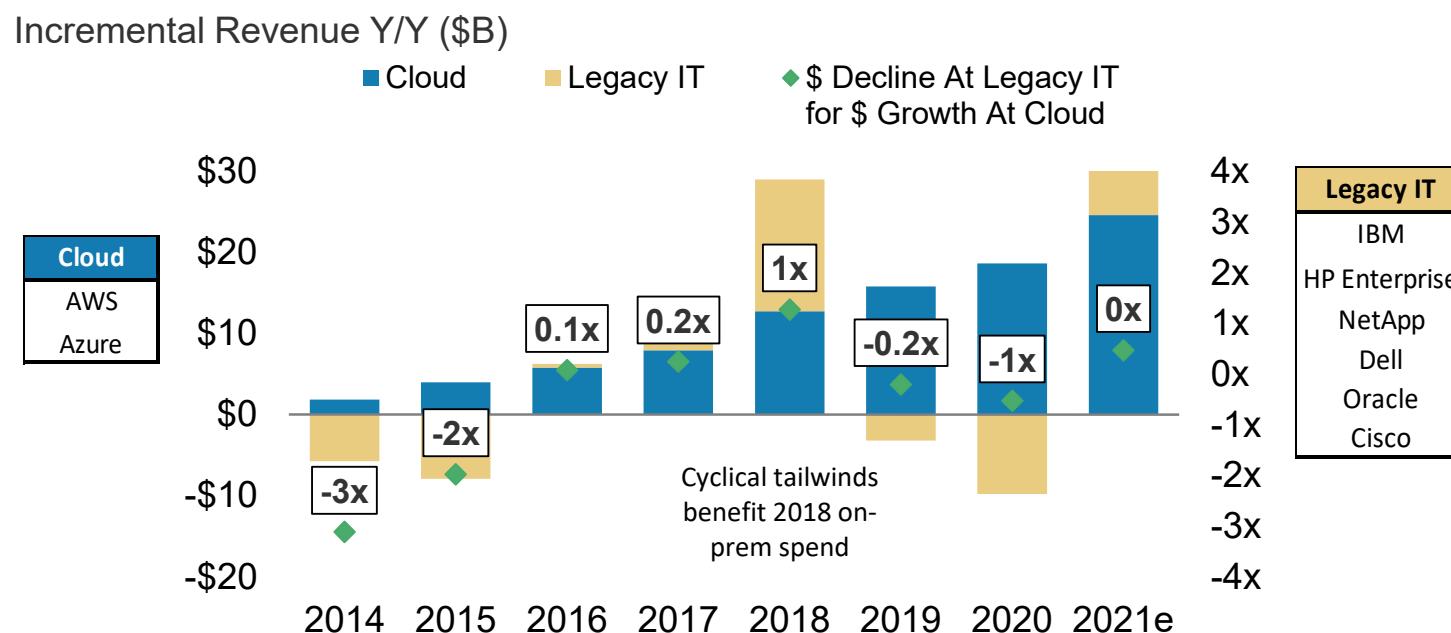
CIO Expected Location of Application Workloads by 2023



Source: AlphaWise CIO Survey, IDC, Morgan Stanley Research.

...But Remains a Long-Term Risk to Growth

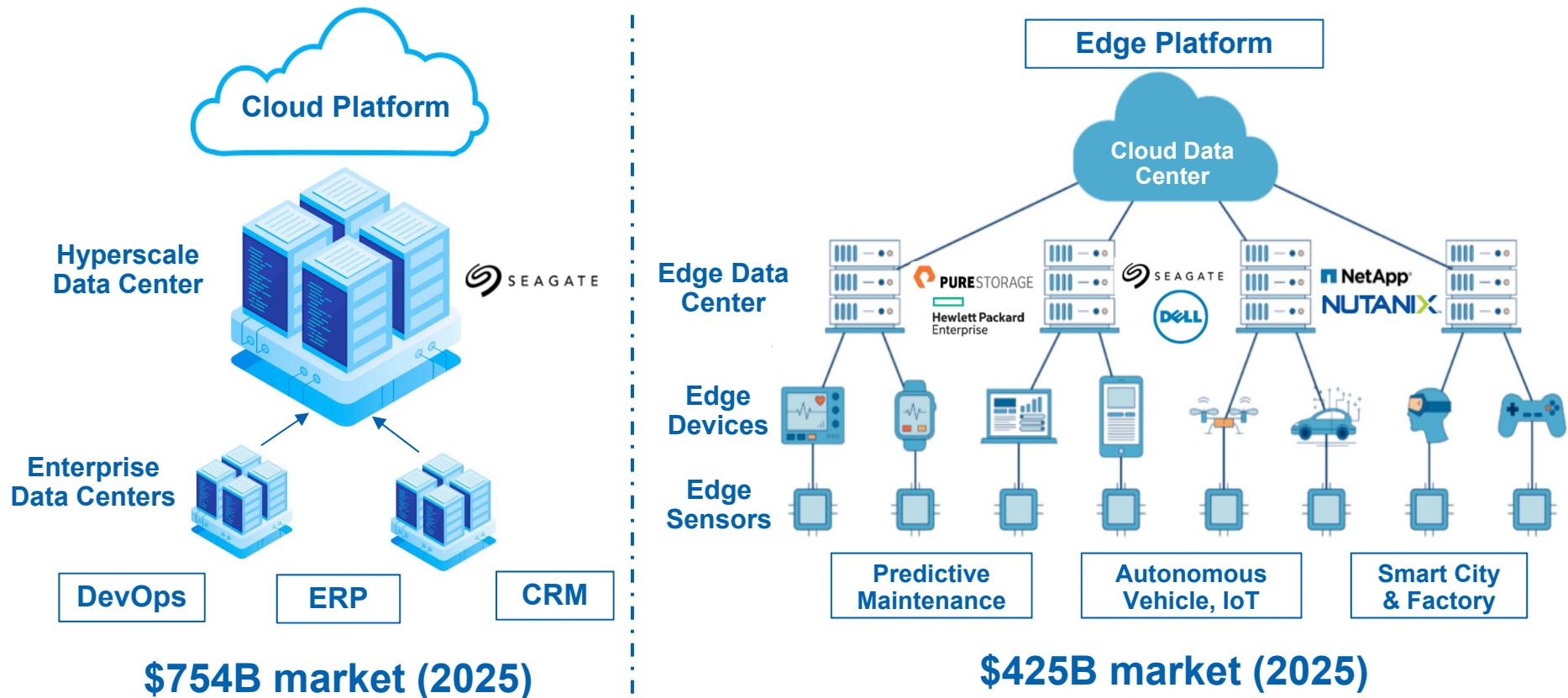
- Cloud adoption cannibalizes on-prem spend.** In 2020, every \$1 of incremental AWS & Azure spend led to \$1 less spend with Legacy IT vendors. While we see this moderating in 2021 as Hardware spend returns, we believe it remains a fundamental risk.



Source: Company data, Morgan Stanley Research.

Edge Opens Up New Opportunities for OEMs

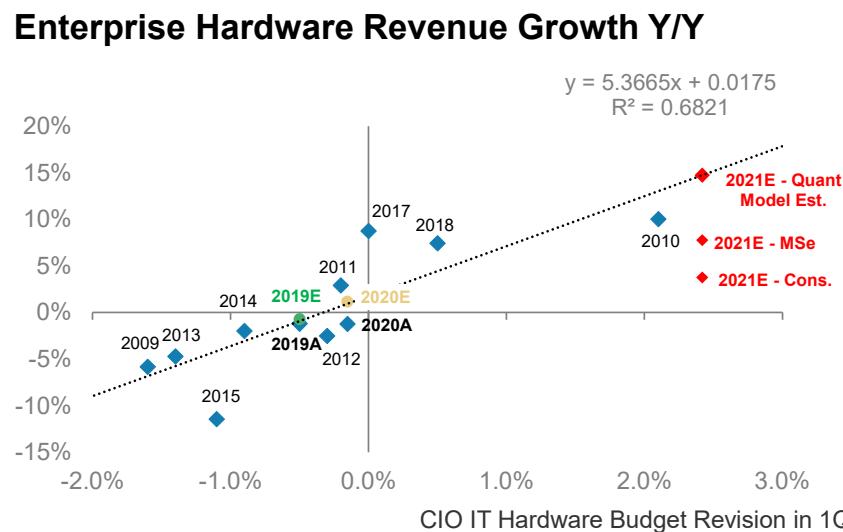
- **Edge workloads introduce net-new workloads.** IDC expects edge workloads to grow at a 33.4% CAGR from 2020-2025. Unlocking real-time insights from these net-new workloads requires local storage and compute near the site of data collection, benefiting hardware OEMs who offer customization, distribution, and services not offered by cloud providers.



Where Do We See Opportunities?

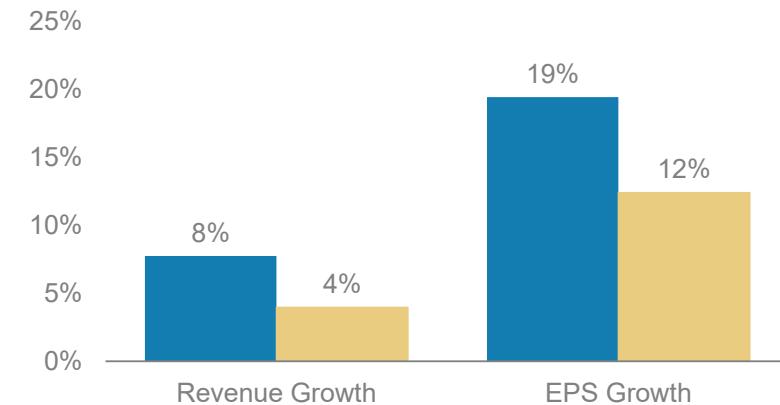
Enterprise Hardware: Positive Estimate Revisions Drive Next Wave of Outperformance

- We believe Street estimates will be revised higher as demand recovers.** Our Sector Quant analysis points to 15% Enterprise Hardware CY21 revenue growth, indicating Street estimates of 4% are too low.
- Preferred Enterprise-Exposed Stocks (OW):** CDW, DELL, HPQ, NCR, NTAP, STX



*Budget revision represents 3Q to 1Q revision. 2019E reflects 2H to 1Q budget revision.

MS vs. Consensus 2021 Enterprise Hardware Estimates



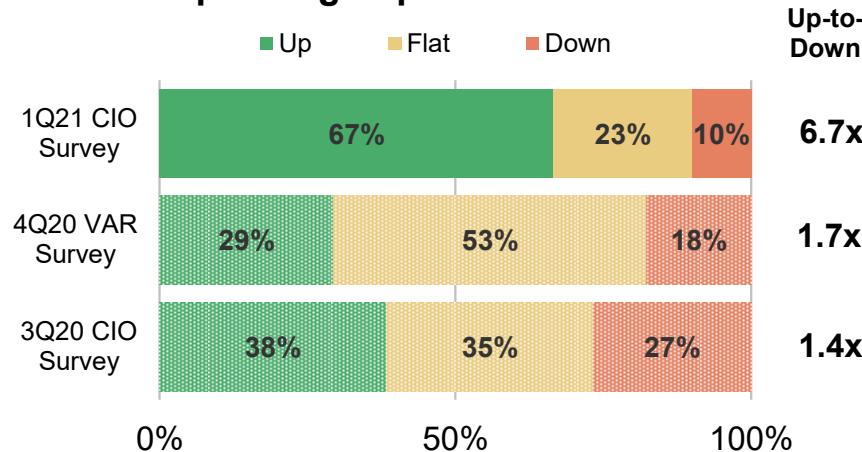
*Growth on a revenue weighted basis. Enterprise HW: CDW, DELL, HPE, HPQ, IBM, NCR, NTAP, NTN, PSTG, STX, TDC, XRX.

Source: AlphaWise, Thomson Reuters, Morgan Stanley Research.

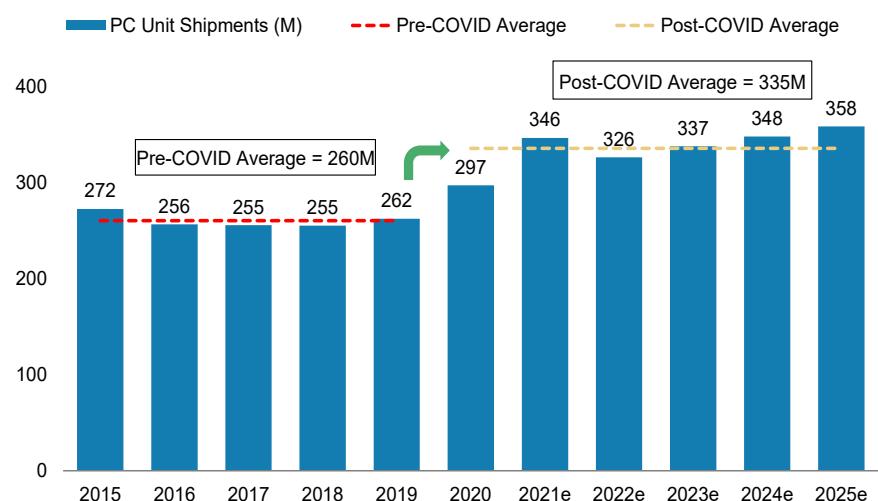
PC Hardware: Stronger-for-Longer PC Demand

- We expect structurally higher PC demand post pandemic.** We believe a more distributed workforce and the mix shift to notebooks will increase the PC installed base and shrink replacement cycles, supporting higher PC shipments vs. pre-COVID levels.
- Stocks (OW):** CDW, DELL, HPQ, LOGI

2021 PC Spending Expectations



Pre vs. Post-COVID PC Shipments

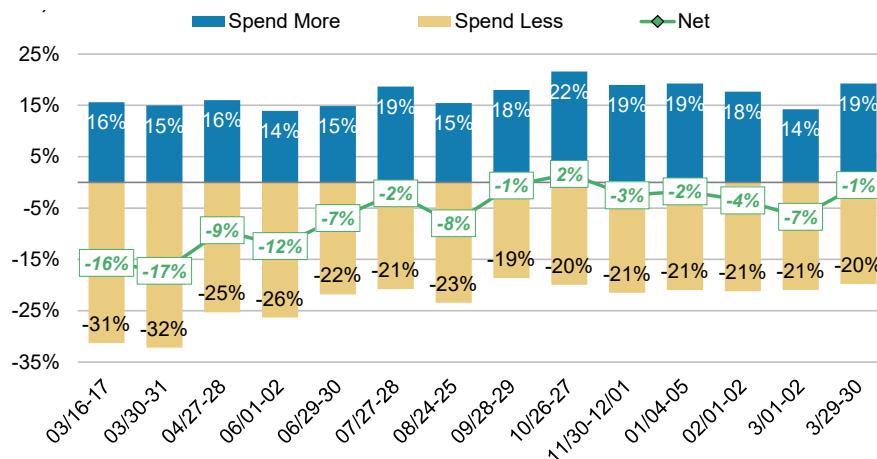


Source: AlphaWise, IDC, Morgan Stanley Research.

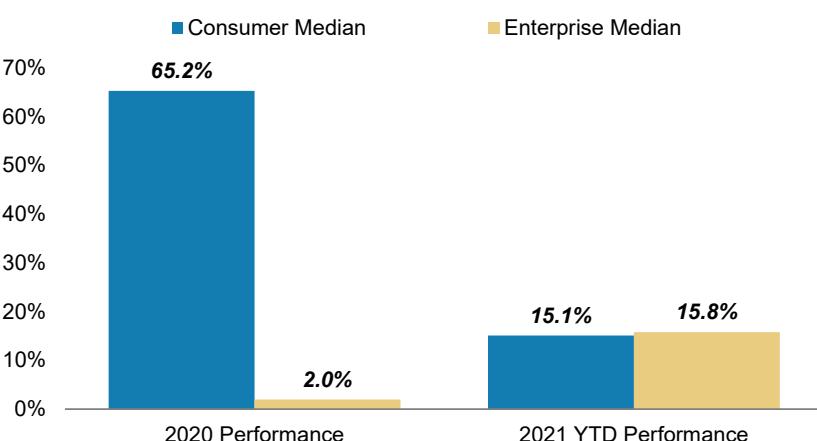
Consumer Hardware: Stay Selective & Pick the Winners

- We recommend being selective with Consumer Hardware stocks in 2021.** While we expect consumer electronics demand to remain strong, recent outperformance and tough compares require careful stock picking.
- Preferred Consumer Hardware Stocks (OW):** AAPL, CRCT, LOGI, SONO

Consumer Electronics Future Spending Intentions (Next Month vs. Now)



Consumer vs. Enterprise Hardware Stock Performance

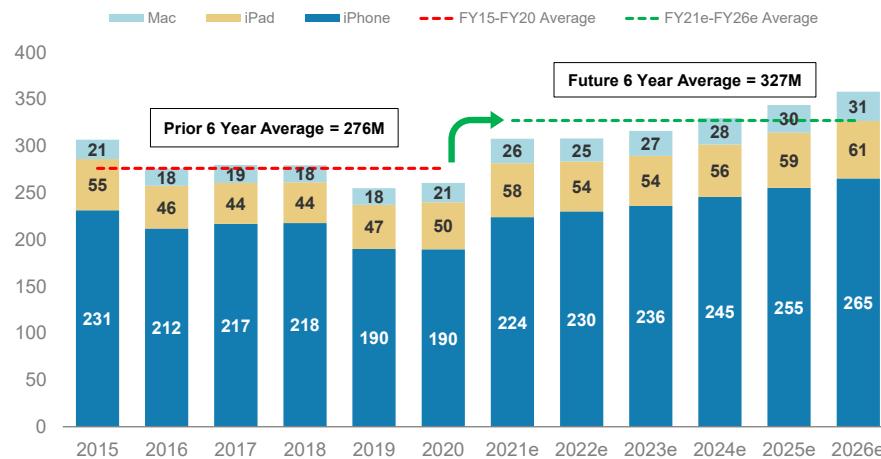


Source: AlphaWise, Thomson Reuters, Morgan Stanley Research.

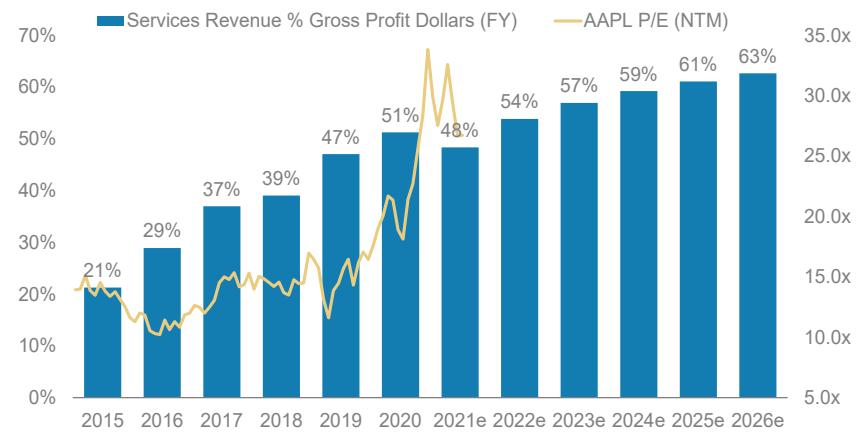
AAPL: Ecosystem Winner with Multiple Growth Opportunities

- Beneficiary of structurally higher product demand.** We see a step-function increase in units sales as replacement cycles decrease for iPhones due to heightened 5G demand and for iPads and Macs due to distributed work and learning.
- Opportunity for continued re-rating as Services mix grows.** Apple's NTM P/E multiple has doubled over the past 6 years, as growing Services mix has facilitated margin expansion and less revenue cyclical. We see a further re-rating opportunity as Services approaches ~65% of gross profit and innovation drives new revenue streams.

Apple iPhone, iPad, and Mac Shipments (M)



Apple Services Mix & Multiple Expansion

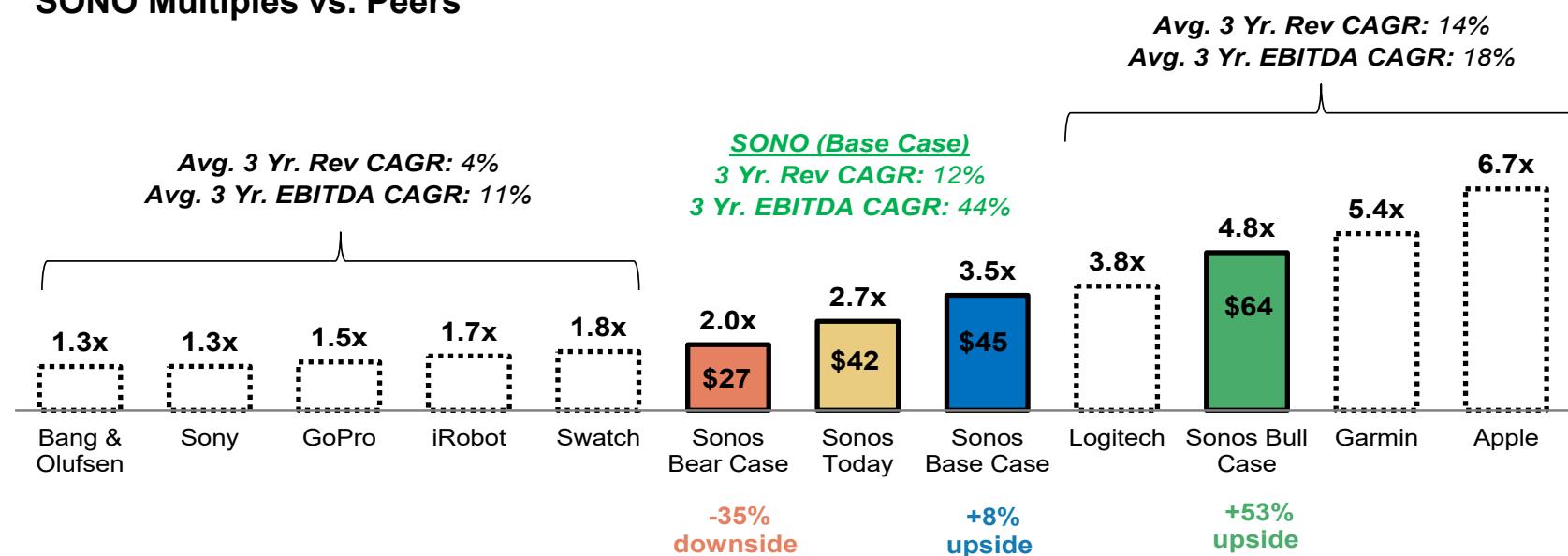


Source: Thomson Reuters, Company Data, Morgan Stanley Research.

SONO: Undervalued Smart Home Play with Long Runway for Growth

- Bullish on growing TAM penetration & strong user engagement.** We are positive on SONO's low but growing penetration of a large market, double digit revenue & earnings growth, and potential new services & licensing streams. As a result, we believe it should trade more in-line with high quality consumer electronics names.

SONO Multiples vs. Peers



Source: Thomson Reuters, Morgan Stanley Research.

April 2021

Technology, Media & Telecom Spring Training Teach-In

Semiconductors: Flashing yellow, but still the good part of the cycle

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Disclosures in this report are as of April 26, 2021; stock recommendations and stock prices as of April 23, 2021, unless otherwise noted.

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For analyst certification and other important disclosures, refer to the Disclosure Section, located at the end of this report.

US Semiconductor Team

Computing, PLDs, Comm-IC, Memory, SemiCap Equipment

Joe Moore – 30 years semiconductor experience:

- National Semiconductor Applications engineer 1990-92 (before graduate school)
- 10 years experience investing long-short in technology at Citadel (2002-03) then at Goldman Sachs (2003-11)

Analog, Microcontrollers, RF, Components

Craig Hettenbach

- Joined MS in April 2013. Previously at Goldman Sachs for 5 years covering the analog space and IT Supply Chain (EMS, distribution, components)
- 23 years of experience on the Street, including 19 years covering tech

Key Stock Calls

Top Overweights:



QORVO



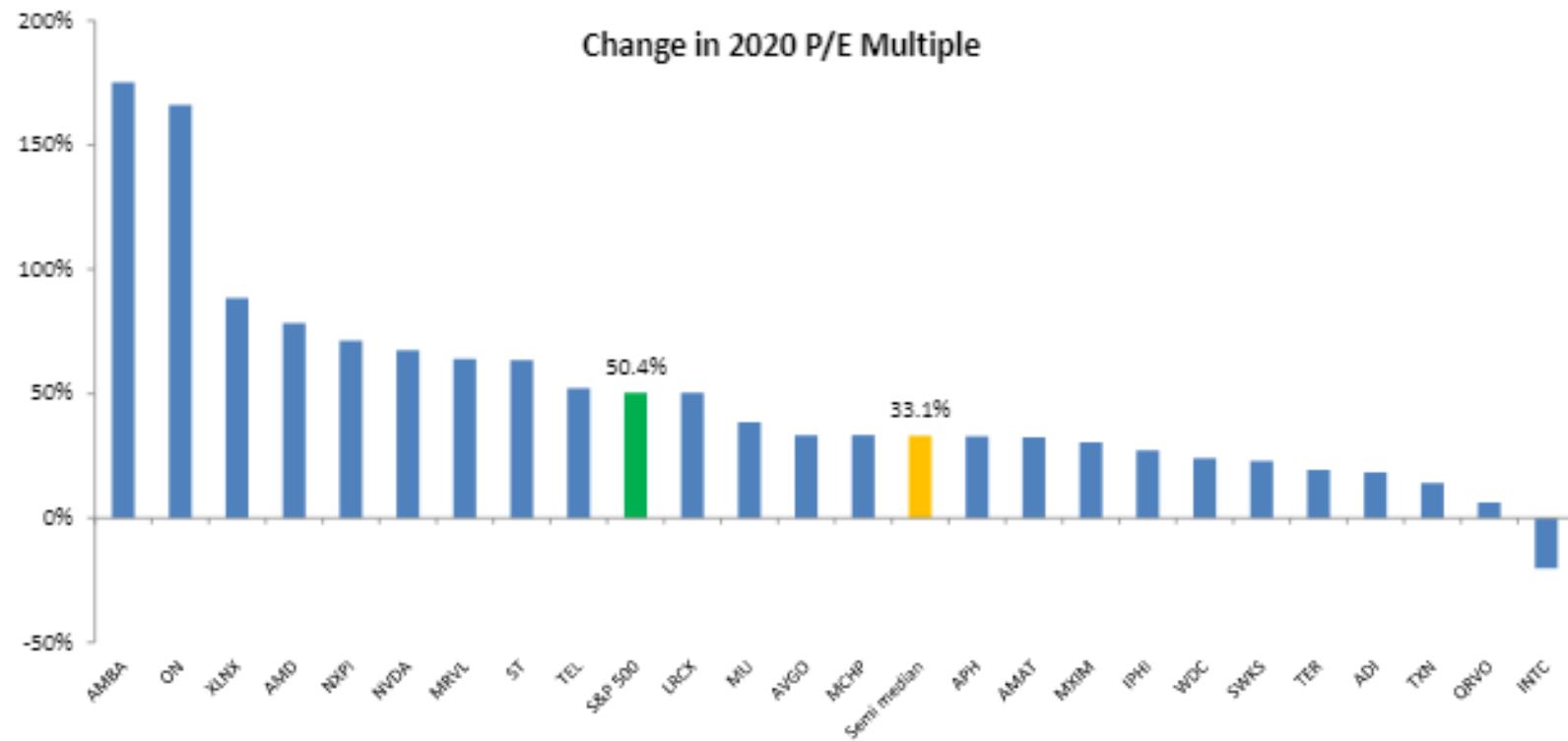
TERADYNE

Qualcomm

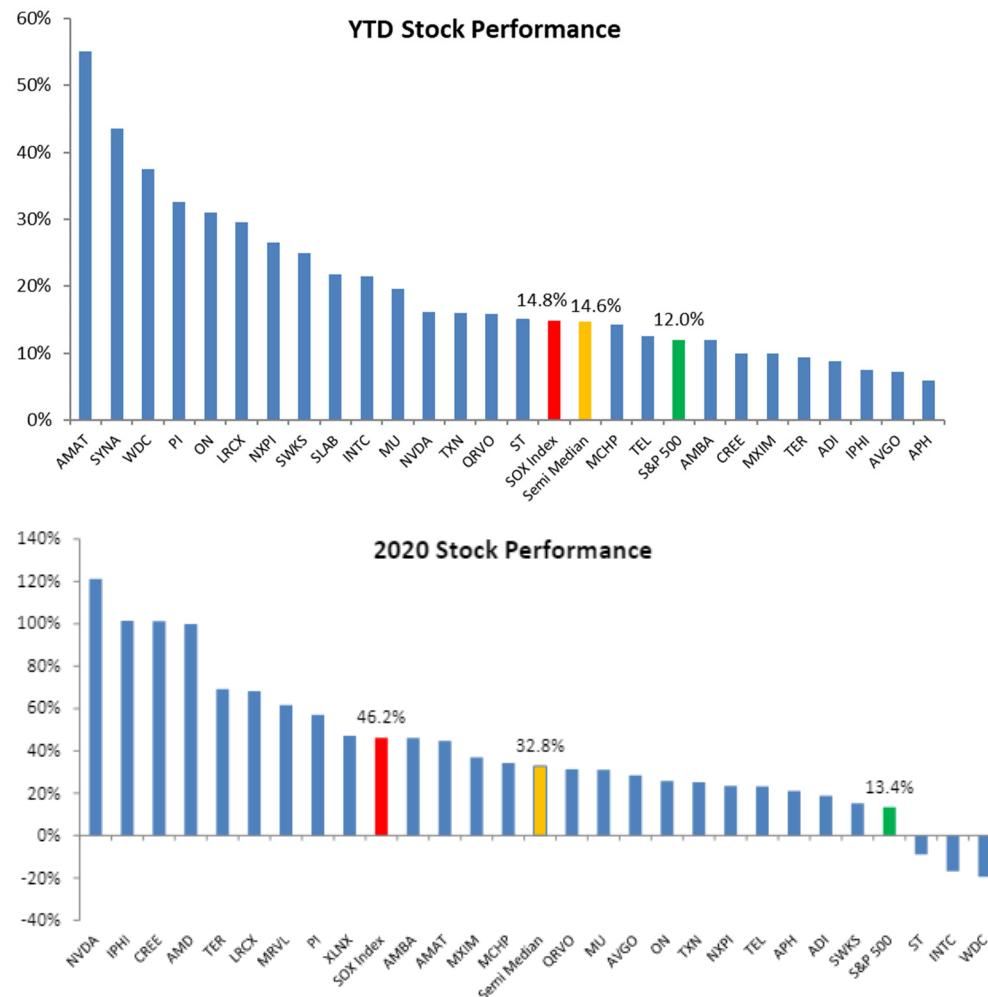
Top Underweights:



2020 was about multiple expansion for idiosyncratic growers...going forward should be different



2021 about cyclical EPS revision; multiples may contract



...and we estimate a strong recovery in 2021 and expect semiconductor sales to grow 16.5%

We expect strong growth across all product categories

- Analog and microcontrollers are expected to grow 15.1% and 16.6% respectively
- We model logic (ex micro) to grow 16.3%
- For memory, we anticipate 22% growth led by DRAM (+34.3%) followed by NAND (+8%)

| | 2009 A | 2010 A | 2011 A | 2012 A | 2013 A | 2014 A | 2015 A | 2016 A | 2017 A | 2018 A | 2019 A | 2020 A | 2021 E |
|-------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Revenues (\$ Millions) | | | | | | | | | | | | | |
| Discretes / Optos / Sensors | 35,971 | 48,406 | 52,449 | 53,322 | 53,808 | 58,541 | 60,684 | 62,233 | 69,087 | 75,446 | 78,953 | 79,164 | 89,724 |
| Analog | 32,001 | 42,285 | 42,338 | 39,303 | 40,117 | 44,365 | 45,228 | 47,848 | 53,069 | 58,380 | 53,939 | 55,658 | 64,036 |
| MCU | 10,839 | 14,799 | 15,155 | 14,633 | 14,659 | 15,310 | 15,479 | 14,573 | 16,430 | 17,027 | 15,808 | 15,484 | 18,054 |
| MPU | 32,331 | 39,927 | 44,725 | 41,882 | 41,120 | 44,033 | 43,268 | 43,142 | 44,370 | 46,371 | 47,974 | 51,812 | 57,463 |
| Other | 5,159 | 5,908 | 5,324 | 3,723 | 2,909 | 2,728 | 2,551 | 2,869 | 3,286 | 3,262 | 2,658 | 2,424 | 2,400 |
| Total Micro | 48,330 | 60,633 | 65,204 | 60,238 | 58,688 | 62,072 | 61,298 | 60,585 | 64,086 | 66,660 | 66,440 | 69,720 | 77,917 |
| Logic (ex Micro) | 65,215 | 77,377 | 78,782 | 81,703 | 85,927 | 91,633 | 90,753 | 91,498 | 102,196 | 109,411 | 106,535 | 118,408 | 137,708 |
| Total Logic | 113,544 | 138,010 | 143,986 | 141,941 | 144,615 | 153,705 | 152,051 | 152,083 | 166,281 | 176,071 | 172,975 | 188,128 | 215,625 |
| DRAM | 22,420 | 39,210 | 29,368 | 26,097 | 34,788 | 46,858 | 44,970 | 41,179 | 72,802 | 98,604 | 62,475 | 64,324 | 86,413 |
| NAND | 14,838 | 21,735 | 24,418 | 25,417 | 27,465 | 28,234 | 28,845 | 32,023 | 47,227 | 54,263 | 40,180 | 49,390 | 53,306 |
| Other | 7,539 | 8,669 | 6,963 | 5,481 | 4,790 | 4,140 | 3,390 | 3,565 | 3,946 | 4,428 | 3,785 | 3,516 | 3,516 |
| Total Memory | 44,797 | 69,614 | 60,749 | 56,995 | 67,043 | 79,232 | 77,205 | 76,767 | 123,976 | 157,295 | 106,440 | 117,230 | 143,235 |
| Total ICs | 190,342 | 249,909 | 247,073 | 238,240 | 251,776 | 277,302 | 274,484 | 276,698 | 343,326 | 391,746 | 333,354 | 361,015 | 422,897 |
| Total Semiconductor | 226,313 | 298,315 | 299,521 | 291,562 | 305,584 | 335,843 | 335,168 | 338,931 | 412,414 | 467,192 | 412,307 | 440,179 | 512,620 |
| Y/Y % Growth | -9.0% | 31.8% | 0.4% | -2.7% | 4.8% | 9.9% | -0.2% | 1.1% | 21.7% | 13.3% | -11.7% | 6.8% | 16.5% |

Drivers of a Semiconductor Inventory Cycle



Why are their shortages?

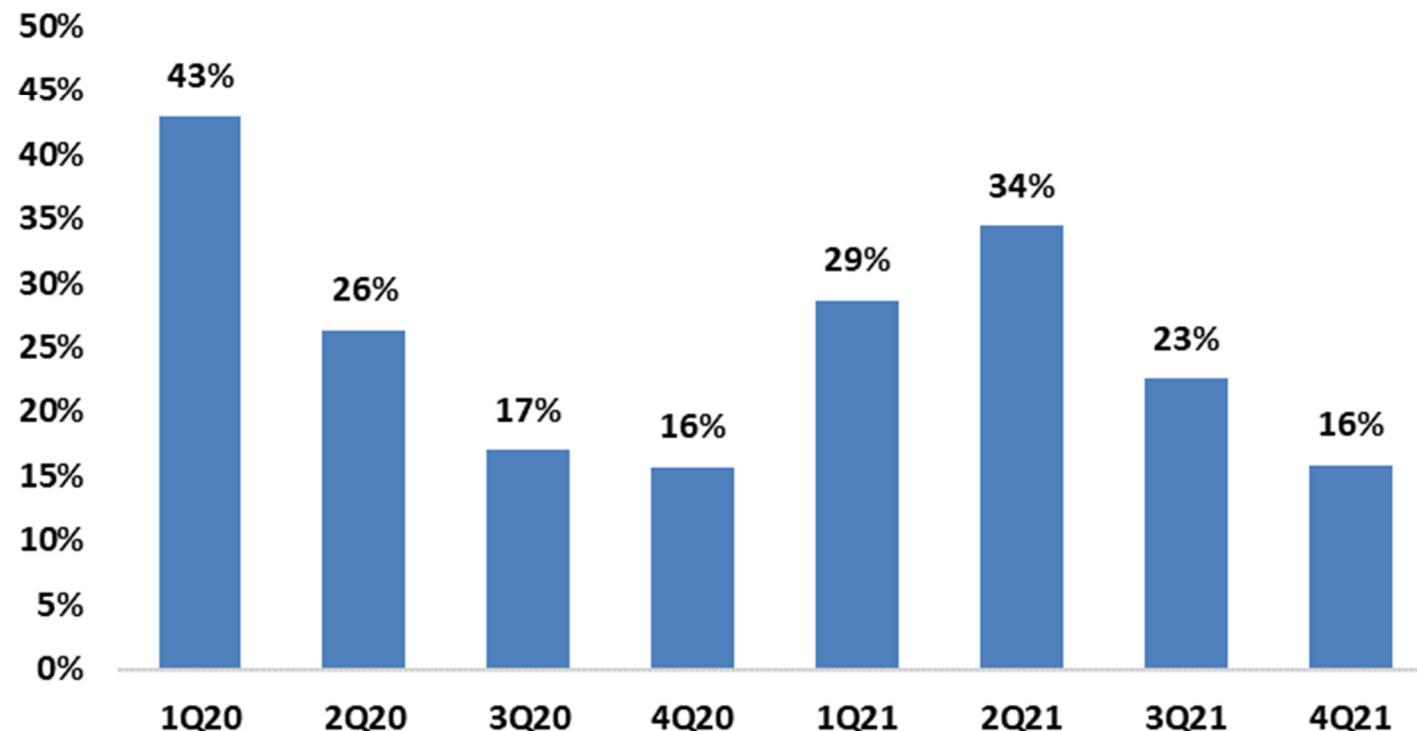
- Exceptional consumer/crypto demand
- Crowding out other supply chains where demand is recovering to normal levels
- Trade tensions driving supply disruption and inventory builds
- Packaging/substrate shortages are more severe than foundry/wafer shortages

What has to happen for the shortages to end?

- In 3 months: fab cycle will help (but disruption has been a setback)
- In 6 months: packaging/substrate issues should start to get resolved
- 12 months+ to add wafer capacity to the extent that is the bottleneck

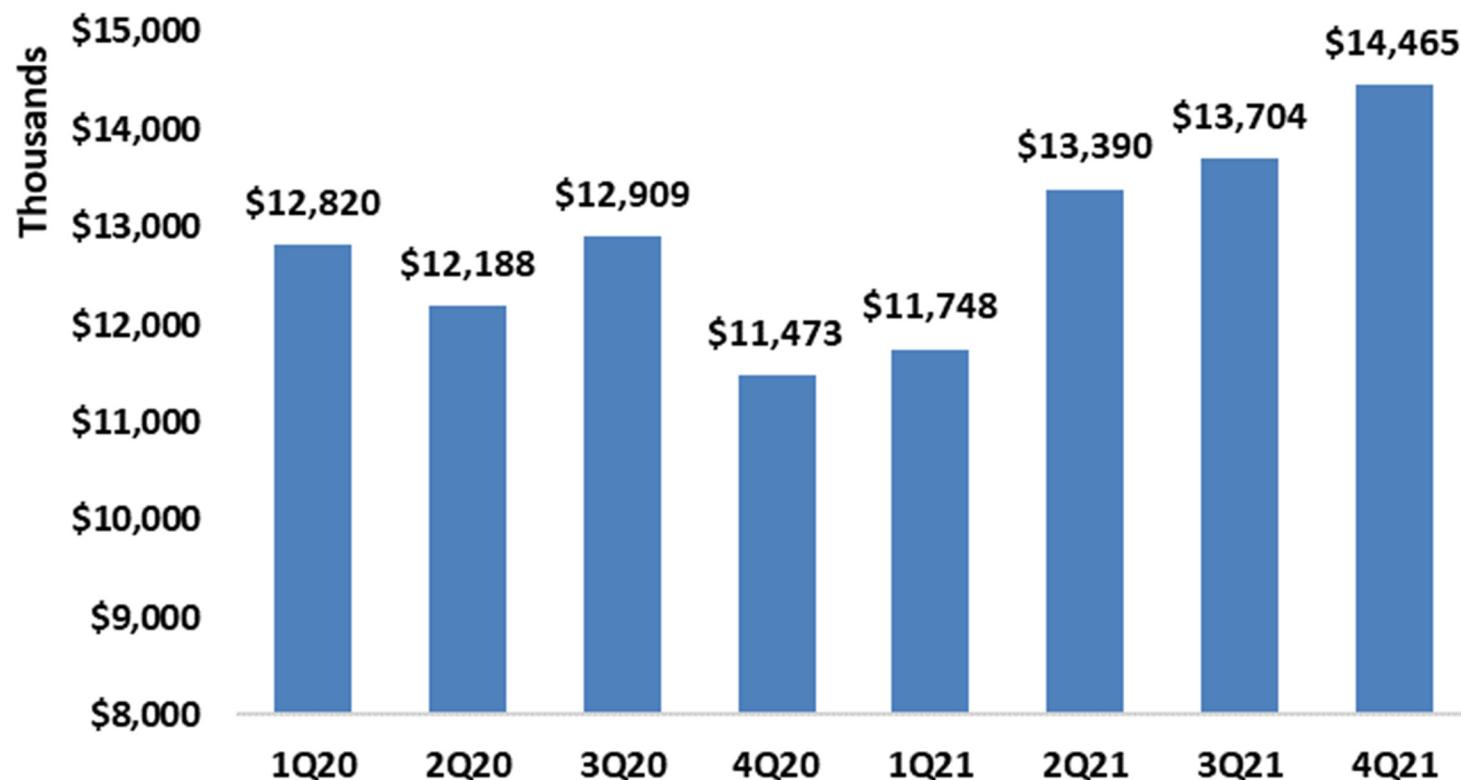
DRAM: While near term checks are mixed, strong 1Q shipments should be a positive setup for the year

Y/Y DRAM GB Shipment Growth



NAND has lagged DRAM in its recovery but is improving now

Quarterly NAND Revenues



MU and WDC: We are positive on memory and expect favorable pricing to drive strong earnings growth through the year

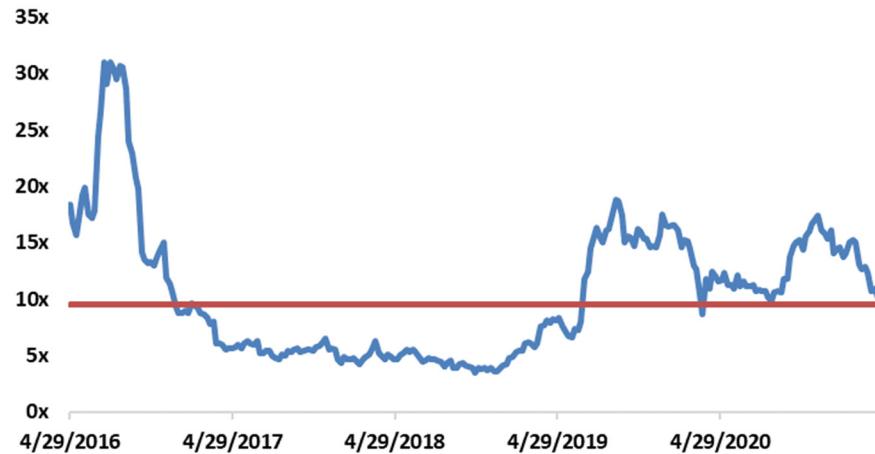
Micron Technology (MU, Overweight, \$105 PT)

- Micron is trading in-line with its long-term P/E compared to the group that is significantly above

Western Digital (WDC, Overweight, \$84 PT)

- WDC SOTP valuation implies significant upside to current levels

Micron NTM P/E vs Long-Term Median

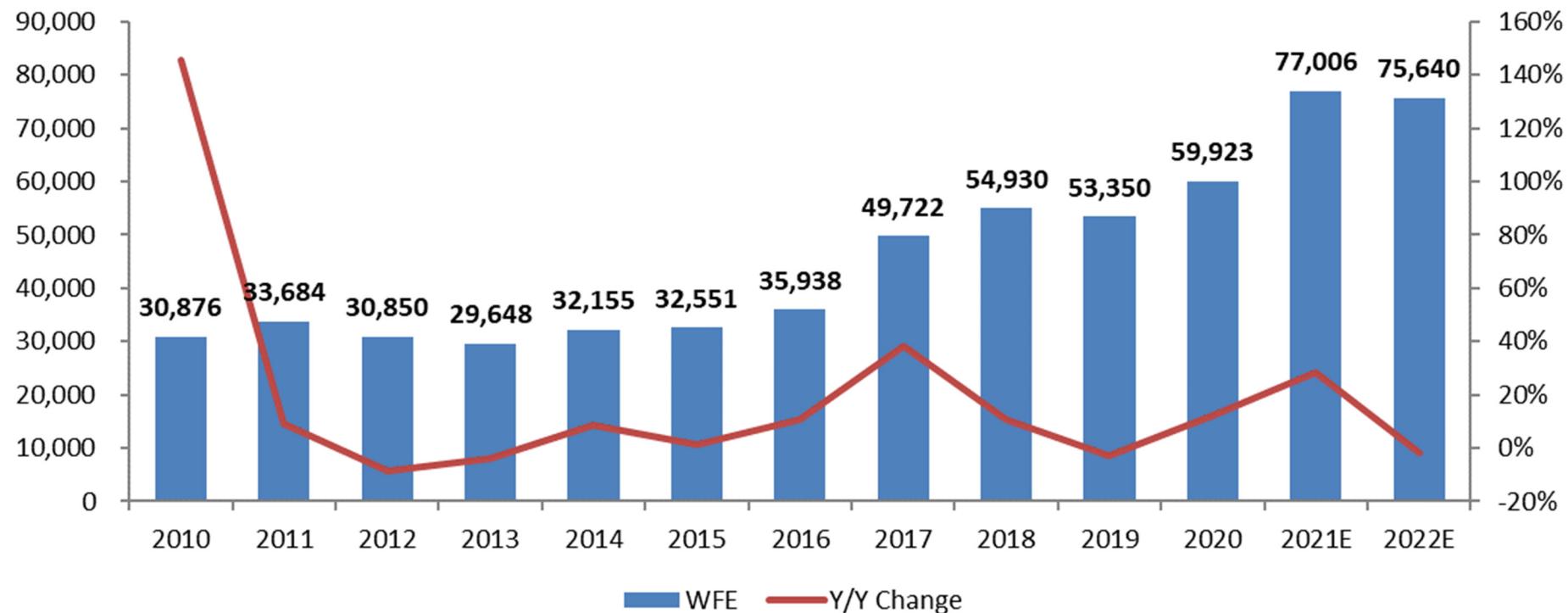


| EV/Sales Peer Valuation | |
|-------------------------|--------------|
| | HDD |
| STX - current | |
| TTM Sales | \$9,376 |
| Price | \$89 |
| Share Count | 237 |
| Implied Market Cap | \$21,128.55 |
| Net Debt | \$3,930 |
| EV | \$25,059 |
| EV/S | 2.67x |
| | |
| | NAND |
| MU - current | |
| TTM Sales | \$23,503 |
| Price | \$86 |
| Share Count | 1154 |
| Implied Market Cap | \$99,279 |
| Net Debt | -\$1,879 |
| EV | \$97,400 |
| EV/S | 4.14x |

| WDC EV/Sales Current | |
|----------------------|-----------------|
| | HDD |
| TTM Sales | \$7,916 |
| EV/S | 2.67x |
| EV | \$21,156 |
| | |
| | NAND |
| TTM Sales | \$8,411 |
| EV/S | 4.14x |
| EV | \$34,856 |
| | |
| Total EV | \$56,012 |
| Net Debt | \$6,177 |
| Market Cap | \$49,835 |
| Share Count | 307 |
| Implied Price | \$162 |

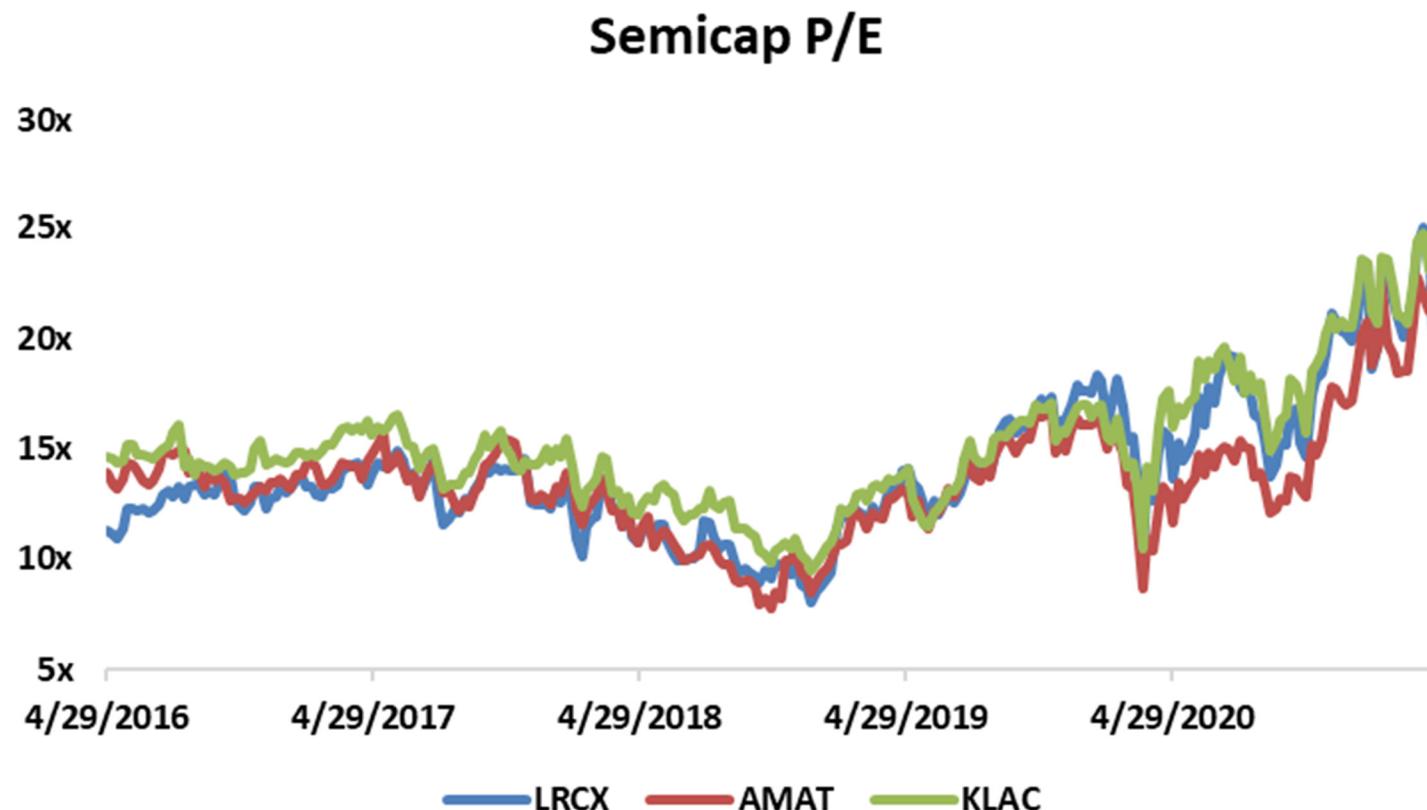
Strong foundry, strong memory, leading to record wafer fab equipment

WFE Forecast



Semiconductor equipment stocks have rallied; we are constructive

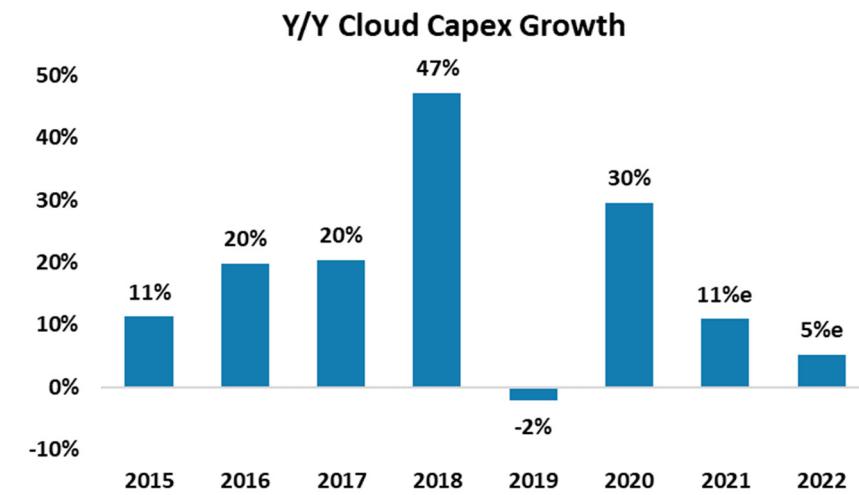
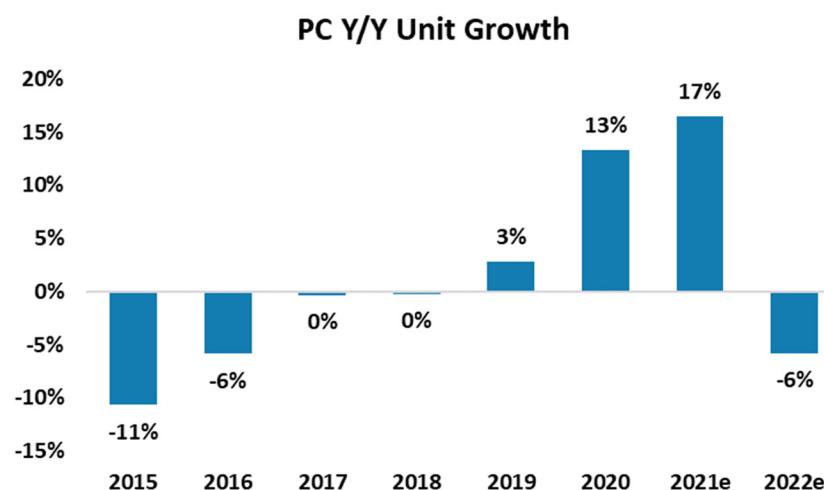
Lam Research (LRCX, Overweight, \$726 PT), Applied Materials (AMAT, Equal-weight, \$113 PT),
KLA Corp (KLAC, Equal-weight, \$349 PT)



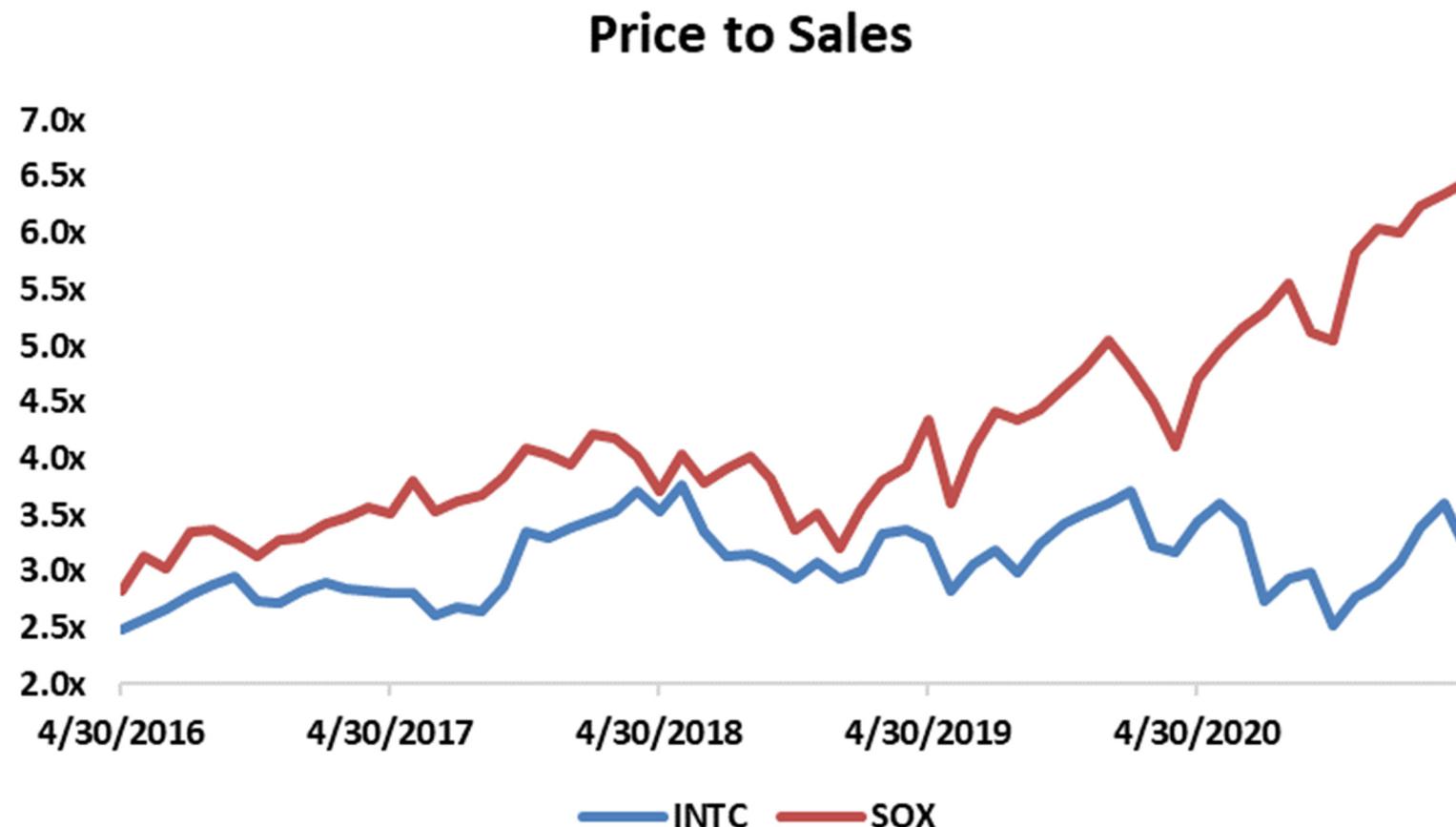
Government action has both upside and downside for equipment

- CHIPS act
- Export Controls Reform Act of 2018
- Commerce Entity list restrictions

Compute markets should transition from consumer to enterprise/cloud



INTC: We believe in the turnaround but it will take time



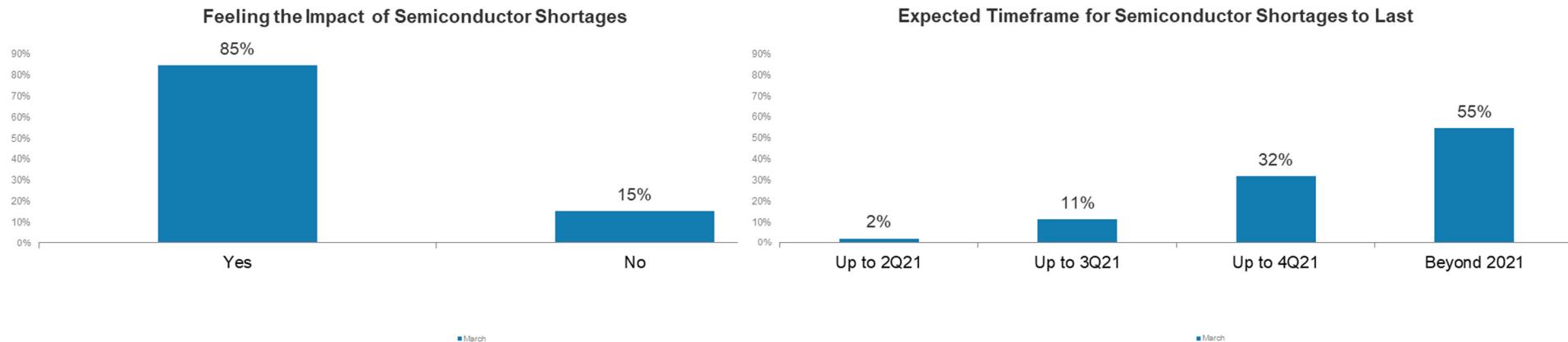
Lightning round; Other key names

- QCOM
- TER
- AMBA
- NVDA/AMD/MRVL

Where are we in the Semiconductor cycle? – Supply

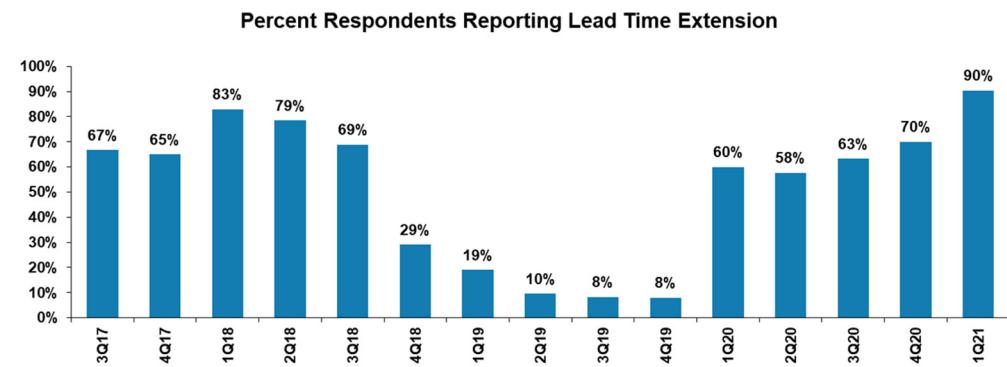
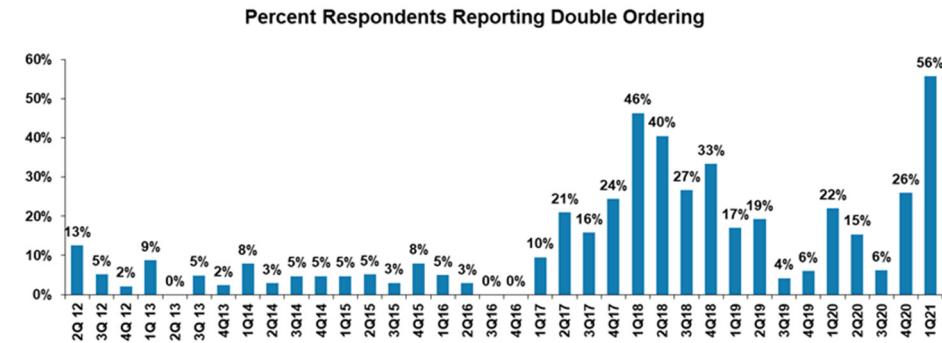
The impact of component shortages are being felt throughout the supply chain

- Component shortages arising from strong demand and limited supply coming out of Covid are having an outsized impact on the market currently
- While past instances of shortages tended to be isolated to a small number of components, this shortage is more broad-based across product categories and end markets
- The shortages have had an outsized influence on supply chain behavior, leading to a significant increase in traditional cyclical indicators such as double ordering, lead times, expedite orders, and inventory build



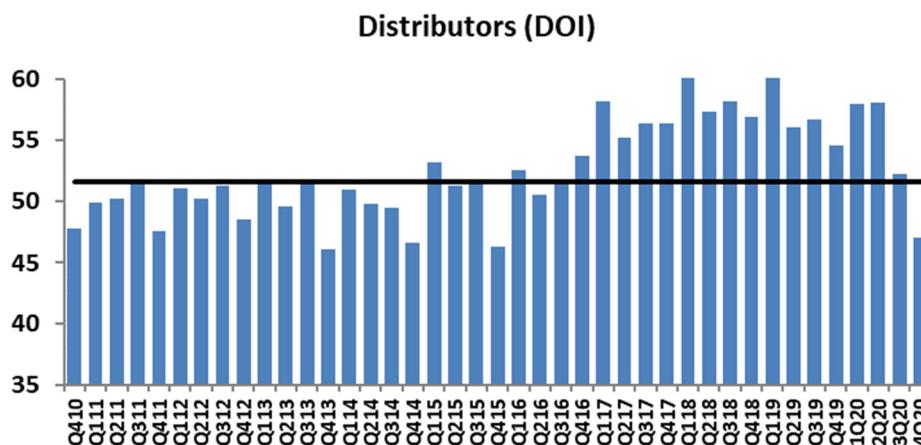
Supply constraints are impacting customer order patterns leading to increased double ordering and elevated lead times

- Lead times and double ordering both increased sequentially and are at or near record levels
- *“Due to product constraints and increasing lead times, customers are placing orders with multiple distributors in order to have the best chance to get product. This is happening across the board.”*
- *“Due to lead times, customer are making speculative buys and buying in advance of demand windows.”*



Supply chain inventory is around long term levels

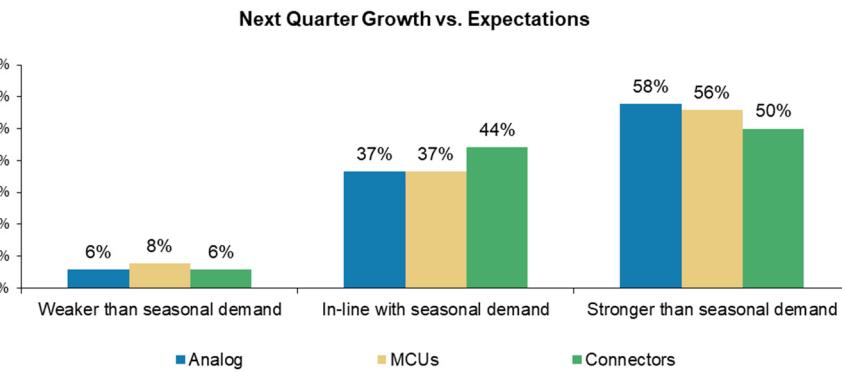
- While overall supply chain inventory is slightly above the long term median, it is down significantly from the recent peak
 - Total supply chain inventory declined 16 days in Q4'20 and is now 42 days below the peak in Q2'20
- Distributor inventory is sitting at or near record lows



Where are we in the Semiconductor cycle? – Demand

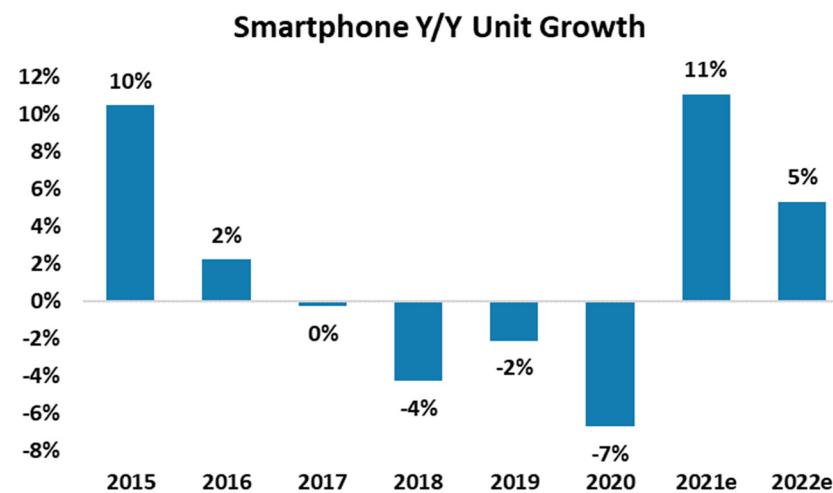
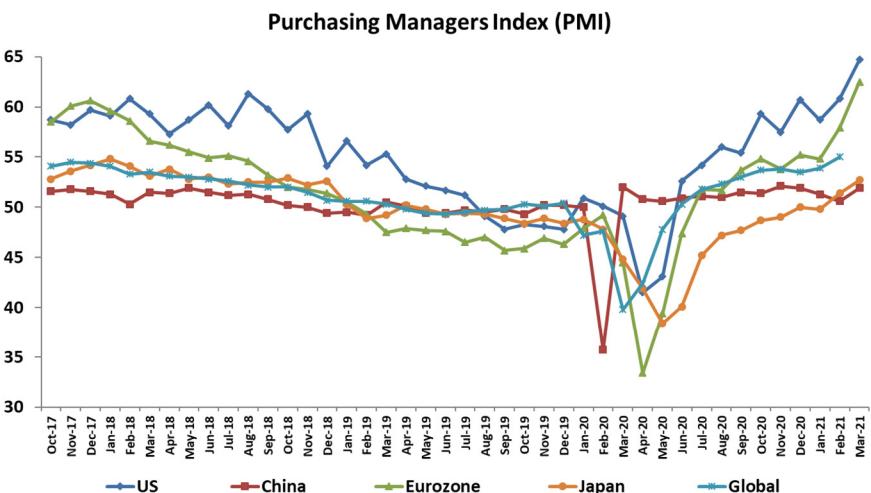
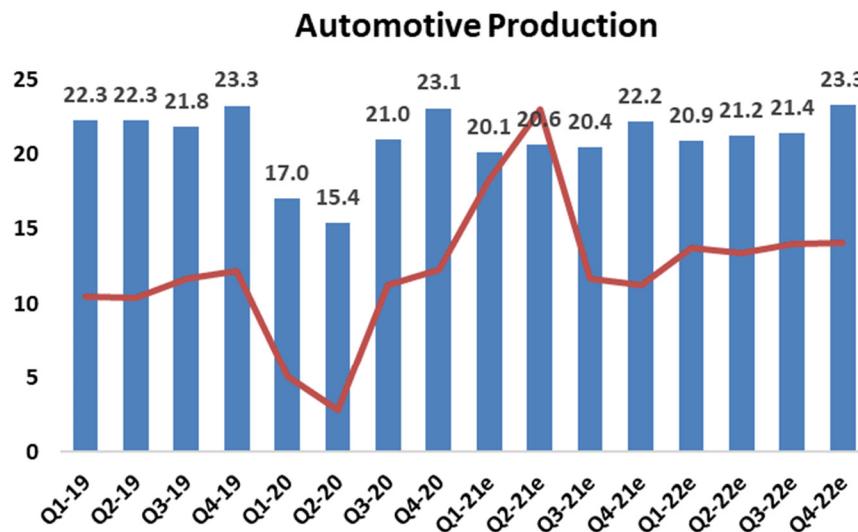
Growth expectations are strong across all product categories and end markets

- Expectations for stronger than seasonal growth in March are at record levels
- The outlook for 1Q was strong across the board - Industrial, PLDs, Communications, and Automotive all saw meaningful improvements
- The majority of respondents expect stronger than seasonal growth to continue into 2Q



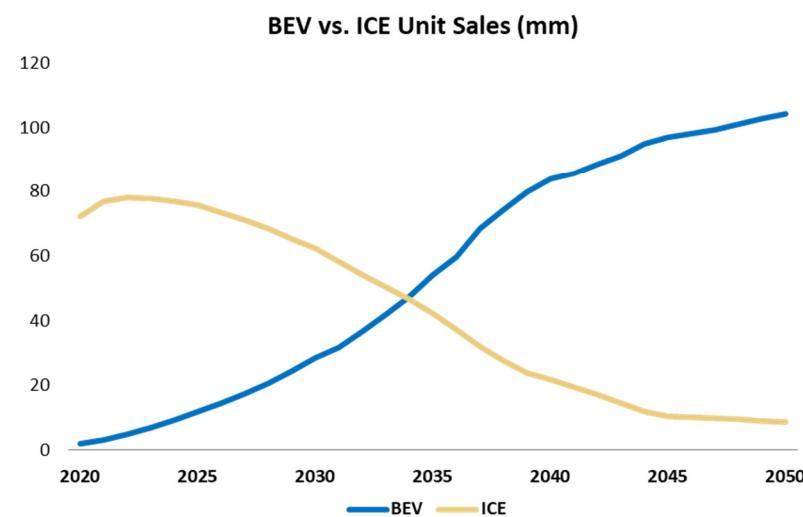
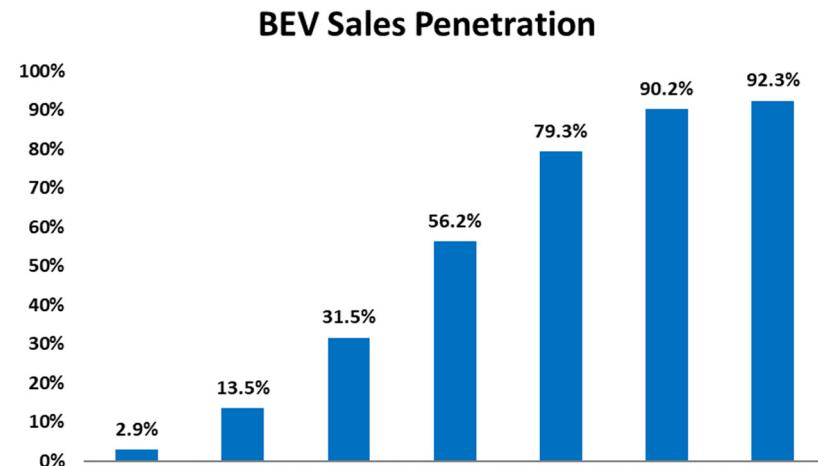
Source: Morgan Stanley Research, AlphaWise

The demand strength is broad-based across end markets



The Rise Of Electric Vehicles And The End Of The ICE Age

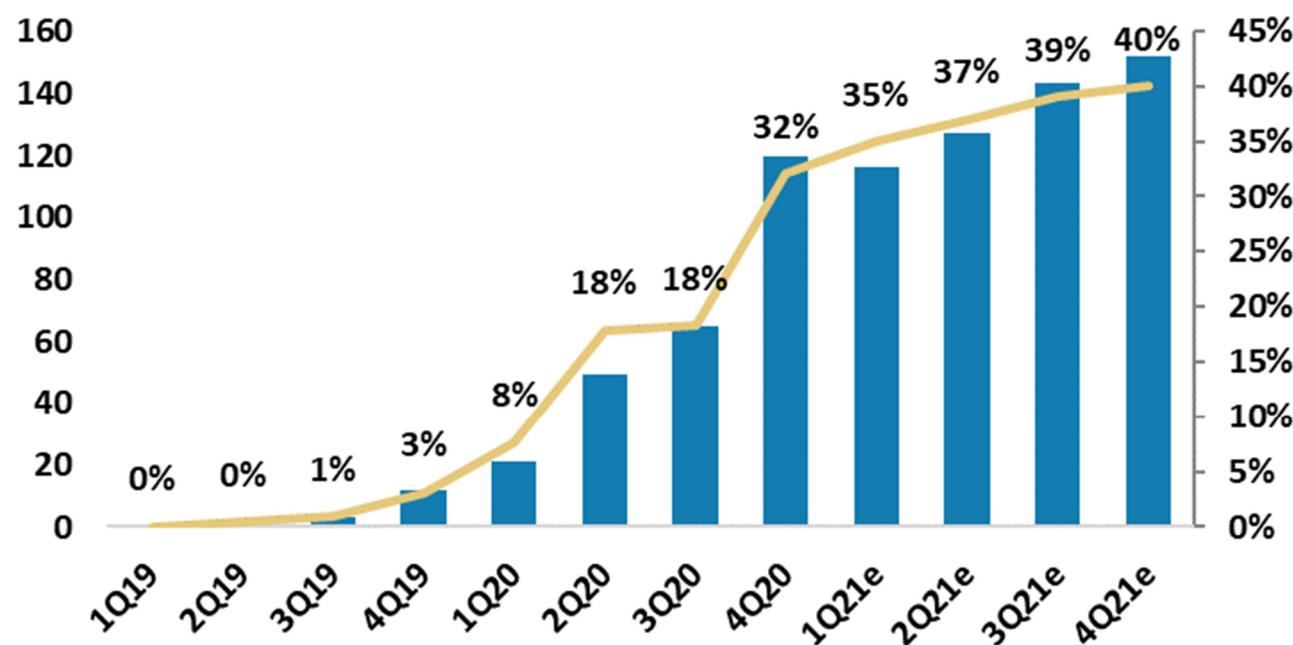
- EVs are inflecting and could reach over 30% of cars sold by 2030
- The "Tesla Effect" has forced Legacy OEMs to radically adjust their product roadmaps, shifting focus and resources to EV Production
- There have been a number of notable announcements from governments around the world that are designed to accelerate EV production and consumption
 - Green Recovery Plan in Europe
 - Ridesharing companies Uber and Lyft both detailed plans to accelerate EV adoption



Increasing 5G penetration is helping to drive a strong rebound in smartphone growth

- 5G unit penetration exceeded initial expectations and MS forecasts penetration to reach 40% by 4Q21, up from 32% in 4Q20 and 3% in 4Q19
- QCOM and QRVO are our top picks in 5G semis, though 5G adoption is also an important catalyst for OW-rated AVGO and EW-rated SWKS

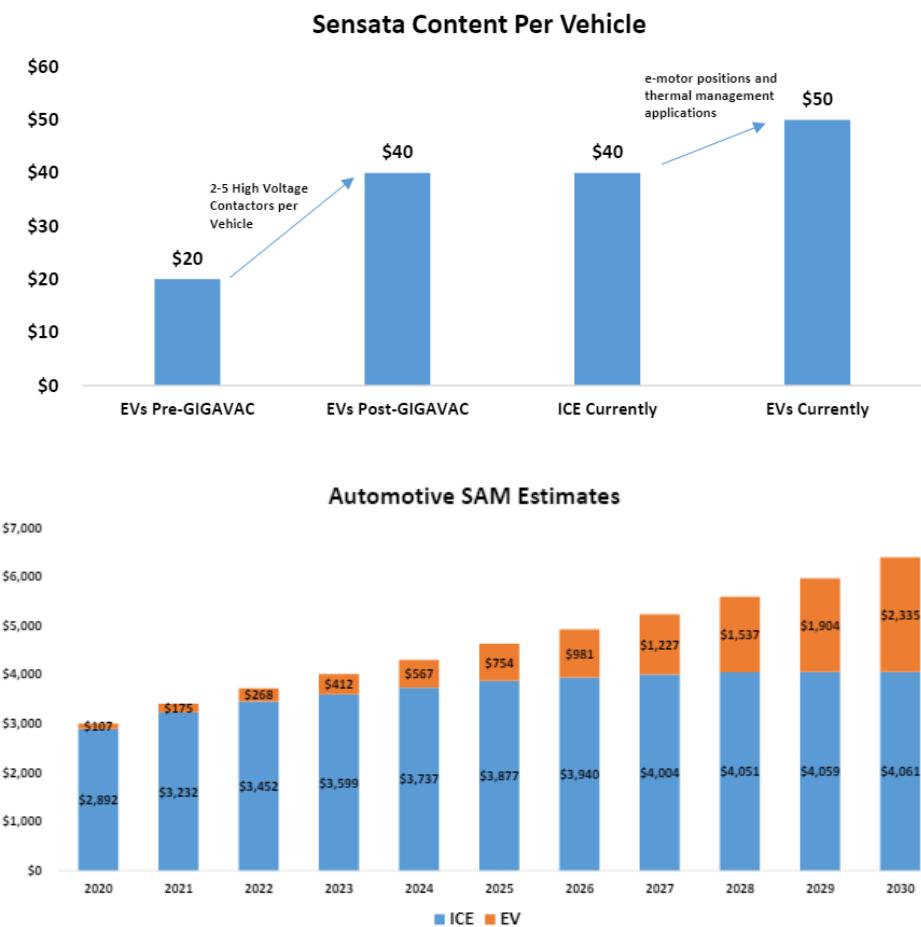
5G Units and Penetration



ST: Expect outperformance driven by increased \$ content growth in EVs

Sensata Technologies (ST, Overweight, \$72 PT)

- ST is our top pick among the broad-based suppliers in 2021
- We expect Sensata's SAM to increase significantly in the coming years, driven by increasing \$ content and the shift to EVs
 - The inflection in EV sales is a meaningful tailwind to growth for Sensata on the back of 20-25% higher \$ content
- Sensata has strengthened its balance sheet, paving the way for tuck-in acquisitions like the accretive Xirgo deal
- ST offers the most compelling valuation in our coverage, where we see a catch up to the substantial multiple expansion seen at peers and the broader market in recent years



MCHP: Multiple poised to re-rate on improved margins and a capital allocation pivot to cash returns

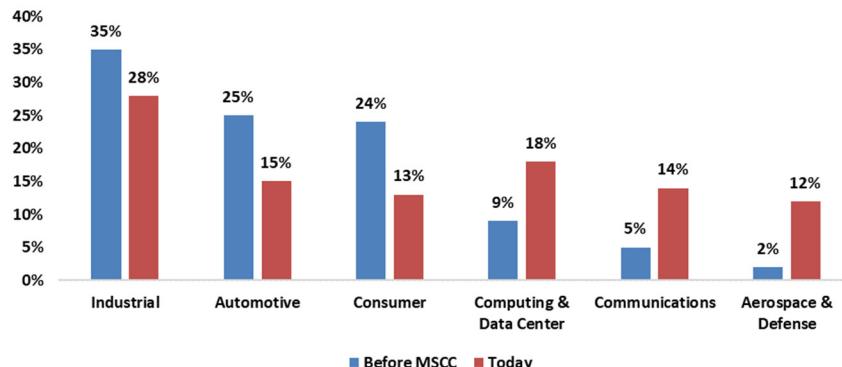
Microchip Technology (MCHP, Overweight, \$165 PT)

- Aggressive debt reduction paves the way for an uptick in cash returns:
 - Microchip increased its dividend by 6% last quarter and we expect a similar quarterly increase going forward
 - Buybacks should be next
- Microchip's low levels of channel inventory should provide a material tailwind as customers restock and we see growth accelerating through the year
- The company is executing well on its total systems solutions (TSS) strategy, with cross selling an important catalyst for stronger growth going forward

Quarterly Debt Paydown



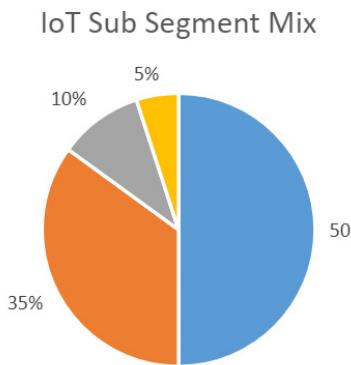
End Market Exposure



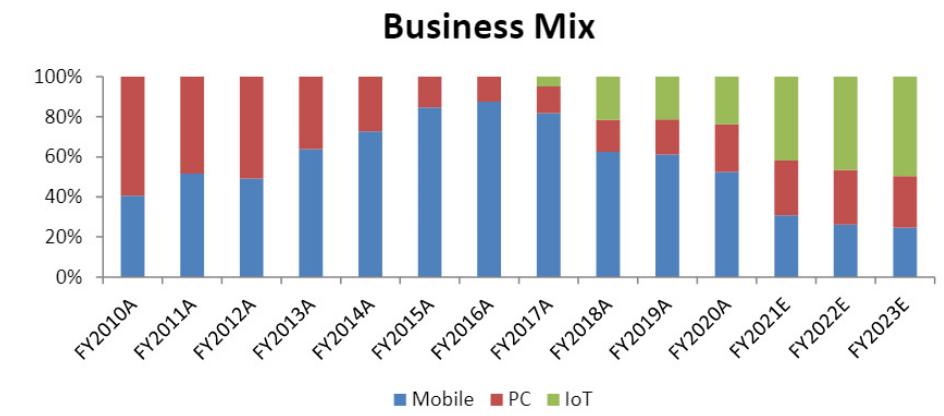
SYNA: Overweight on the most compelling business transformation in our coverage

Synaptics (SYNA, Overweight, \$173 PT)

- The stock trades at a 50% discount to the SOX on EV/S, which should narrow as GM expands
- New management has driven a meaningful shift in strategy and improvement in execution leading to improving business mix and higher gross margins, including acquisitions of Broadcom's Connectivity IP and DisplayLink
- Key Growth Drivers include: Connectivity, Edge SoC, automotive touch and high speed video interface



■ Edge SoC ■ High-Speed Video Interface ■ Connectivity ■ Automotive

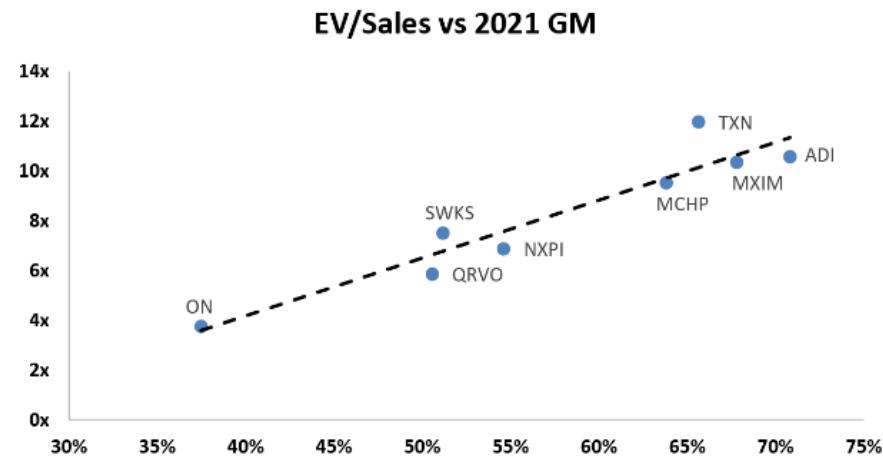
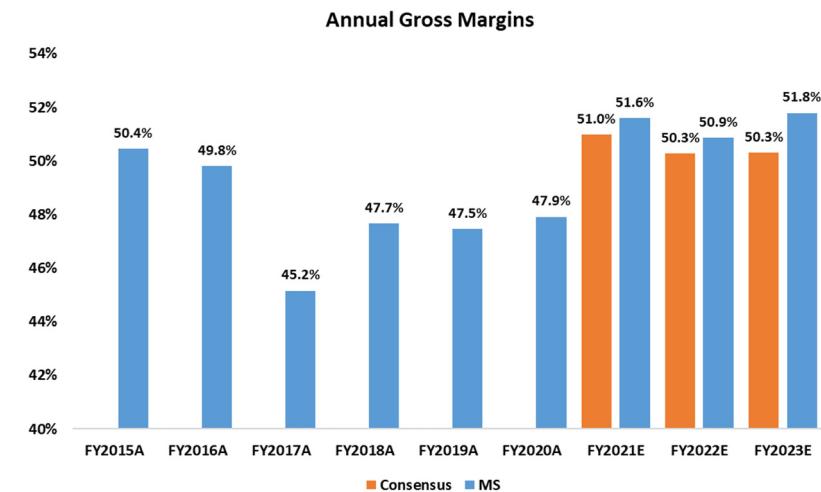


Source: Morgan Stanley Research, Company Data

QRVO: Overweight on 5G catalyst, IDP strength and improving execution

Qorvo (QRVO, Overweight, \$210 PT)

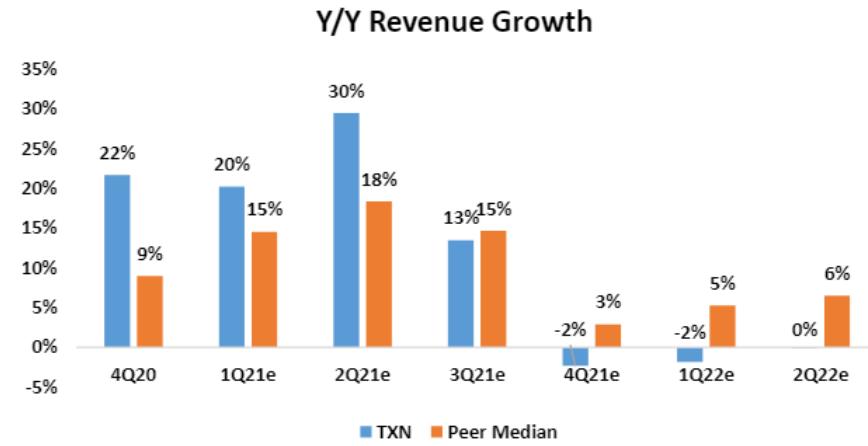
- We are Overweight QRVO due to a cyclical recovery in smartphones and higher \$ content in 5G...
 - We see smartphone units rebounding 11% in 2021 and 5G adds over \$5 in incremental RF content, or over 30%
 - Infrastructure and defense products (IDP) should reaccelerate in 2H
- ...And think the Street is under-modeling GM, with upside potential due to improving mix, manufacturing cost reductions and firmer pricing
- Rising FCF provides optionality around M&A and stock buybacks
- As Qorvo continues to execute, the stock's discount relative to peers should close



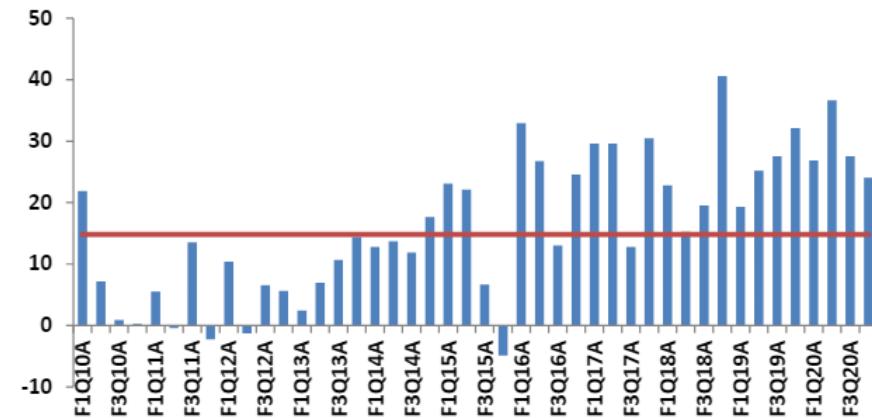
TXN: Underweight and expect growth to lag peers in 2H

Texas Instruments (TXN, Underweight, \$176 PT)

- We expect TXN to remain a core holding in the group, but do see the stock underperforming as its growth begins to decelerate
- TI's decision to run at higher utilization and inventory levels has helped drive stronger revenue growth than peers in recent quarters
 - TI has not been as constrained on manufacturing
 - We believe their outperformance is in part the result of inventory build and demand pull-ins which could reverse in 2H, especially in autos and personal electronics
- The company has consistently returned 100% of free cash flow to shareholders, which already appears reflected in the stock's multiple and compares to peers who are earlier in their pivot to cash returns



TXN DOI Differential vs Peers



April 2021

Technology, Media & Telecom Spring Training Teach-In

US IT Services Enabling Digital Transformation

MORGAN STANLEY RESEARCH
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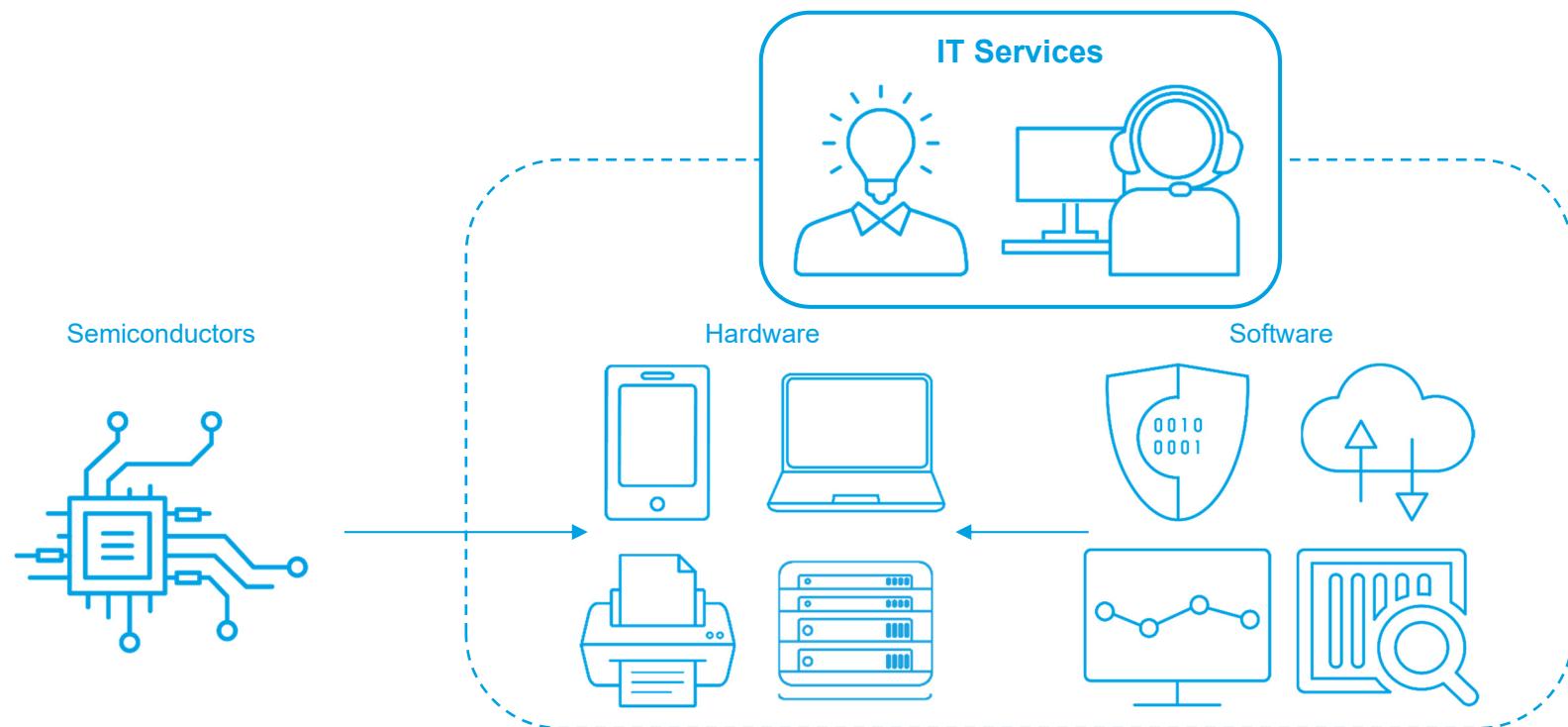
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For analyst certification and other important disclosures, refer to the Disclosure Section, located at the end of this report.

Disclosures in this report are as of April 26, 2021; stock recommendations and stock prices as of April 26, 2021, unless otherwise noted.

IT Services address business problems for enterprises

- Providers help enterprises **address friction or problems in a business** using people-based strategic or process-driven solutions
- Serve as **enablers of digital transformation** as they help **plan, implement, and manage** digital transformation projects and cloud adoption
- Seen as **platform-agnostic** digital transformation plays given broad exposure to implementation of hardware / software and development work



Coverage includes diversified consultancies, digital-focused services, and contact center / outsourcing

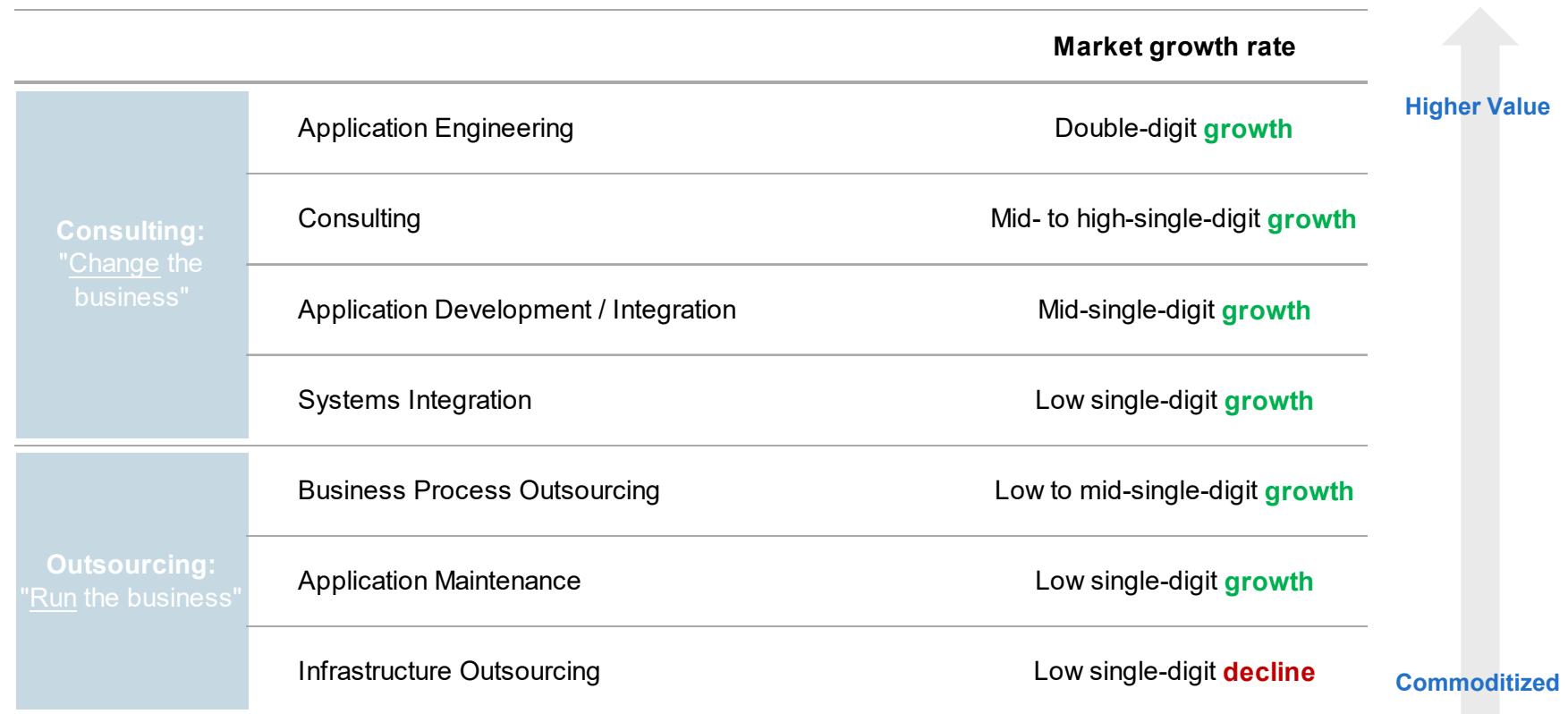
| | Diversified IT Services | | Digital Pure-play | | Contact Center / BPO | | |
|----------------------------|-------------------------|------------|-------------------|--------------|----------------------|--------------|--------------|
| Ticker | ACN | CTSH | DXC | DAVA | EPAM | TTEC | TIXT |
| Rating | Overweight | Overweight | Equal-weight | Equal-weight | Overweight | Equal-weight | Equal-weight |
| Price Target | \$305 | \$95 | \$31 | \$93 | \$450 | \$87 | \$31 |
| Monitor read-throughs from | | | | | | | |



Source: Morgan Stanley Research

Note: GLOB is covered by Morgan Stanley analyst Cesar Medina; INFY and TCS are not covered by Morgan Stanley Research

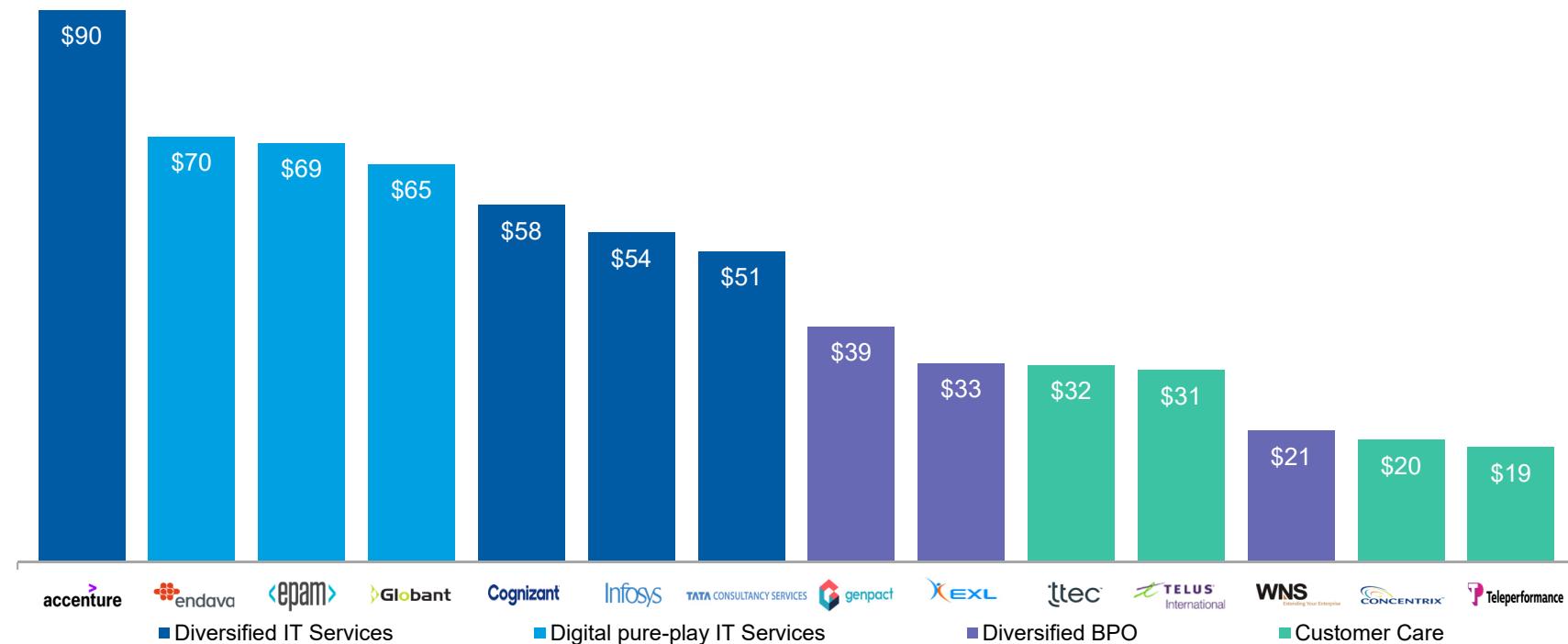
Services help “change” and “run” businesses



Source: Morgan Stanley Research

Value of services reflected in revenue per head metric...

Revenue per head (\$'000)

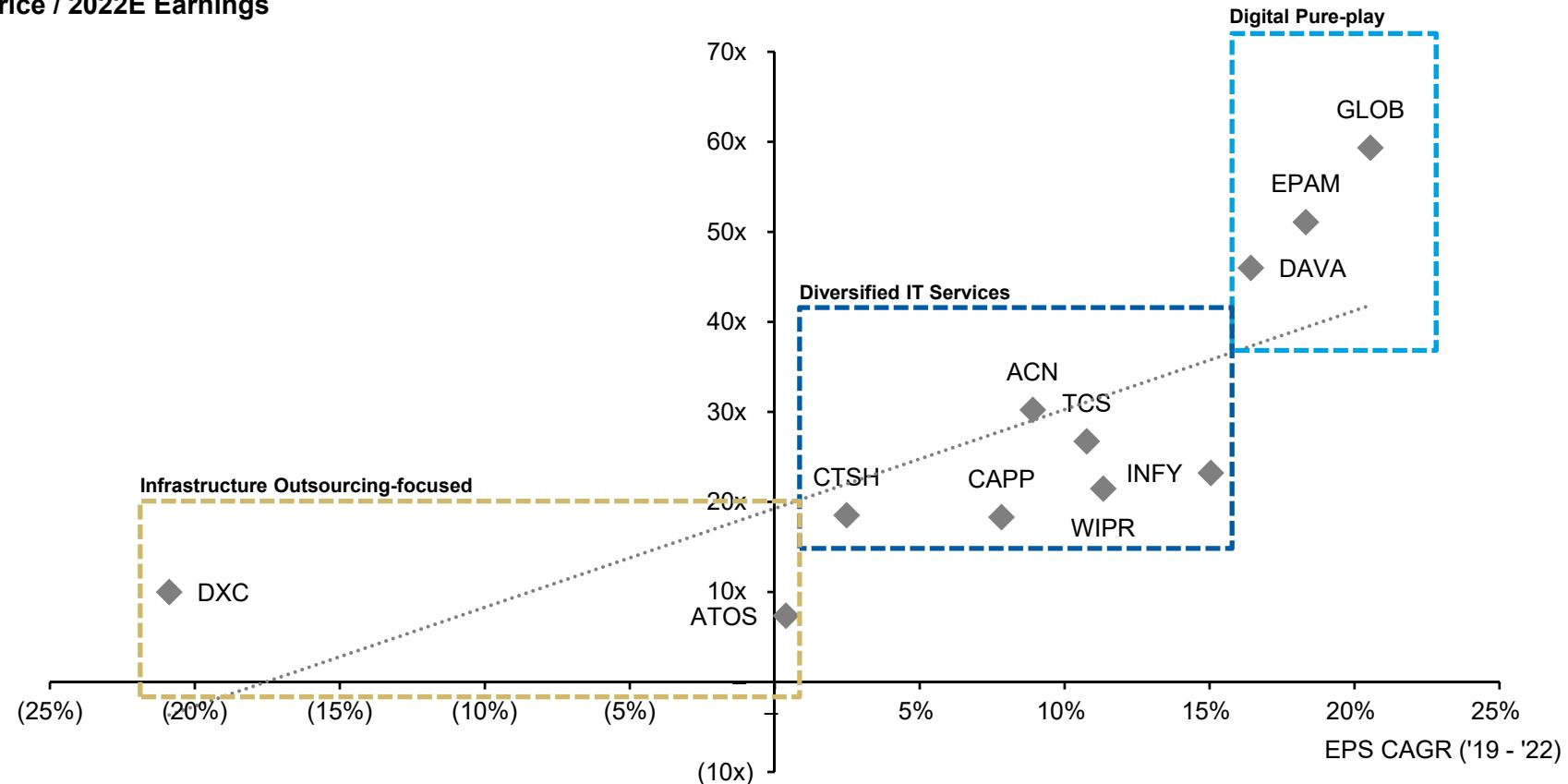


Source: Company data, Morgan Stanley Research

Note: Calculated as CY19 revenue divided by average total headcount between CY18 and CY19; TIXT revenue pro forma for CCC and Lionbridge AI acquisitions; GLOB is covered by Morgan Stanley analyst Cesar Medina; TEPRF is covered by Morgan Stanley analyst Edward Stanley; CNXC, EXL, G, INFY, TCS and WNS are not covered by Morgan Stanley Research

...and also reflected in valuation

Price / 2022E Earnings



Source: Thomson Reuters (as of April 26, 2021), Morgan Stanley Research

Note: ATOS and CAPP are covered by Morgan Stanley analyst Adam Wood; GLOB is covered by Morgan Stanley analyst Cesar Medina; INFY, TCS, and WIPR are not covered

Demand is driven by a need for Digital Transformation

Large enterprises slower to innovate

- Need help adapting to new threats
- New businesses now built on mobile and cloud platforms
- Want to know how to defend against new disruptive businesses
- Leverage **digital, cloud, analytics, and social** channels more efficiently to customize offerings for end users

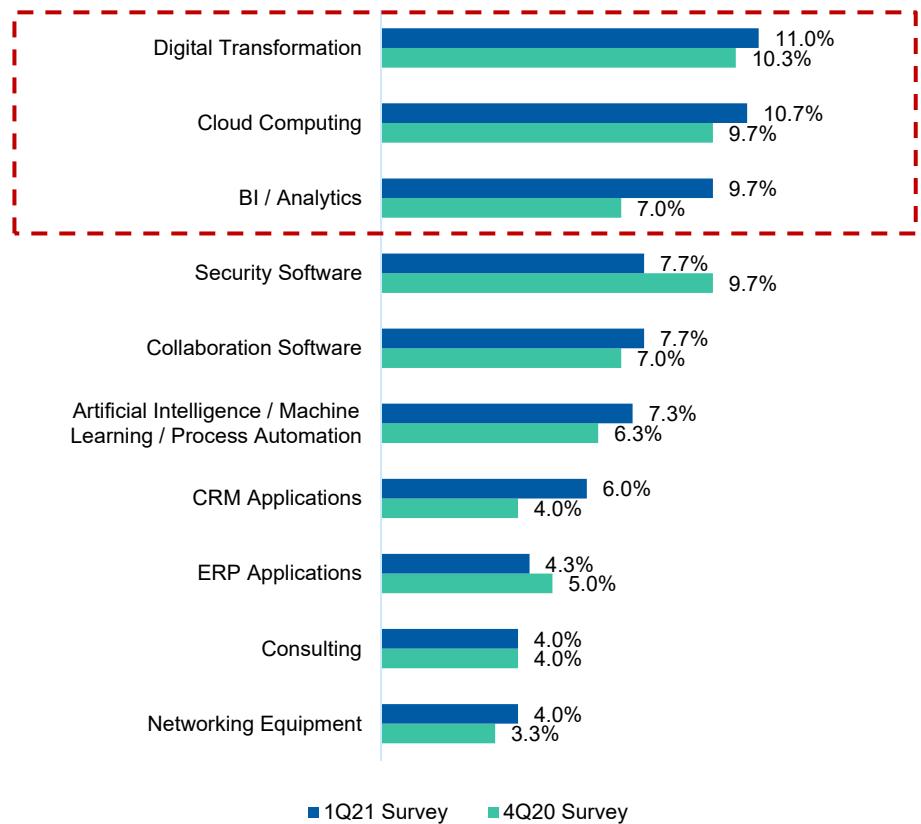
ACN

"We continued to see compressed transformation, where companies have to simultaneously transform multiple parts of their enterprise and reskill their people in what previously would have been sequential programs... COVID has hit a giant fast-forward button to the future, and we believe the demand to innovate at unprecedented speed and scale with rapid adoption of cloud, AI and other disruptive technologies is accelerating."

– CEO Julie Sweet, March 2021

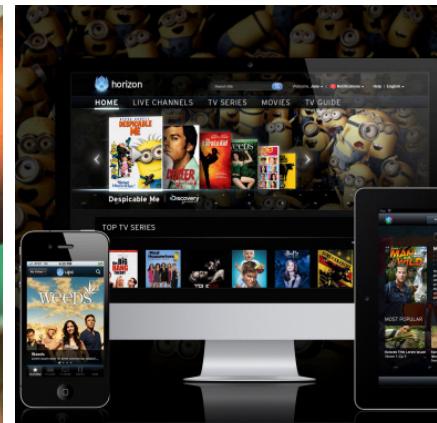
Source: Company data

Projects with largest spend increase in 2021 (% of responses)



Source: AlphaWise; Morgan Stanley Research; n = 100 (US and EU data)

IT Services companies enable Digital Transformation



AVIANCA

ACCENTURE

- Avianca worked with Accenture to create its Facebook chatbot, Carla, utilizing artificial intelligence
- Carla provides customer service through check-in, itinerary check-in, flight status updates, among other functions

CARLSBERG

ACCENTURE

- Carlsberg partnered with Accenture as part of the brewery's digital transformation initiative
- Implemented digital connectivity across supply chain to help drive improved customer interaction

DISNEY

GLOBANT

- Disney partnered with Globant to create Disney Parks' Magic Bands
- Magic Bands operate as digital wallets and park passes
- Provides Disney with information about visitor behavior and preferences

LIBERTY MEDIA

EPAM

- Liberty Media partnered with EPAM to create a cross-platform UI, develop a platform for contextual content recommendations, identify upsell opportunities, and integrate with Facebook to socialize media viewing

Source: Company data

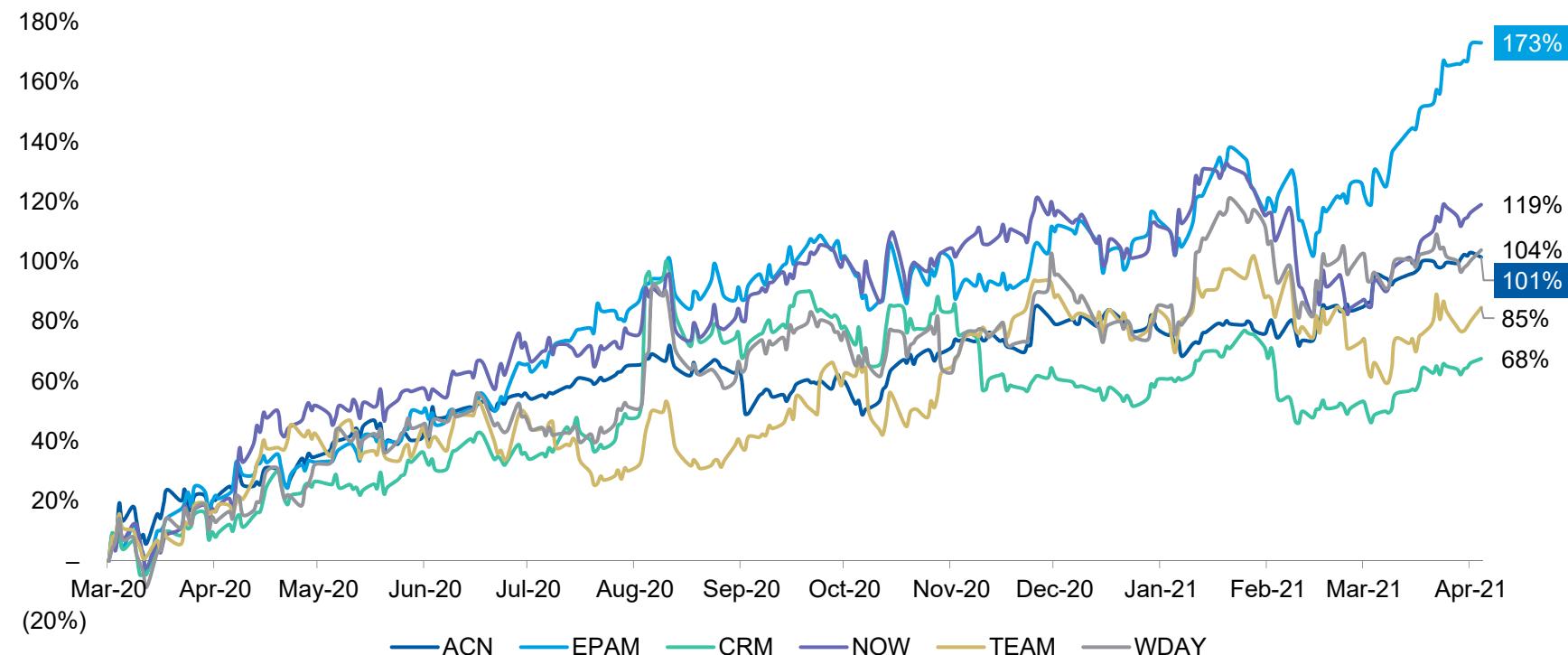
Note: GLOB is covered by Morgan Stanley analyst Cesar Medina

April 2021

Technology, Media & Telecom Spring Training Teach-In

IT Services is a platform-agnostic way to gain exposure to secular Digital Transformation tailwinds

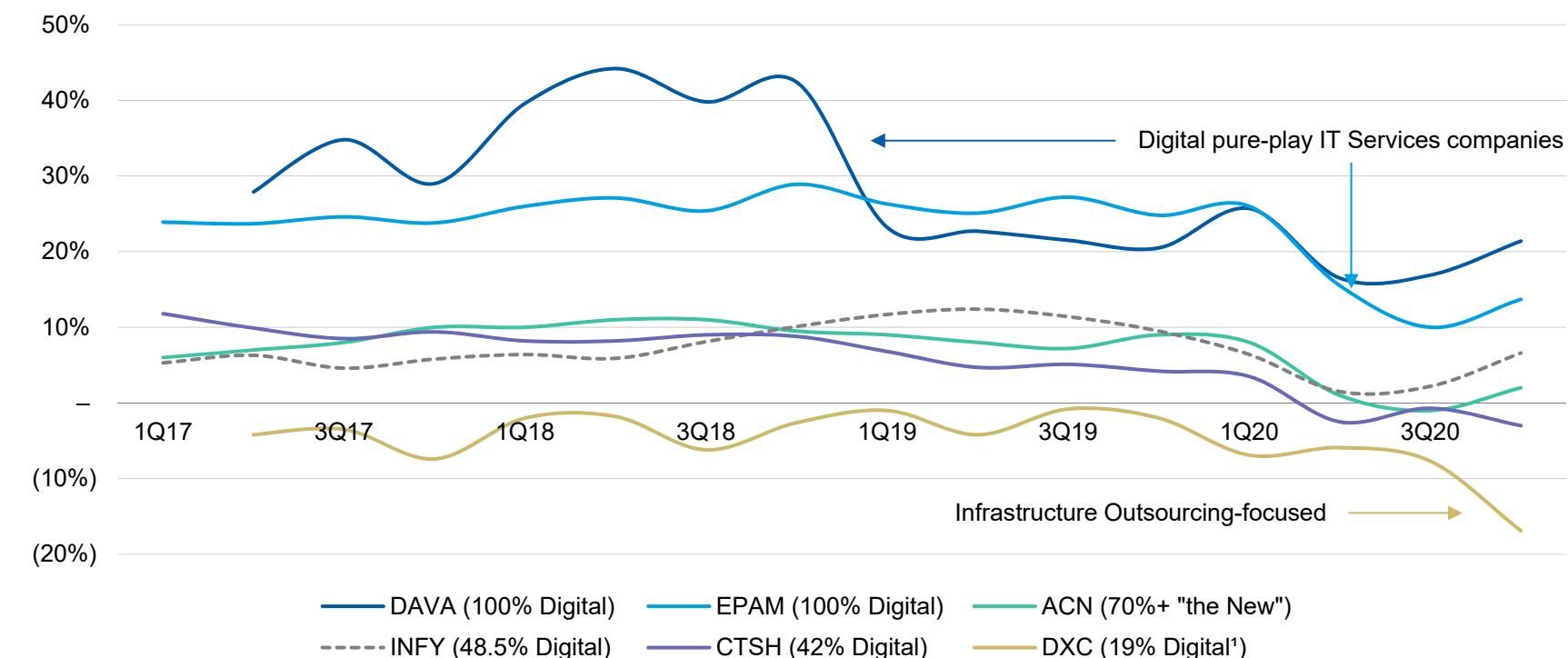
ACN & EPAM: Performance vs. software peers since pandemic trough



Source: Company data, Thomson Reuters (as of April 26, 2021), Morgan Stanley Research
 Note: CRM, NOW, TEAM, and WDAY are covered by Morgan Stanley analyst Keith Weiss

Greater exposure to “digital” revenue typically underpins faster revenue growth

Constant currency revenue growth (y/y)



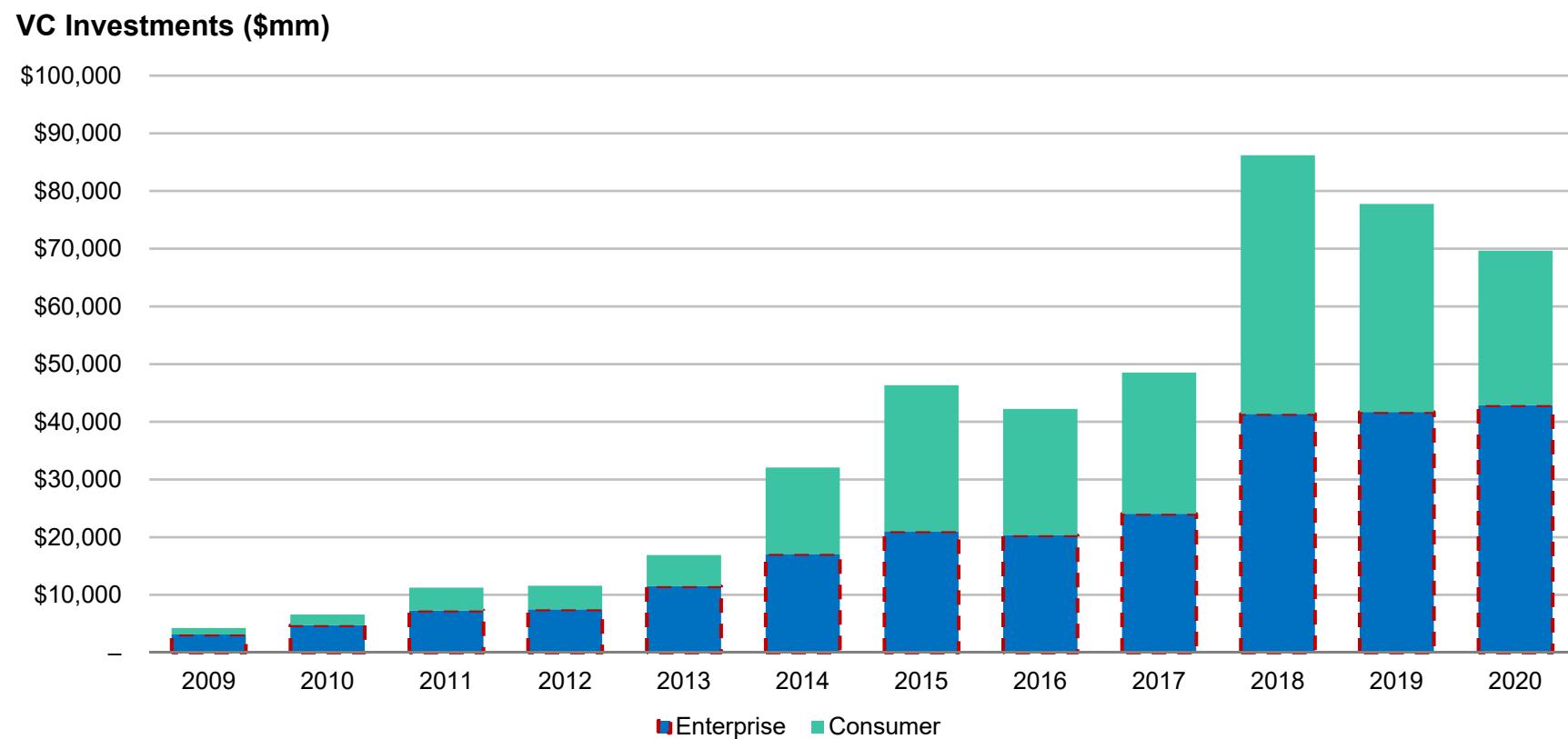
Source: Company data; Morgan Stanley Research

Note: Data on calendar quarter basis; digital exposure as of most recent quarter; ACN no longer reports “the New,” therefore disclosure is as of last reported figure (September 2020); INFY not covered by Morgan Stanley Research

¹ DXC exposure includes “Data, Analytics, and Engineering Services” and “Cloud / Security Services” as of C3Q19 (F2Q20) earnings

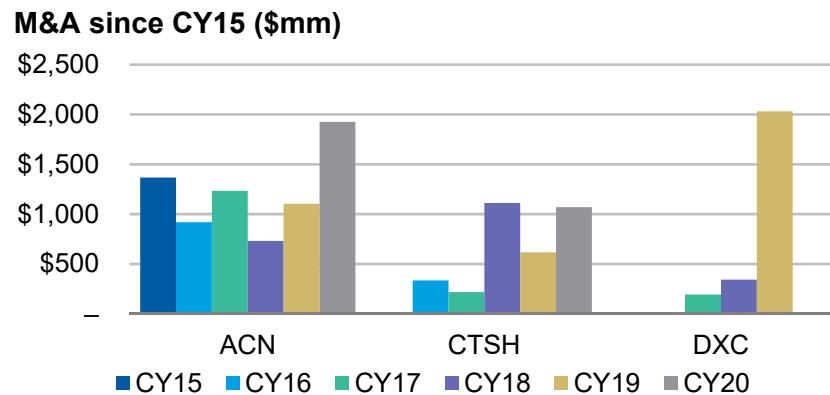
Enterprise-focused VC investment may drive services offerings longer term as innovation continues

As VC-backed companies grow and mature, we believe they will inevitably turn to IT Services companies for help with integration and deployment



Source: PitchBook, Morgan Stanley Research

Favor vendors with strong M&A, as it provides optionality



Source: Company data, Morgan Stanley Research

Select recent IT Services acquisitions

| Date Announced | Acquirer | Target | Category |
|----------------|-----------|-------------------------|--------------------------|
| 3/15/2018 | EPAM | Continuum | Consulting / Design |
| 10/4/2018 | Cognizant | Softvision, LLC | Digital Engineering |
| 1/7/2019 | DXC | Luxoft | Digital Engineering |
| 4/3/2019 | Accenture | Droga5 | Marketing / Advertising |
| 2/3/2020 | Cognizant | Code Zero | Salesforce Practice |
| 2/5/2020 | Cognizant | EI Technologies | Salesforce Practice |
| 5/5/2020 | Cognizant | Collaborative Solutions | Workday Practice |
| 7/28/2020 | Cognizant | New Signature | Microsoft Business Group |
| 8/25/2020 | Cognizant | Tin Roof Software | Digital Engineering |
| 9/2/2020 | EPAM | Ricston | Salesforce Practice |
| 10/22/2020 | Cognizant | Bright Wolf | Internet of Things |
| 2/2/2021 | Accenture | Future State | Talent & Organization |
| 2/15/2021 | Accenture | Edenhouse | SAP Business Group |
| 3/1/2021 | Accenture | Pollux | Industry X0 |
| 3/1/2021 | Accenture | Cirrus | Talent & Organization |
| 3/2/2021 | EPAM | PolSource | Salesforce Practice |
| 3/10/2021 | Accenture | fable+ | Talent & Organization |
| 4/1/2021 | Endava | Lewel LLC | Geographic expansion |
| 4/23/2021 | Accenture | Root Inc. | Talent & Organization |

Source: Company data, Morgan Stanley Research

Recent acquisitions point to a shift in focus for IT Services vendors

Implementation:

- Services companies have made multiple acquisitions to expand practices related to major software platforms

Consulting:

- Accenture has recently acquired several human capital consulting organizations to assist with workforce transformation
- EPAM acquired Continuum to broaden capabilities into consulting and physical engineering

Interactive:

- Accenture and Cognizant have both expanded capabilities in **digital advertising** (known as each company's Interactive segment), disrupting the likes of traditional advertisers

Engineering:

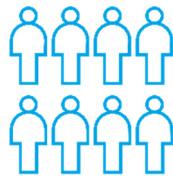
- Cognizant and DXC both acquired Eastern European Digital pure-play companies, specifically focused on digital engineering

Fundamentally, revenue is influenced by three factors



Pricing:

- Discussed qualitatively by companies
- Digital services command a **premium**, while commoditized services face **pricing pressure**



Headcount growth:

- IT Services is a people-based business
- People are needed to deliver project work
- Headcount growth and revenue growth linearity is common



Utilization:

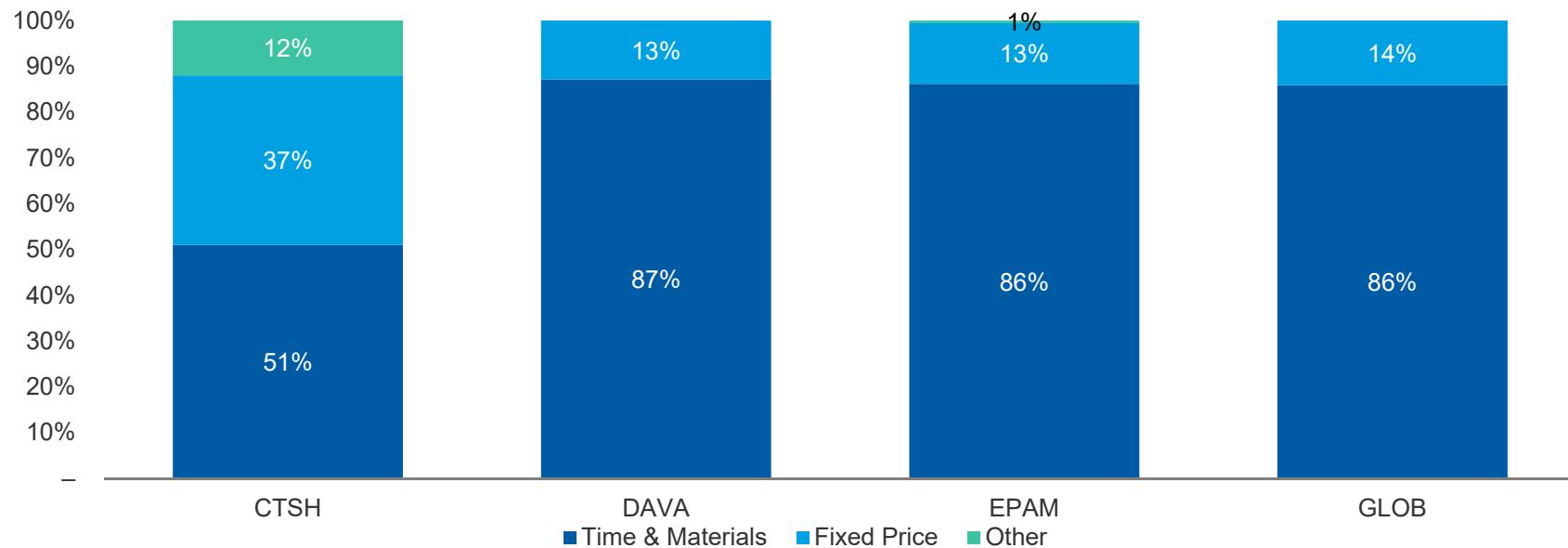
- Measure of employee productivity
- Companies measure utilization differently and therefore metrics are not directly comparable

Pricing x Headcount x Utilization = Revenue

Contract structure and pricing: time and materials (T&M) or fixed-price

- **Time & materials** contracts limit commercial risks and are more conducive to agile development / digital transformation projects
- **Fixed price** contracts force providers to appropriately manage pyramid / project costs, and may be negatively impacted by scope creep
- Diversified IT Services companies have historically priced commoditized work as fixed price in order to expand margins
- **Digital IT Services command premium pricing**, while **commoditized services see pricing pressure**

Contract types (% of revenue)

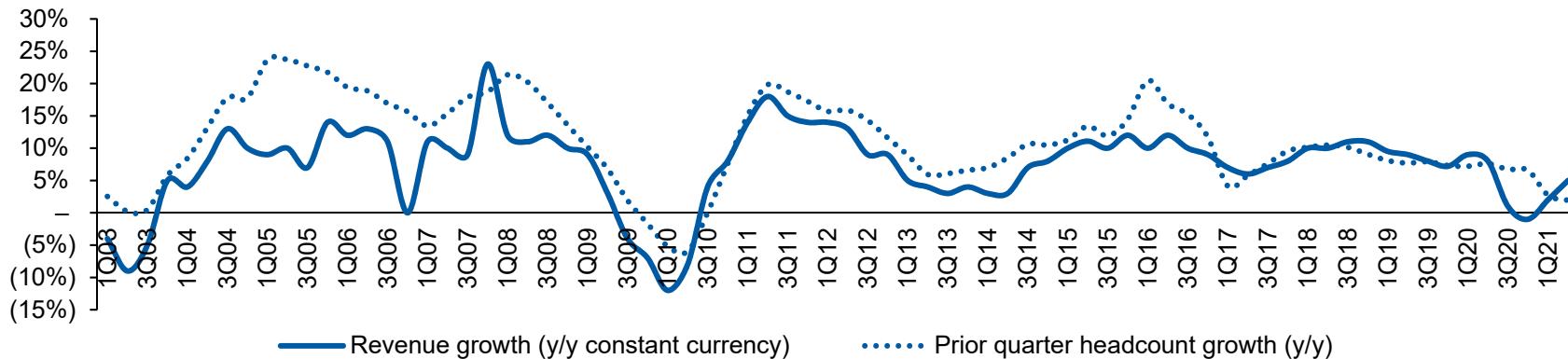


Source: Company data, Morgan Stanley Research

Note: CTSH mix as of 4Q20; EPAM and GLOB mix as of CY20; DAVA mix as of FY20 (ending June 2020); GLOB is covered by Morgan Stanley analyst Cesar Medina

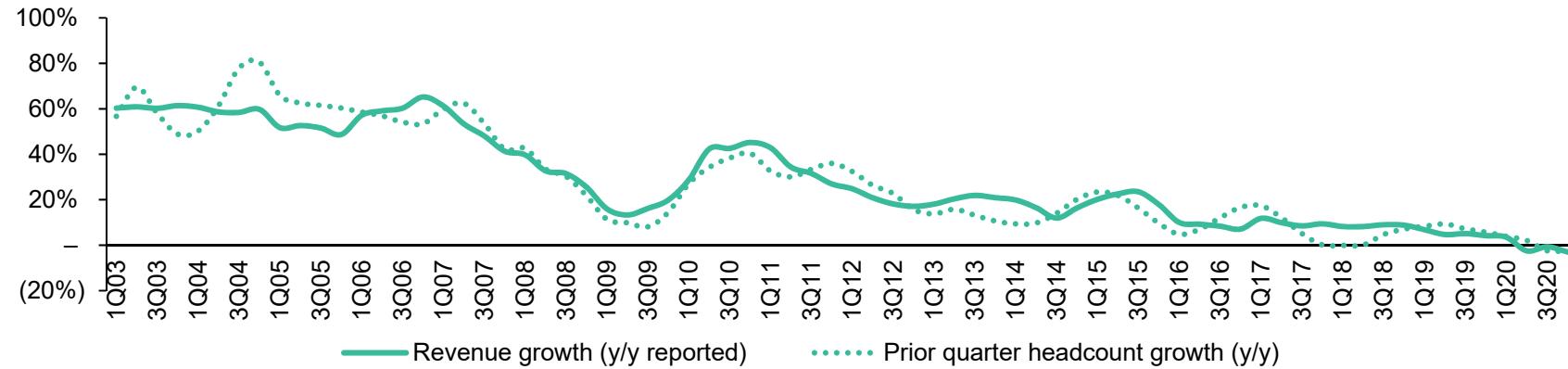
T&M pricing drives headcount-revenue linearity

ACN: Revenue growth vs. headcount growth



Source: Company data; Morgan Stanley Research

CTSH: Revenue growth vs. headcount growth



Source: Company data, Morgan Stanley Research

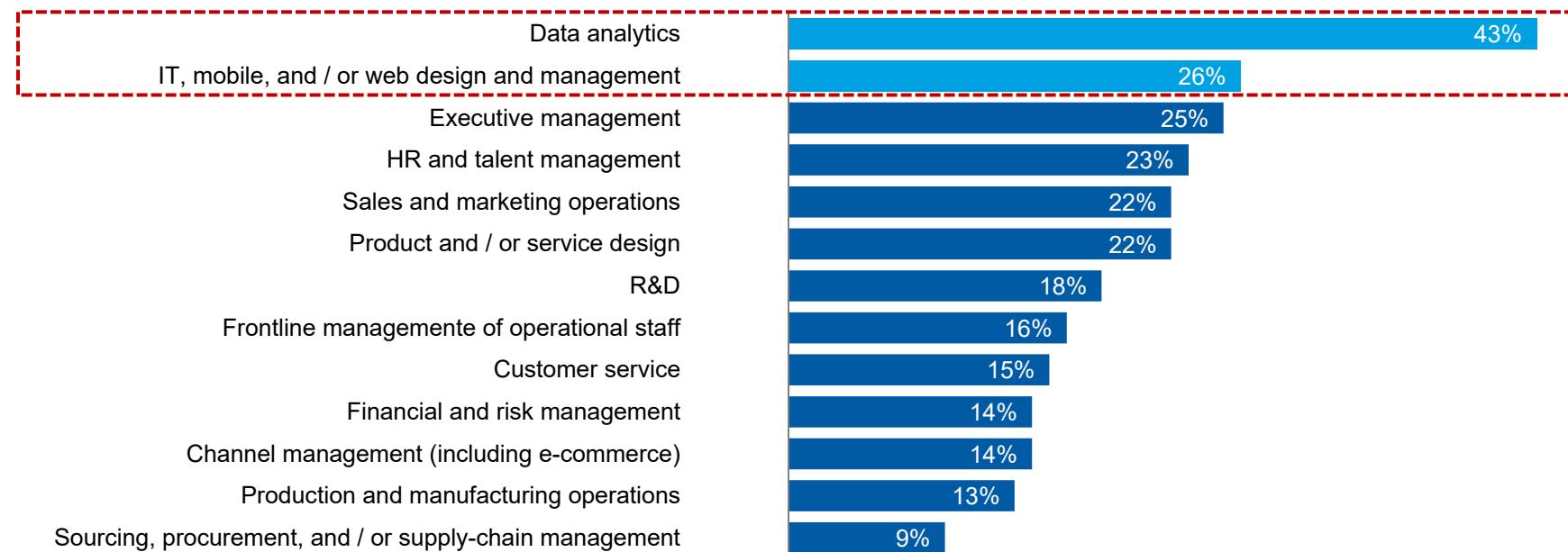
Note: Constant currency revenue growth beginning 1Q17; CTSH has only reported constant currency revenue growth since 1Q17

Meaningful talent gap impacts supply of headcount...

As technology and innovation evolve, companies face **skill shortages**, particularly in higher growth areas such as analytics and engineering

CTSH CEO Brian Humphries (February 2021): “The whole industry is going through a *massive demand-supply imbalance*... Even when I talk to clients, some of those clients, by the way, have in-sourced roles over the years, they too are struggling with this... It's broad-based. It's across the hyperscaler capabilities, some SaaS players like Salesforce, digital engineering, full-stack engineers across the entire engineering landscape from Angular, Java, .NET and of course, in the hot areas of the market around data, analytics, AI, ML, etc.”

Business areas with greatest need to address potential skill gaps (% of respondents)

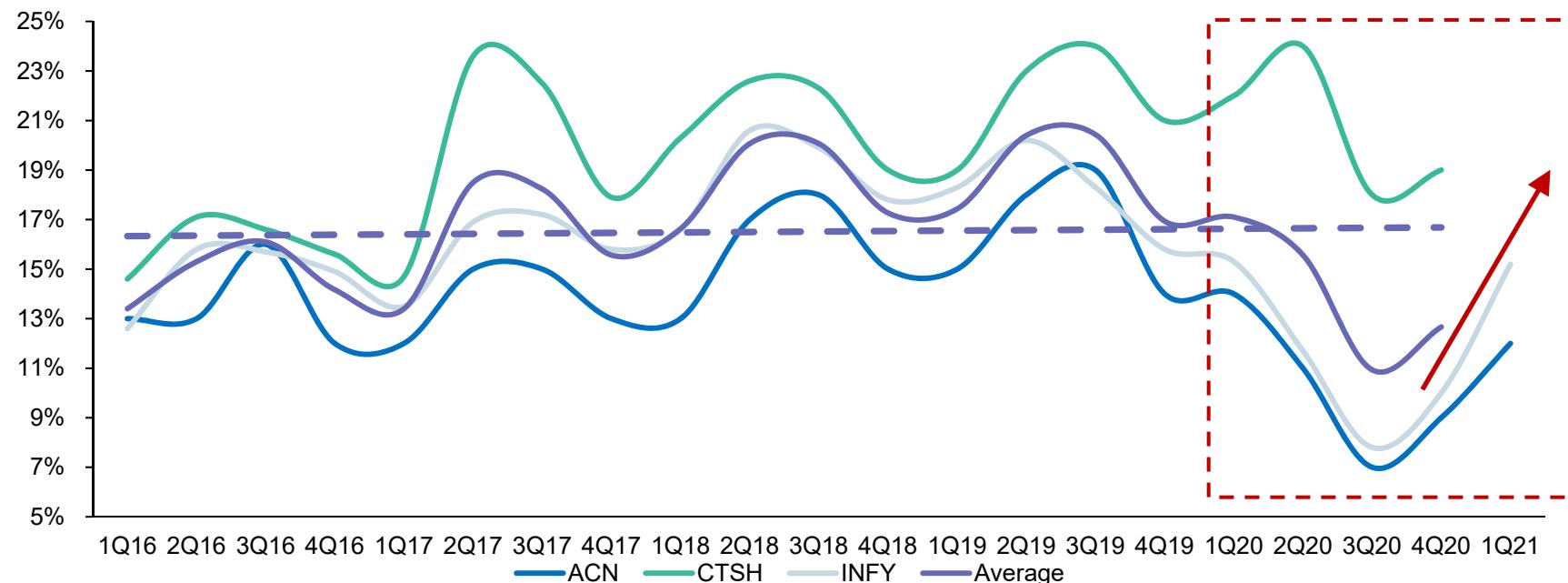


Source: Company data; McKinsey & Company (“Beyond hiring: How companies are reskilling to address talent gaps,” n=1,145; February 2020)

...Which is exacerbated by worsening attrition as we enter a recovery phase

- Pandemic periods saw low levels of attrition given soft demand at the onset of the pandemic and uncertainty around job security (driven by early demand uncertainty)
- Attrition is likely to **worsen** after several quarters of low attrition as: 1) demand recovers; 2) competition for talent increases; and 3) pandemic-related uncertainty subsides

Historical attrition levels (%)



Source: Company data, Morgan Stanley Research

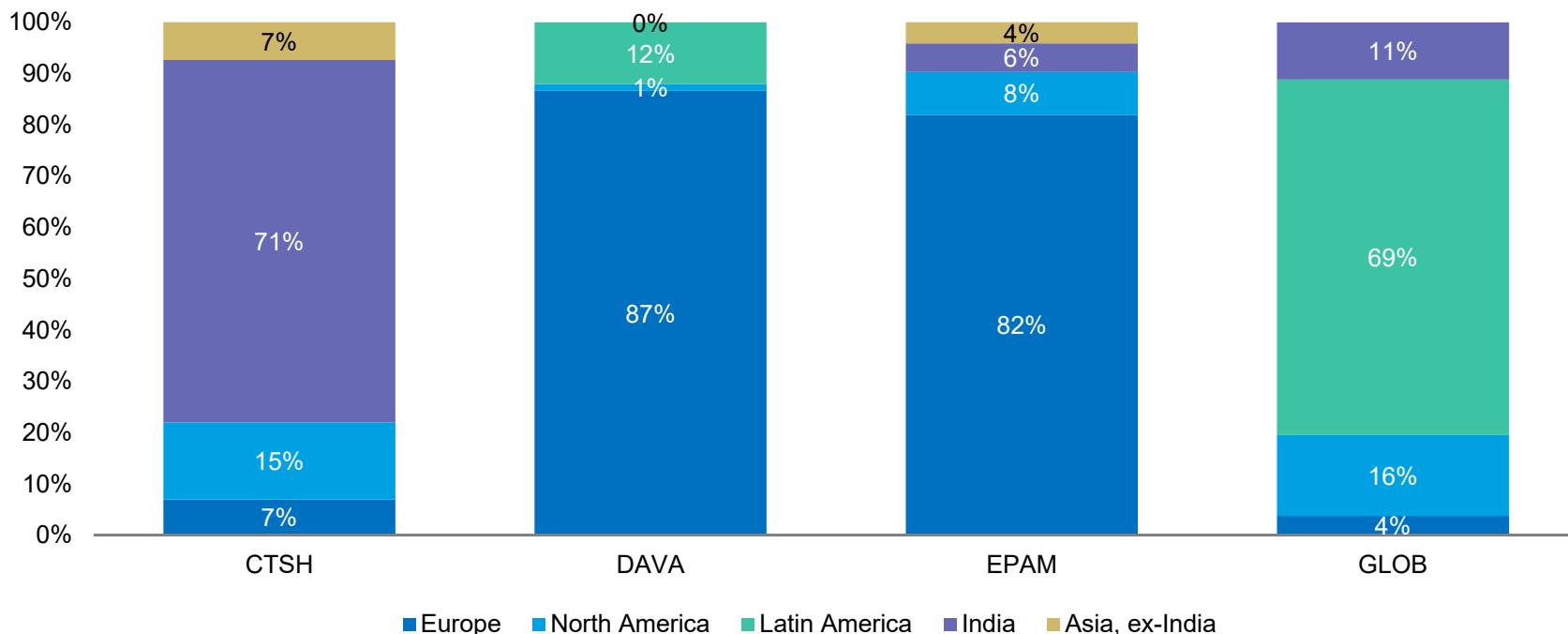
Note: Dates on calendar quarter basis; DAVA, DXC, and EPAM do not report attrition figures; INFY is not covered by Morgan Stanley Research

Digital-focused companies typically deliver work from near-shore and on-shore locations

An industry shift toward agile development has driven work delivery for digital services toward near-shore and on-shore locations due to talent supply, time zone convenience, and culture

- While **ACN** does not disclose headcount segmentation, we estimate its workforce is globally distributed given its consulting history
- Latin American** talent known for UX / CX design, **Eastern European** talent known for engineering, **Indian** talent known for legacy maintenance

Headcount by location (%)

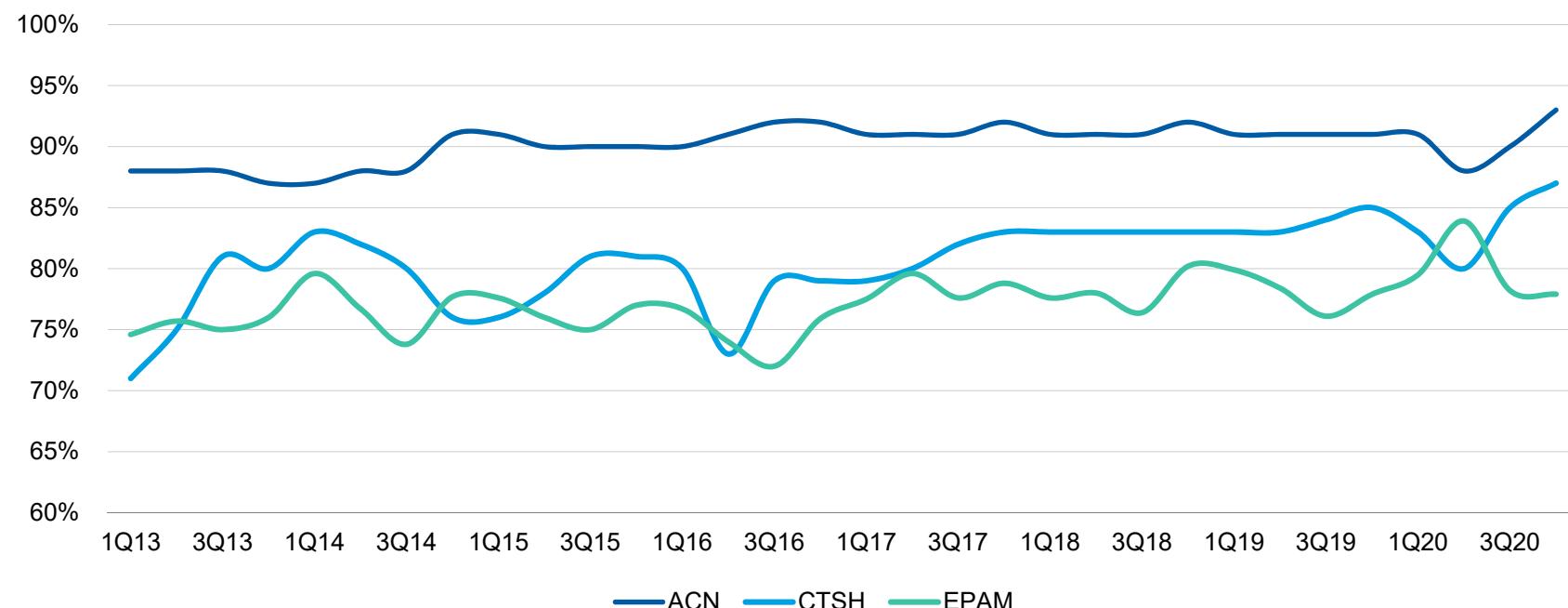


Note: CTSH headcount ex-North America, Europe, and India assumed to be Asia, ex-India; GLOB is covered by Morgan Stanley analyst Cesar Medina

Utilization measures employee productivity

- At the most basic level, utilization is a measure of total hours worked or billed divided by total hours available in a given time period
- Companies calculate utilization differently, so metrics may not be directly comparable
- Higher utilization is better for profitability, but attrition “running hot” is unsustainable

IT Services: Utilization rates



Source: Company data, Morgan Stanley Research

Note: Data on a calendar quarter basis; DAVA and DXC do not report utilization

COVID-19 changed IT Services dynamics last year...

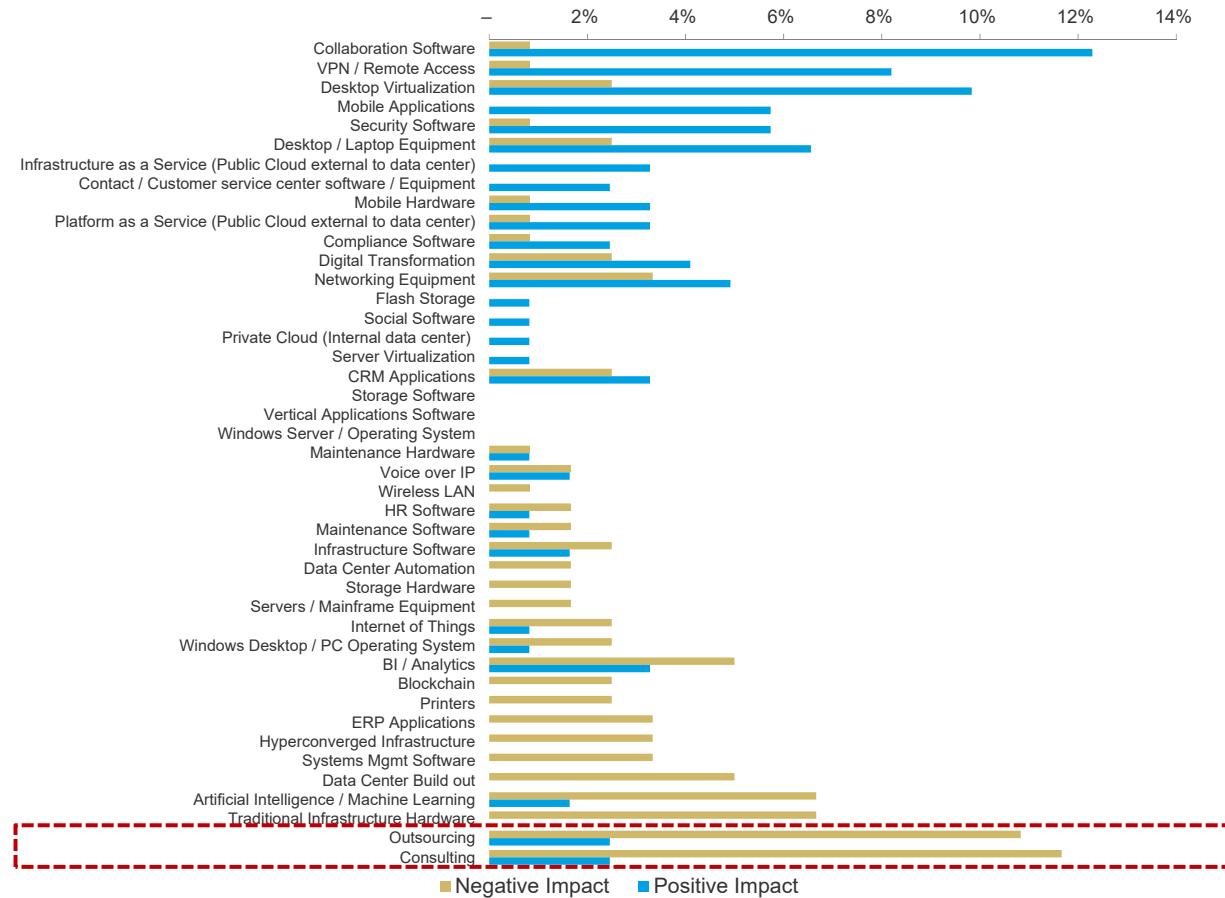
IT Services hardest hit

- 1Q20 COVID-19 Flash CIO Survey pointed to deterioration in spend for Services projects with **spending for Consulting and Outsourcing deemed most negatively impacted by COVID-19**
- Channel and buyer conversations show **discretionary and digital transformation projects are delayed**
- We remained **optimistic** that secular demand trends driving business prior to COVID-19 (e.g., digital transformation) would remain in-tact in better macro environment

Remote delivery is challenging:

- “But there have been some cases where the transition has been complicated either by security or other business concerns within our clients or access to appropriate technology and infrastructure for associates.” – CTSH CFO (April ‘20)*
- “Much of the revenue leakage was due to the supply side impact arising out of delays or inability to activate remote access for some of the offshore teams due to regulatory concerns.” – TCS CFO (April ‘20)*

Projects with largest positive / negative impact from COVID-19 (% of total respondents)



Source: AlphaWise, Company data, Morgan Stanley Research; n = 44 (US and EU data)

...but demand quickly returned, driven by Digital Transformation

Outside of pandemic-impacted industries, IT Services demand meaningfully accelerated due to demand for digital engagements



ACN: "We continued to see **compressed transformation**, where companies have to simultaneously transform multiple parts of their enterprise and reskill their people in what previously would have been sequential programs... **COVID has hit a giant fast-forward button to the future**, and we believe the demand to innovate at unprecedented speed and scale with rapid adoption of cloud, AI and other disruptive technologies is **accelerating**."



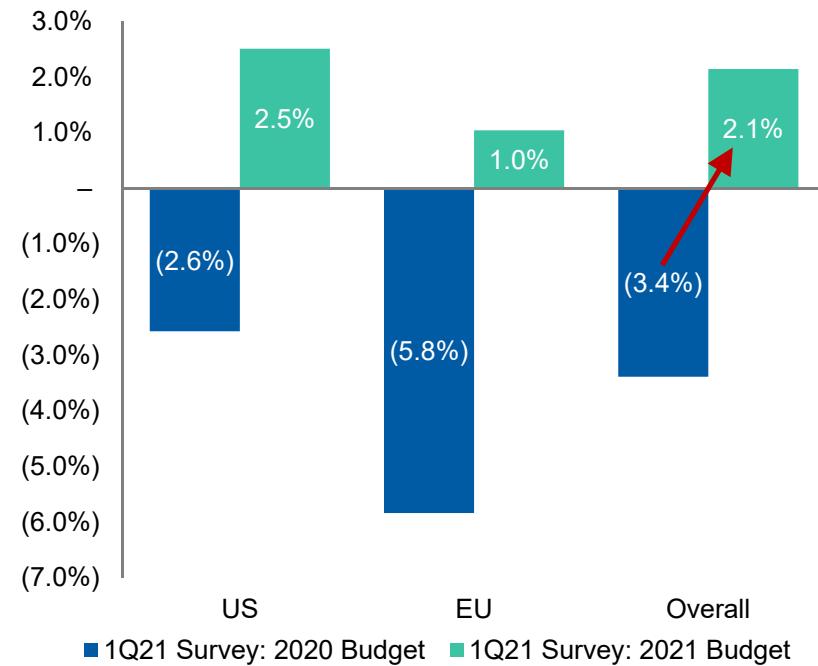
DAVA: "Within all these challenges, the good news for Endava has been that **digital transformation has become even more of a priority** in the new world order, and we continue to see **growing numbers of engagements** with existing and new clients on how to shape their digital future and transform their operating model. COVID-19 has accelerated recognition of the amount of digital transformation work still to be done and has **brought forward the urgency** to do it now."



EPAM: "With the events of the past year, our clients are adapting to changing landscape, which requires hybrid business models and different ways of interacting with their customers in the end market. This requires even **faster pace of transformation**, the organization of application as well as the building of expansion of the platform with connect and powered enterprise, enabled first by the cloud and the need for really co-innovation partners."

Source: Company data, Morgan Stanley Research

**Morgan Stanley CIO Survey:
2020 vs. 2021 IT Services spending growth expectations (%)**



Source: AlphaWise; Morgan Stanley Research; n = 100 (US and EU data)

Reinforces our belief that IT Services companies enable Digital Transformation

Contact center / BPO exposed to different themes than digital / diversified IT Services

- Focused on commoditized “run the business” type work
- Involves outsourcing less technical functions or processes to third-party vendors
- Labor arbitrage model with heavy reliance on areas with strong English language capabilities and / or local language capabilities as required by customers
- Pricing dependent on: **1) location of delivery; 2) skillset; and 3) time of day**
- Attrition meaningfully higher than that of IT Services companies



Contact center:

- Demand driven by continued need for customer support and focus on customer experience (voice and omnichannel)
- Contracts typically priced on per minute, per hour, per FTE, per transaction, per call basis

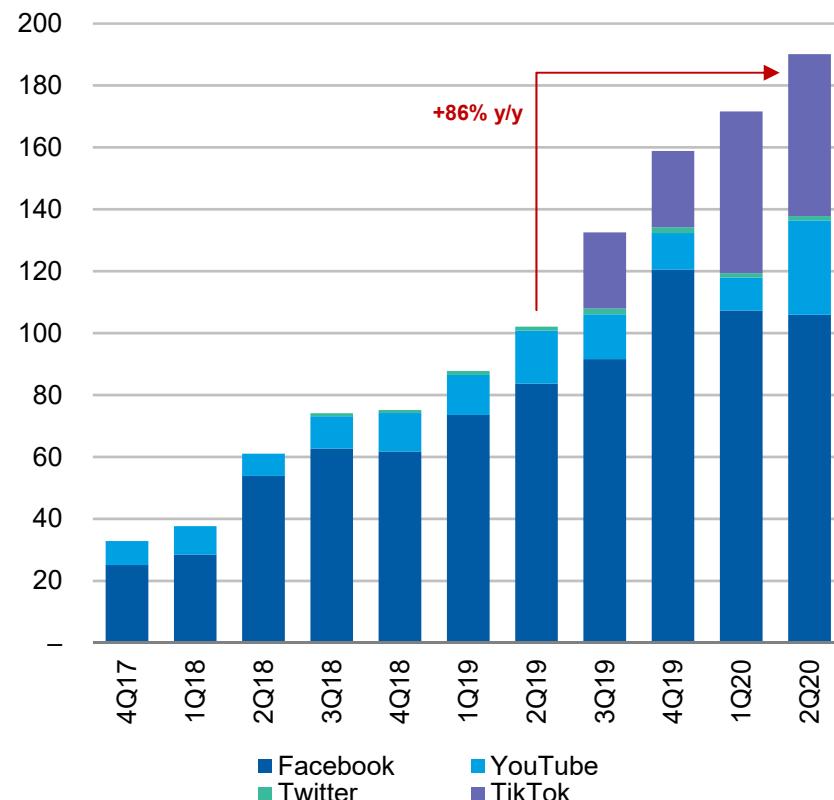


Content-focused BPO:

- Demand driven by need to moderate new content across media platforms, originally moderated in-house
- Contracts typically priced on an hourly or per unit basis

Growth indexed to content moderation and customer care

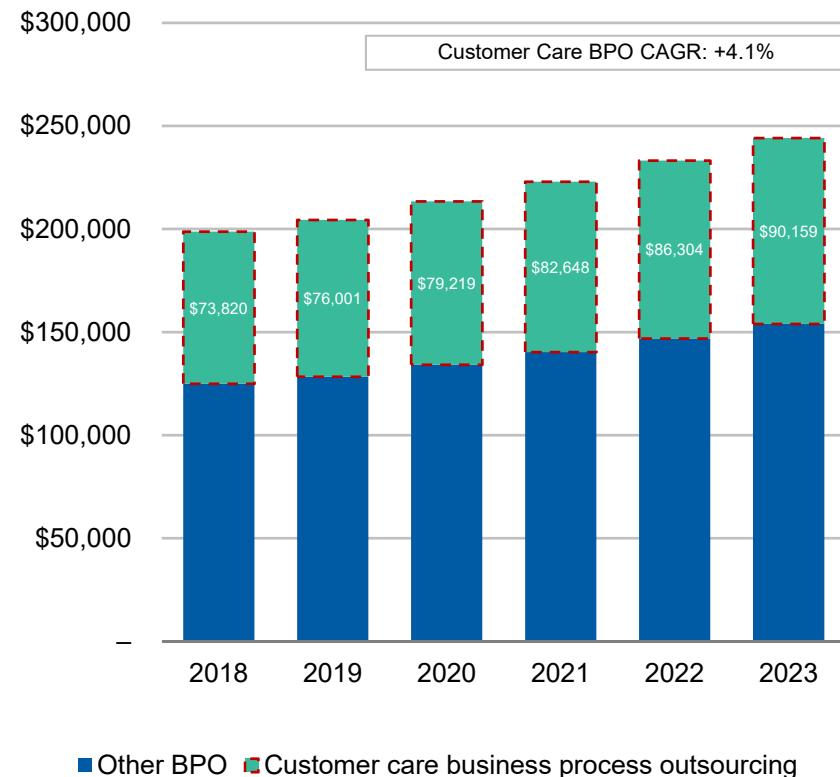
Total content moderated across platforms (mm of pieces)



Source: Company data, Morgan Stanley Research

Note: Data shows content actioned rather than total content screened; Twitter and TikTok data disclosed semi-annually, and therefore, quarterly data shows half of semi-annual reported figure per quarter

Customer care BPO spend forecast (\$mm)



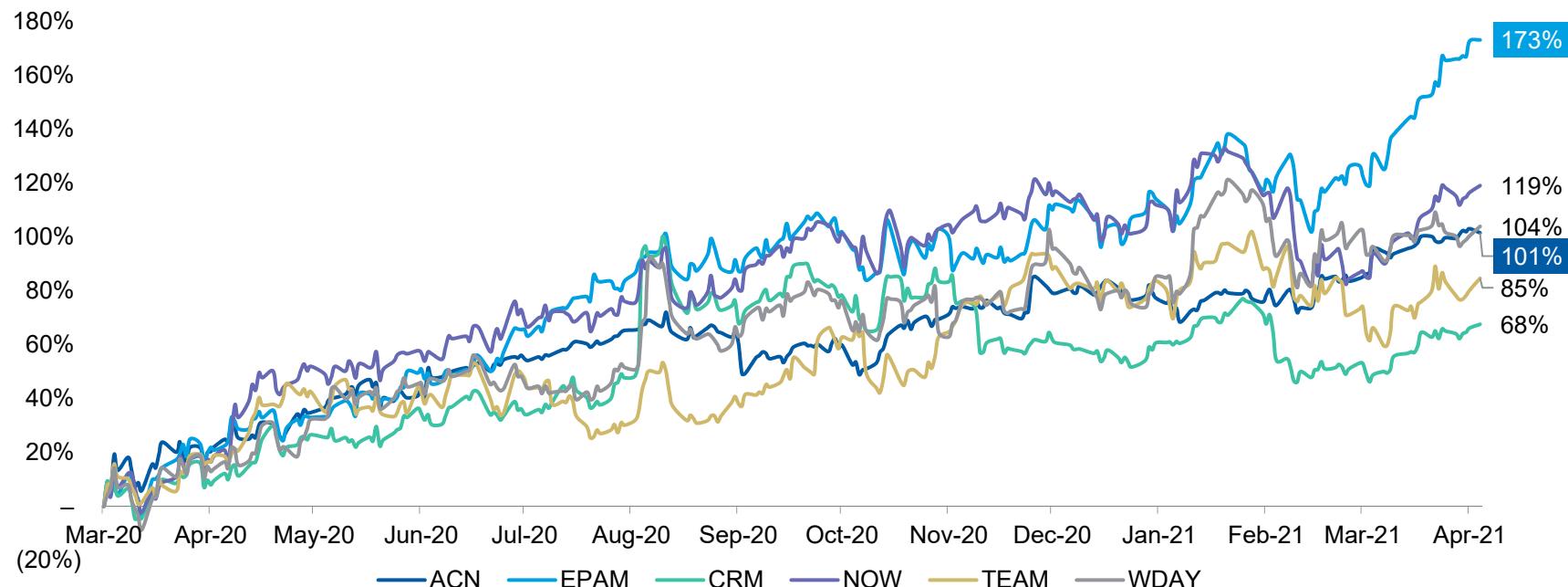
Source: IDC, Morgan Stanley Research

Debate 1: Software vs. Services

We continue to see investors selling IT Services companies to fund Software purchases

- **Market view:** Outperformance can only be found by picking a winning platform exposed to digital transformation.
- **Our view:** High-quality IT Services companies are platform-agnostic and have exposure to all major software / cloud vendors. Services companies such as ACN and EPAM use tuck-in acquisitions to stay on the leading edge of new technology and partner with leading software and infrastructure providers to make digital transformation work.

ACN & EPAM: Performance vs. software peers since pandemic trough

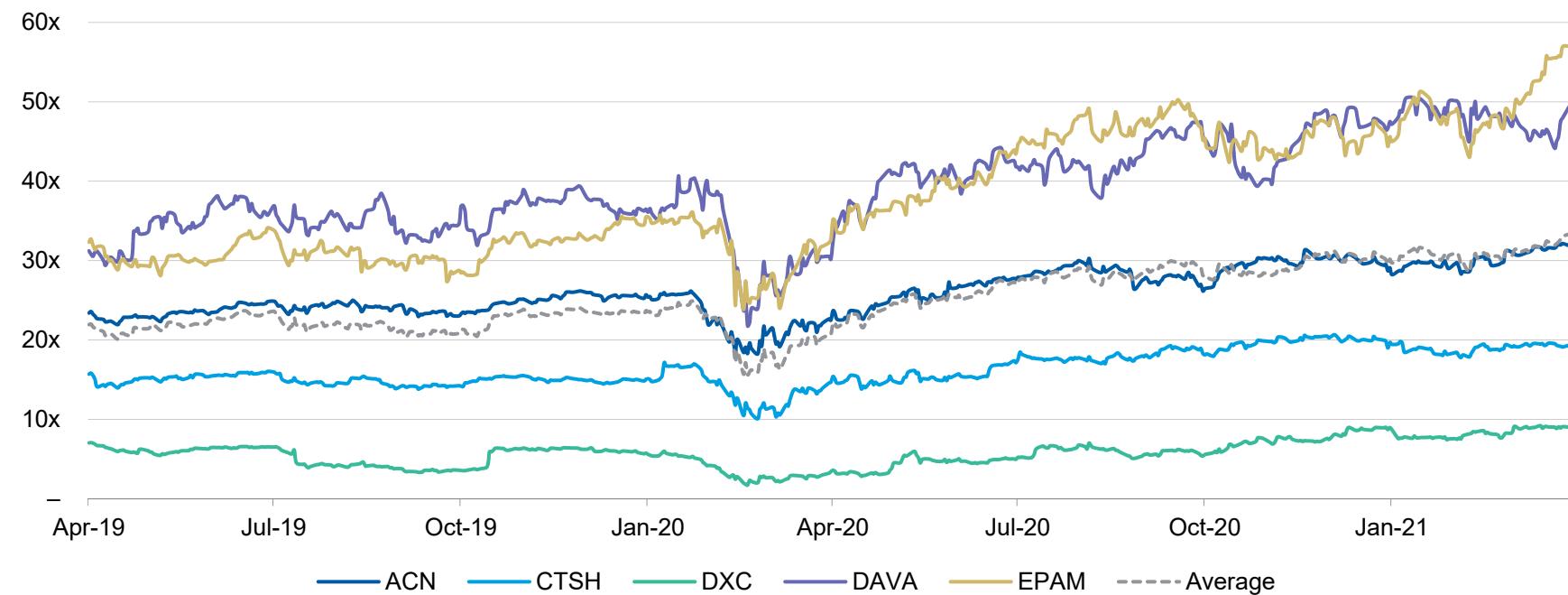


Debate 2: Valuation

Multiples for high-quality IT Services companies have re-rated above pre-pandemic levels

- **Market view:** IT Services stocks are over-valued as revenue growth remains below that of pre-pandemic levels despite peak valuations.
- **Our view:** As long as enterprise-focused VC investments and innovation continue, demand for IT Services will continue to beat estimates, putting incremental upward pressure on IT Services stocks.

IT Services: NTM P/E multiples since April 2019



Source: Thomson Reuters (as of April 26, 2021), Morgan Stanley Research

Preference for ACN, CTSH, and EPAM within coverage

| Diversified IT Services | | | |
|---|------|--------------|---|
|  | ACN | Overweight | Among the best-positioned IT Services companies to maintain optionality while being able to balance acquisitions and capital return. Consistent acquisitions underpin consistency of revenue growth and margin expansion, leading to compounding EPS growth. |
|  | CTSH | Overweight | Meaningful strides in acquisition strategy have allowed it to expand platform partnerships and capabilities in order to remix revenue toward higher-growth digital services. |
|  | DXC | Equal-weight | Company is exposed to business segments in secular decline (infrastructure outsourcing), and a focus on debt repayment and rationalizing the business prevents the company from making the necessary acquisitions to remix capabilities and expand. |
| Digital Pure-play | | | |
|  | DAVA | Equal-weight | 100% digital revenue exposure with strong engineering capabilities, but limited trading liquidity makes it difficult for investors to own, an issue we do not believe management can easily address near-term. |
|  | EPAM | Overweight | 100% digital revenue exposure, an agile development-focused nearshore workforce, and disciplined acquisition-focused capital allocation strategy make it among the best-positioned to benefit from digital transformation spending as companies emerge from COVID-19. |
| Contact Center / BPO | | | |
|  | TTEC | Equal-weight | Contact center-centric BPO firm working on remixing revenue exposure to higher-growth digital means. Remixing of revenue toward higher-growth digital is likely to take several years before seeing meaningful contribution, with better exposure to digital elsewhere in our coverage. |
|  | TIKT | Equal-weight | Revenue remains largely BPO-oriented despite some exposure to systems integration and engineering work, and therefore, should trade relatively in-line with contact center / BPO peers that have similar content moderation exposure. |

Source: Company data, Morgan Stanley Research



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IT Services: Comparable companies

| Company | Ticker | Rating | Price | Market Cap (mm) | Enterprise Value (mm) | Sales CAGR | | Operating Margin | | | | Price / EPS | | EPS CAGR | | EV / EBITDA | | EBITDA Margin | | | |
|--|--------|--------|-----------|-----------------|-----------------------|-------------|-------|------------------|-------|-------|-------|-------------|-------------|----------|-------|-------------|-------|---------------|-------|--|--|
| | | | | | | 2019 - 2022 | 2019 | 2020 | 2021E | 2022E | 2021E | 2022E | 2019 - 2022 | 2021E | 2022E | 2019 | 2020 | 2021E | 2022E | | |
| Diversified IT Services | | | | | | | | | | | | | | | | | | | | | |
| Accenture PLC | ACN | OW | \$289.52 | \$187,123 | \$178,556 | 6.7% | 14.7% | 14.8% | 15.1% | 15.3% | 32.9x | 30.2x | 8.9% | 20.0x | 19.7x | 17.1% | 19.0% | 17.7% | 17.0% | | |
| Atos SE | ATOS | EW | €57.64 | €5,862 | €6,332 | (0.3%) | 10.6% | 9.0% | 9.5% | 10.4% | 8.2x | 7.4x | 0.4% | 3.6x | 3.4x | 16.4% | 15.1% | 15.5% | 16.3% | | |
| Capgemini SE | CAPP | OW | €150.80 | €25,688 | €30,604 | 7.6% | 10.8% | 10.4% | 10.6% | 11.1% | 20.7x | 18.3x | 7.8% | 11.8x | 10.8x | 16.2% | 15.9% | 15.5% | 16.1% | | |
| Cognizant Technology Solutions Corp | CTSH | OW | \$79.56 | \$42,206 | \$40,183 | 3.4% | 16.6% | 14.4% | 15.8% | 16.2% | 20.0x | 18.5x | 2.5% | 12.0x | 11.3x | 19.6% | 17.7% | 18.8% | 19.2% | | |
| DXC Technology Co | DXC | EW | \$31.65 | \$8,166 | \$10,826 | (7.8%) | 15.9% | 6.2% | 7.2% | 7.5% | 12.4x | 10.0x | (20.9%) | 4.3x | 4.2x | 22.4% | 14.5% | 15.0% | 15.1% | | |
| HCL Technologies Ltd | HCLT | NR | ₹928.80 | ₹2,520,452 | ₹31,662 | 10.8% | 0.3% | 21.1% | 20.9% | 20.7% | 19.0x | 16.5x | 12.2% | 0.1x | 0.1x | 24.2% | 26.1% | 25.7% | 25.3% | | |
| Infosys Ltd | INFY | NR | ₹1,343.55 | ₹5,712,484 | ₹5,516,620 | 12.8% | 21.9% | 23.9% | 24.1% | 23.8% | 26.2x | 23.2x | 15.0% | 18.0x | 16.1x | 24.5% | 27.0% | 27.2% | 26.8% | | |
| Tata Consultancy Services Ltd | TCS | NR | ₹3,100.80 | ₹11,481,777 | ₹11,271,299 | 10.1% | 24.8% | 25.5% | 26.2% | 26.3% | 30.4x | 26.7x | 10.8% | 21.1x | 19.3x | 26.9% | 29.9% | 29.0% | 28.4% | | |
| Wipro Ltd | WIPR | NR | ₹480.30 | ₹2,653,475 | ₹2,409,390 | 9.3% | 16.7% | 18.9% | 18.3% | 18.1% | 23.8x | 21.5x | 11.3% | 14.9x | 13.4x | 20.1% | 23.0% | 23.0% | 22.7% | | |
| Diversified IT Services Mean | | | | | | 5.9% | 14.7% | 16.0% | 16.4% | 16.6% | 21.5x | 19.1x | 5.3% | 11.8x | 10.9x | 20.8% | 20.9% | 20.8% | 20.8% | | |
| Diversified IT Services Median | | | | | | 7.6% | 15.9% | 14.8% | 15.8% | 16.2% | 20.7x | 18.5x | 8.9% | 12.0x | 11.3x | 20.1% | 19.0% | 18.8% | 19.2% | | |
| Digital Pure-play IT Services | | | | | | | | | | | | | | | | | | | | | |
| Endava PLC | DAVA | EW | \$90.20 | \$3,713 | \$3,629 | 21.6% | 20.1% | 18.8% | 19.3% | 19.3% | 54.4x | 46.0x | 16.4% | 31.2x | 25.6x | 24.1% | 24.4% | 24.8% | 24.8% | | |
| EPAM Systems Inc | EPAM | OW | \$458.83 | \$27,000 | \$25,642 | 19.8% | 17.0% | 17.8% | 17.0% | 17.0% | 61.8x | 51.1x | 18.3% | 40.9x | 34.2x | 18.9% | 20.1% | 19.1% | 19.0% | | |
| Globant SA | GLOB | OW | \$238.03 | \$9,742 | \$9,230 | 25.5% | 14.0% | 13.7% | 15.8% | 16.1% | 72.9x | 59.3x | 20.6% | 44.6x | 35.7x | 20.7% | 17.6% | 19.4% | 19.8% | | |
| Digital Pure-play IT Services Mean | | | | | | 22.3% | 17.0% | 16.8% | 17.4% | 17.5% | 63.0x | 52.1x | 18.4% | 38.9x | 31.9x | 21.2% | 20.7% | 21.1% | 21.2% | | |
| Digital Pure-play IT Services Median | | | | | | 21.6% | 17.0% | 17.8% | 17.0% | 17.0% | 61.8x | 51.1x | 18.3% | 40.9x | 34.2x | 20.7% | 20.1% | 19.4% | 19.8% | | |
| Customer Care / Contact Center | | | | | | | | | | | | | | | | | | | | | |
| Concentrix Corp | CNXC | NR | \$159.24 | \$8,249 | \$9,285 | NM | NM | 10.7% | 12.9% | NM | 17.3x | NM | NM | 11.0x | NM | NM | 13.7% | 15.5% | NM | | |
| Teleperformance SE | TEPRF | OW | €325.90 | €19,101 | €21,375 | 10.4% | 14.3% | 12.8% | 14.1% | 14.7% | 28.3x | 26.5x | 10.0% | 15.6x | 14.6x | 21.3% | 19.7% | 19.8% | 20.3% | | |
| TELUS International (Cda) Inc. | TIXT | EW | \$29.51 | \$7,260 | \$8,873 | 34.9% | 12.4% | 11.7% | 9.2% | 11.8% | 32.5x | 25.3x | 39.1% | 16.8x | 14.1x | 21.8% | 23.6% | 24.4% | 24.7% | | |
| TTEC Holdings Inc | TTEC | EW | \$105.35 | \$4,959 | \$5,278 | 12.3% | 7.9% | 11.0% | 12.1% | 10.6% | 25.4x | 26.4x | 25.8% | 16.3x | 15.9x | 12.7% | 15.6% | 15.0% | 14.2% | | |
| Customer Care / Contact Center Mean | | | | | | 19.2% | 11.5% | 11.5% | 12.1% | 12.3% | 25.9x | 26.1x | 24.9% | 14.9x | 14.9x | 18.6% | 18.2% | 18.7% | 19.7% | | |
| Customer Care / Contact Center Median | | | | | | 12.3% | 12.4% | 11.4% | 12.5% | 11.8% | 26.8x | 26.4x | 25.8% | 15.9x | 14.6x | 21.3% | 17.6% | 17.7% | 20.3% | | |
| Diversified BPO | | | | | | | | | | | | | | | | | | | | | |
| Conduent Inc | CNDT | NR | \$6.79 | \$1,427 | \$2,644 | (2.9%) | 0.8% | 6.1% | 5.7% | 6.0% | 12.3x | 11.3x | (0.9%) | 5.8x | 5.6x | 11.0% | 11.5% | 11.2% | 11.5% | | |
| Genpact Ltd | G | NR | \$44.90 | \$8,748 | \$9,354 | 7.3% | 12.5% | 15.2% | 15.1% | 15.4% | 19.6x | 17.4x | 8.1% | 12.8x | 11.4x | 18.6% | 17.0% | 18.4% | 18.8% | | |
| WNS (Holdings) Ltd | WNS | NR | \$73.05 | \$3,790 | \$3,508 | 6.7% | 16.0% | 21.7% | 20.4% | 20.3% | 24.1x | 21.2x | 4.7% | 14.4x | 13.0x | 28.0% | 27.0% | 25.6% | 25.5% | | |
| Diversified BPO Mean | | | | | | 3.7% | 9.8% | 14.3% | 13.7% | 13.9% | 18.7x | 16.6x | 3.9% | 11.0x | 10.0x | 19.2% | 18.5% | 18.4% | 18.6% | | |
| Diversified BPO Median | | | | | | 6.7% | 12.5% | 15.2% | 15.1% | 15.4% | 19.6x | 17.4x | 4.7% | 12.8x | 11.4x | 18.6% | 17.0% | 18.4% | 18.8% | | |
| Group Mean | | | | | | 10.5% | 13.7% | 14.9% | 15.2% | 15.6% | 28.5x | 25.4x | 10.6% | 16.6x | 14.9x | 20.2% | 19.9% | 20.0% | 20.3% | | |
| Group Median | | | | | | 9.7% | 14.5% | 14.4% | 15.1% | 15.7% | 24.1x | 22.3x | 10.4% | 14.9x | 13.8x | 20.4% | 19.0% | 19.1% | 19.5% | | |

Source: Company data, Thomson Reuters (as of April 26, 2021), Morgan Stanley Research

Note: ATOS and CAPP covered by Adam Wood; GLOB covered by Cesar Medina; TEPRF covered by Edward Stanley; NR = Not Rated

Accenture Plc (ACN.N, ACN US)

Consistency and optionality underpin premium valuation



Source: Company data; Thomson Reuters; Morgan Stanley Research; as of April 20, 2021

Price Target

Derived from our Base Case

US\$305

Bull

38x Bull Case FY22E EPS

US\$400

Base

33x Base Case FY22E EPS

US\$305

Bear

25x Bear Case FY22E EPS

US\$200

Why Overweight

- Well-positioned to benefit from its outsized exposure to new and digital work post-COVID-19
- Diversified vertical and geographic mix to mitigate risk to revenue growth
- Proven M&A capabilities provide optionality

Investment Drivers

- Acquisitions to support investment in newer offerings or geographies
- Continued demand for new and digital-related services post-COVID-19
- Profitable share gains across IT Services and Advertising markets
- Impending ERP upgrade cycle

Potential Catalysts

- Return to office / client sites
- Incremental acquisitions
- Company and peer earnings

Risks to Upside

- Acceleration in high-growth strategic priorities
- Profitable share gains across IT Services and Advertising markets
- Faster than expected recovery in pandemic-impacted verticals

Risks to Downside

- Deceleration in revenue growth across operating groups and / or business dimensions
- Bookings do not result in acceleration in revenue growth
- Attrition accelerates; Recession

Cognizant Technology Solutions Corp (CTSH.O, CTSH US)

Accelerated pace of acquisitions should help expand capabilities



Source: Company data; Thomson Reuters; Morgan Stanley Research; as of April 20, 2021

Price Target

Derived from our Base Case

US\$95

Bull

25x Bull Case FY22E EPS

US\$116

Base

22x Base Case FY22E EPS

US\$95

Bear

15x Bear Case FY22E EPS

US\$55

Why Overweight

- Management continues to make progress on reaccelerating revenue growth through: 1) an accelerated pace of acquisitions; 2) establishment of core platform partnerships; and 3) globalizing delivery into nearshore and onshore territories to drive penetration
- An acquisition-focused capital allocation strategy should drive a continued pace of tuck-ins that will keep CTSH at the forefront of emerging technology and contribute to overall revenue growth
- We anticipate multiple expansion in CTSH shares as investors begin to appreciate the impact of FY20 actions in FY21, narrowing the gap between CTSH shares and that of peer ACN

Investment Drivers

- Accelerating pace of acquisitions to remix capabilities toward higher-growth services
- Improving demand dynamics

Potential Catalysts

- Incremental acquisitions
- News on deal wins / losses
- Company and peer earnings

Risks to Upside

- Recovery across large bank relationships and COVID-19-impacted industries
- Accelerated growth among lower penetrated markets
- Better-than-expected margin expansion

Risks to Downside

- Inability to deliver on contracted work
- Accelerating rates of attrition
- Share losses to competitors
- Restrictions on H-1B and work visas
- Recession

DXC Technology Company (DXC.N, DXC US)

On the path to stabilization



Price Target

Derived from our Base Case

US\$31

Bull

10x Bull Case FY22E EPS

US\$40

Base

10x Base Case FY22E EPS

US\$31

Bear

7x Bear Case FY22E EPS

US\$12

Why Equal-weight

- Path to revenue growth and industry-level margins are likely to take time as near-term goals are centered around sequential revenue stabilization, margin expansion, and achieving a book-to-bill of at least 1x
- A focus on rationalizing non-core assets and paying down debt prevents the company from being able to expand capabilities to encompass emerging technology
- Investors likely require a longer track record of consistency around execution

Investment Drivers

- Revenue stabilization
- Margin expansion to industry average
- Acquisition by strategic or financial buyer

Potential Catalysts

- Company and peer earnings
- News on deal wins / losses

Risks to Upside

- Better-than-expected execution on core turnaround strategy
- Potential bid from strategic or financial buyer

Risks to Downside

- Poor macroeconomic backdrop (e.g., recession)
- Poor execution on turnaround plan
- Inability to achieve revenue stabilization
- Inability to achieve industry margins

Endava PLC (DAVA.N, DAVA US)

Strong digital-driven growth with limited COVID-19 impact



Key: — Historical Stock Performance ● Current Stock Price ♦ Price Target

Source: Company data; Thomson Reuters; Morgan Stanley Research; as of April 20, 2021

Price Target

Derived from our Base Case

US\$93

Bull

55x Bull Case FY22E EPS

US\$125

Base

51x Base Case FY22E EPS

US\$93

Bear

39x Bear Case FY22E EPS

US\$65

Why Equal-weight

- As a pure-play digital IT Services company with limited exposure to COVID-19-impacted verticals, DAVA should be able to maintain double-digit growth near-term
- DAVA should be a beneficiary of digital-related spend as companies look to re-accelerate growth post-COVID-19
- Limited trading liquidity makes it difficult for investors to take meaningful positions

Investment Drivers

- Organic and inorganic expansion in new capabilities, verticals, and geographies
- Continued demand for digital-related services
- Acceleration of digital transformation post-COVID-19

Potential Catalysts

- Incremental acquisitions
- Company and peer earnings

Risks to Upside

- Acceleration in revenue growth across Payments and TMT verticals
- Profitable share gains across application engineering and digital transformation
- Earlier than expected macroeconomic recovery

Risks to Downside

- Project cancellations and extended decision cycles
- Deceleration in revenue growth across verticals
- Higher than expected need to reinvest
- Geopolitical issues in key delivery locations
- FX volatility
- Recession

EPAM Systems Inc (EPAM.N, EPAM US)

Growth driven by accelerating demand for digital transformation



Key: — Historical Stock Performance ● Current Stock Price ◆ Price Target

Source: Company data; Thomson Reuters; Morgan Stanley Research; as of April 20, 2021

Price Target

Derived from our Base Case

US\$450

Bull

67x Bull Case FY22E EPS

US\$690

Base

50x Base Case FY22E EPS

US\$450

Bear

30x Bear Case FY22E EPS

US\$203

Why Overweight

- Digital transformation is driving demand for EPAM's digital-focused services, shifting supply and demand dynamics such that EPAM is seeing outsized demand relative to its ability to satisfy it
- As a pure-play digital IT Services company, EPAM will be a beneficiary of digital spend as companies look to recover and re-accelerate growth post-COVID-19
- Growth remains better than that of diversified IT Services peers, warranting a premium multiple

Investment Drivers

- Organic and inorganic expansion in new capabilities, verticals, and geographies
- Continued demand for digital-related services
- Acceleration of digital transformation post-COVID-19

Potential Catalysts

- Incremental acquisitions
- Company and peer earnings

Risks to Upside

- Acceleration in revenue growth across verticals
- Profitable share gains across application engineering and digital transformation
- Earlier than expected macroeconomic recovery

Risks to Downside

- Project cancellations and extended decision cycles
- Inability to hire talent to meet demand
- Geopolitical issues arising in key delivery locations
- Recession

TELUS International (Cda) Inc. (TIXT.N, TIXT US)

High-growth BPO company aspiring to expand capabilities



Key: — Historical Stock Performance ● Current Stock Price ◆ Price Target

Source: Company data; Thomson Reuters; Morgan Stanley Research; as of April 20, 2021

Price Target

Derived from our Base Case

US\$31

Bull

35x Bull Case FY22E EPS

US\$47

Base

26x Base Case FY22E EPS

US\$31

Bear

16x Bear Case FY22E EPS

US\$12

Why Equal-weight

- Durability of above-average revenue growth and operating margins remains to be seen, particularly given the company's exposure to lower-margin contact center work
- We believe TIXT's revenue remains largely BPO-oriented despite some exposure to systems integration and engineering work, and therefore, should trade relatively in-line with its peers

Investment Drivers

- Increased volume of objectionable content requiring screening
- Greater need for data annotation services
- Increased outsourcing of call centers
- Increased customer engagement volume across end customers
- Additional acquisitions

Potential Catalysts

- Incremental acquisitions
- Company and peer earnings

Risks to Upside

- Sustained levels of high revenue growth
- Increased mix of high margin digital engineering work
- Greater than expected demand for content moderation, customer care, and / or data annotation

Risks to Downside

- Pricing pressure
- Elevated levels of attrition
- Deceleration in revenue growth
- Share loss to competitors, insourcing, and / or automation
- Corporate decisions made by parent company / board that negatively impact TIXT

TTEC Holdings, Inc. (TTEC.N, TTEC US)

Transformation journey likely takes several years



Source: Company data; Thomson Reuters; Morgan Stanley Research; as of April 20, 2021

Price Target

Derived from our Base Case

US\$87

Bull

30x Bull Case FY22E EPS

US\$129

Base

22x Base Case FY22E EPS

US\$87

Bear

16x Bear Case FY22E EPS

US\$39

Why Equal-weight

- TTEC operates in highly fragmented sub-segments of both BPO and digital IT Services focused on contact center and customer experience, respectively
- Remixing of revenue toward higher growth Digital likely to take several years before seeing meaningful contribution
- Pandemic-related work likely drives near-term Engage volume

Investment Drivers

- Adoption of cloud-based contact center solutions
- Increased outsourcing of contact centers
- Increased customer engagement volume across end customers

Potential Catalysts

- Incremental acquisitions
- Company and peer earnings

Risks to Upside

- Strong execution across TTEC Digital via partnerships
- Deeper partnerships with software providers
- Accelerated outsourcing of contact centers
- Sustainable pandemic-related volumes

Risks to Downside

- Loss of share to competitors
- Insourcing of contact centers
- Reduced engagement volume
- Widespread illness within TTEC contact center locations
- Recession

Valuation Methodology & Risks

Accenture Plc (ACN.N, ACN US)

Valuation: Our price target is derived from our Base Case scenario, which assumes double digit revenue growth near-term and mid-to-high-single-digit revenue growth in FY22. Our target applies an approximate 33x multiple to our FY22E EPS, a slight premium to the company's peak multiple, which we believe is warranted given the company's exposure to digital transformation tailwinds post-COVID-19 and an improving demand dynamic across ACN's key segments.

Risks to upside:

- Acceleration in high-growth strategic priorities
- Profitable share gains across IT Services and Advertising markets
- Faster than expected recovery in pandemic-impacted verticals

Risks to downside:

- Deceleration in revenue growth across operating groups and / or business dimensions
- Bookings do not result in acceleration in revenue growth
- Attrition accelerates
- Recession

Valuation Methodology & Risks (cont.)

Cognizant Technology Solutions Corp (CTSH.O, CTSH US)

Valuation: Our price target is derived from our Base Case scenario, which assumes mid-single digit revenue growth in FY21 driven in part by acquisitions and easier compares. Our target applies a 22x P/E multiple to our Base Case FY22E EPS estimate, representing an approximate 7x discount to OW-rated ACN, in-line with the narrowest discount since CEO Humphries' tenure.

Risks to upside:

- Recovery across large bank relationships and COVID-19-impacted industries
- Accelerated growth among lower penetrated markets
- Better-than-expected margin expansion

Risks to downside:

- Inability to deliver on contracted work
- Accelerating rates of attrition
- Share losses to competitors
- Restrictions on H-1B and work visas
- Recession

Valuation Methodology & Risks (cont.)

DXC Technology Company (DXC.N, DXC US)

Valuation: Our price target is derived from our Base Case scenario, which assumes sequential revenue stabilization and modest margin expansion. Our target applies a 10x multiple to our FY22E EPS, broadly in-line with that of infrastructure-focused peer ATO.

Risks to upside:

- Better-than-expected execution on core turnaround strategy
- Potential bid from strategic or financial buyer

Risks to downside:

- Poor macroeconomic backdrop (e.g., recession)
- Poor execution on turnaround plan
- Inability to achieve revenue stabilization
- Inability to achieve industry margins

Valuation Methodology & Risks (cont.)

Endava PLC (DAVA.N, DAVA US)

Valuation: Our price target is derived from our Base Case scenario, which assumes continued double-digit revenue growth. Our target applies a 51.0x multiple to our FY22E EPS, in-line with DAVA's peak multiple.

Risks to upside:

- Acceleration in revenue growth across Payments and TMT verticals
- Profitable share gains across application engineering and digital transformation
- Earlier than expected macroeconomic recovery

Risks to downside:

- Project cancellations and extended decision cycles
- Deceleration in revenue growth across verticals
- Higher than expected need to reinvest
- Geopolitical issues in key delivery locations
- FX volatility
- Recession

Valuation Methodology & Risks (cont.)

EPAM Systems Inc (EPAM.N, EPAM US)

Valuation: Our price target is derived from our Base Case scenario, which assumes a double-digit revenue growth trajectory longer-term. Our target applies a 50.0x multiple to our FY22E EPS, in-line with EPAM's 1-year historical peak NTM P/E multiple, and broadly in-line with the average PEG of profitable IT Services companies exhibiting profitable growth.

Risks to upside:

- Acceleration in revenue growth across verticals
- Profitable share gains across application engineering and digital transformation
- Earlier than expected macroeconomic recovery

Risks to downside:

- Project cancellations and extended decision cycles
- Inability to hire talent to meet demand
- Geopolitical issues arising in key delivery locations
- Recession

Valuation Methodology & Risks (cont.)

TELUS International (Cda) Inc. (TIXT.N, TIXT US)

Valuation: Our price target is derived from our Base Case scenario, which assumes organic revenue growth in the mid-teens. Our target applies a 26x P/E multiple to our Base Case FY22E EPS, in-line with that of European contact center / BPO peer Teleperformance.

Risks to upside:

- Sustained levels of high revenue growth
- Increased mix of high margin digital engineering work
- Greater than expected demand for content moderation, customer care, and / or data annotation

Risks to downside:

- Pricing pressure
- Elevated levels of attrition
- Deceleration in revenue growth
- Share loss to competitors, insourcing, and / or automation
- Corporate decisions made by parent company / board that negatively impact TIXT

Valuation Methodology & Risks (cont.)

TTEC Holdings, Inc. (TTEC.N, TTEC US)

Valuation: Our price target is derived from our Base Case scenario, which assumes double digit-growth in TTEC Digital post-COVID-19 and low-to mid-single digit growth in TTEC Engage. Our target applies a 22x P/E multiple to consolidated FY22E EPS, in-line with TTEC's one-year average NTM P/E multiple.

Risks to upside:

- Strong execution across TTEC Digital via partnerships
- Deeper partnerships with software providers
- Accelerated outsourcing of contact centers
- Sustainable pandemic-related volumes

Risks to downside:

- Loss of share to competitors
- Insourcing of contact centers
- Reduced engagement volume
- Widespread illness within TTEC contact center locations
- Recession

April 2021

Technology, Media & Telecom Spring Training Teach-In

Telecom Services & Communications Infrastructure

MORGAN STANLEY RESEARCH
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For analyst certification and other important disclosures, refer to the Disclosure Section, located at the end of this report.

Stock recommendations and disclosures in this report are as of April 26, 2021; stock prices as of April 21, 2021, unless otherwise noted.

Telecom Services

Telecom Services: Cautious Industry View

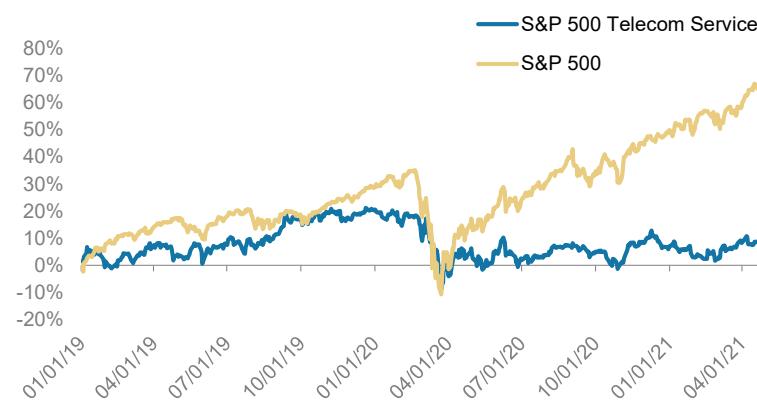
| | |
|-------------------|---|
| Wireless | Competitive concerns building – Concerned about increasing wireless competitive intensity pressuring industry profitability with T-Mobile, Cable, and Dish looking to increase share. We believe potential catalysts could be the 5G iPhone supercycle, Dish's 5G network moving closer to deployment, Cable scaling in mobility, and T-Mobile's 5G ramp potentially triggering more aggressive pricing by competitors. Macro pressures could also drive prepaid adoption. |
| Wireline | Focus on Enterprise spend and Broadband – Remain focused on customer trends as Enterprise wireline spending has been a lagging indicator in the past. In Broadband, Telcos are losing to Cable, but things are improving due to higher speed deployments as the Telcos build out their fiber footprints. We expect 2021 to be more difficult for Broadband as industry growth slows following COVID-19-driven demand. Following the RDOF auction, we look to learn more about capex implications as well as business opportunities to expand Broadband footprints. |
| Regulatory | New Presidential administration & FCC leadership – Focused on several key priorities for the new administration including Digital Divide & Infrastructure plans, Net Neutrality regulations, Corporate Tax policy, Anti-trust, and Defense spending (for satellite providers). We await news of who will be nominated to lead the FCC. In Canada, we await a review of the Rogers-Shaw deal, rate negotiations around the new MVNO policy, and a review of previously set wholesale internet rates. |
| Valuation | Valuation discount remains: Bells' spread relative to the US 10-year are now close to 2-year averages. |

April 2021

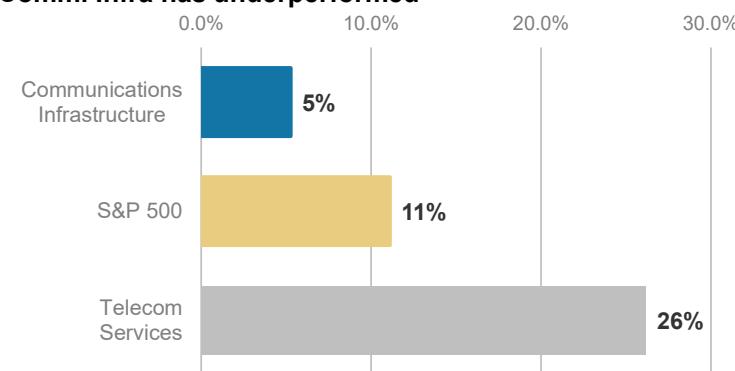
Technology, Media & Telecom Spring Training Teach-In

Telecom Services Outperforming the Market YTD while Comm. Infrastructure Lags

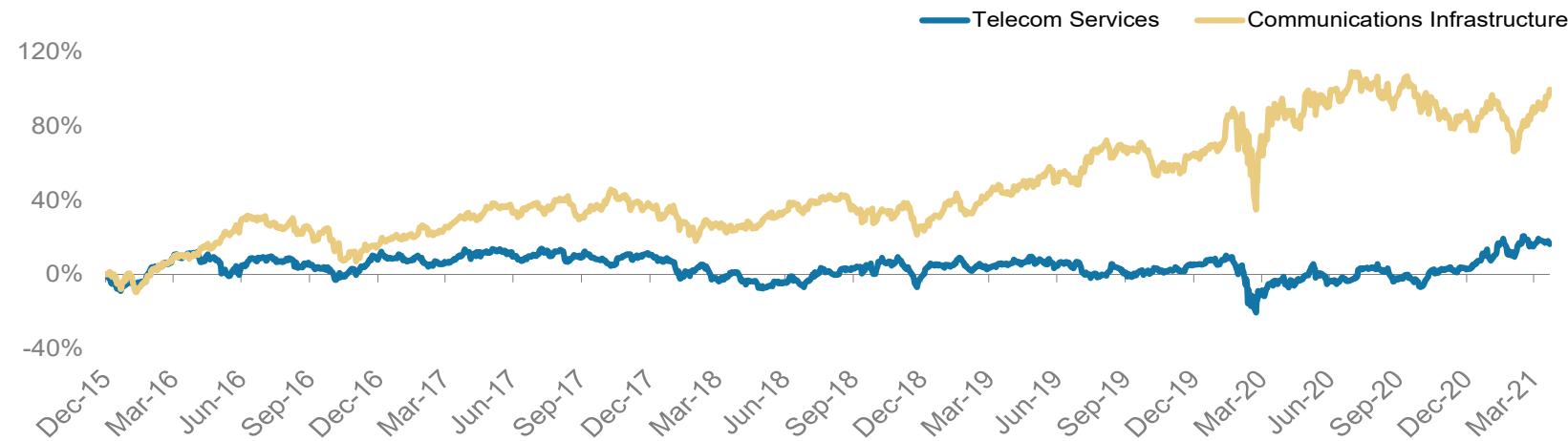
Telecom has historically underperformed the market...



... but is outperforming YTD (stocks under coverage avg.) while Comm. Infra has underperformed



Communications Infrastructure has historically outperformed telecom services



Source: Thomson Reuters, Morgan Stanley Research. Priced as of April 21, 2021. Infrastructure stocks include AMT, CCI, SBAC, EQIX, DLR, CONE, QTS & UNIT

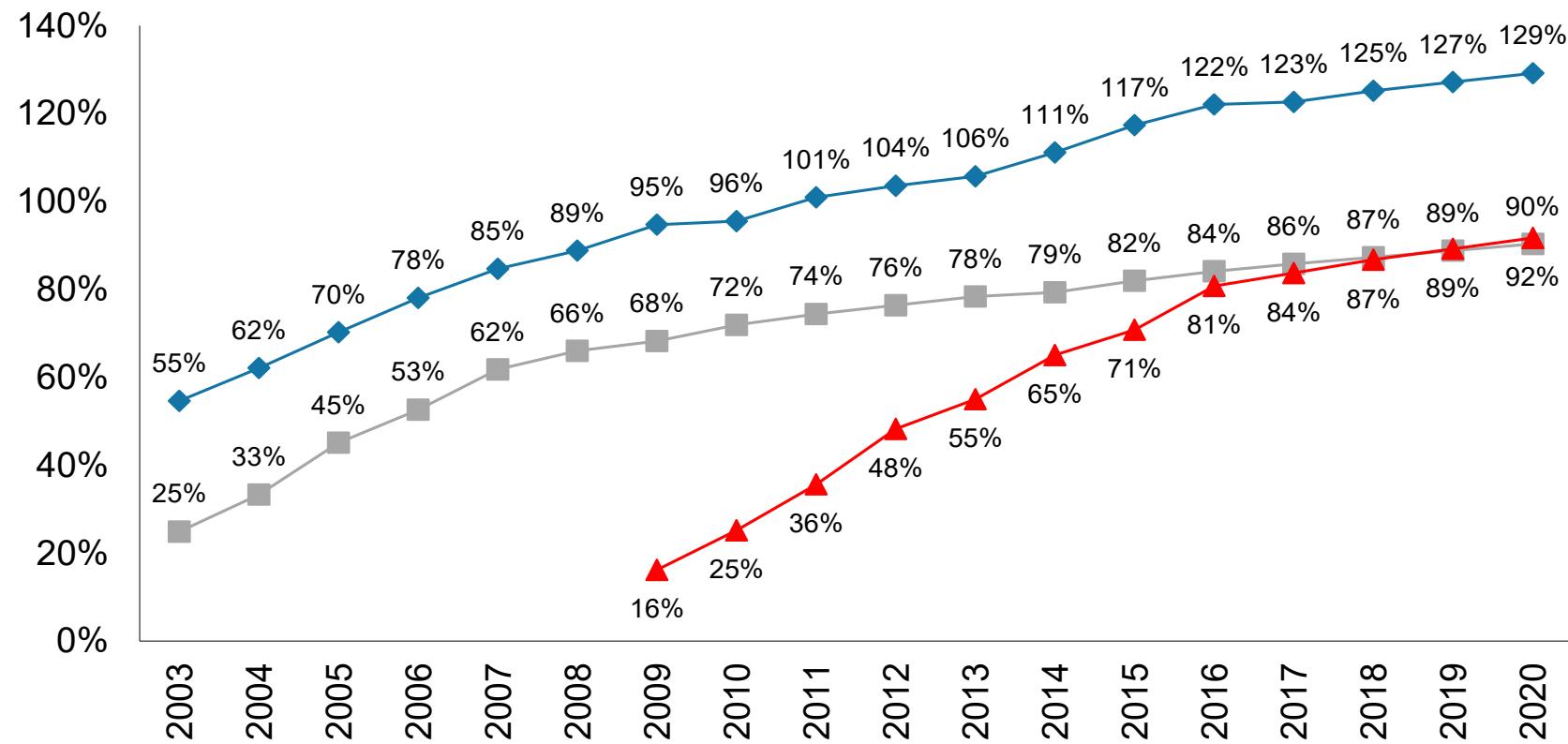
Wireless + Wireline Industries Are Mature and Saturated

TELECOM SERVICES PENETRATION

■ Broadband Penetration (% of U.S. Households)

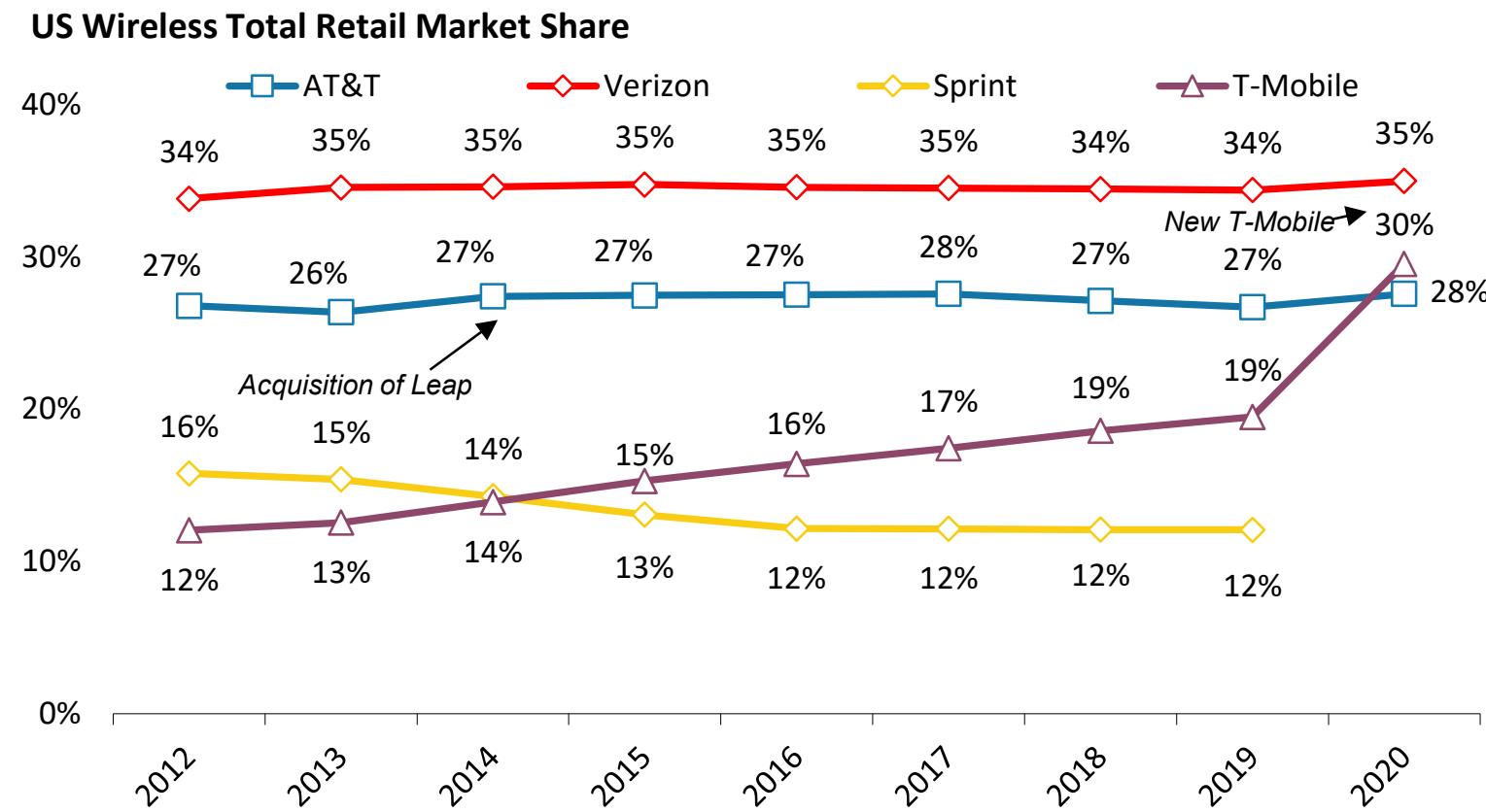
◆ Cellular Penetration (% of U.S. Population)

▲ Smartphone Penetration (% of U.S. Population)



Source: Company Data, Morgan Stanley Research. CTIA, Annual Wireless Survey Results: A Comprehensive Report from CTIA Analysing the U.S. Wireless Industry

New T-Mobile Market Share Now on Par with Bells

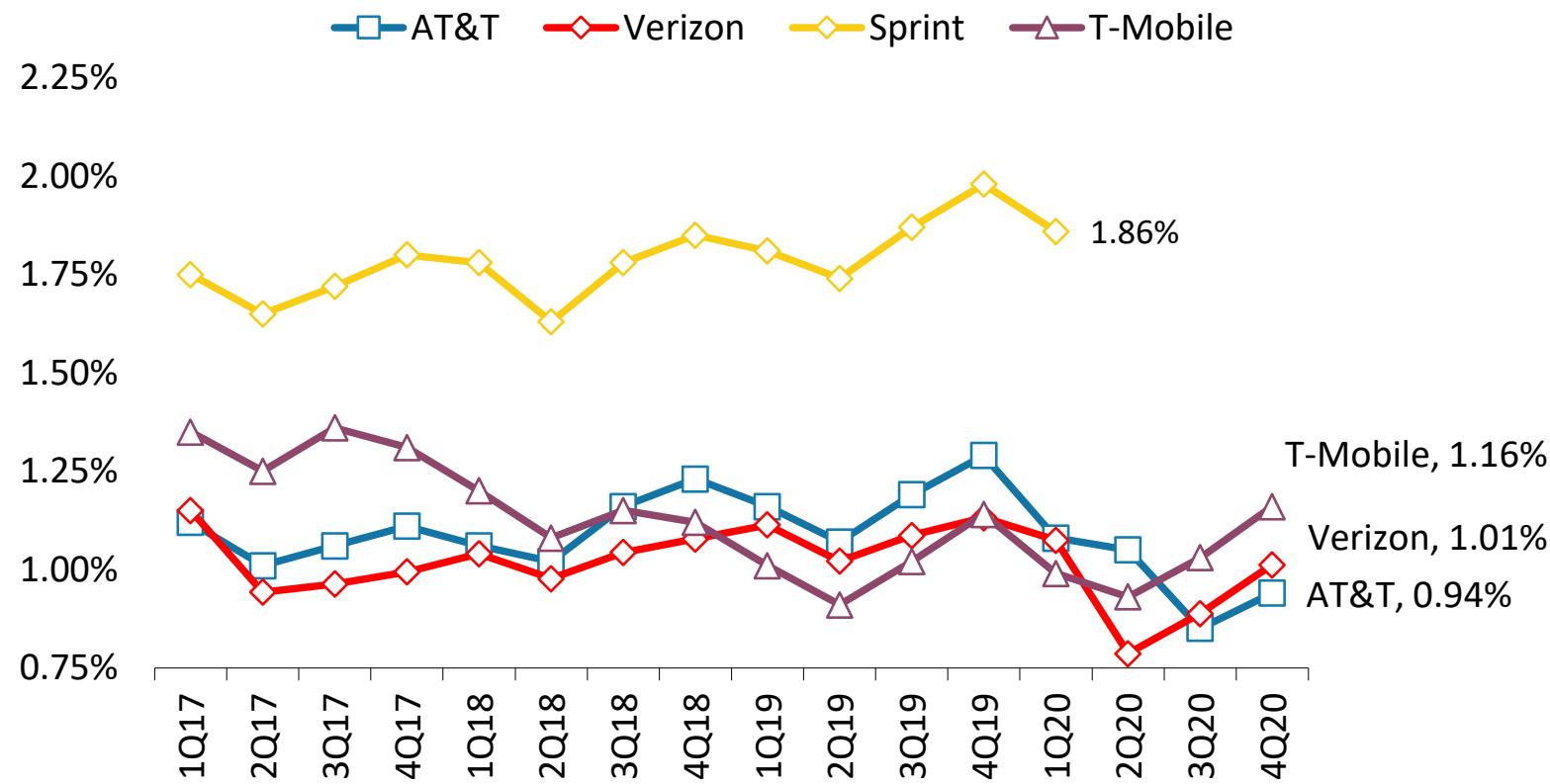


Source: Company Data, Morgan Stanley Research.

Notes: T-Mobile is based on branded postpaid + prepaid subscribers.

COVID Driving Industry Churn Even Lower in the Short Term

Total Postpaid Churn



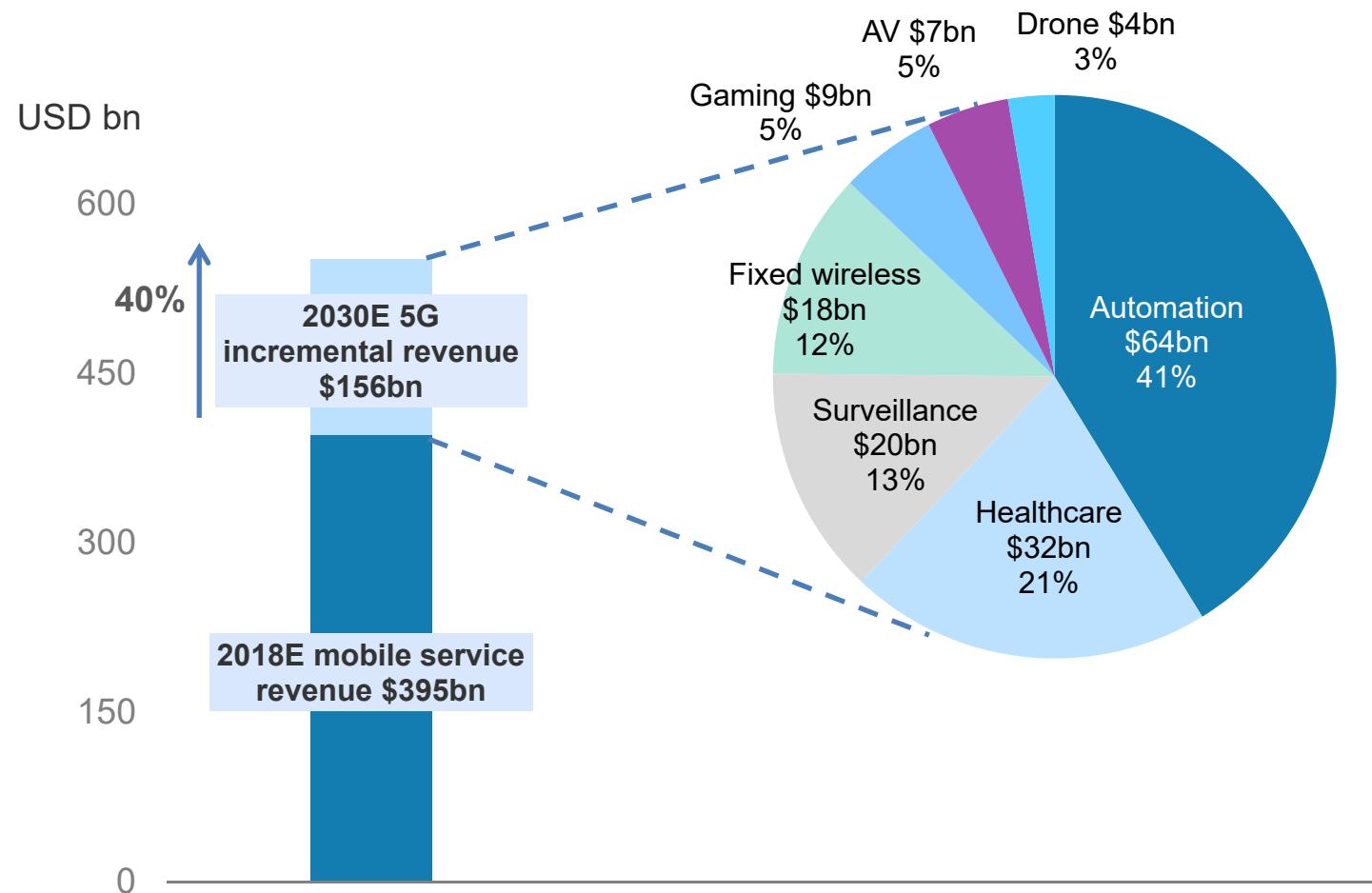
Source: Morgan Stanley Research Estimates, Company Data.

5G Deployments Heating Up in the US



| | Started With Fixed Wireless But Mobile Now In Focus | 5G Nationwide Coverage Now Available | 5G Nationwide Coverage With Low-Band Live | 5G Rollout Ramping in 2H21 |
|----------|--|--|---|---|
| Current | <ul style="list-style-type: none"> Started with 5G Home roll-out (18 cities live) 61 Ultra Wideband mobile 5G markets live Chicago first 5G Home market with new CPE 5G Nationwide coverage for ~230M POPs now live via Dynamic Spectrum Sharing (DSS) 43 stadiums and arenas covered with Ultra Wideband | <ul style="list-style-type: none"> Launched mobile 5G+ standards-based network in parts of 38 cities (using mmWave); ~160M POPs covered 5G Evolution coverage live in 550+ markets; majority of all Americans covered in 1H19 AT&T 5G covers ~230M POPs Using DSS in parts of some markets | <ul style="list-style-type: none"> Launched 5G nationwide on its 600 MHz band in December 2019 Previously launched 5G in select areas of six major markets (mmWave) Nationwide 5G covers 287M POPs Ultra Capacity / 2.5 GHz 5G covers 125M POPs | <ul style="list-style-type: none"> Network planning, vendor selection, and Boost MVNO Guiding to lower end of 2020 Wireless capex range of \$250-500M |
| Planned | <ul style="list-style-type: none"> C-Band: 100M POPs covered by ~March '22, 175M+ by '22-'23, 250M+ by '24 and beyond C-Band capex of \$10bn over 3 years; 7-8k C-Band cell sites, 14k+ additional mmWave sites in '21 Fixed Home Wireless (4G/5G): 15M homes covered by YE'21, 30M by YE'23, 50M by YE'25 | <ul style="list-style-type: none"> Nationwide 5G coverage now available (~230M POPs) C-Band: 70-75M POPs covered by end of '22, 100M Pops covered by early '23 C-Band capex of \$6-8bn in '22-'24 | <ul style="list-style-type: none"> Multi-band strategy; targeting 200M+ POPs covered by Ultra Capacity / 2.5GHz by YE'21, 250M by YE'22 and 90% by '23 New T-Mobile: 5G coverage to 97% by '23 Wireless broadband coverage w/ speeds of 100+ Mbps, to 90% of population in 6 years | <ul style="list-style-type: none"> Plans to ramp 5G network build in 2H21 as Open RAN equipment becomes available; first major market launch by end of 3Q21 AWS-4 FCC commitments require 20% population coverage by June 2022 and 70% coverage by June 2023 Phase 2 buildout entails \$10B in capex |
| Spectrum | <ul style="list-style-type: none"> Initial strategy millimeter wave focused (28 GHz) C-Band: 60 MHz in top 46 markets by Dec '21; 161 MHz nationwide by Dec '23 | <ul style="list-style-type: none"> Will use millimeter wave and lower band spectrum (sub-6 GHz) (850 MHz) C-Band: 40 MHz in top 46 markets by Dec '21; 80 MHz nationwide by Dec '23 | <ul style="list-style-type: none"> “Layer-cake” approach built on a base of 600 MHz + mmWave + 2.5 GHz from Sprint C-Band: ~27 MHz nationwide by Dec '23 including 40 MHz avg. in top markets covering 225M POPs | <ul style="list-style-type: none"> Owns over 100 MHz of Sub-6 GHz spectrum including AWS, CBRS, 600 MHz and 700 MHz |
| Pricing | <ul style="list-style-type: none"> Nationwide 5G included but Ultra Wideband 5G not available on lower-end plans | <ul style="list-style-type: none"> 5G available to all Unlimited tiers | <ul style="list-style-type: none"> Included | <ul style="list-style-type: none"> To be announced |
| 5G Subs | <ul style="list-style-type: none"> 9% of YE20 Consumer Postpaid Phone base | <ul style="list-style-type: none"> Not disclosed | <ul style="list-style-type: none"> 10M+ | <ul style="list-style-type: none"> Not applicable |

5G Use Cases (US, China, Japan, South Korea)



Source: Company Data, Morgan Stanley Research.

Verizon and AT&T Were the Biggest Spenders in the FCC's C-band Auction

| Company | License Payment (\$m) | MHz-Pops (Bn) | \$ / MHz-Pop | License Spend by Category (\$m) | | | Total Cost (\$m) |
|-------------------------------------|-----------------------|---------------|---------------|---------------------------------|---------------|---------------|------------------|
| | | | | A | BC | ABC | |
| Cellco Partnership (Verizon) | 45,455 | 49.3 | \$0.92 | 13,971 | 19,810 | 11,673 | 52,936 |
| AT&T Spectrum Frontiers LLC | 23,407 | 24.5 | \$0.96 | 9,287 | 8,599 | 5,522 | 27,485 |
| T-Mobile License LLC | 9,336 | 8.3 | \$1.13 | - | 8,115 | 1,221 | 10,580 |
| United States Cellular Corporation | 1,283 | 1.6 | \$0.82 | - | 240 | 1,043 | 1,454 |
| NewLevel II, L.P. | 1,277 | 1.1 | \$1.16 | - | 1,084 | 194 | 1,448 |
| Canopy Spectrum, LLC | 197 | 0.7 | \$0.28 | - | - | 197 | 223 |
| Widespread Wireless, LLC | 65 | 0.2 | \$0.40 | - | - | 65 | 73 |
| Cellular South Licenses, LLC | 50 | 0.1 | \$0.62 | - | - | 50 | 57 |
| Pioneer Telephone Cooperative, Inc. | 24 | 0.0 | \$2.06 | - | - | 24 | 27 |
| Carolina West Wireless, Inc. | 19 | 0.0 | \$0.58 | - | - | 19 | 21 |
| Top 10 | 81,112 | 85.8 | \$0.95 | 23,258 | 37,847 | 20,007 | 94,304 |
| Total (All Winners) | 81,169 | 85.9 | \$0.95 | 23,258 | 37,847 | 20,064 | 94,369 |

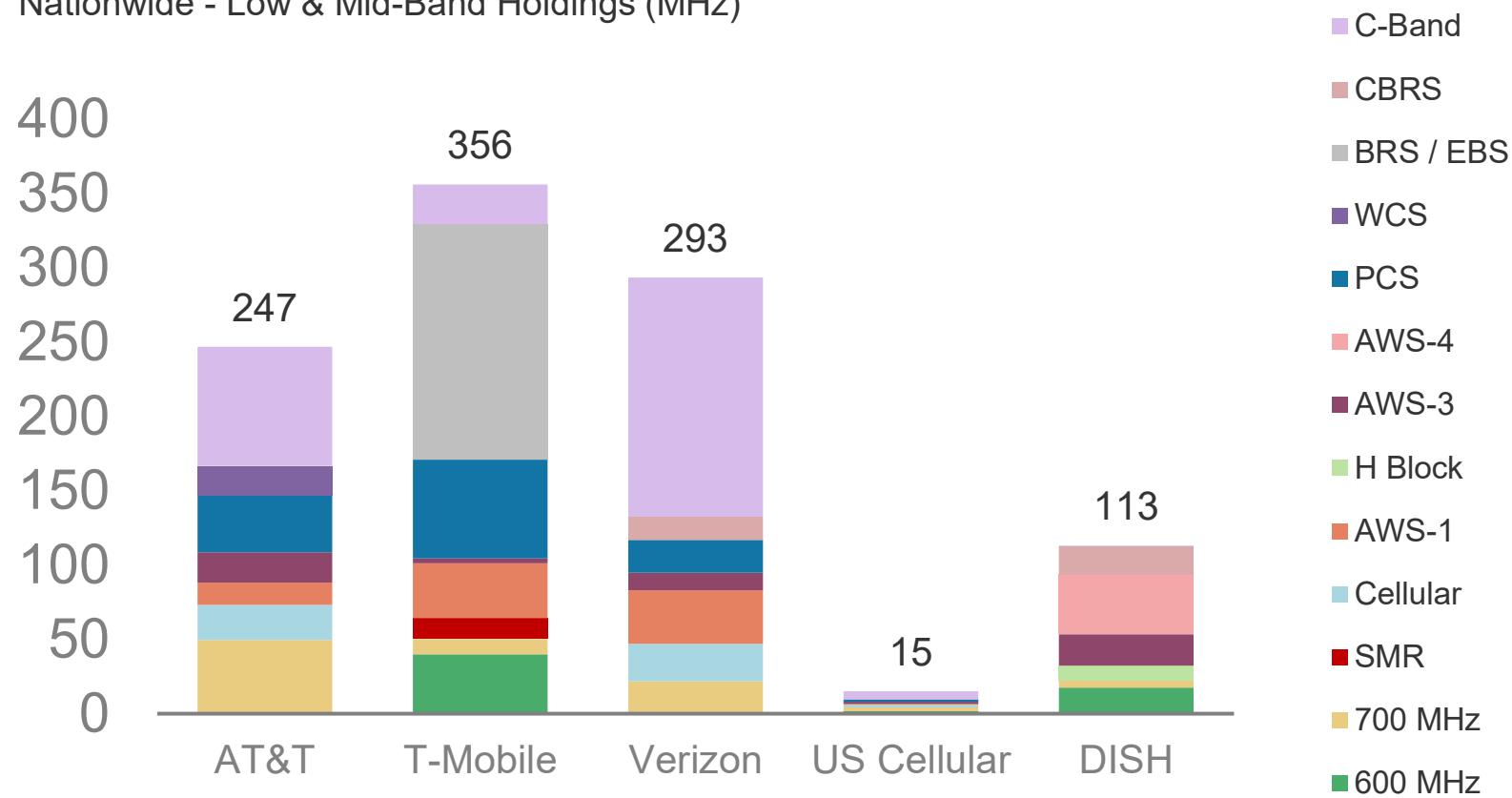
Upcoming auctions:

- FCC set to auction 100 MHz of 3.45-3.55 GHz spectrum in October 2021 for estimated proceeds of \$15-20bn
- Canadian 3.5 GHz auction scheduled for June 2021

Source: Morgan Stanley Research. Note: Total cost Includes \$9.7B in accelerated relocation and estimated \$3.5B in clearing costs. License payment, \$ / MHz-Pop, license spend by category and total costs columns are based on gross auction total of \$81,169m rather than net proceeds of \$81,115m so is not reflective of bidding credits.

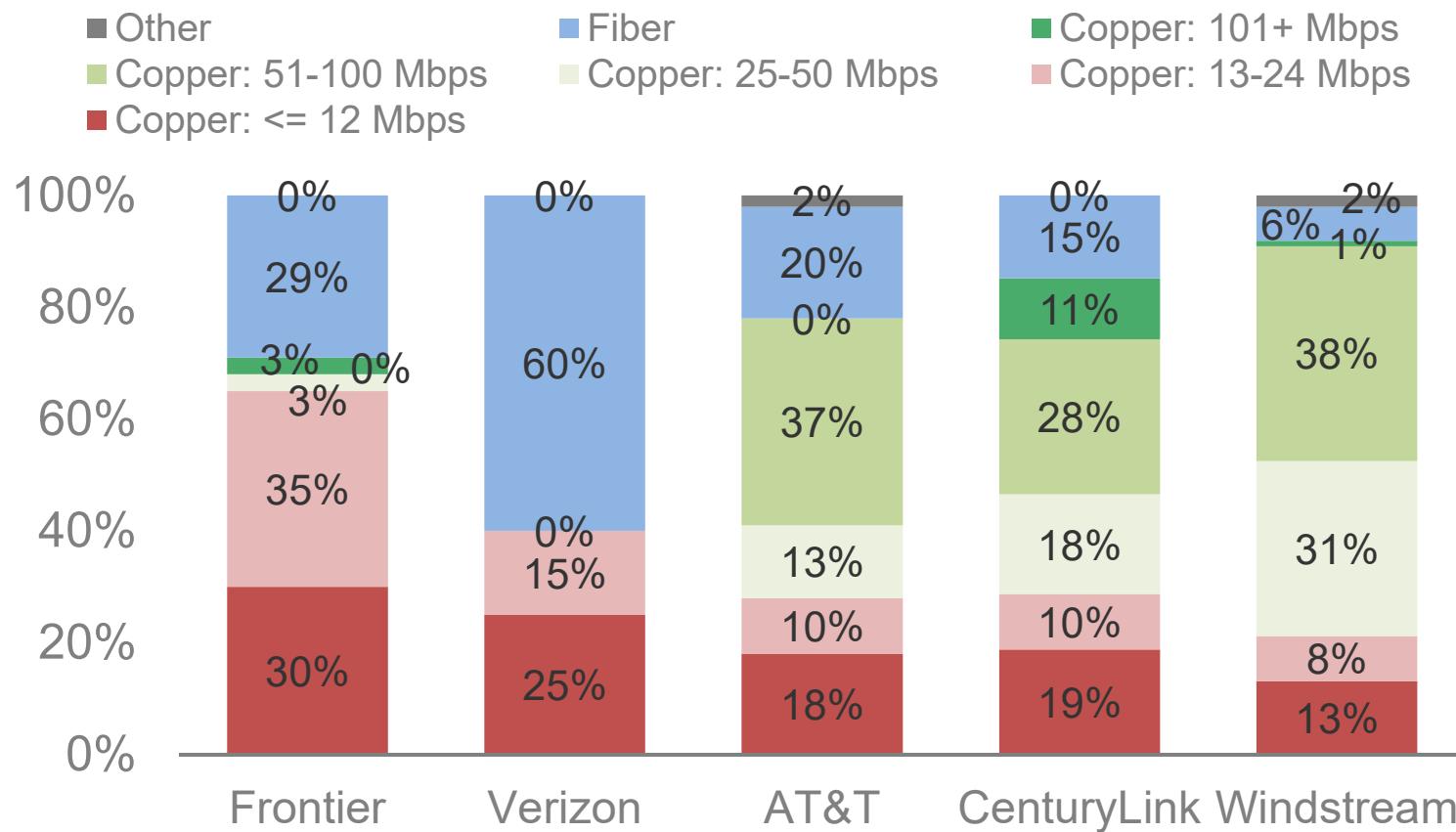
Company Spectrum Holdings Post C-Band Auction

Nationwide - Low & Mid-Band Holdings (MHz)



Telco Broadband Speed Offerings Vary by Provider

ILECs: % Housing Units by Max BB Speed / Tech Available in Census Blocks

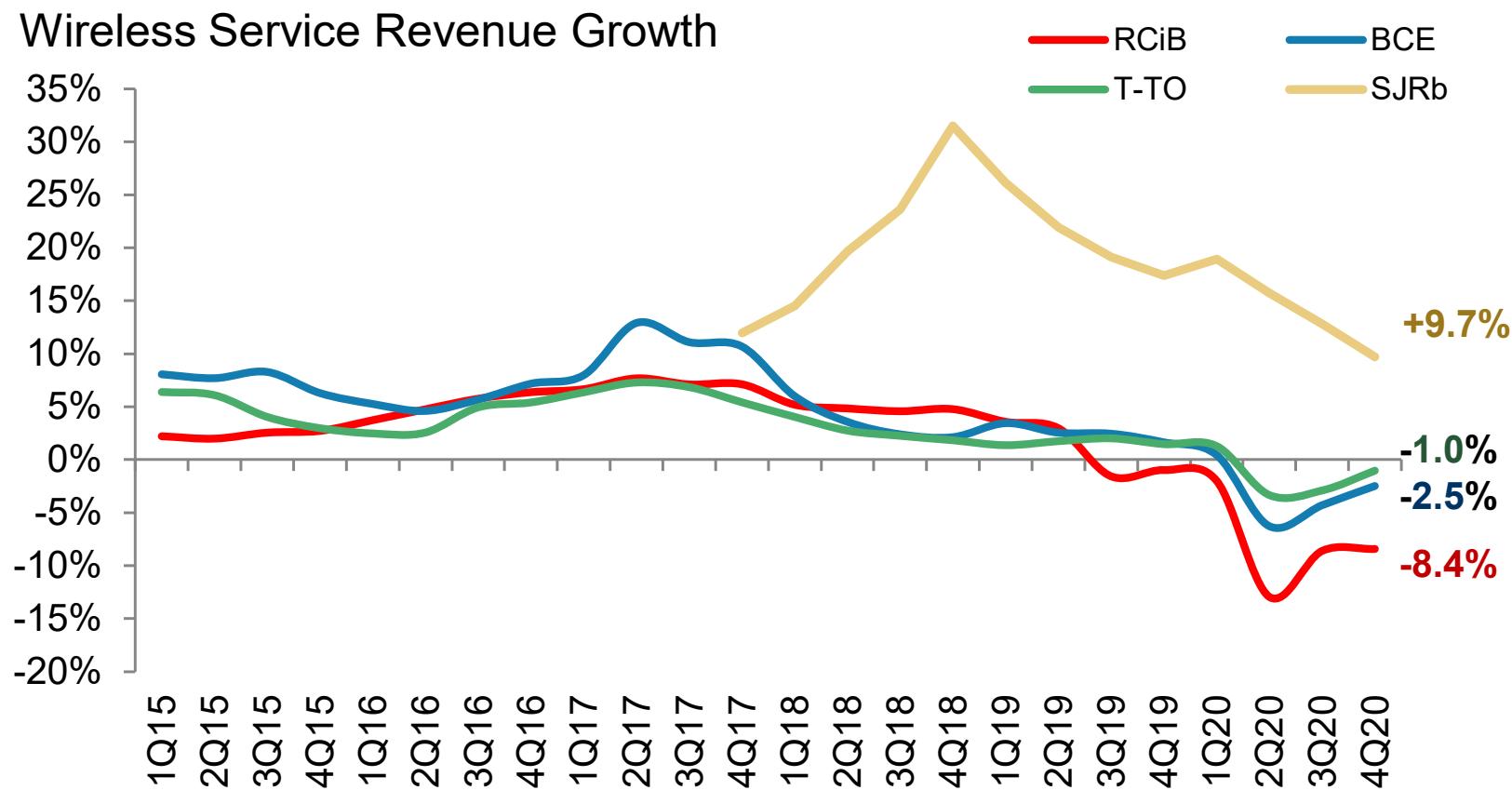


Source: Frontier 8-K Published 3/27/2020 page 72, FCC Form 477. FTR figures shown are pro-forma for WDC transaction

Regulation Bears Watching

- Infrastructure bill proposes \$100bn in broadband funding
- Corporate tax increases also on the table
- Anti-trust policy could change, with several deals on the table
- Awaiting nominee to head the FCC permanently, with Net Neutrality in focus

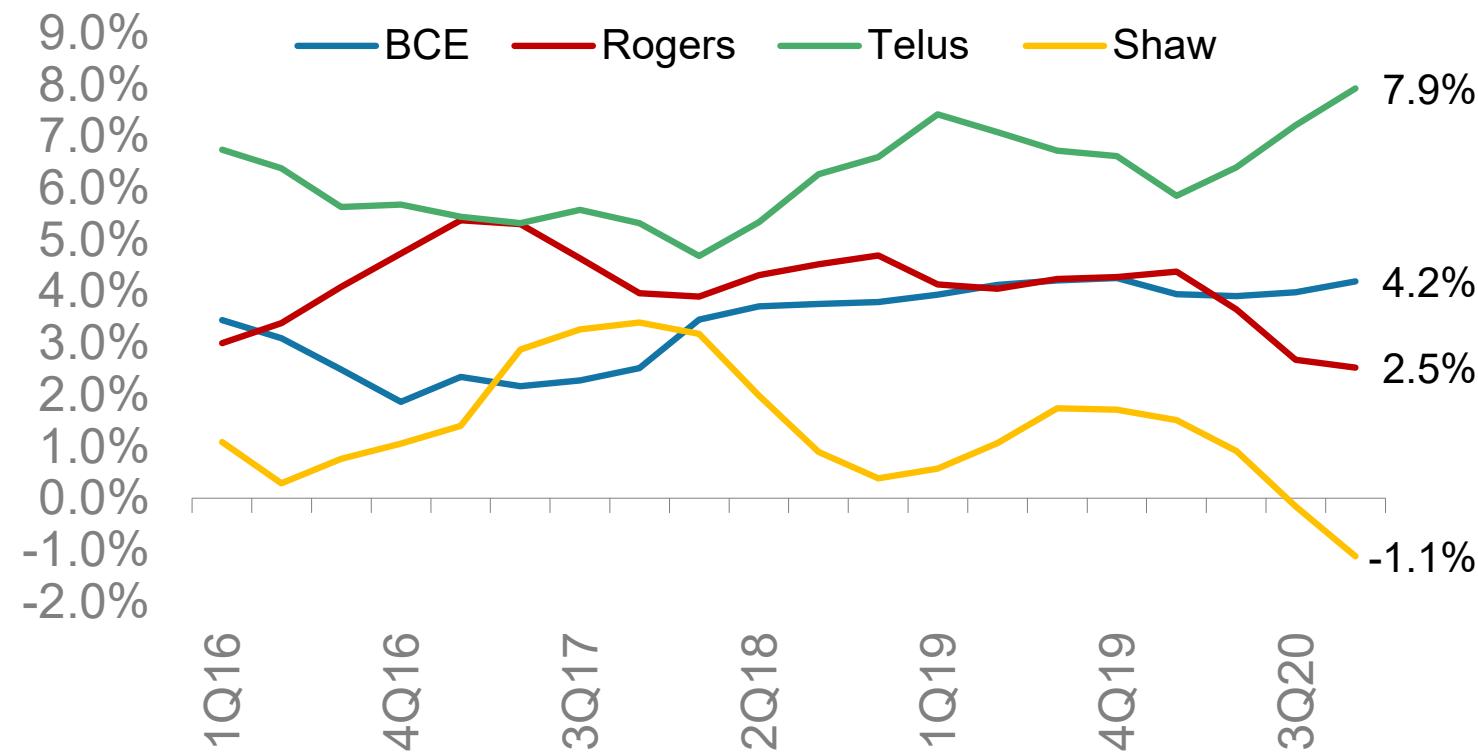
Canada – Wireless Service Revenues Being Pressured by the Loss of Overage and Roaming Revenues



Source: Company Data, Morgan Stanley Research.

Canada – Broadband Demand Has Been Strong During COVID, Accelerating Trends for Telus

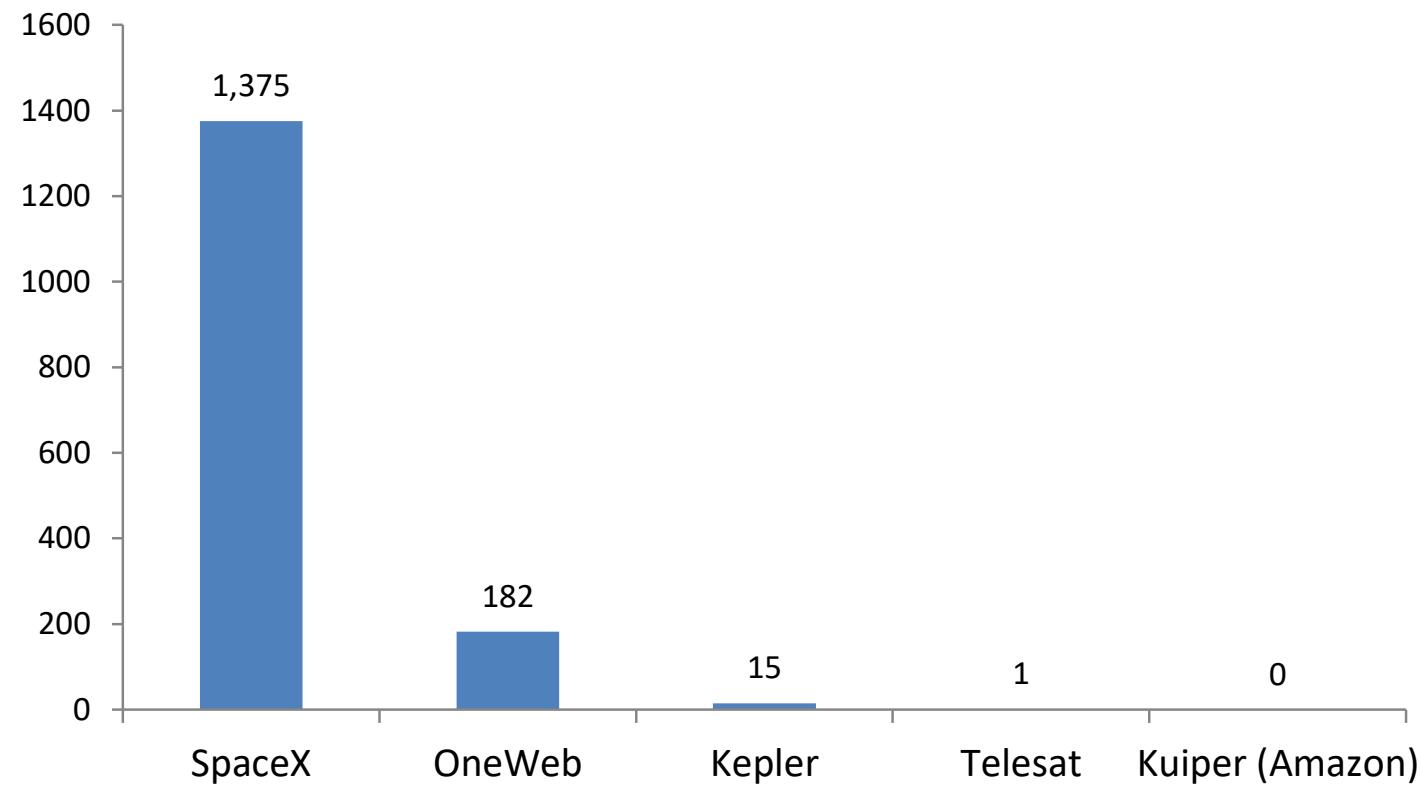
Broadband Subscriber Growth



Source: Company Data, Morgan Stanley Research.

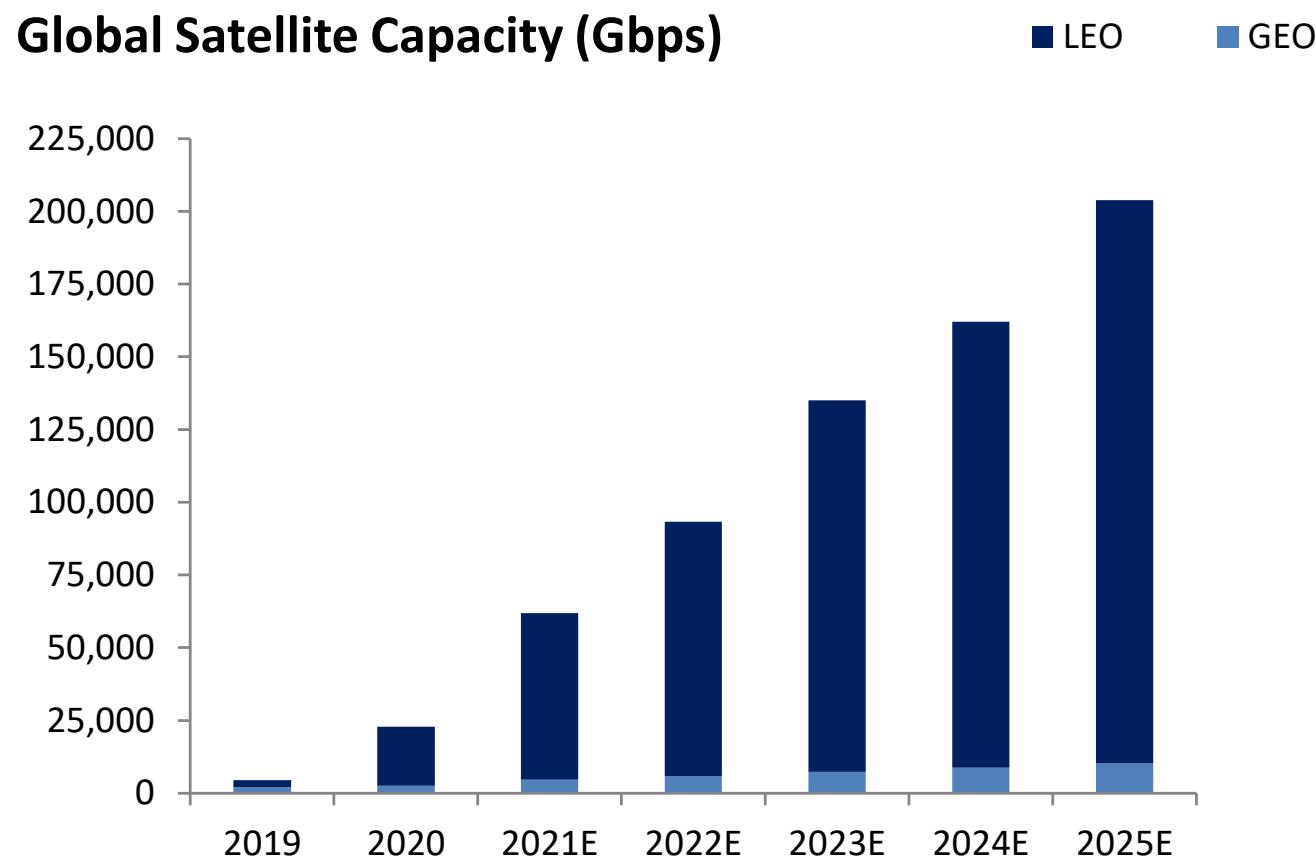
LEO Race Heating Up with SpaceX Leading the Way

LEO Satellites Launched to Date



Source: Company Data, Morgan Stanley Research.

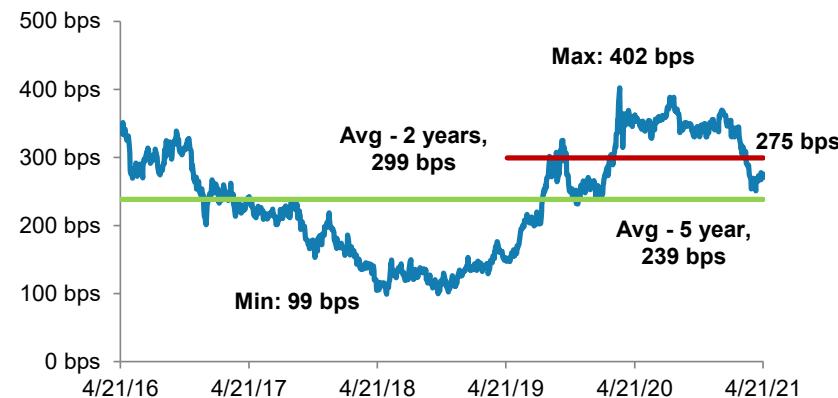
Satellite Capacity Expected to Increase Substantially in Coming Years



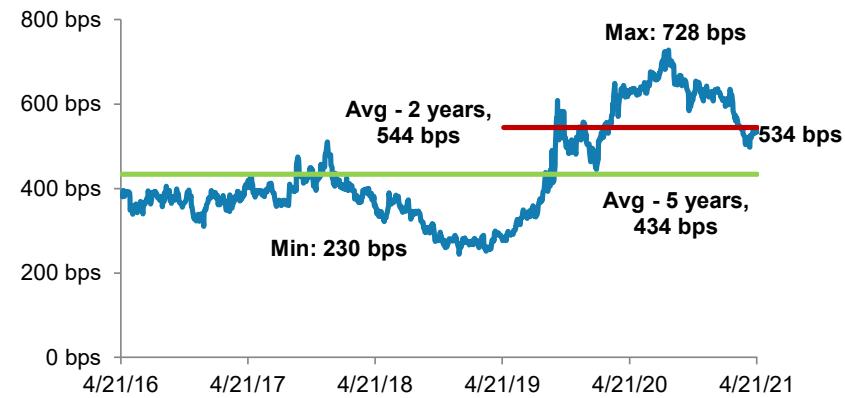
Source: Company Data, Morgan Stanley Research.

AT&T and Verizon Valuation Charts

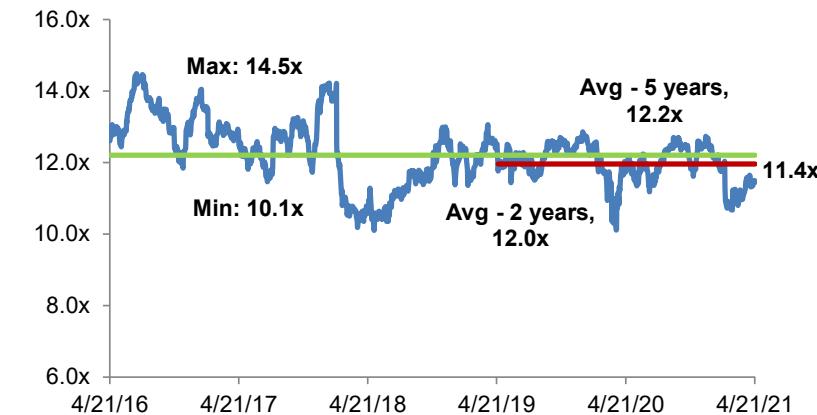
VERIZON DIVIDEND YIELD SPREAD VERSUS US 10-YEAR



AT&T DIVIDEND YIELD SPREAD VERSUS US 10-YEAR



VERIZON - NTM P/E



AT&T - NTM P/E



Source: Thomson, Company data, Morgan Stanley Research

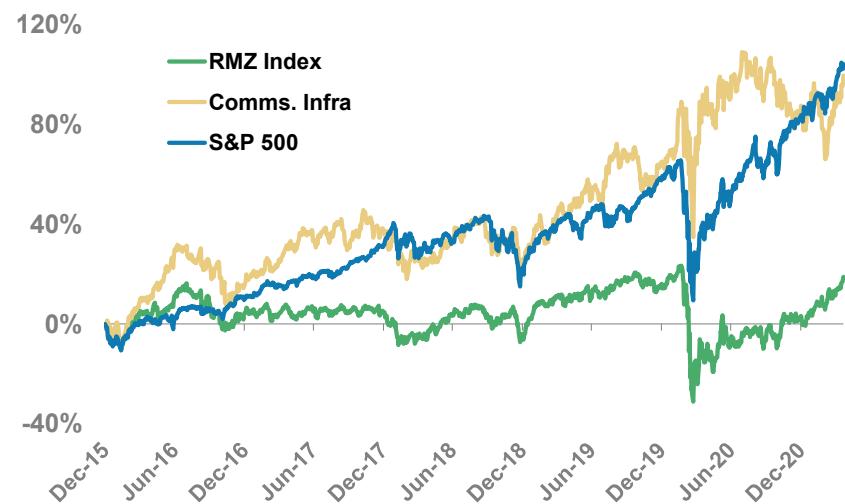
Communications Infrastructure

Communications Infrastructure: In-Line Industry View

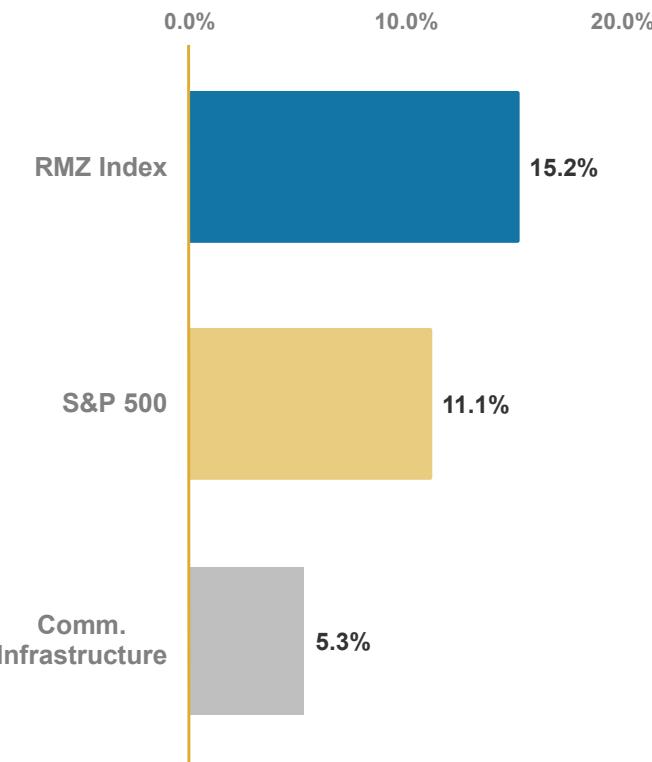
| | |
|---|--|
| Stable Business Models | The companies provide passive infrastructure assets with high barriers to entry, and a significant degree of visibility into forward revenue (i.e., long lease terms, annual rent escalators). COVID-19 impacts may drive incremental demand for cloud spending, but could also pressure enterprise IT spending overall. |
| Supportive Secular Growth Trends | Global and North America internet and wireless network traffic is growing at a healthy rate, which is expected to continue for the foreseeable future. The latest Cisco forecasts call for global IP traffic to increase at a 27% CAGR through 2022, with global mobile data increasing at a 46% CAGR over that period. |
| Significant Cash Flow Growth | We expect our Communications Infrastructure group to see AFFO/share growth of mid-to-high single digits annually through 2022, which compares favorably to the REITs overall at ~2%. |
| Valuation | REITs valuations provide support: Communications Infrastructure trades at ~26x 2021 AFFO/sh while offering ~10% total returns vs REITs overall at ~23x with ~5% total returns. We believe a valuation premium is justified due to several business model advantages, but note it has compressed in recent quarters due to towers and data centers screening as expensive secular growth stories vs a market preference for reopening winners. |

Communications Infrastructure Price Performance

Comm. Infra has historically outperformed the RMZ ...



... but is underperforming in 2021 YTD

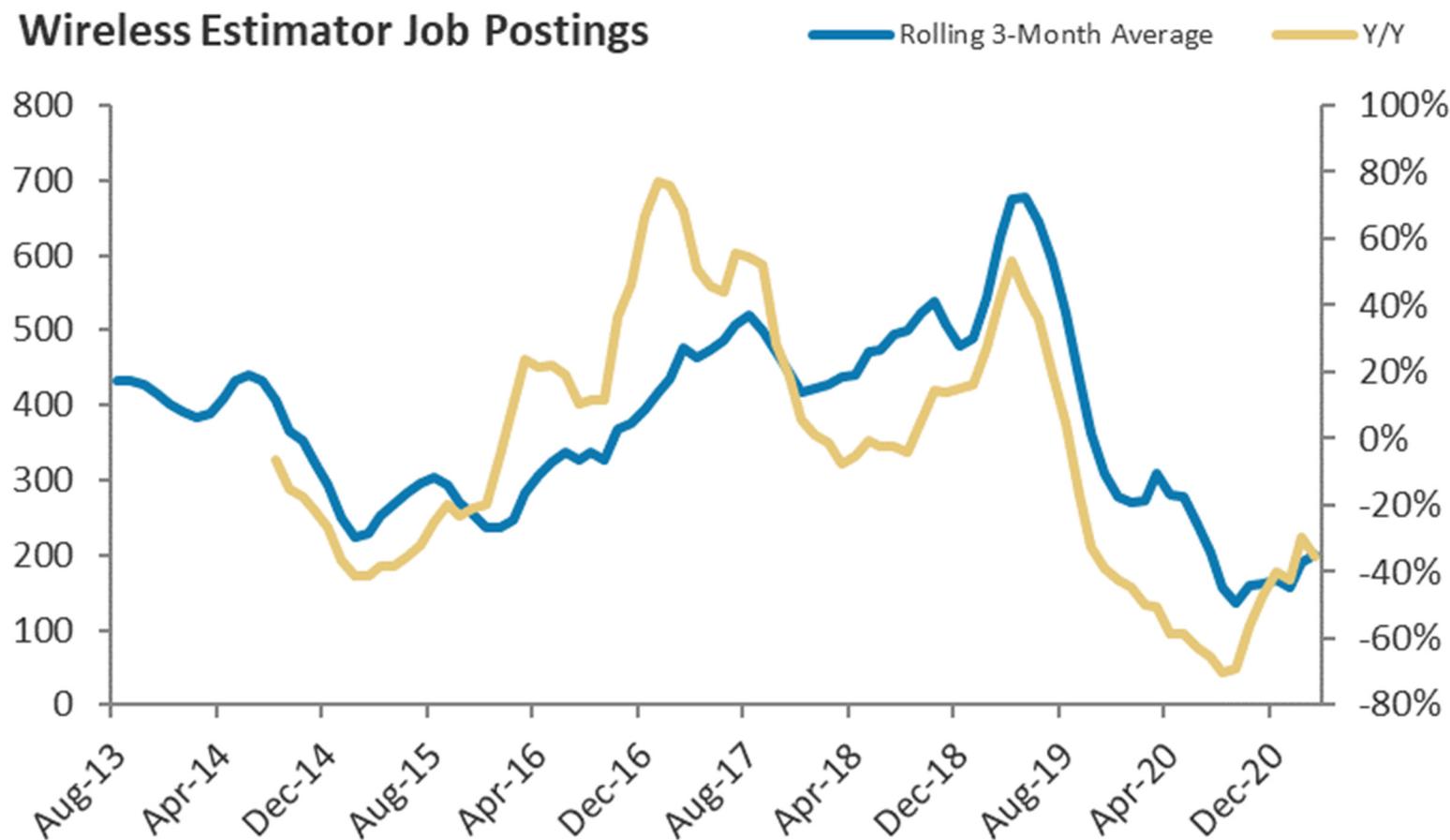


Towers vs Data Centers: Business Model Characteristics

| Metric | Towers (US) | Data Centers |
|---|-------------|--------------|
| Contract Length | 5-15 Years | 3-12 Years |
| Annual Escalators | ~3% | 2-4% |
| Avg. Asset Utilization | ~50% | ~90% |
| Top 5 Tenant Concentration | >85% | 25-35% |
| Annual Supply Growth | ~1-2% | 5-10% |
| Competitive Moat / Zoning Protection | High | Medium |
| Land Ownership | ~30% | ~90%+ |

Source: Company Data, Morgan Stanley Research

Towers – Job Postings Off Peak, but Starting to Rebound



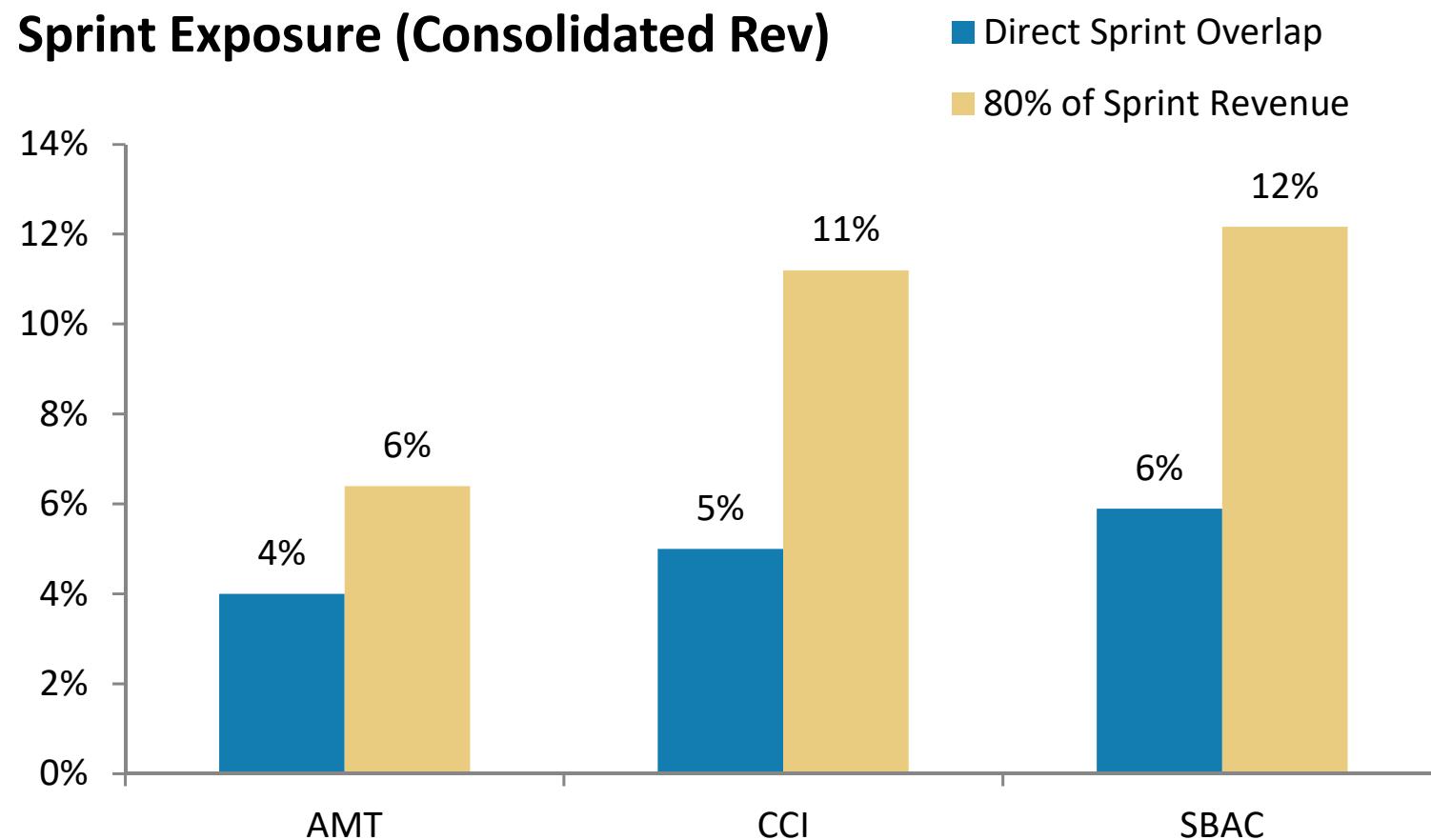
Source: Wirelessestimator.com, Company Data, Morgan Stanley Research

Towers – Multiple Tower Leasing Drivers for 2021+

| Driver | Rev Impact | Timeline | | | | | | MS Expectation |
|---|----------------------------|----------|------|------|------|------|------|---|
| | | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | |
| New T-Mobile Site Decommission | 35k sites at \$3,250/month | | | | | | | Site decommissioning likely to take several years after initial network build given remaining lease terms |
| | -11% | | | | | | | |
| New T-Mobile Colocations | 10k sites at \$2,500/month | | | | | | | Company has committed to 3 and 6-year network build targets |
| | 2% | | | | | | | |
| New T-Mobile Site Upgrades | 60k sites at \$600/month | | | | | | | Company has committed to 3 and 6-year network build targets |
| | 4% | | | | | | | |
| DISH Network Build | 30k sites at \$2,000/month | | | | | | | Any spend is largely incremental. Committed 20% coverage by 2022 and 70% by 2023 |
| | 6% | | | | | | | |
| VZ/T Match C-Band Amendments | 110k sites at \$600/month | | | | | | | The Bells deploy C-Band to their existing macro networks |
| | 6% | | | | | | | |
| VZ/T C-Band Densification | 30k sites at \$2,500/month | | | | | | | As the new Big 3 compete on 5G, the Bells densify to match T-Mobile's 85k+ macros |
| | 7% | | | | | | | |
| Net Impact to Tower Industry Revenue | 15% | | | | | | | |

Source: Company Data, Morgan Stanley Research

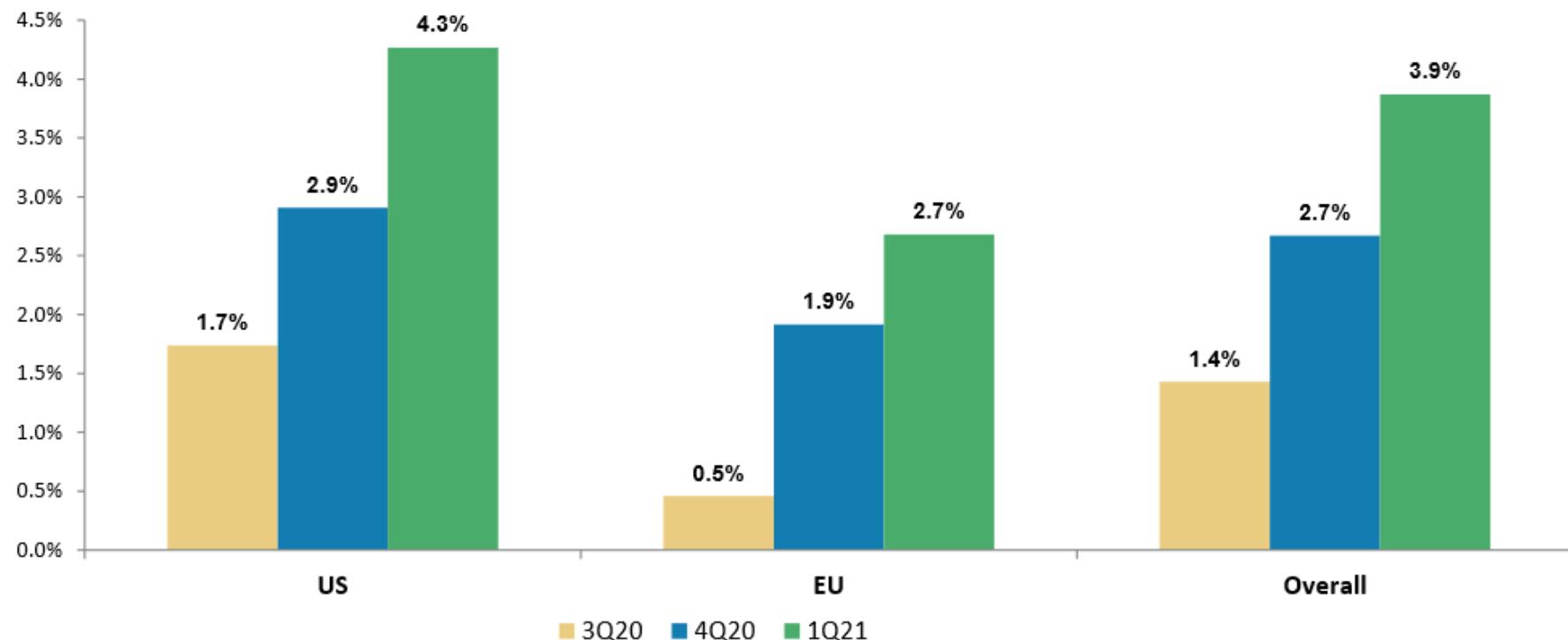
Towers – Significant Exposure to S/TMUS Merger



Source: Company Data, Morgan Stanley Research

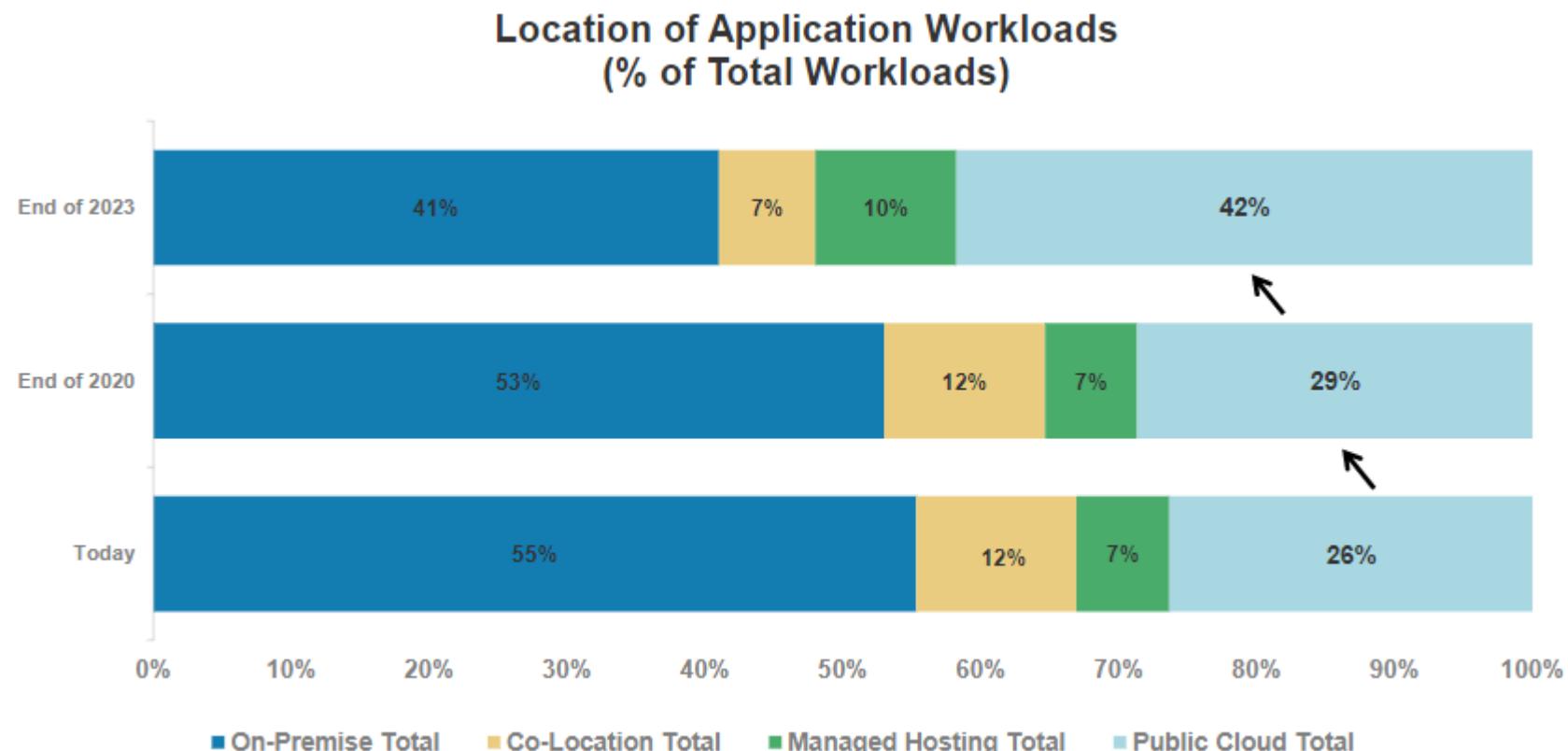
CIO Survey: Expectations for 2021 IT Budget Growth Return to Historical Levels

2021 External IT Spending Growth Expectations by Region



Source: AlphaWise Morgan Stanley Research. N=100 (US and EU data)

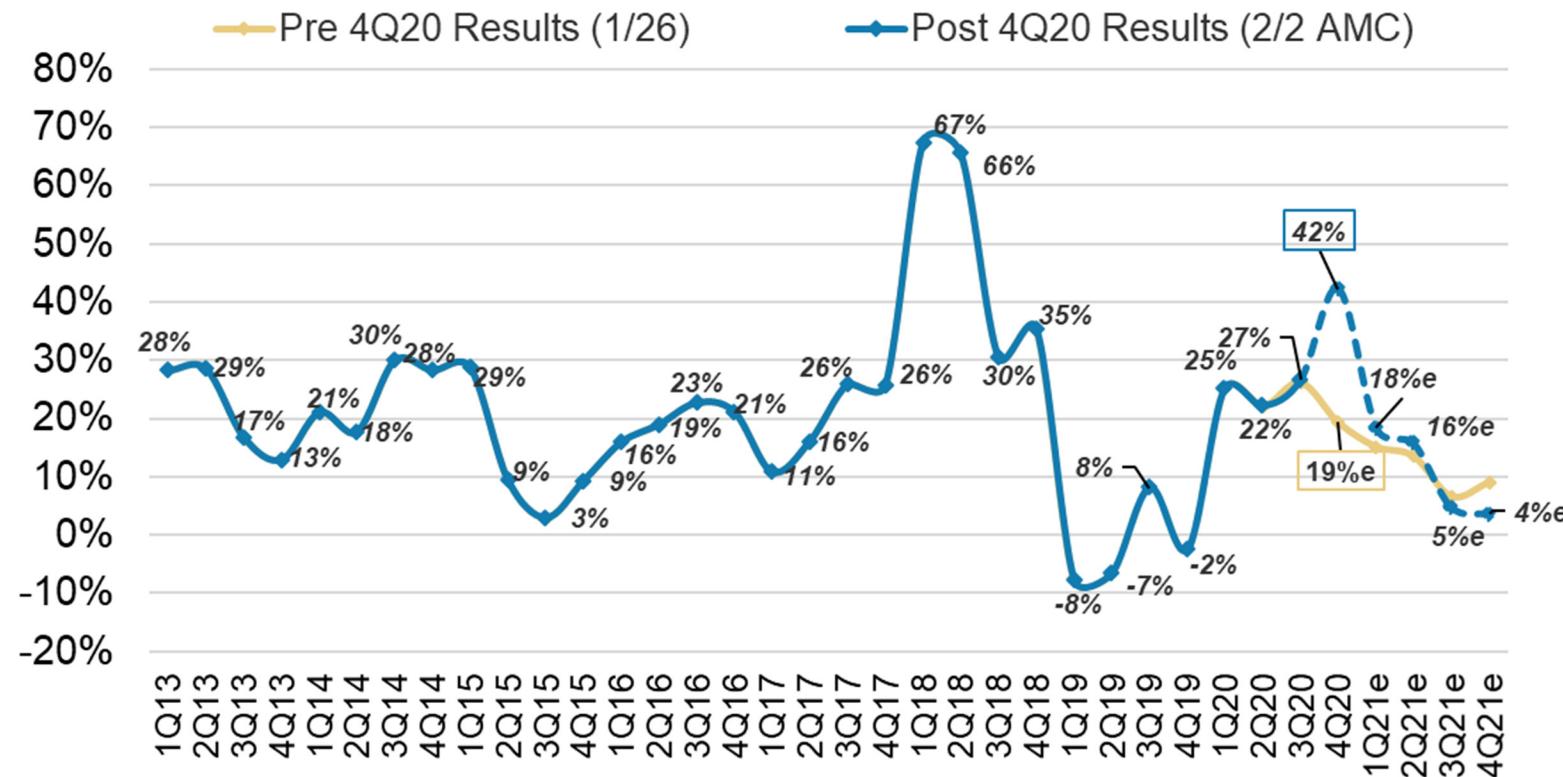
On-premise Workloads Declining to 41% of Total by 2023



Source: AlphaWise, Morgan Stanley Research. n=100 (US and EU data)

Cloud Capex Estimates Forecast Mid-teen Growth for 1H21

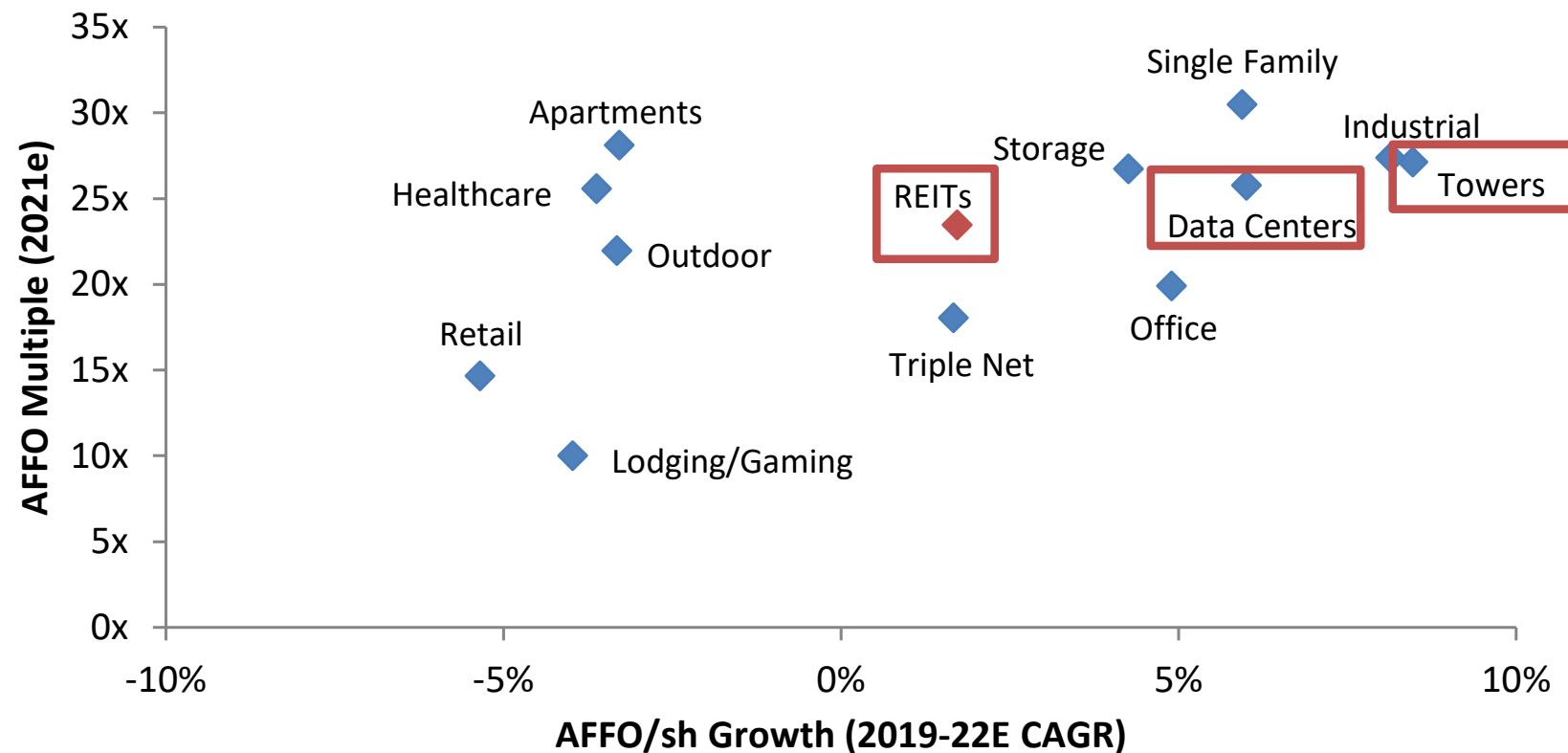
Cloud Capex Growth (Y/Y) - Weighted Avg.



Source: Company data, Thomson Reuters, Morgan Stanley Research, irs.gov. Note: Cloud capex includes capex from Alphabet, Amazon, Microsoft, Facebook, Alibaba, Tencent, Baidu, Apple, IBM, and Oracle. Forward estimates include MSe for Tencent and Baidu, consensus est. for the others.

Towers & Data Centers Versus REITs

AFFO Growth vs Valuation

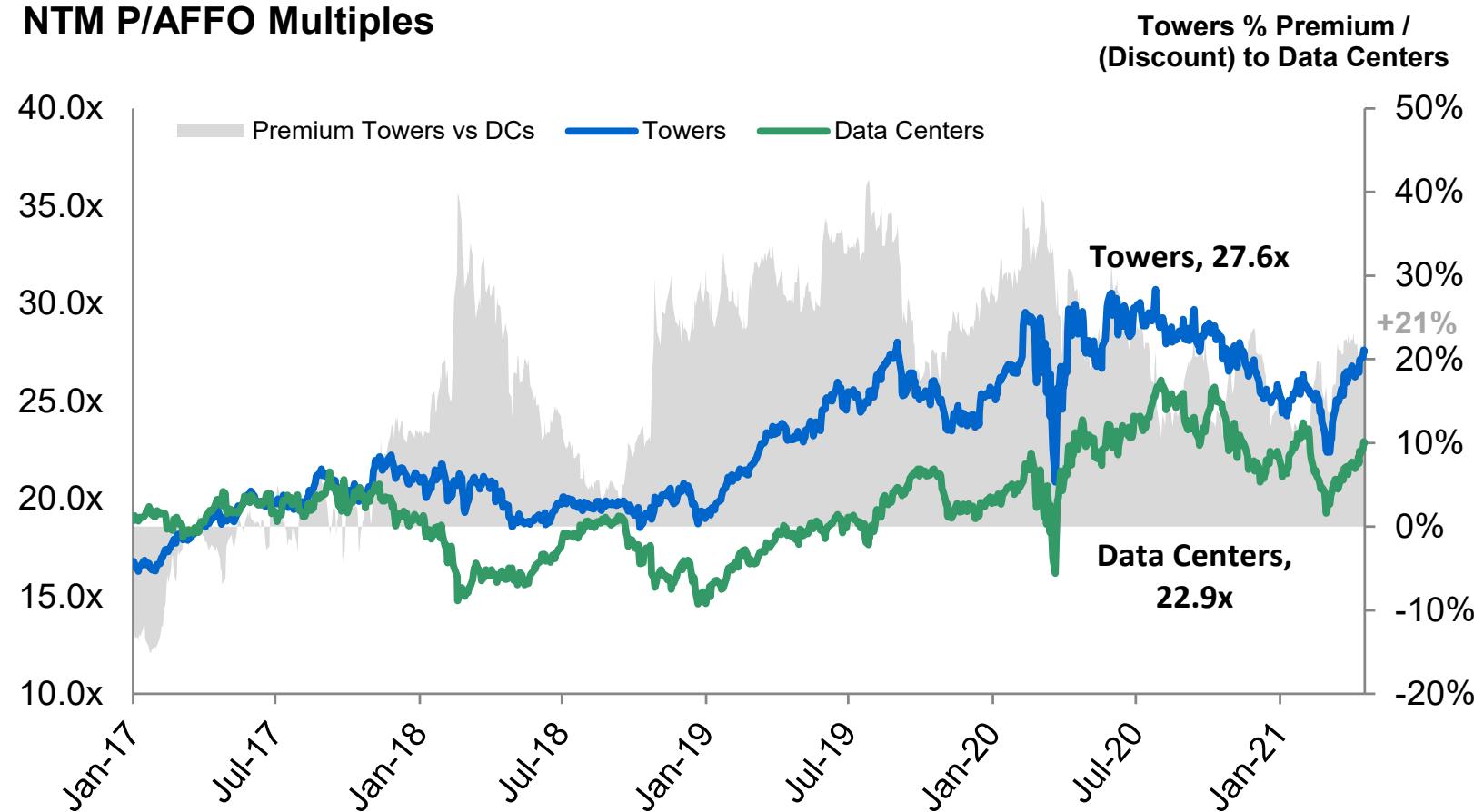


Source: Company Data, Morgan Stanley Research, Thomson Reuters.

Notes: REITs include those covered by Morgan Stanley. Market weighted AFFO per share and growth.

Towers Now Trade at a ~21% Premium to Data Centers

NTM P/AFFO Multiples



Source: Morgan Stanley Research Estimates, Refinitiv.

Top Picks

Telecom Services

T-Mobile

Strong outlook as company leverages newfound scale and achieves \$6bn+ in run-rate synergies

TDS® U.S. Cellular

Significant upside possible from potential monetization of USM tower portfolio

TELUS

Strong Canadian wireless market growth and an attractive dividend growth story

Communications Infrastructure

CROWN CASTLE

Continuing to benefit from ongoing wireless carrier network spending into 2021 and beyond

QTS

Business execution is improving on exposure to stable enterprise revenue streams; attractive upside for valuation to re-rate to peer averages

CyrusOne

Secular demand supports growth – global expansion through Zenium is viewed positively by the market

April 2021

Technology, Media & Telecom Spring Training Teach-In

TMT Credit Research

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David Hamburger, Lindsay Tyler and Fernanda Lima are fixed income strategists and are not opining on equity securities. Their views are clearly delineated. Due to the nature of the fixed income market, the issuers or bonds of the issuers recommended or discussed in this report may not be continuously followed. Accordingly, investors must regard this report as providing stand-alone analysis and should not expect continuing analysis or additional reports relating to such issuers or bonds of the issuers.

Note: Information as of April 16, 2021, unless otherwise indicated.

Morgan Stanley does and seeks to do business with companies covered in Morgan Stanley Research. As a result, investors should be aware that the firm may have a conflict of interest that could affect the objectivity of Morgan Stanley Research. Investors should consider Morgan Stanley Research as only a single factor in making their investment decision.

For analyst certification and other important disclosures, refer to the Disclosure Section, located at the end of this report.

Coverage Universe

Sector credit views

- **Cable:** Cautious
- **Telecom:** Cautious
- **Media:** Cautious

Credits in focus

- **Investment Grade (IG):** AT&T (T), Verizon (VZ), Charter (CHTR), T-Mobile (TMUS, SPRNTS), Comcast (CMCSA), Cox Communications (COXENT), Discovery (DISCA), The Walt Disney Co (DIS), Fox Corp (FOXA), Dell (DELL), VMware (VMW)
- **High Yield (HY):** T-Mobile (TMUS), Charter (CHTR), Lumen Technologies (LUMN, QWECOM, LVLT), DISH DBS (DISH), Altice USA (CSCHLD), Netflix (NFLX), Dell (DELL)
- **Distressed:** Diamond Sports (SBGI/DSPORT), Uniti (UNIT), Frontier (FTR)

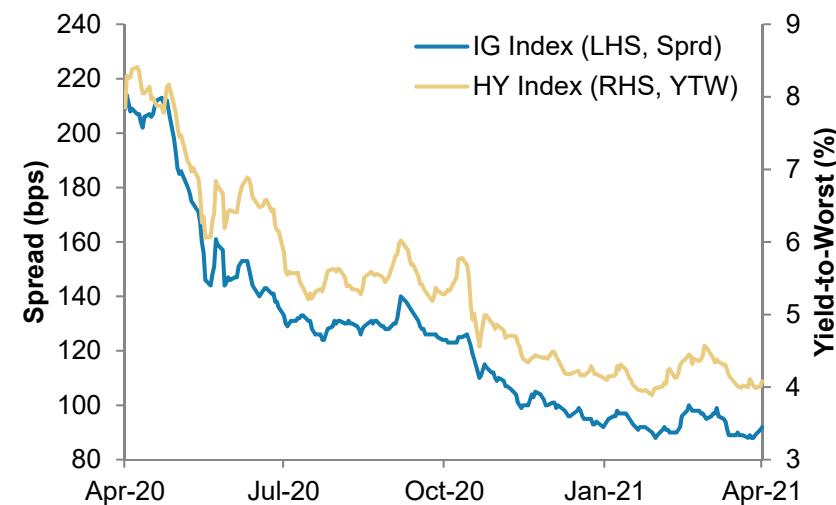
Bond Market Pricing & Performance

IG on spread: Investment grade bonds are quoted as a spread to the Treasury, but we also look at g-spread, z-spread, option-adjusted spread (OAS), and dollar price.

HY on Px/YTW: High-yield bonds, as well as term loans, are quoted on dollar price, with an implied Yield-to-Worst, taking into account call schedules. OAS can be used.

CDS: Credit default swaps (CDS) are quoted on spread (or points upfront in more distressed cases).

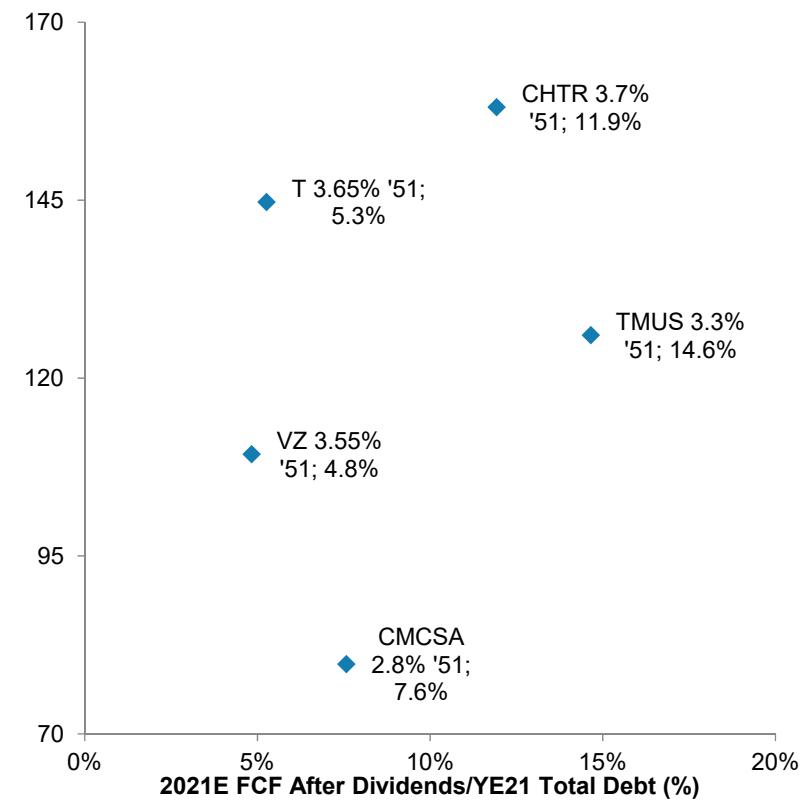
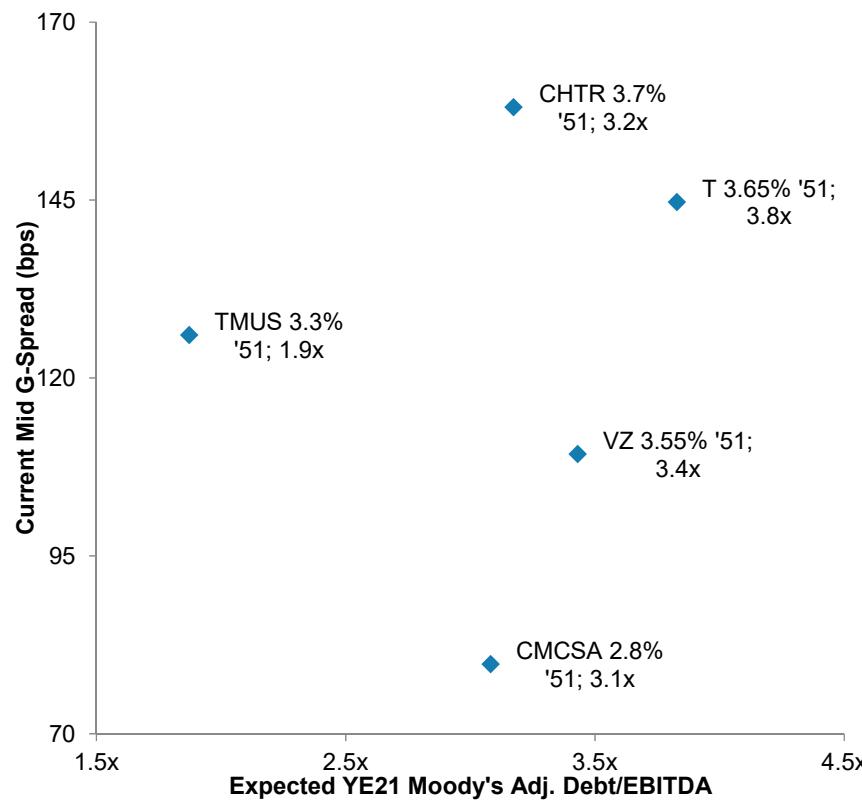
YoY Performance of Broader Credit Indices



Source: Bloomberg (LUACOAS and LF98YW Index), Morgan Stanley Research. Updated 4/21/2021.

Investment Grade Valuation Framework

The market prices on rating, while we prefer focusing on FCF after dividends/debt, causing a more random scatter.



Source: Morgan Stanley Research, Company filings, Moody's (Credit Opinions as of 04/08/21 for AT&T, 03/12/21 for VZ, 12/29/20 for TMUS, 11/30/20 for CHTR and 10/29/20 for CMCSA), Morgan Stanley Equity Research (select EBITDA, FCF and dividend estimates from Simon Flannery's AT&T, VZ and TMUS models all dated 04/05/21, as well as Ben Swinburne's CHTR 02/01/21 model and CMCSA 03/04/21 model). Presenting debt in each graph for CHTR and TMUS as the secured debt balance, and therefore, are presenting a metric on the left for what we'd expect Moody's to see leverage at through that layer though it is not a principal metric used by the agency. Updated 4/15/2021 close.

Rating Agencies

There are three main credit rating agencies that evaluate the creditworthiness of bond issuers.

| Moody's | | S&P | | Fitch | |
|-----------|------------|-----------|------------|-----------|------------|
| Long-term | Short-term | Long-term | Short-term | Long-term | Short-term |
| Aaa | P-1 | AAA | A-1+ | AAA | F1+ |
| Aa1 | | AA+ | | AA+ | |
| Aa2 | | AA | | AA | |
| Aa3 | | AA- | | AA- | |
| A1 | | A+ | | A+ | |
| A2 | | A | | A | |
| A3 | P-2 | A- | A-2 | A- | F2 |
| Baa1 | | BBB+ | | BBB+ | |
| Baa2 | P-3 | BBB | A-3 | BBB | F3 |
| Baa3 | | BBB- | | BBB- | |
| Ba1 | Not prime | BB+ | B | BB+ | B |
| Ba2 | | BB | | BB | |
| Ba3 | | BB- | | BB- | |
| B1 | | B+ | | B+ | |
| B2 | | B | | B | |
| B3 | | B- | | B- | |
| Caa1 | | CCC+ | C | CCC+ | C |
| Caa2 | | CCC | | CCC | |
| Caa3 | | CCC- | | CCC- | |
| Ca | | CC | | CC | |
| C | | C | | C | |
| / | | SD/D | | RD/D | |
| / | | | | RD/D | |

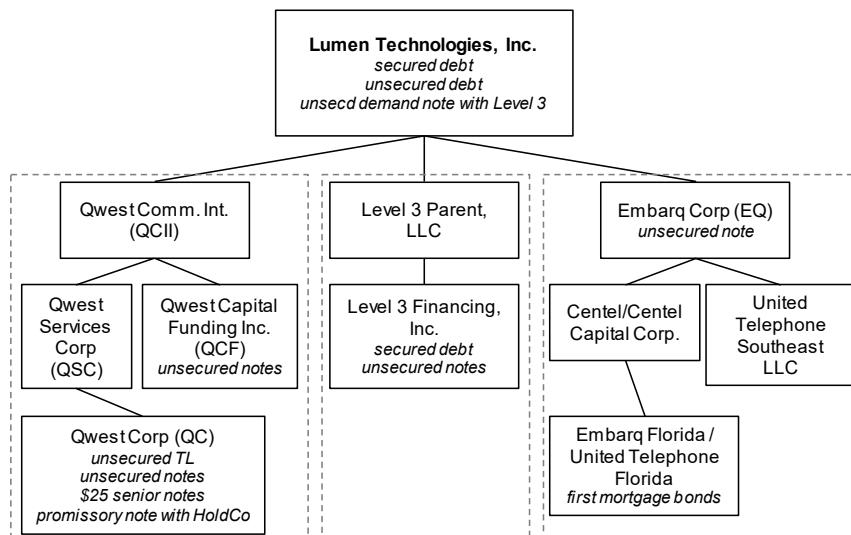
Rating agencies make adjustments to a reported debt balance for debt-like liabilities.

| Example: AT&T Adj. Debt Calculation | | |
|--|--|----------------|
| Balance sheet debt | | |
| Total balance sheet debt* | | 180,199 |
| Adjustments | | |
| (-) Cash and cash equivalents* | | (11,342) |
| (+) Pension unfunded status | | 7,552 |
| (+) Preferred in Mobility | | 8,656 |
| (+) Operating leases | | 31,123 |
| (+) Equipment installment receivables | | 5,646 |
| (+) Revolving receivables | | 5,300 |
| (+) Preferred interests in subsidiaries | | 8,000 |
| (+) Preferred equity (50% treatment)* | | 2,675 |
| Total adjustments | | 57,610 |
| Adjusted debt | | 237,809 |
| Other items to flag | | |
| OPEB unfunded status | | 10,085 |
| UTBs | | 12,451 |
| Total adjustments / adjusted debt | | 24% |

Covenants, Collateral, & Corporate Structures

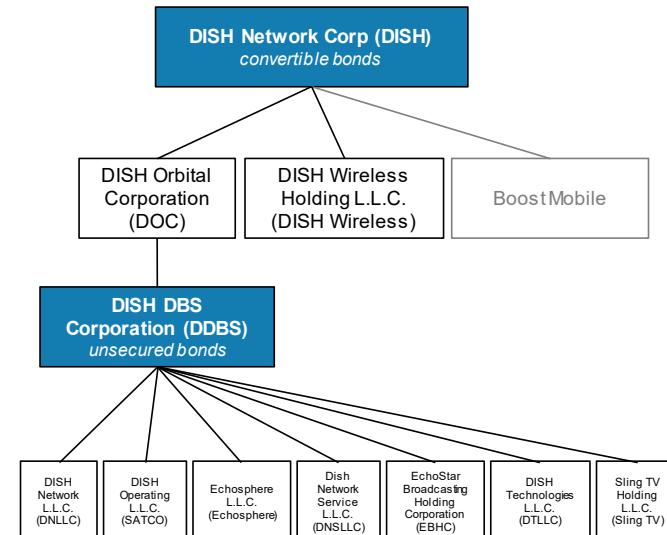
Example – Lumen Technologies (LUMN, LVLT, QWECOM):

LUMN has debt at the HoldCo and then at three large OpCo credit pools (Qwest, Embarq, and Level 3), with multiple classes of debt at each and intracompany lending. Each pool has a different recovery waterfall.



Example – DISH DBS (DISH):

Our thoughts for potential funding options for the wireless build-out stem from flexibility under covenants (debt incurrence, secured debt, restricted payments) and the structure where spectrum sits outside the DBS obligor.



Appendix: Trade Recommendations in Telecom & Cable

| Description | Trade | Entry Level | Entry Date | Rationale | Risks |
|------------------------|--|---|--|---|---|
| TMUS IG 10Y | Buy TMUS 3.875 04/15/30 Buy TMUS 2.55 02/15/31 Buy TMUS 2.25 11/15/31 | +201 bps +167 bps +111 bps | 6/3/2020 7/16/2020 1/19/2021 | <ul style="list-style-type: none"> We think TMUS will gain a competitive edge in 5G vs. its peers before C-Band spectrum becomes available, which will drive improving credit metrics causing spreads to tighten further relative to VZ. Reinforcing our view is T-Mobile's 2021E FCF / Est. YE21 Total IG Debt of 14.6% far exceeding Verizon's 2021E FCF after Dividends / Est. YE21 Total Debt of 4.8%. We continue to have a preference for the 10Y part of the TMUS IG curve, due to the relatively flat 10s/30s curve compared to AT&T and considering the 10Y are trading flat to AT&T 10Y. | <ul style="list-style-type: none"> Some risks related to the Sprint deal are merger integration, execution risks, and synergy expectations. Achieving a full IG structure would result in collateral being released on the secured notes. But once the company as a whole achieves an IG capital structure, we think the company's competitive position and finances should be in better shape, making the security less relevant. While management guided to an IG CFR in 2023, it is possible that it could take longer to attain. |
| TMUS New HY | Buy TMUS 2.250 02/15/26 Buy TMUS 2.625 04/15/26 Buy TMUS 2.625 02/15/29 Buy TMUS 3.375 04/15/29 Buy TMUS 2.875 02/15/31 Buy TMUS 3.500 04/15/31 | 101½ (1.86%) 102¼ (2.03%) 101½ (2.39%) 102½ (2.83%) 98¾ (3.02%) 102¾ (3.13%) | 1/19/2021 4/15/2021 1/19/2021 4/15/2021 4/15/2021 4/15/2021 | <ul style="list-style-type: none"> We think TMUS/Sprint high yield notes offer attractive relative value. T-Mobile US unsecured and Sprint HY notes are trading at a ~60bp and ~80bp discount to the IG secureds, respectively, though it depends where on the curve. Charter unsecured HY notes trade at a larger discount, ~150bp, to the IG secureds, but the differential between the two structures is likely a result of T-Mobile management's goal of attaining an IG capital structure in contrast with Charter management's desire to maintain split IG/HY ratings given higher leverage for stock buybacks. TMUS management has guided to an IG CFR in 2023, and the security will fall away from the secured paper on an IG rating event. See above for other thoughts on competition and FCF/debt. | <ul style="list-style-type: none"> Some risks related to the Sprint deal are merger integration, execution risks, and synergy expectations. While management guided to an IG CFR in 2023, it is possible that it could take longer to attain. While we could see TMUS issue other new HY debt to refinance front-end 6% coupon debt, we currently don't expect the company to issue more HY unsecured debt on a net basis, but that's still a risk. |
| Sprint Spectrum Notes | Buy SPRNTS 5.152 03/20/28 | 112¾ (+225 bps) | 6/3/2020 | <ul style="list-style-type: none"> With a duration comparable to the TMUS 3.5% 2025, these bonds trade at about a 40bp discount despite 1) higher ratings (Baa1/BBB+), 2) security in Sprint's most valuable spectrum and subscriber revenue, and 3) the potential that asset coverage will improve as we expect management to refinance these bonds at the TMUS IG level in order to unencumber Sprint's assets. | <ul style="list-style-type: none"> We think the risk with the SPRNTS notes is that they are less liquid than other parts of the TMUS structure. |
| Sprint Unsecnd 24s-26s | Buy S 7.125 06/15/24 Buy S 7.625 02/15/25 Buy S 7.625 03/01/26 | 115¾ (2.95%) 118¾ (3.08%) 121¾ (3.21%) | 6/3/2020 | <ul style="list-style-type: none"> Sprint unsecured 26s are trading at about a 80bp discount to TMUS secured debt. We think the bonds will be tethered to the IG market and converge with the TMUS unsecured and IG bonds over time, particularly as we expect Sprint to delever with its debt being refinanced at the T-Mobile level. | <ul style="list-style-type: none"> A key risk to the trade is that the Sprint unsecureds don't benefit from a guarantee from T-Mobile operating subsidiaries, only from T-Mobile USA and T-Mobile US. Moody's rates these notes a notch lower than the T-Mobile unsecured notes. We don't see this as particularly concerning as the company aspires to an IG capital structure. |

Appendix: Trade Recommendations Cont'd

| Description | Trade | Entry Level | Entry Date | Rationale | Risks |
|-------------|--|--|---|--|---|
| CHTR IG 30Y | Buy CHTR 5% 07/01/49 Buy CHTR 4.8 03/01/50 Buy CHTR 3.7 04/01/51 Buy CHTR 3.9 06/01/52 | +239 bps +237 bps +223 bps +167 bps | 12/2/2019 12/2/2019 7/16/2020 4/15/2021 | <ul style="list-style-type: none"> We continue to be impressed with the company's free cash flow generation. Leverage has been maintained in the 4.5x target area, with secured leverage inside 3.25x. We think that Charter's use of share buybacks instead of dividends lets the company scale those buybacks to maintain leverage within the target, while providing the company financial flexibility as opportunities arise. We continue to think CHTR long bonds offer attractive relative value. These are about 35bp wide of TMUS 30Y and 15bp wide of T 30Y notes. We think Charter spreads will converge on AT&T given the relative strength of Charter's operating performance and FCF generation. Reinforcing our view is Charter's IG 2021E FCF / Est. YE21 Total IG Debt of 11.9% far exceeding AT&T's 2021E FCF after Dividends / Est. YE21 Total Debt of 5.3%. | <ul style="list-style-type: none"> Secular trends in video and any significant reversal of broadband subscribers' growth trend. Charter could be acquired by a more levered company, and the IG bonds do not have Change of Control; we are not aware of any potential deal. The company does significant share buybacks and could issue more debt moving forward, maintaining leverage at the high end of their target leverage range. These factors could be a hurdle to outperformance. The Moody's Ba1 rating is another technical. For there to be a meaningful step function change in this hurdle, we would likely need to see Moody's upgrade to Baa3, and that doesn't seem likely given management's preference to keep leverage at the high end of the target range and the amount of secured debt in the structure. |
| CHTR IG 10Y | Buy CHTR 2.8 04/01/31 Buy CHTR 2.3 02/01/32 | +135 bps +131 bps | 1/29/2021 4/15/2021 | <ul style="list-style-type: none"> We recently reiterated our recommendation for the CHTR IG 31s and added CHTR IG 32s for the same fundamental rationale as noted above. CHTR IG 10Y trades ~20bp wide of both AT&T and TMUS IG 10Y paper. | |
| CHTR HY | Buy CHTR 5% 06/01/29 Buy CHTR 4% 03/01/30 Buy CHTR 4½ 08/15/30 Buy CHTR 4½ 02/01/31 Buy CHTR 4½ 05/01/32 | 107 (4.1%) 106% (3.5%) 104½ (3.9%) 103½ (3.8%) 104½ (3.9%) | 4/13/2020 1/29/2021 7/16/2020 1/29/2021 7/16/2020 | <ul style="list-style-type: none"> While T-Mobile US unsecured and Sprint HY notes are trading at a ~60bp and ~80bp discount to the IG secureds, respectively, Charter unsecured HY notes trade at a larger ~150bp discount to the IG secureds. We continue to recommend the CHTR HY bonds trading wider than 3% ask YTW. | <ul style="list-style-type: none"> See above comments regarding secular trends and share buybacks. We could see more HY issuance. |

April 2021

Technology, Media & Telecom Spring Training Teach-In

Media & Entertainment: Creative Destruction

Cable/Satellite: Connectivity Plus

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Stock recommendations and disclosures in this report are as of April 26, 2021; stock prices as of April 22, 2021, unless otherwise noted.

Media, Entertainment, & Cable/Satellite Key Themes

Key Themes for 2021

- Strong cyclical recovery
- Reopening tailwinds

- Transition across Media to Internet distribution

1. Media & Entertainment – Creative Destruction

- COVID comps
- Advertising strength
- Transition to streaming

2. Audio Entertainment – For Those About to Rock

- Further along in transition to streaming
- Podcasting
- Return to live

3. Cable/Satellite – How High Is Cable's Wall of Worry?

- 5G competition; regulatory creep

4. 2021 US Advertising Outlook

- Above-consensus view of US advertising growth

Media & Entertainment: Creative Destruction

Media: Where are we in the investment cycle?

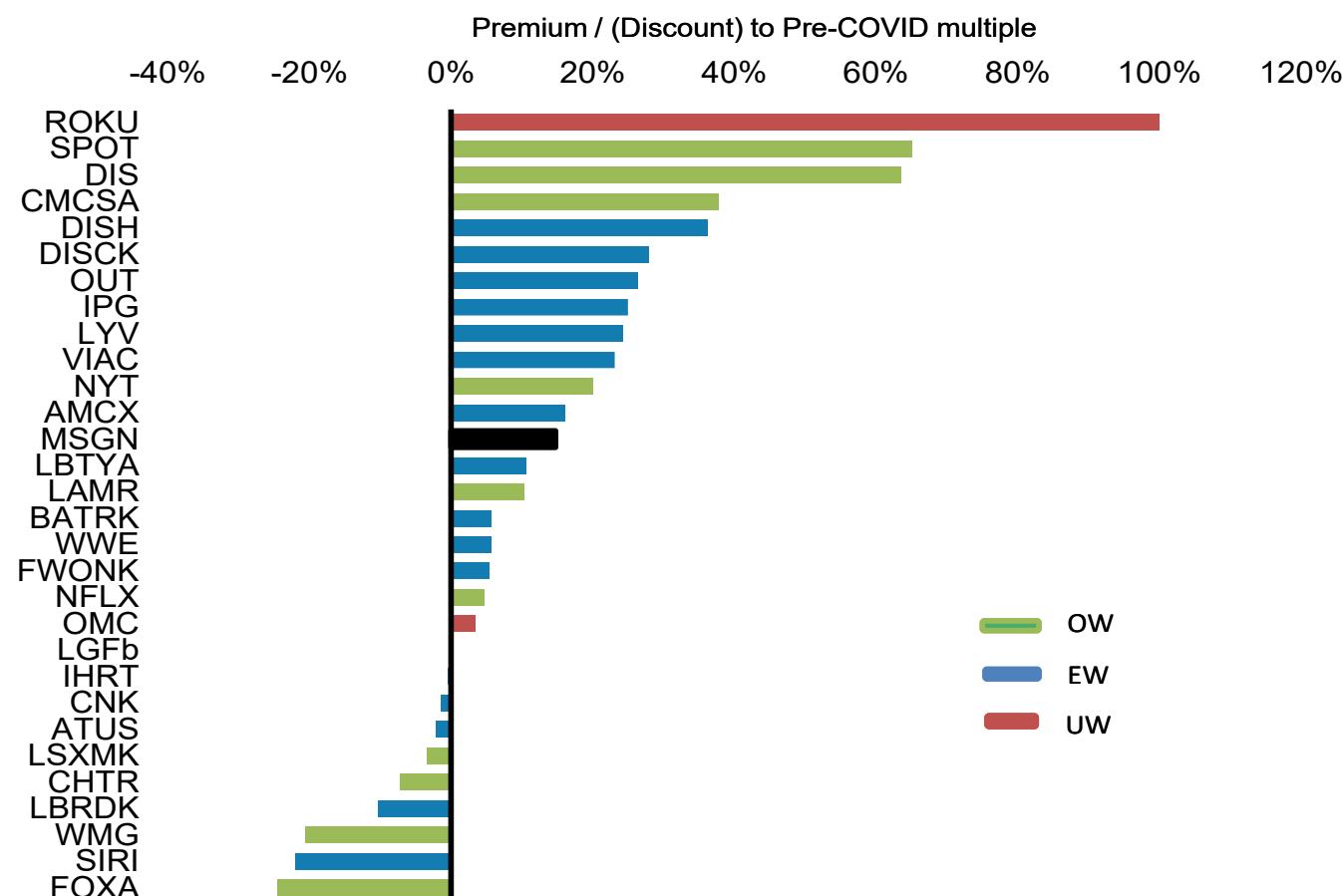
- Rising content investments across media companies highlight a competitive video landscape

| Media, Entertainment, Advertising, & Cable/Satellite Investment Playbook | | | | | | | |
|--|--------|------------------------|--------|---------------------------|--------|------------------|--------|
| Defensive/WFH Winners | | Defensive + Re-Opening | | Re-Opening Secular Growth | | Cyclical / Value | |
| Ticker | Rating | Ticker | Rating | Ticker | Rating | Ticker | Rating |
| NFLX | OW | CMCSA | OW | DIS | OW | FOXA | OW |
| NYT | OW | LSXMK | OW | MSGSS | OW | DISCK | EW |
| SPOT | OW | DISH | EW | BATRK | EW | AMCX | EW |
| | | SIRI | EW | FWONK | EW | LGFb | EW |
| CHTR | OW | | | LYV | EW | VIAC | EW |
| ATUS | EW | WMG | OW | MSGE | NA | MSGN | NA |
| LBRDK | EW | WWE | EW | | | | |
| LBTYA | EW | | | LAMR | OW | IPG | EW |
| | | | | CCO | EW | OMC | UW |
| | | | | OUT | EW | | |
| | | | | ROKU | UW | CNK | EW |
| | | | | | | IHRT | EW |

Source: Morgan Stanley Research.

Media: COVID's impact – what's priced in?

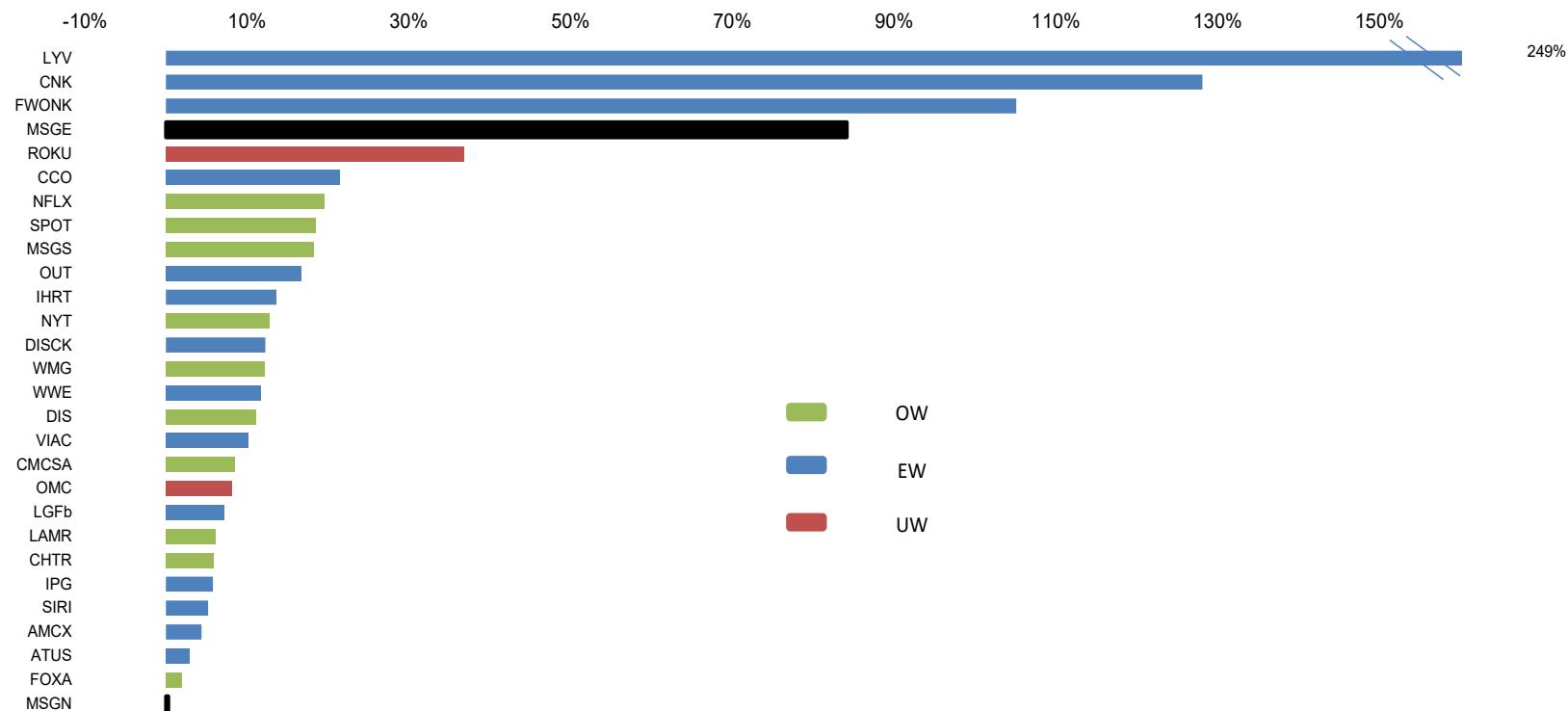
- Consensus view is that those positively affected by COVID tailwinds were rewarded in 2020, and vice versa...



Source: Company data, Morgan Stanley Research.
E = Morgan Stanley Research estimates.

Media: Reopening and recovery driving top line

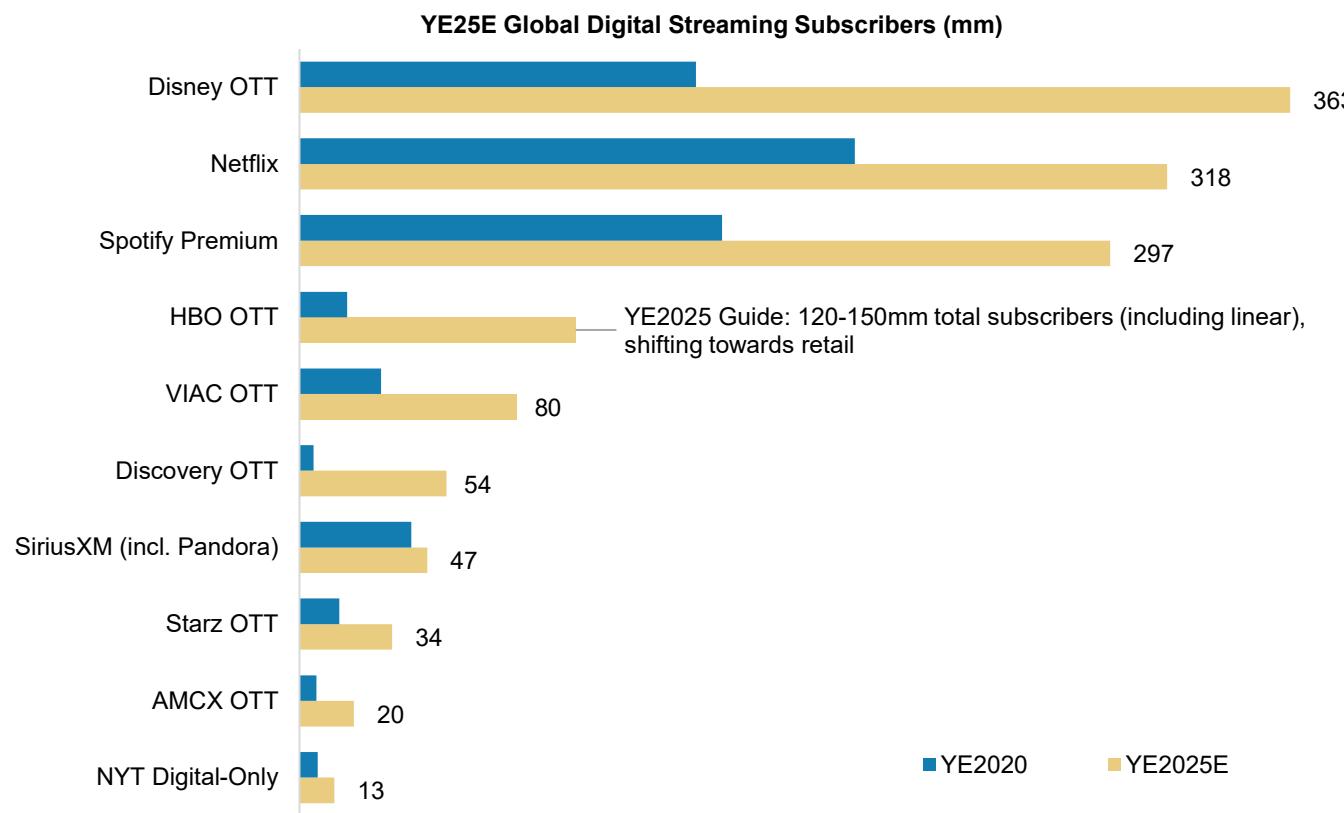
- 2021 revenue growth over 2020: We see the largest magnitude of revenue recovery at outdoor/sports names within our coverage



Source: Company data, Morgan Stanley Research.
E = Morgan Stanley Research estimates.

Media: Everyone's going streaming, but can everyone scale?

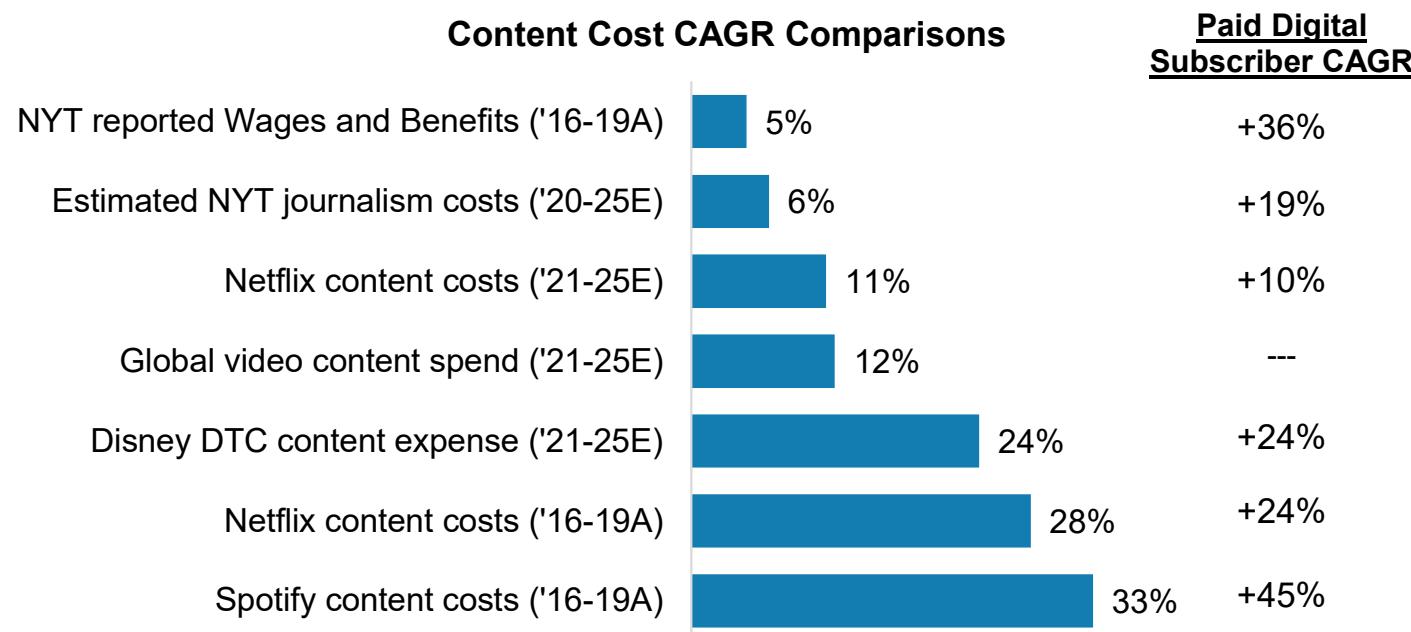
- Our global OTT forecast assumes meaningful subscriber adoption still to come for scaled players



Source: Company data, Morgan Stanley Research.
E = Morgan Stanley Research estimates.

Media: Streaming economics vary across media

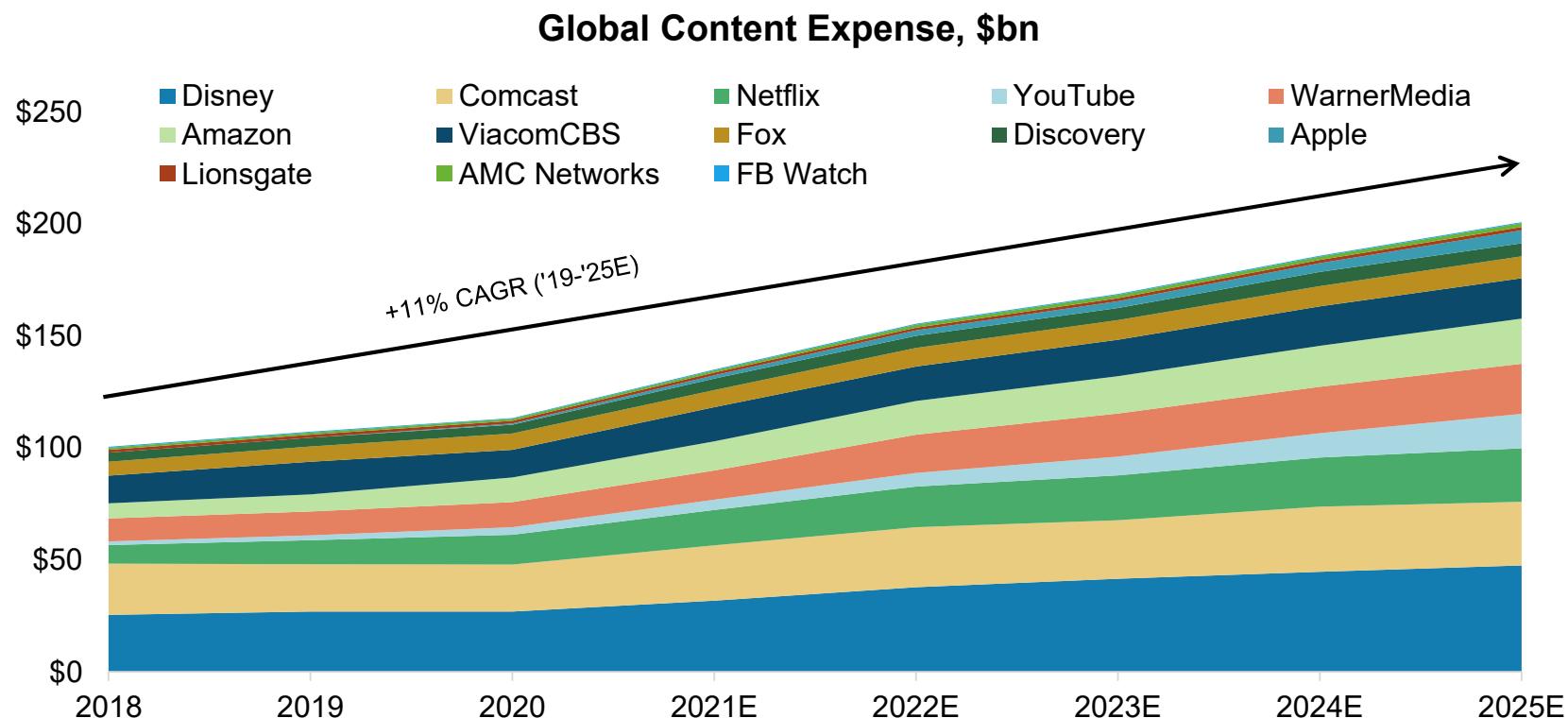
- Content investment needs will likely differ to drive paid digital subscriber growth



Source: Company data, Morgan Stanley Research.
E = Morgan Stanley Research estimates.

Media: Everyone's going streaming, but can everyone scale?

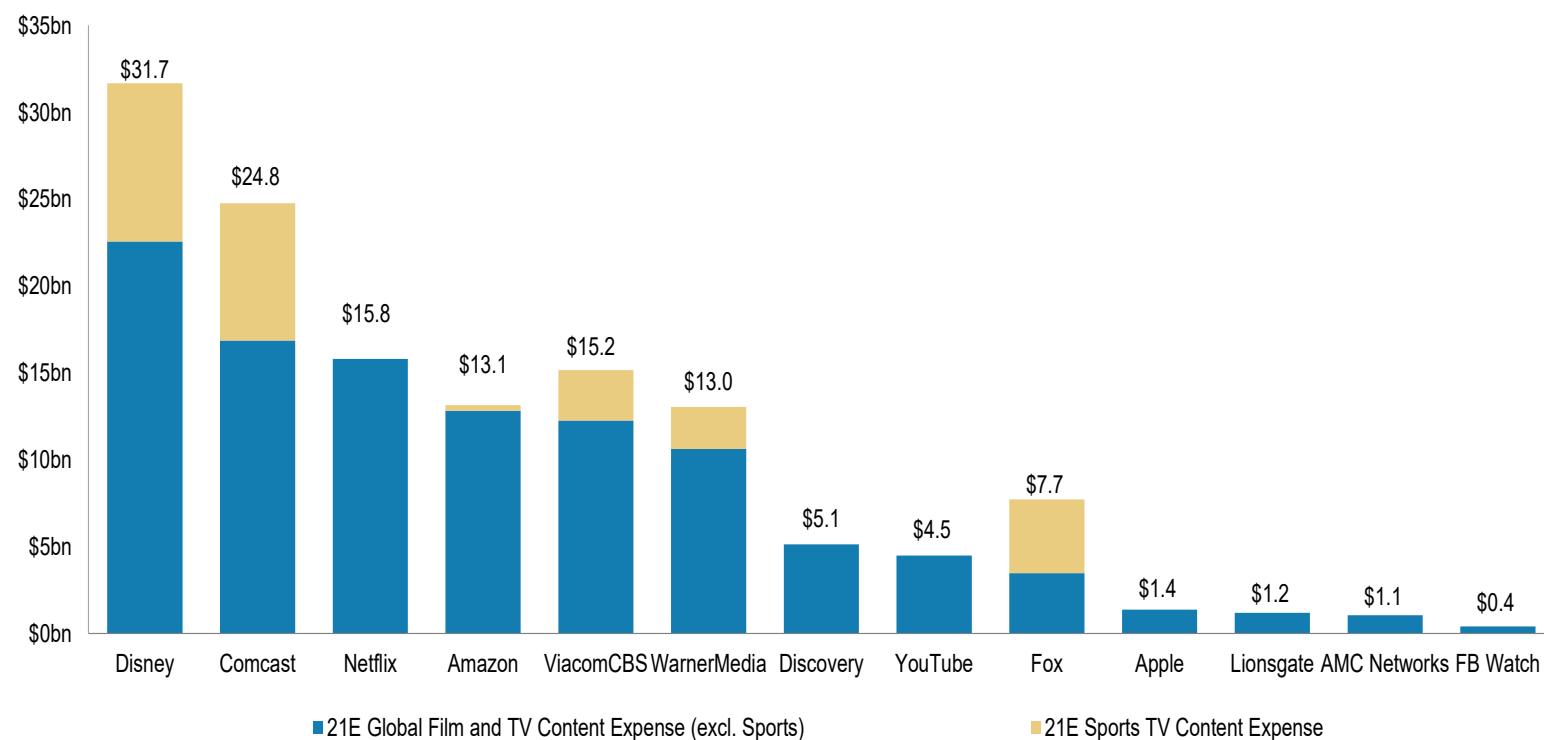
- In the video entertainment market, global content expense is on the rise



Source: Company data, Morgan Stanley Research.
E = Morgan Stanley Research estimates.

Media: Everyone's going streaming, but can everyone scale?

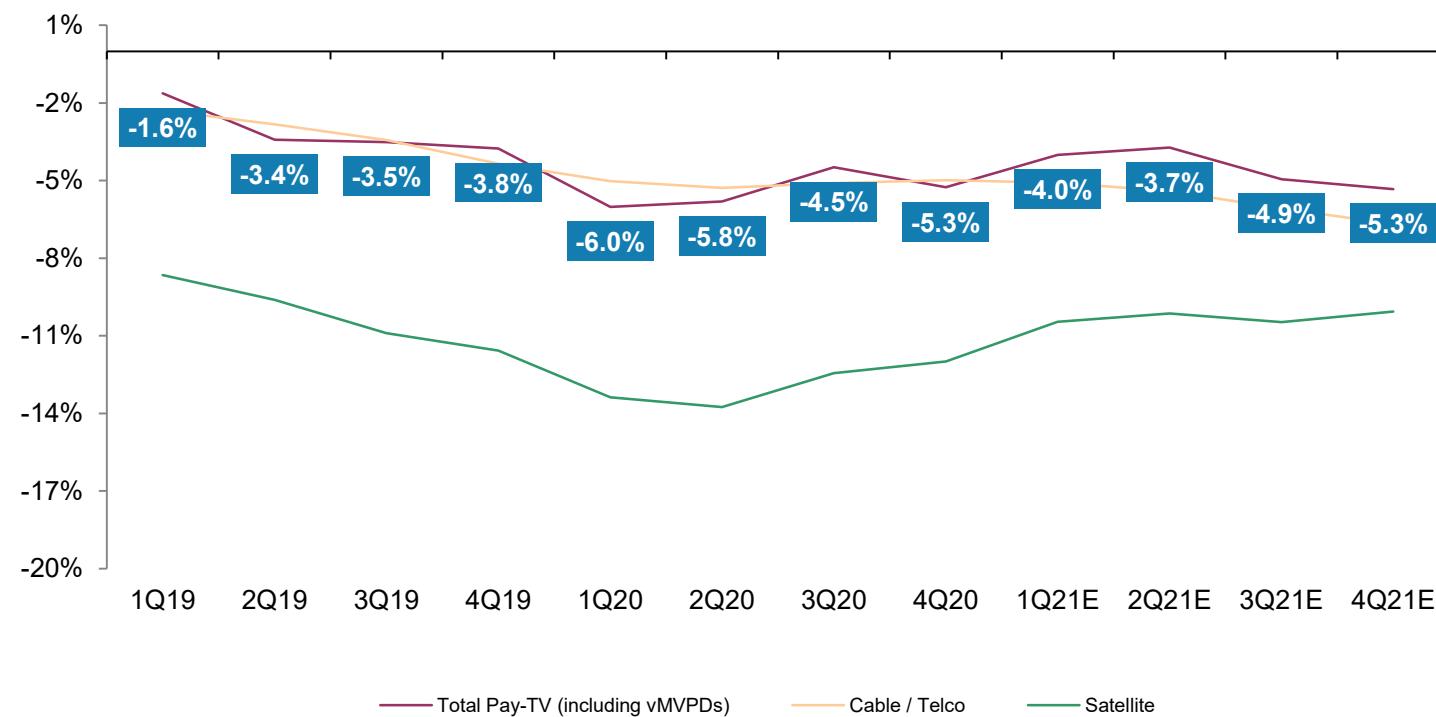
- Rising content investments across media companies highlight a competitive video landscape



Source: Company data, Morgan Stanley Research. Note: content expense reflects estimated amortization expense and other direct content costs

Media: Cord-cutting likely to reaccelerate in 2H21

- Video subscriber erosion has improved over the past few quarters, but remains a major headwind

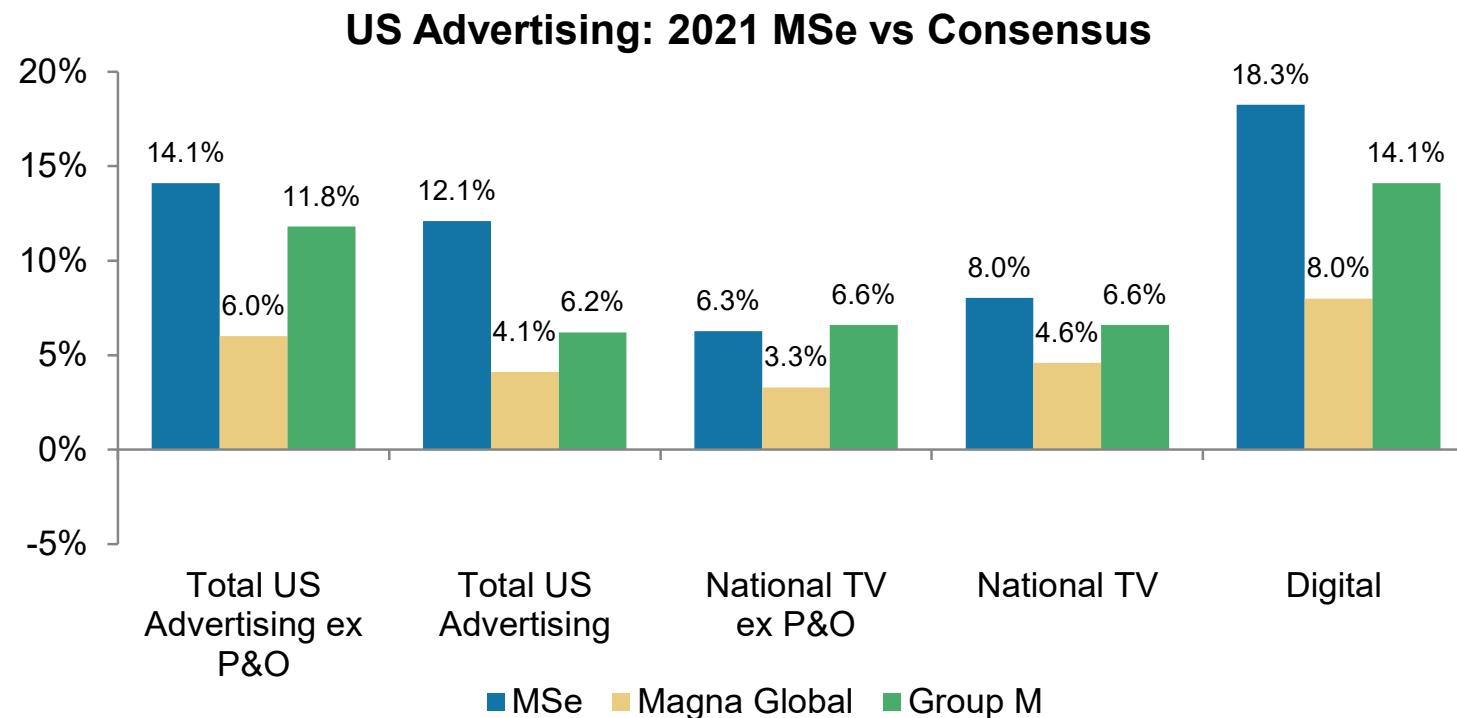


Source: Company data, Morgan Stanley Research.
E = Morgan Stanley Research estimates.

2021 US Advertising Outlook

2021 MS US Advertising Outlook – Above Consensus

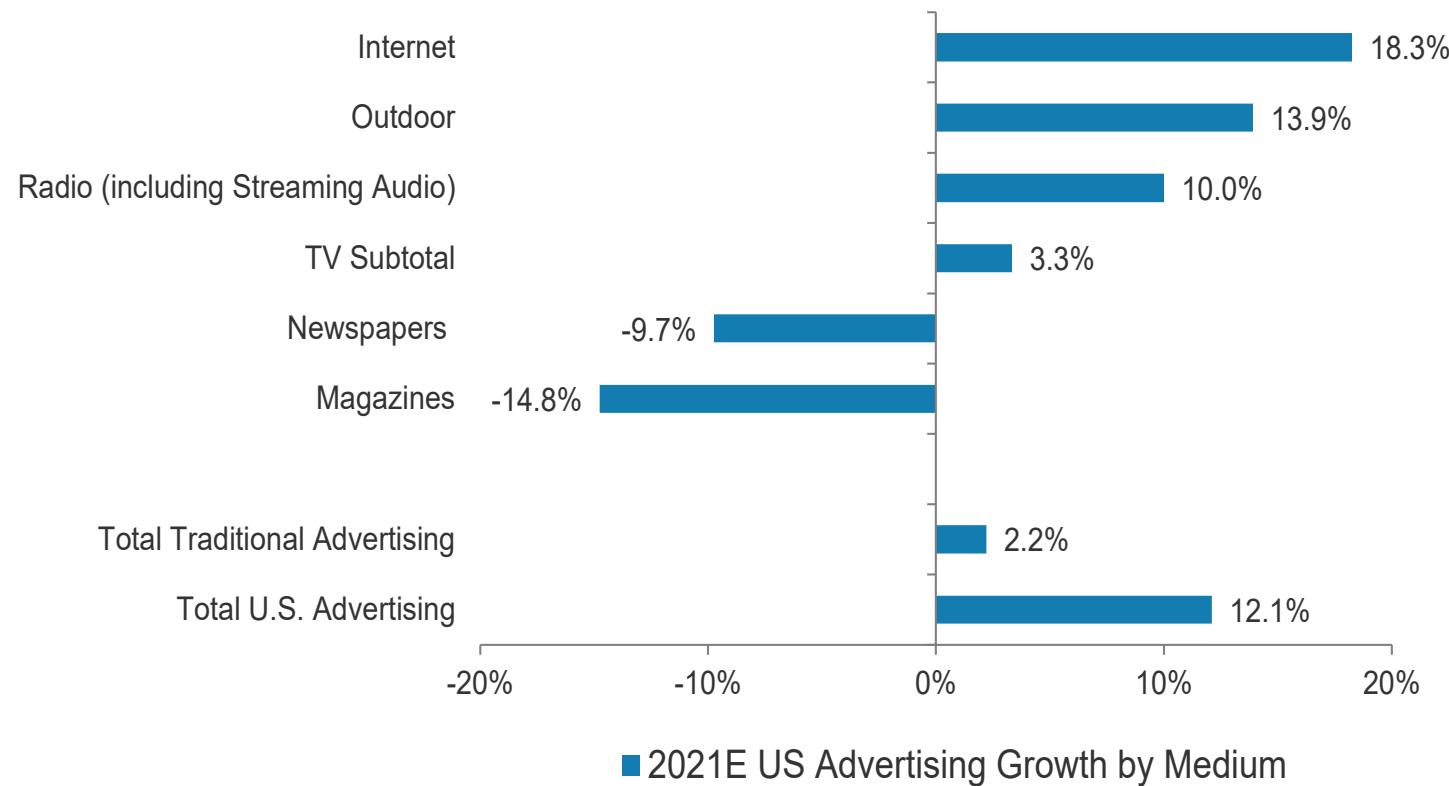
- We are more constructive than consensus in '21, driven by Digital



Source: RAB, OAAA, NAAA, PIB, CMAG, IAB, Magna Global, Group M, Company Data, Morgan Stanley Research.
Note: National TV estimates include digital extensions

2021 US Advertising Outlook – Bullish on OOH

- Internet is driving overall ad market growth as traditional advertising declines

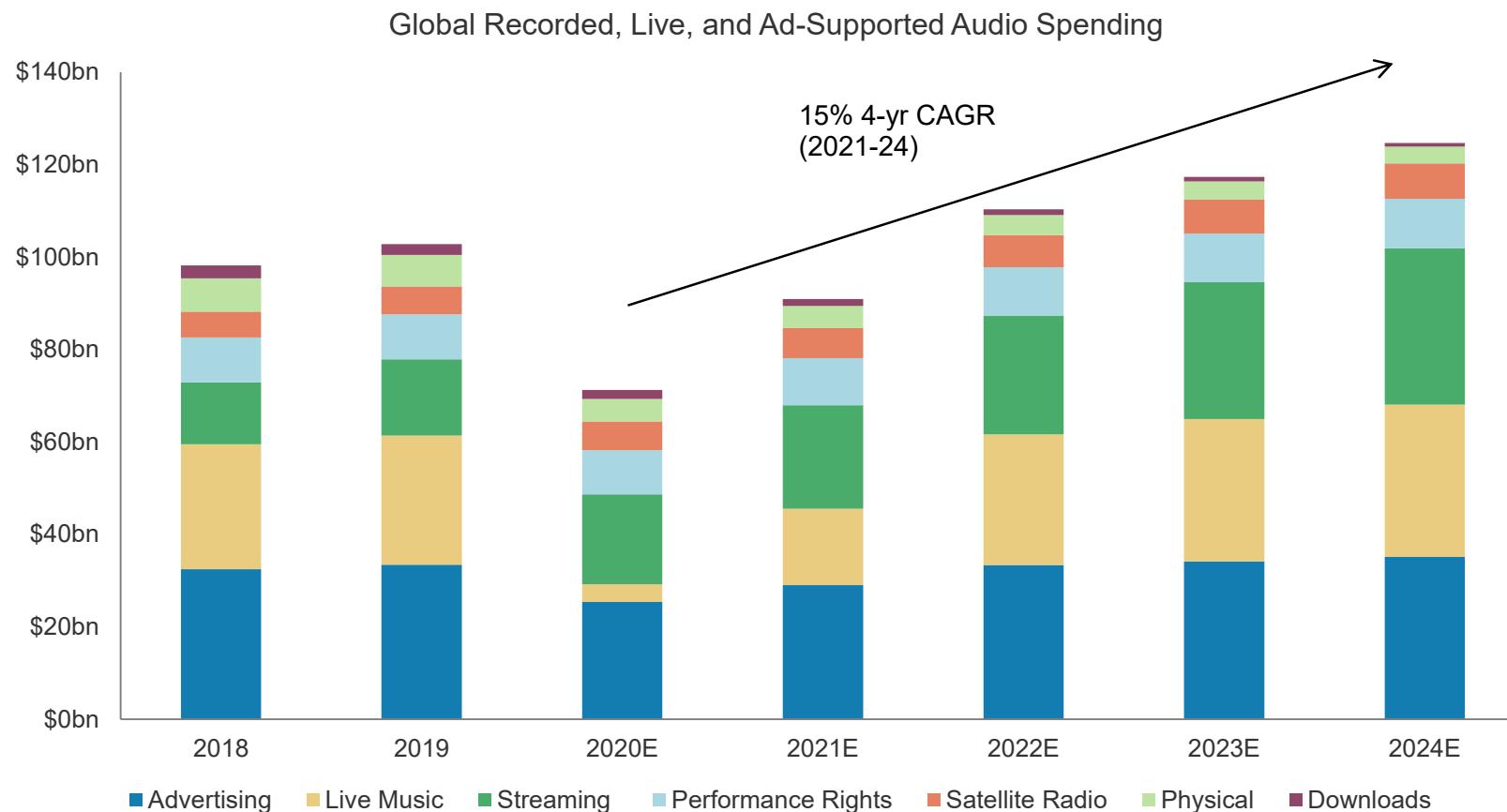


Source: RAB, OAAA, NAAA, PIB, CMAG, IAB, Company data, Morgan Stanley Research

Audio Entertainment: For Those About to Rock

Audio Entertainment – Return to live & streaming scale

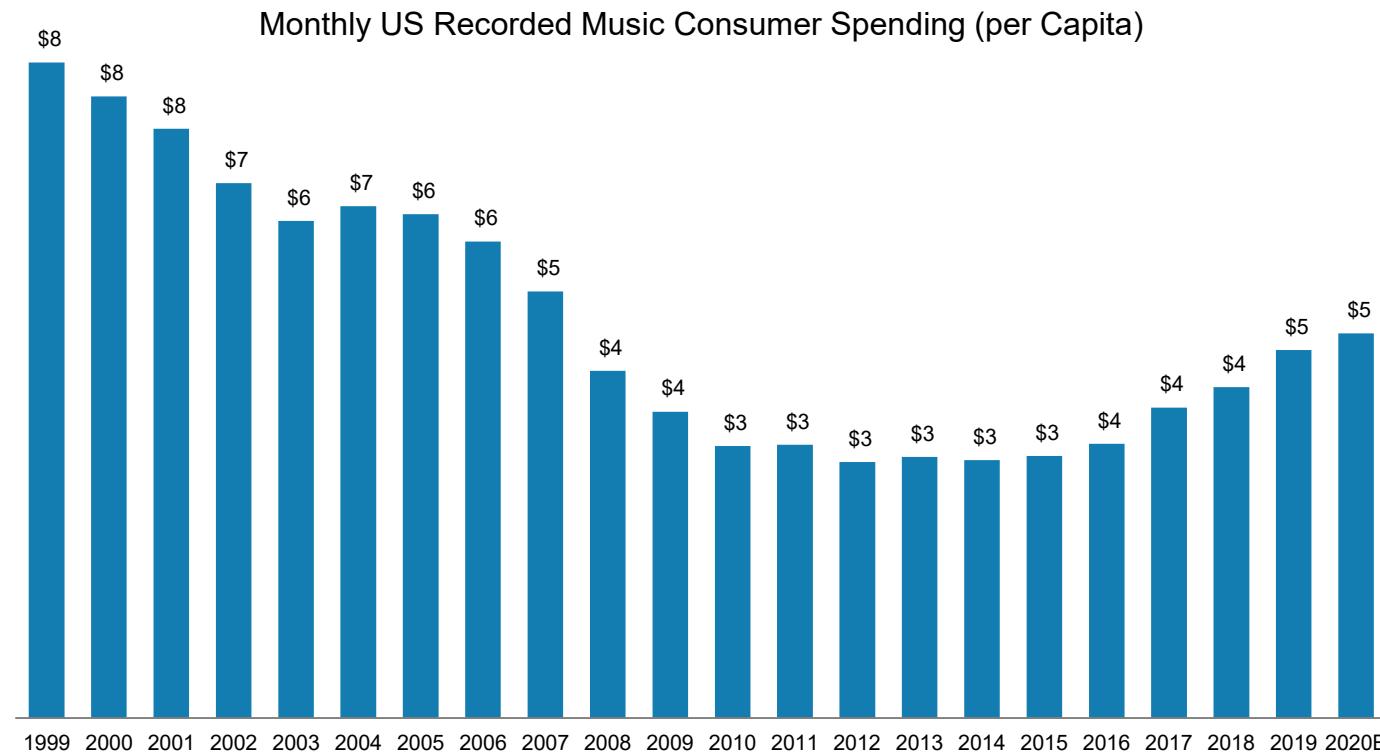
- We estimate that global audio spending, inclusive of live events and advertising, will grow at a 15% CAGR between 2021-24



Source: Company data, RIAA, PwC, Ovum, IFPI, Morgan Stanley Research

Audio Entertainment: Is there pricing power in streaming?

- Despite recent growth, per capita spending on music in the US remains a fraction of what it was in the late 90s



Source: Company data, RIAA, PwC, Ovum, IFPI, census.gov, Morgan Stanley Research

Audio Entertainment: Spotify raising prices

- We believe labels and publishers, in aggregate, should be the largest beneficiaries from any price increase to digital service platforms

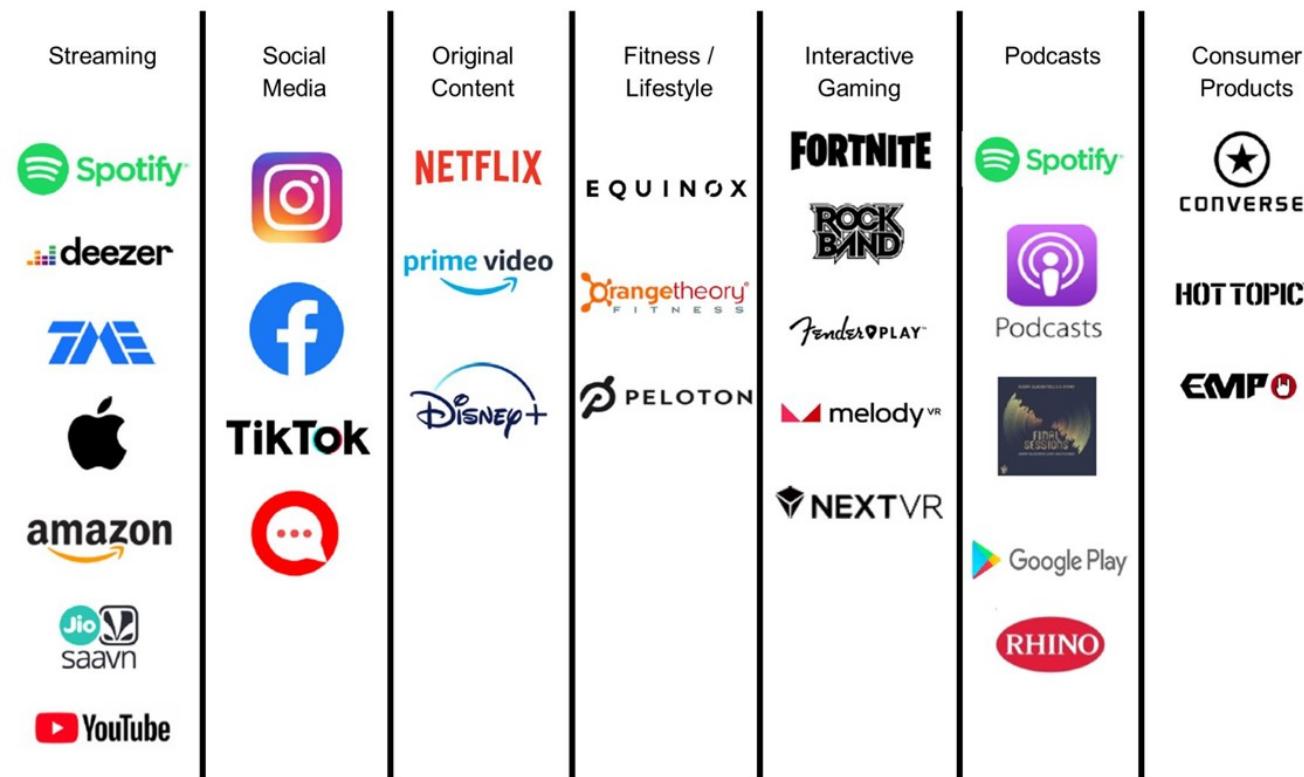
Estimated Approx. Share of One Dollar of Streaming Revenue



Source: Company data, Morgan Stanley Research; Note: does not account for any applicable tax or app store share

Audio Entertainment: Music streaming has global tailwinds

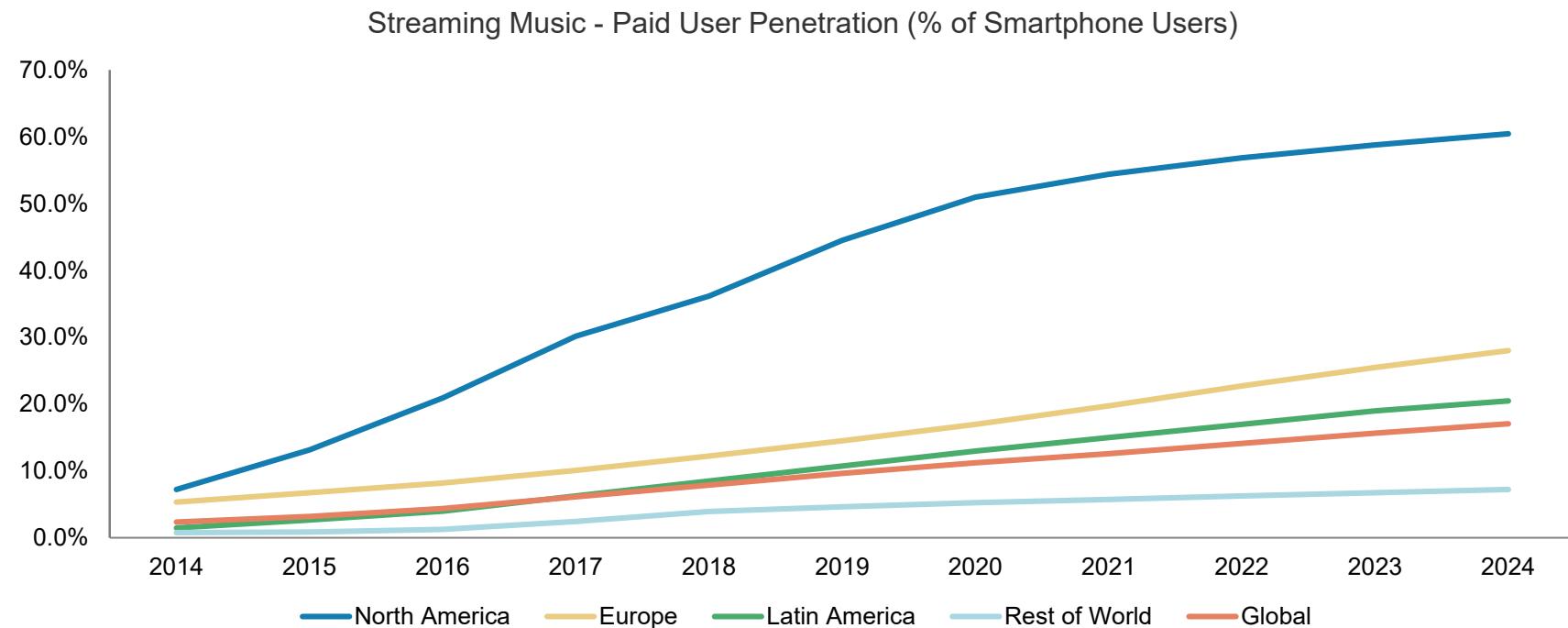
- Beyond subscription streaming, music monetization platforms are expanding



Source: Company data, Morgan Stanley Research

Audio Entertainment: US adoption bullish for global opportunity

- North America has already reached ~50% penetration of smartphone users, we estimate, suggesting our international assumptions may be conservative

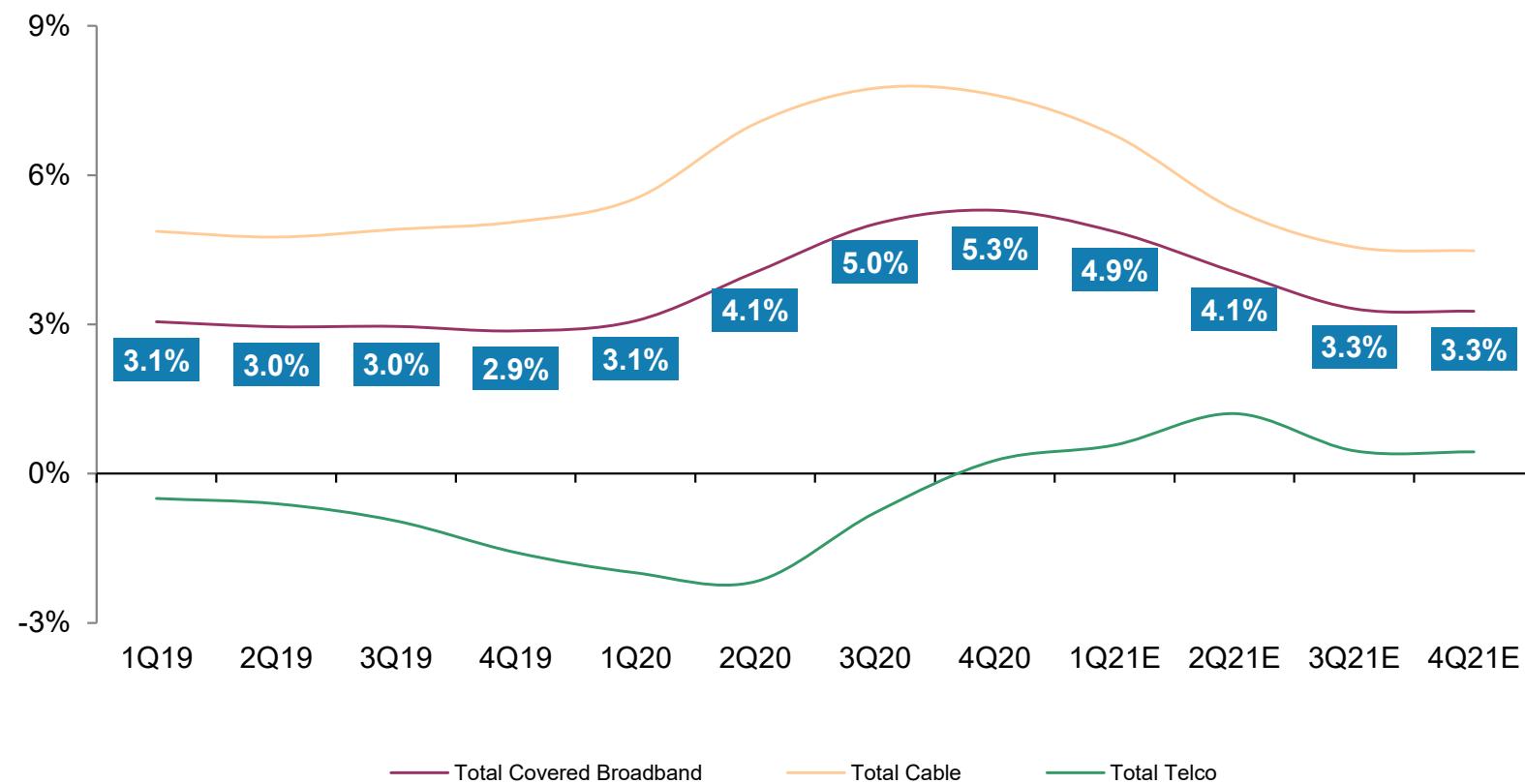


Source: Company data, RIAA, PwC, Ovum, IFPI, Morgan Stanley Research. Note: 2020 data & forward are Morgan Stanley Estimates

Cable/Satellite: Connectivity Plus

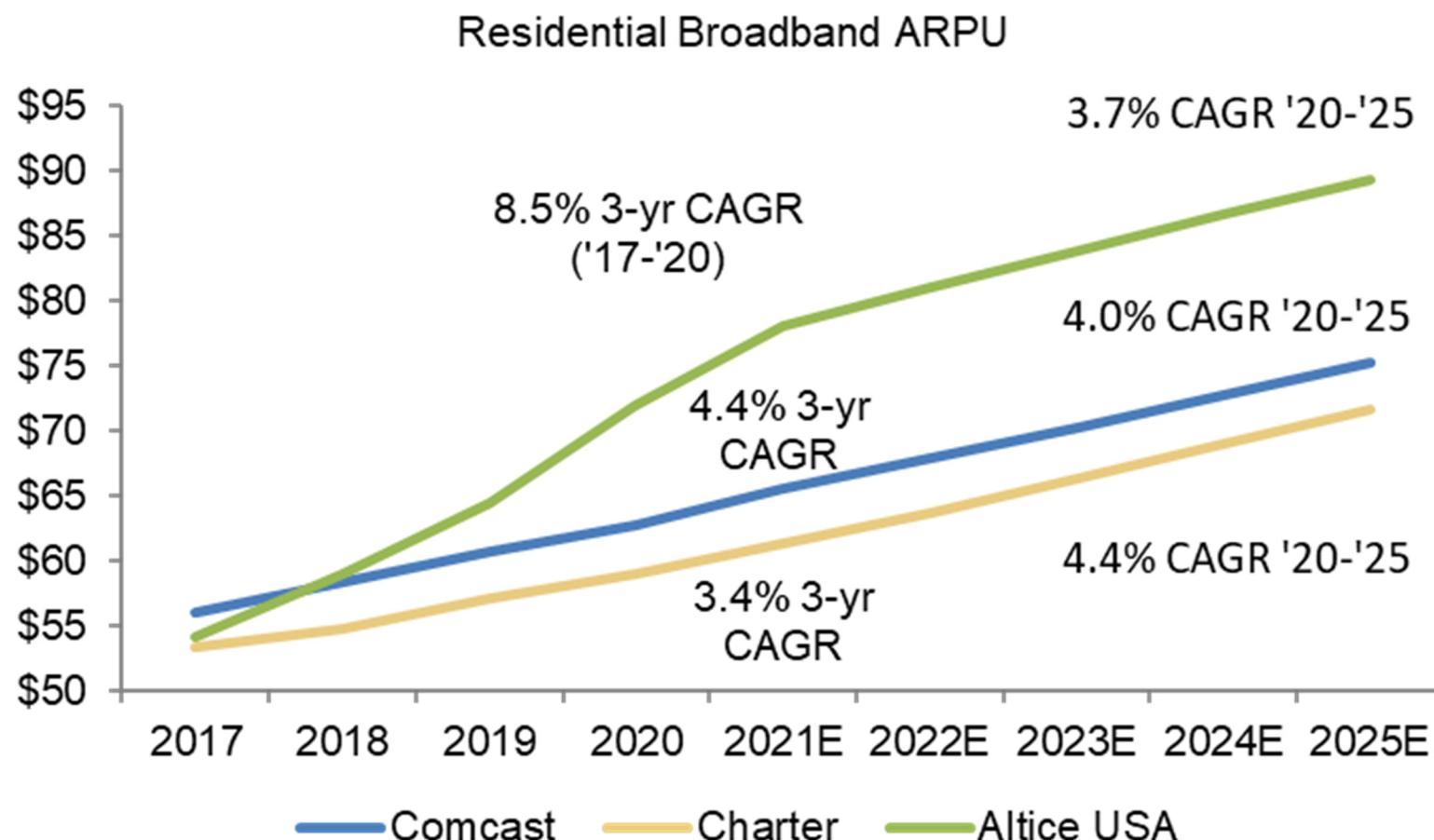
Cable/Satellite – Broadband growth moderating in '21

- Broadband subscriber growth accelerated in 2020, should moderate in 2021



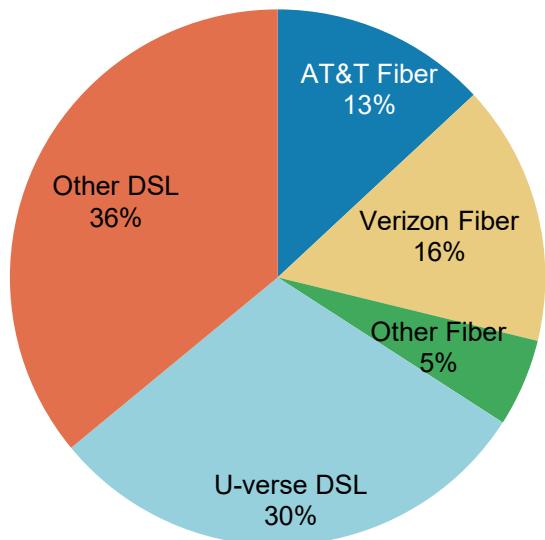
Cable/Satellite – Pricing power, but regulatory risk

- We trimmed our longer-term pricing assumptions (~50bp)

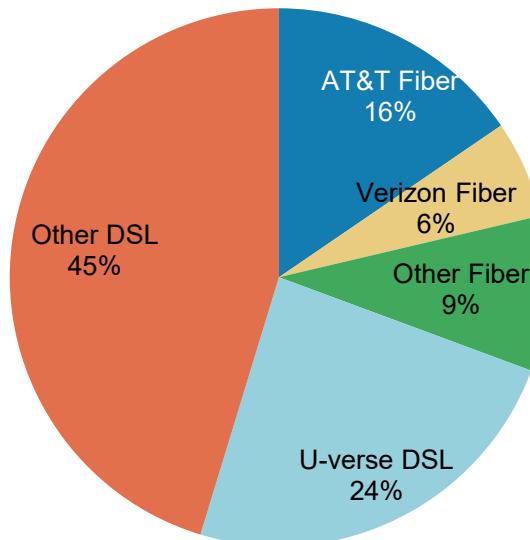


Cable/Satellite – Fiber competition remains limited

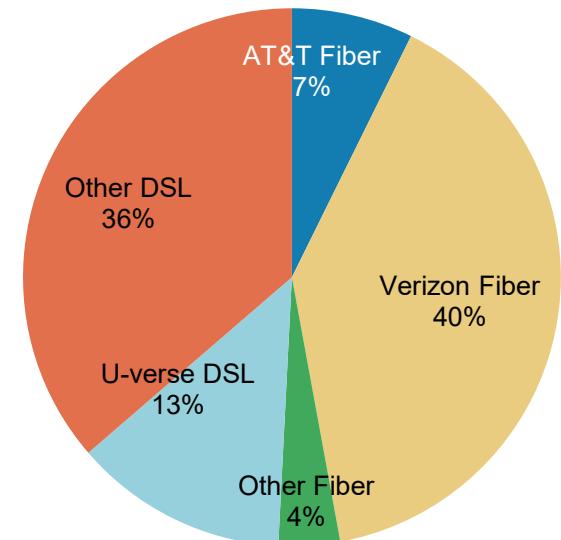
- Out of the three major operators, CHTR has the lowest overbuild with fiber competitors



We estimate roughly 35% FTTH competition for Comcast



We estimate just roughly 30% FTTH competition for Charter



We estimate Altice USA has just over 50% of its footprint overbuilt by FTTH competition

Cable/Satellite – US Broadband Policy Update

Agency-Level Risk

FCC-related risk stem from Title 2 and rate regulation in broadband. However, we note (1) cable operations and equities performed well in prior Title 2 regime, and (2) a move towards rate regulation would likely be challenged in court. It is difficult to assess impact of agency action without a sense of Democratic FCC leadership.

White House: *The American Jobs Plan*

Revitalize America's Digital Infrastructure

- Reach 100% high-speed broadband coverage. Prioritize networks owned/operated/affiliated with local governments, non-profits, and co-operatives.
- Promote transparency and competition.
- Reduce the cost of broadband. Short-term subsidies, but long-term wants to work with Congress to reduce Internet prices for all Americans.

Legislation: *LIFT America Act*

Expansion of Broadband Internet Access Nationwide:

- \$80bn for unserved and underserved rural, suburban, and urban areas. Low-tier (25/25 Mbps); Mid-tier (100/100 Mbps).
- \$5bn in federal funding for low-interest financing of broadband deployment.
- \$9.3bn for broadband affordability and adoption.

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US Internet

Internet Media, E-Commerce, Video Games and Rideshare

MORGAN STANLEY RESEARCH
North America

Morgan Stanley & Co. LLC



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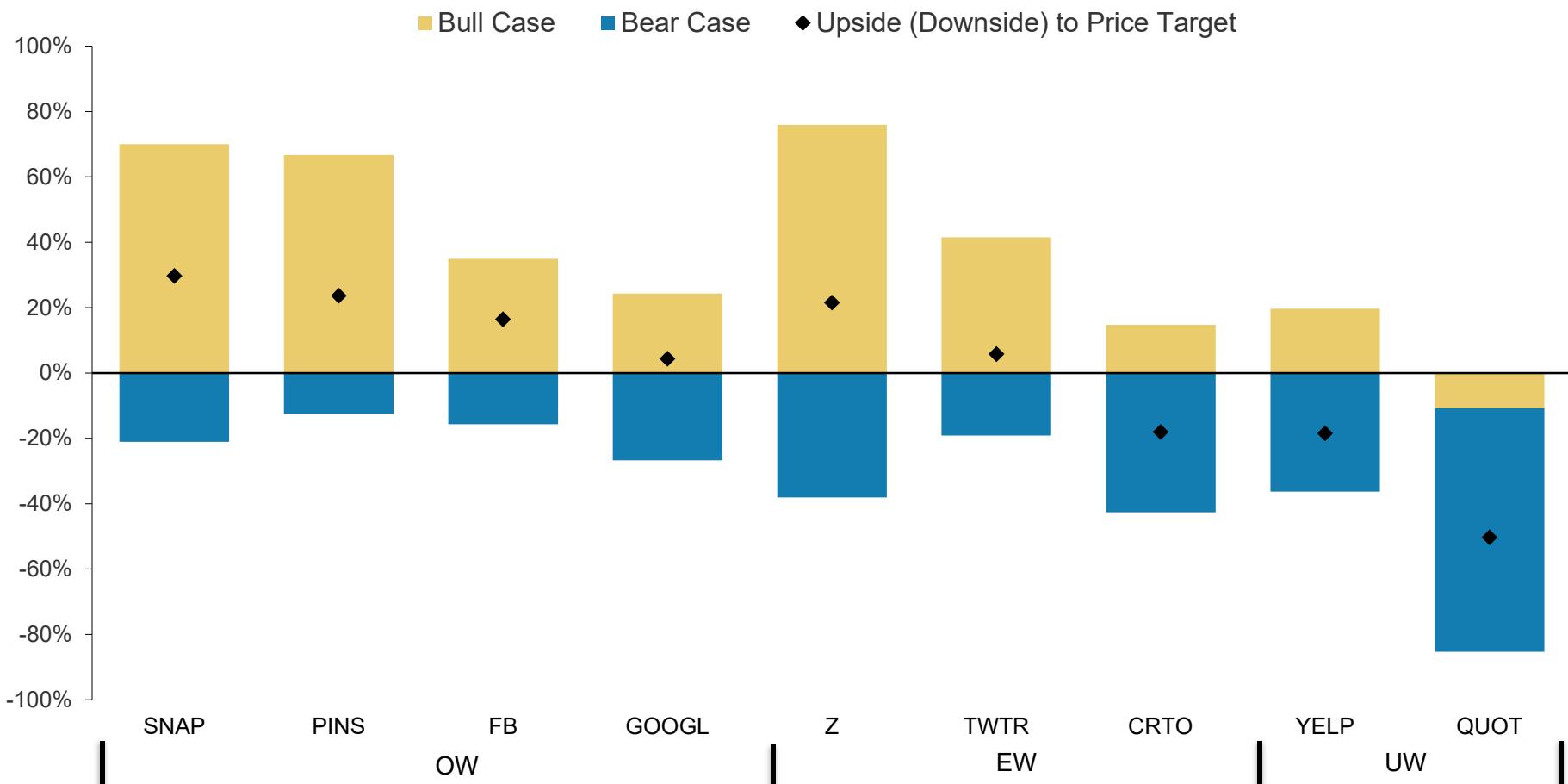
Lauren Schenk
Head of US SMID-Cap Internet Research
(212) 761 4143
Lauren.Schenk@morganstanley.com

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For analyst certification and other important disclosures, refer to the Disclosure Section, located at the end of this report.

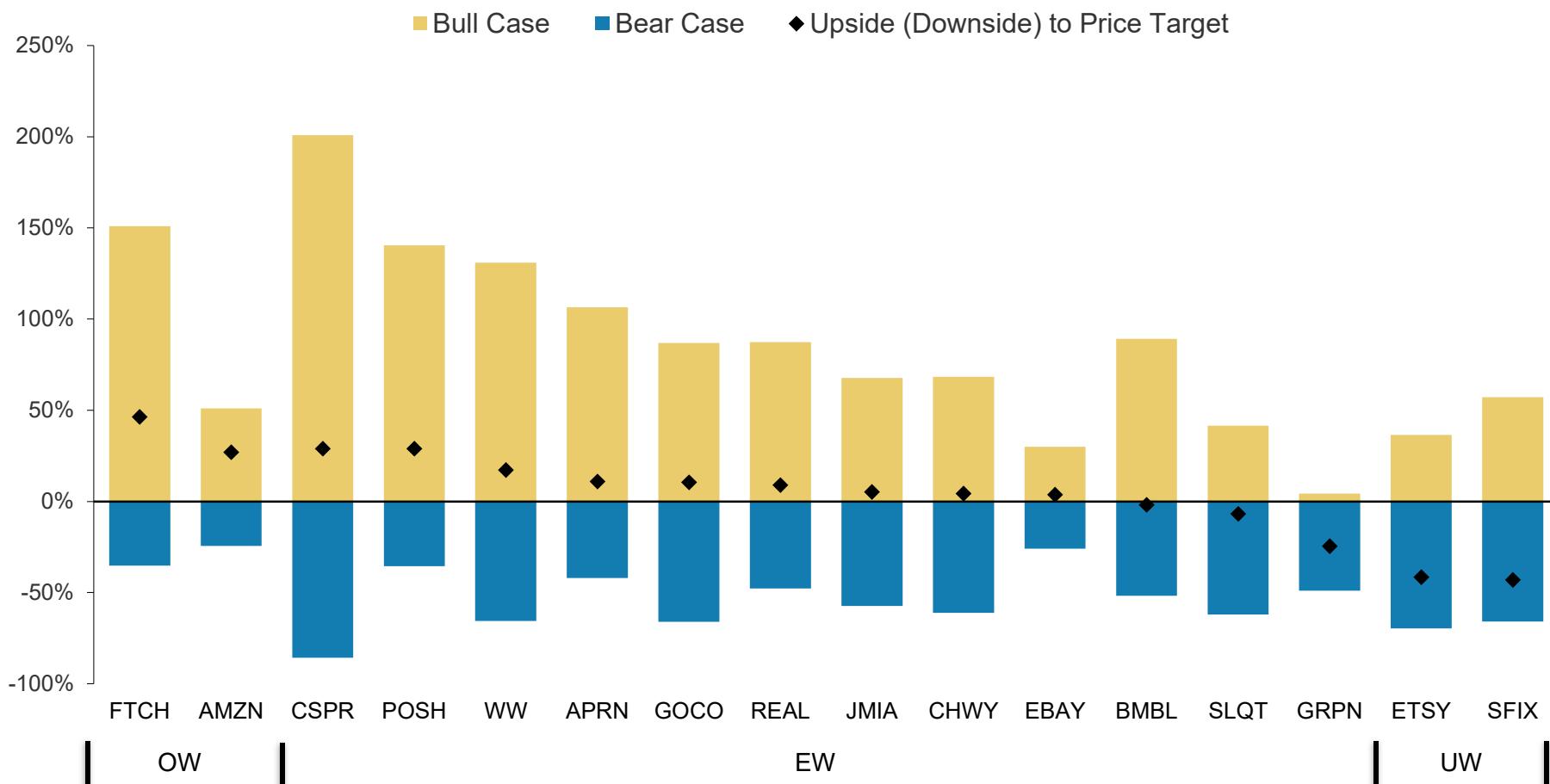
Disclosures in this report are as of April 26, 2021; stock recommendations and stock prices as of April 22, 2021, unless otherwise noted.

Coverage Universe of 9 Online Advertising Companies at ~\$2.6tn of Market Cap



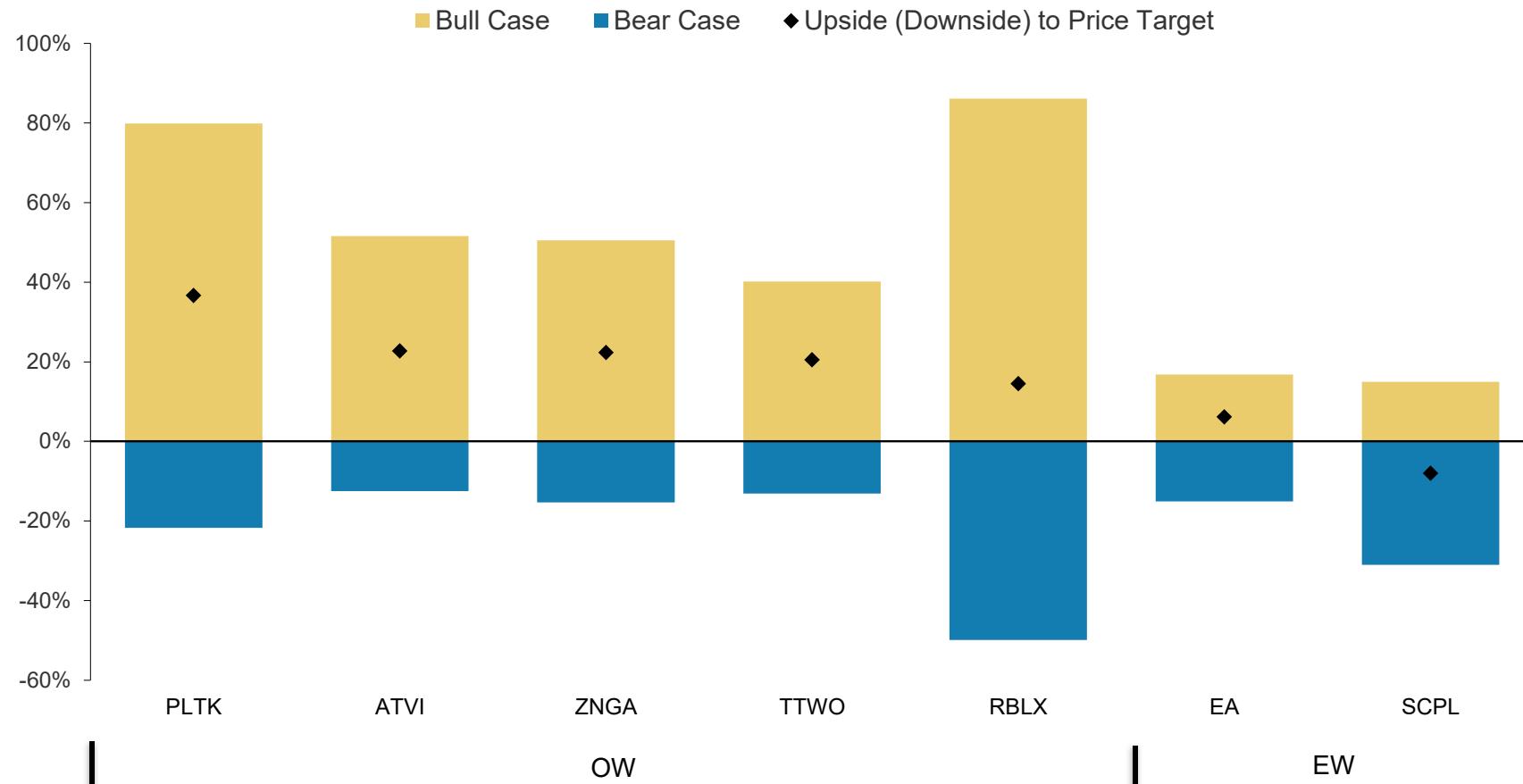
Source: Bloomberg, Thomson Reuters, Morgan Stanley Research Estimates; Updated for closing prices on April 22nd, 2021; For valuation methodology and risks associated with any recommendation, rating or price target referenced in this report, please contact the Client Support Team as follows: US/Canada +1 800 303-2495; Hong Kong +852 2848-5999; Latin America +1 718 754-5444 (U.S.); London +44 (0)20-7425-8169; Singapore +65 6834-6860; Sydney +61 (0)2-9770-1505; Tokyo +81 (0)3-6836-9000. Alternatively you may contact your investment representative or Morgan Stanley Research at 1585 Broadway, (Attention: Research Management), New York, NY 10036 USA.

Coverage Universe of 16 E-Commerce Companies at ~\$1.8tn of Market Cap



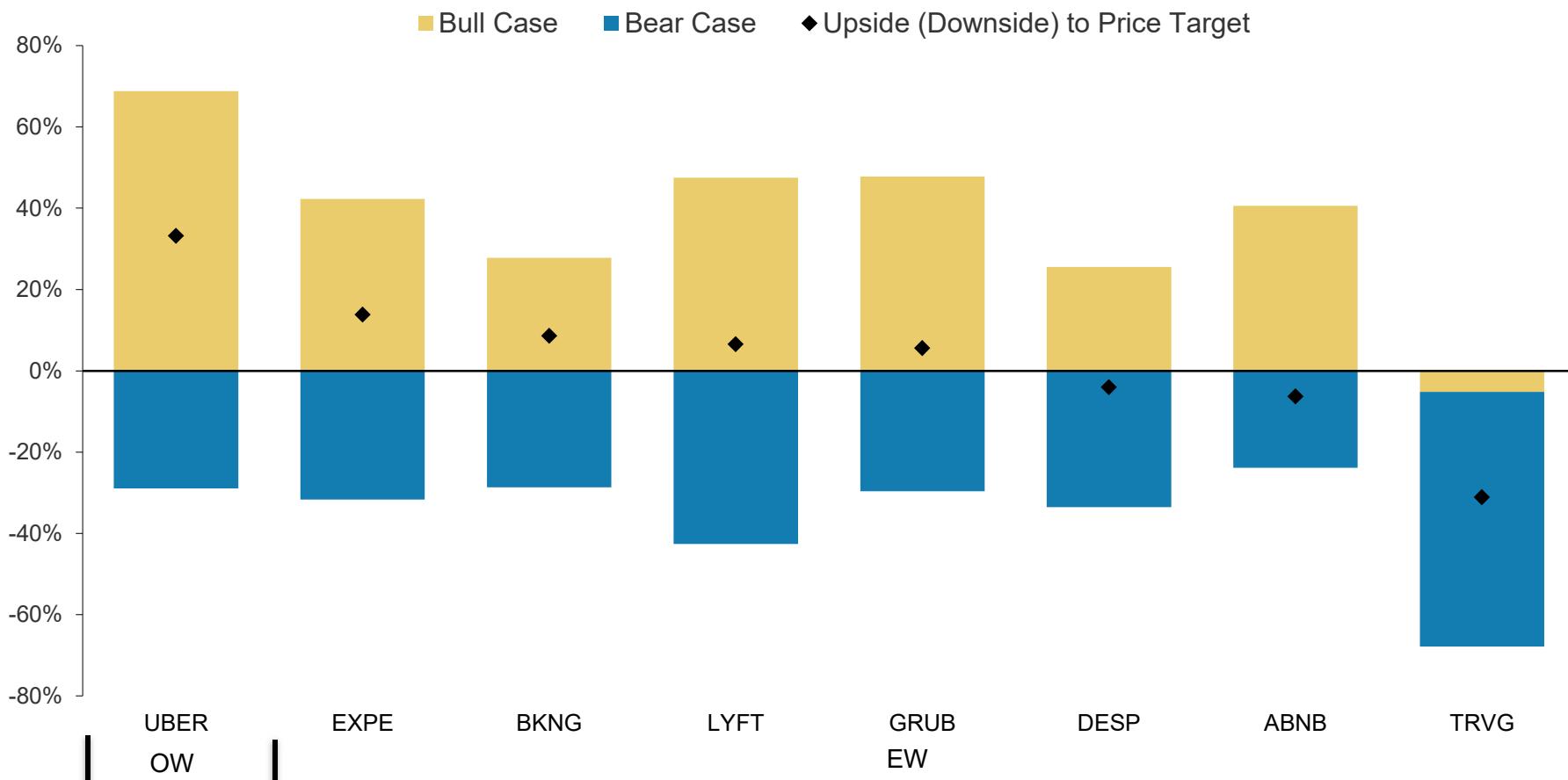
Source: Bloomberg, Thomson Reuters, Morgan Stanley Research Estimates; Updated for closing prices on April 22nd, 2021; For valuation methodology and risks associated with any recommendation, rating or price target referenced in this report, please contact the Client Support Team as follows: US/Canada +1 800 303-2495; Hong Kong +852 2848-5999; Latin America +1 718 754-5444 (U.S.); London +44 (0)20-7425-8169; Singapore +65 6834-6860; Sydney +61 (0)2-9770-1505; Tokyo +81 (0)3-6836-9000. Alternatively you may contact your investment representative or Morgan Stanley Research at 1585 Broadway, (Attention: Research Management), New York, NY 10036 USA.

Coverage Universe of 7 Video Games Companies at ~\$200bn of Market Cap



Source: Bloomberg, Thomson Reuters, Morgan Stanley Research Estimates; Updated for closing prices on April 22nd, 2021; For valuation methodology and risks associated with any recommendation, rating or price target referenced in this report, please contact the Client Support Team as follows: US/Canada +1 800 303-2495; Hong Kong +852 2848-5999; Latin America +1 718 754-5444 (U.S.); London +44 (0)20-7425-8169; Singapore +65 6834-6860; Sydney +61 (0)2-9770-1505; Tokyo +81 (0)3-6836-9000. Alternatively you may contact your investment representative or Morgan Stanley Research at 1585 Broadway, (Attention: Research Management), New York, NY 10036 USA.

Coverage Universe of 8 Travel/Shared Economy Companies at ~\$350bn of Market Cap



Source: Bloomberg, Thomson Reuters, Morgan Stanley Research Estimates; Updated for closing prices on April 22nd, 2021; For valuation methodology and risks associated with any recommendation, rating or price target referenced in this report, please contact the Client Support Team as follows: US/Canada +1 800 303-2495; Hong Kong +852 2848-5999; Latin America +1 718 754-5444 (U.S.); London +44 (0)20-7425-8169; Singapore +65 6834-6860; Sydney +61 (0)2-9770-1505; Tokyo +81 (0)3-6836-9000. Alternatively you may contact your investment representative or Morgan Stanley Research at 1585 Broadway, (Attention: Research Management), New York, NY 10036 USA.

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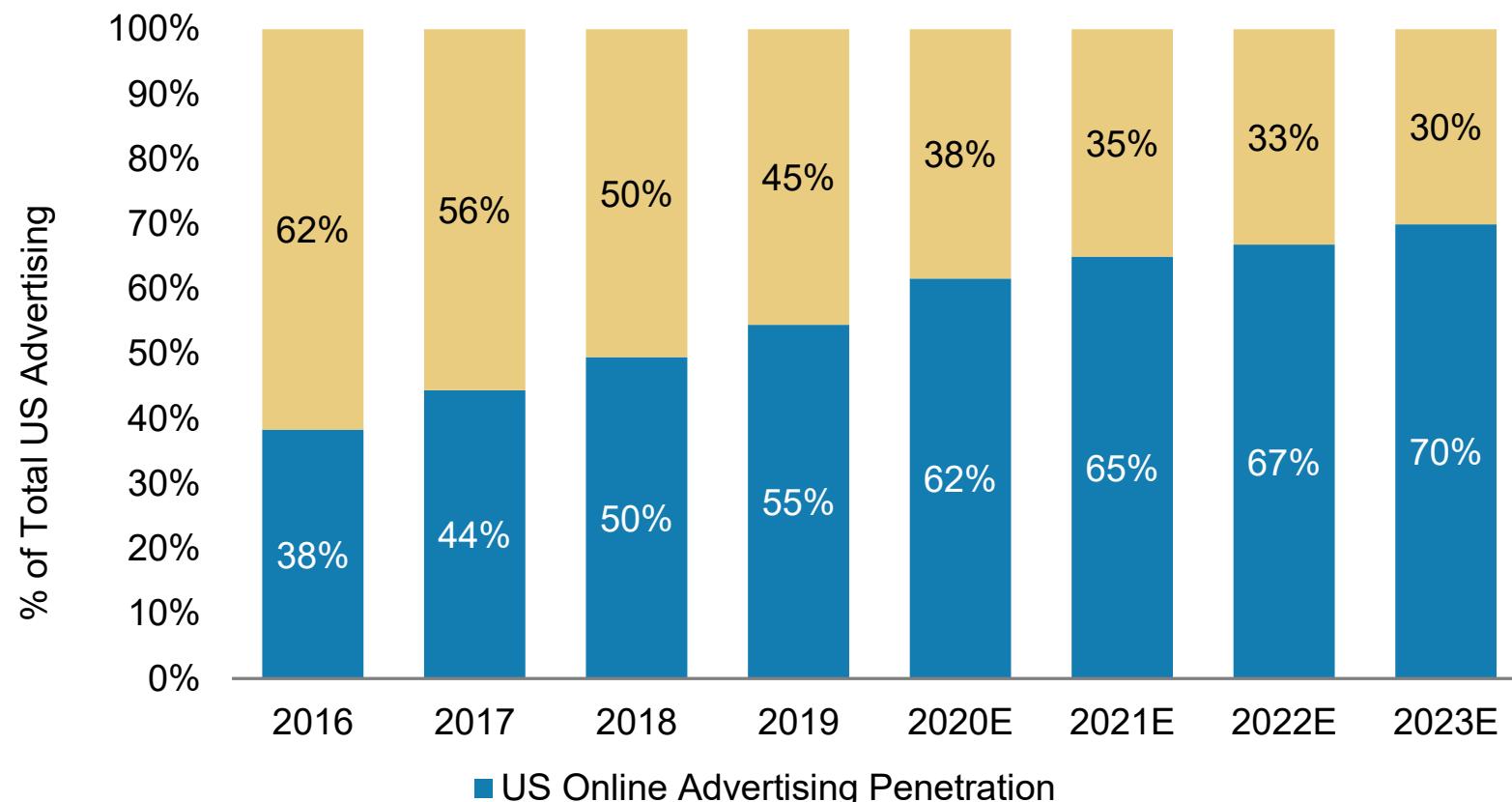
April 2021

FOUNDATION

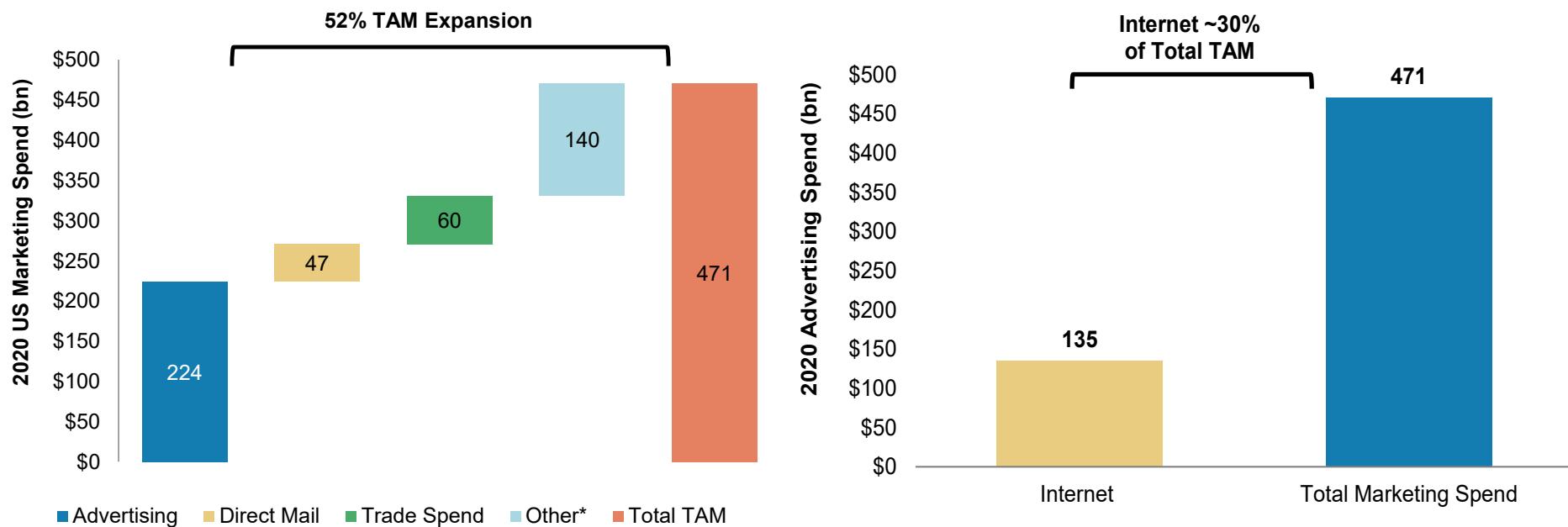
Technology, Media & Telecom Spring Training Teach-In

Online Advertising

Online Advertising: There is ~\$230bn Spent on Advertising in the US; ~60% of Which is Online



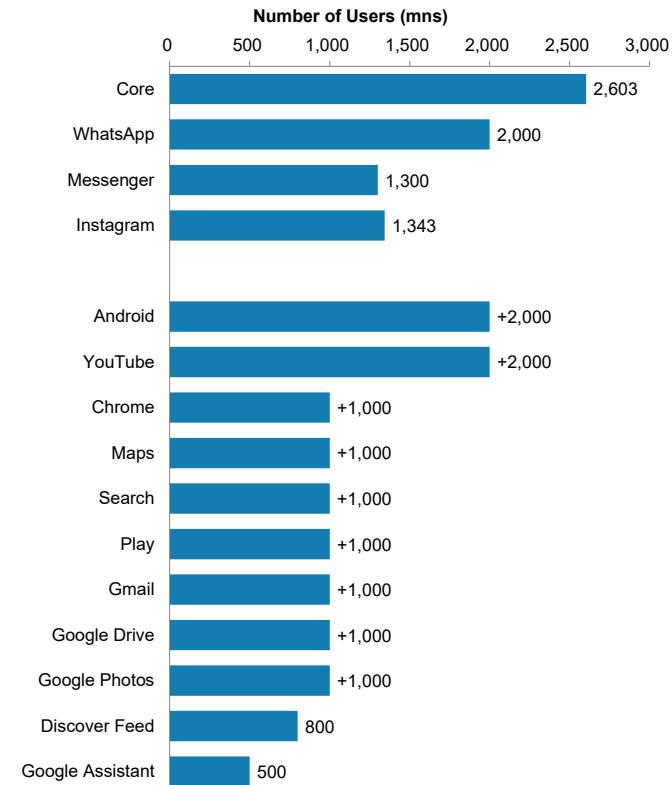
But Really, We Think Online Advertising is Only ~30% Penetrated



Note: *Other includes Telemarketing, Event Sponsorship, Business-to-Business Promotion, Directories and Public Relations
 Source: Morgan Stanley Research, Magna, RAB, OAAA, IAB, NAA, Zenith, & PIB

What Determines Winners? It All Starts with Engagement. GOOGL and FB's Leading Ecosystems Are Large and Intact...

| Platform | | Number of Users (mns) ¹ | Engagement |
|---|------------------|------------------------------------|-----------------------------------|
| Facebook | | | |
|  | Core | 2,603 | ~40 min/user daily |
|  | WhatsApp | 2,000 | |
|  | Messenger | 1,300 | 100bn messages daily ² |
|  | Instagram | 1,343 | ~30 min/user daily |
| Alphabet | | | |
|  | Android | +2,000 | - |
|  | YouTube | +2,000 | ~40 min/user daily |
|  | Chrome | +1,000 | - |
|  | Maps | +1,000 | - |
|  | Search | +1,000 | 1.4tn queries annually |
|  | Play | +1,000 | 67bn downloads annually |
|  | Gmail | +1,000 | - |
|  | Google Drive | +1,000 | - |
|  | Google Photos | +1,000 | - |
|  | Discover Feed | 800 | - |
|  | Google Assistant | 500 | - |



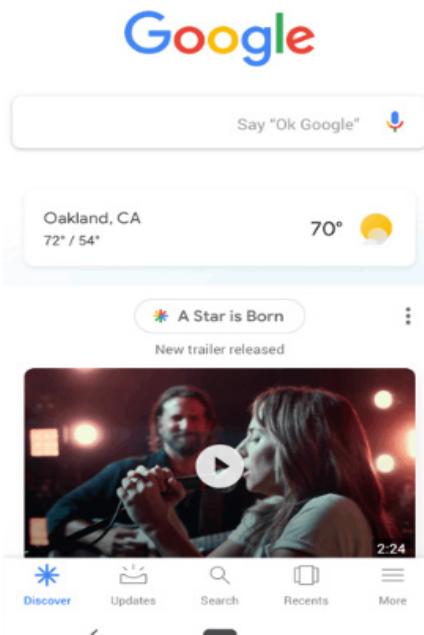
Notes: (1) Most recently reported, (2) Shared between WhatsApp and Messenger
Source: Facebook, Alphabet, comScore, Sensor Tower, Morgan Stanley Research

...As We Look at Monetization on A Bottom Up Basis

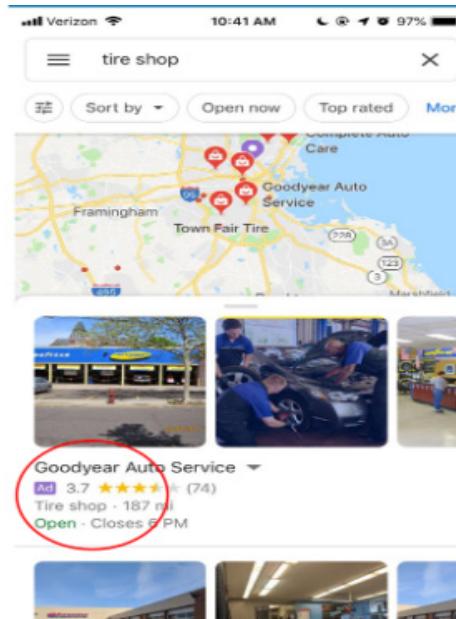
| 2020 US Ad Revenue Drivers | Core Facebook | Instagram | Pinterest | Twitter | Snap |
|-----------------------------|-----------------|----------------|----------------|----------------|----------------|
| Daily Active Users (mn) | 176 | 101 | 34 | 37 | 83 |
| Hours per DAU per Day | 0.7 | 0.6 | 0.4 | 0.6 | 0.5 |
| Ads per DAU per Hour | 109.6 | 101.9 | 77.3 | 47.7 | 40.8 |
| Average Pricing (CPM) | \$5 | \$4 | \$3 | \$4 | \$3 |
| Ad Revenue (mn) | \$27,524 | \$8,994 | \$1,425 | \$1,739 | \$1,597 |
| Ad Revenue per DAU | \$157 | \$89 | \$42 | \$47 | \$19 |
| Ad Revenue per DAU per Hour | \$0.59 | \$0.44 | \$0.27 | \$0.21 | \$0.10 |

And the Leading Platforms Continue to Create New Monetization Opportunities

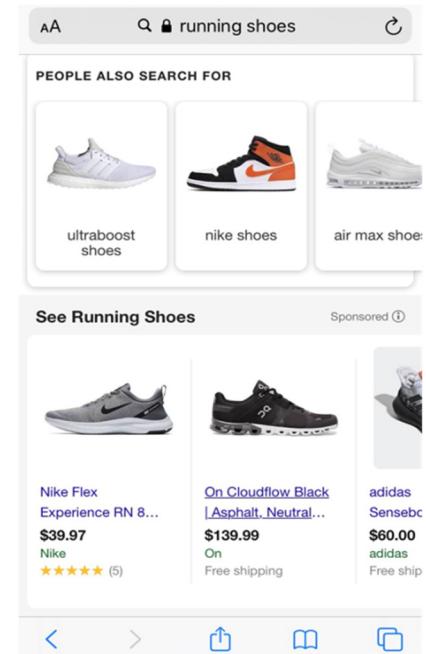
Discover
\$2.0 bn



Maps
\$3.0 bn



E-Commerce
\$1.1 bn

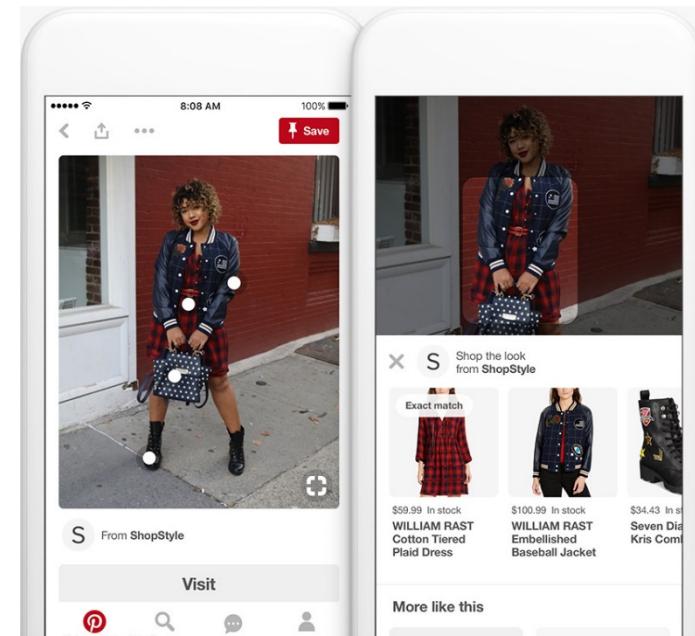


And We See the Same Thing At Snapchat and Pinterest

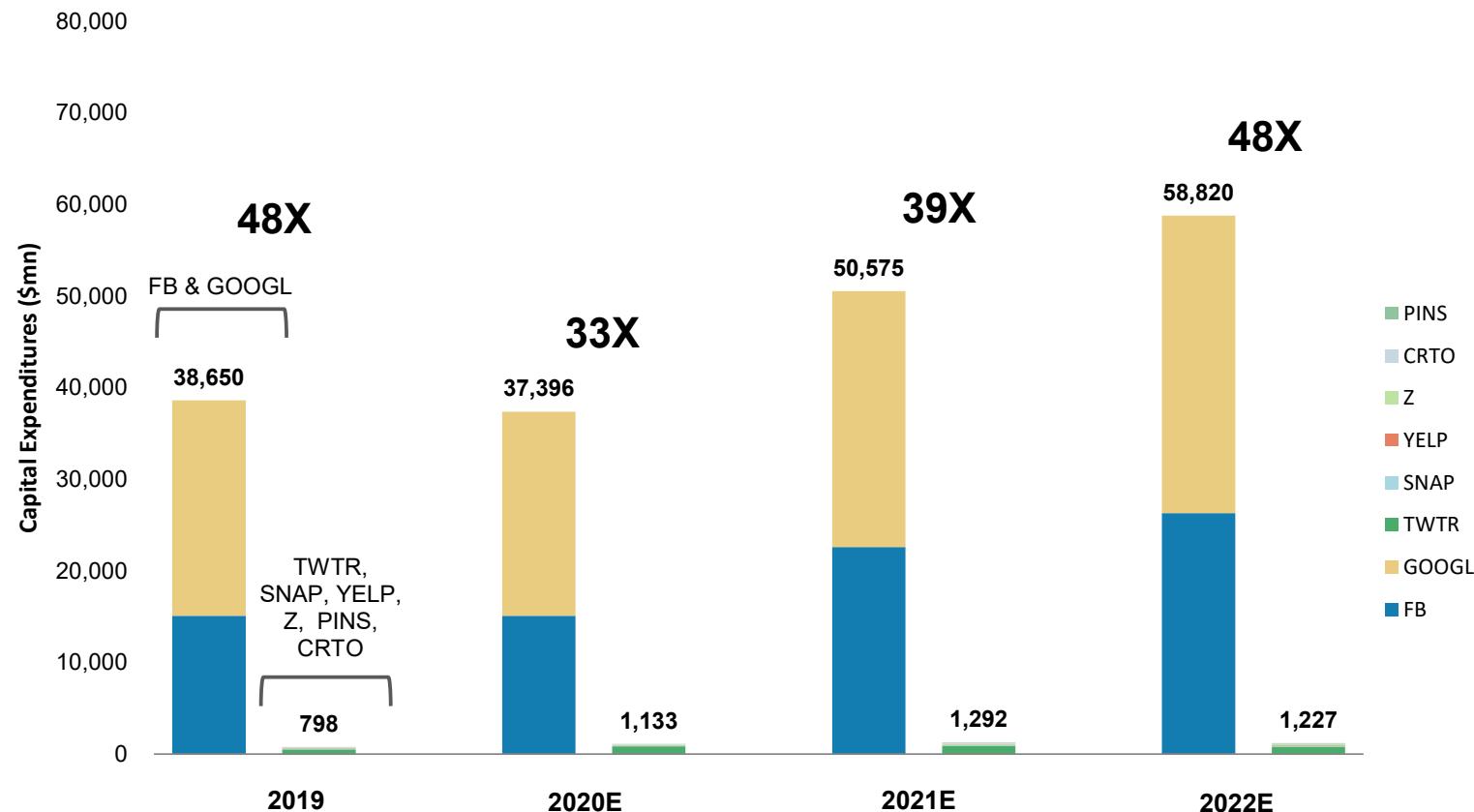
Spotlight
\$1.0 bn



Social Shopping



On Top of That, These Companies Continue to Invest to Improve Monetization and User Offerings



Morgan Stanley

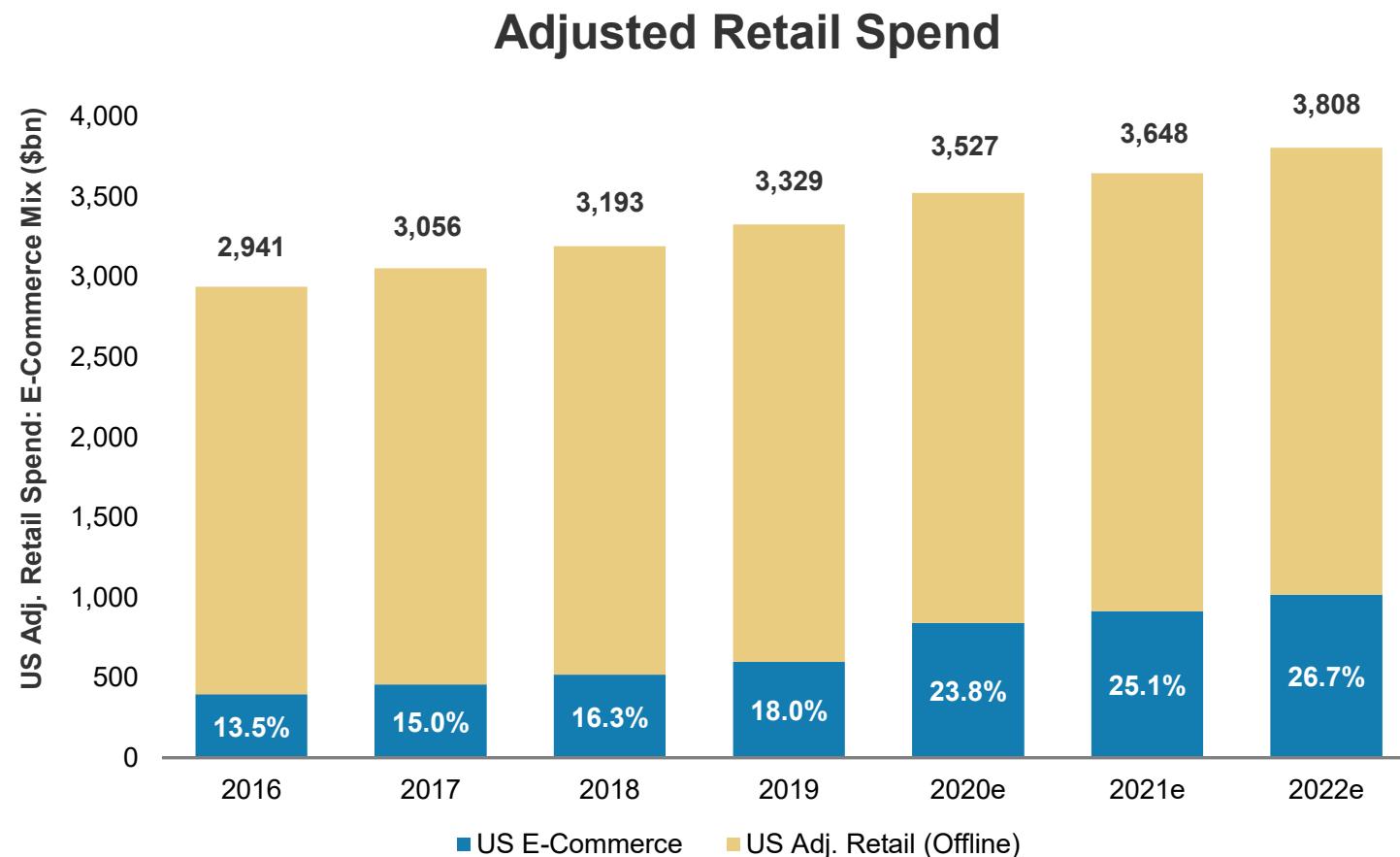
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Technology, Media & Telecom Spring Training Teach-In

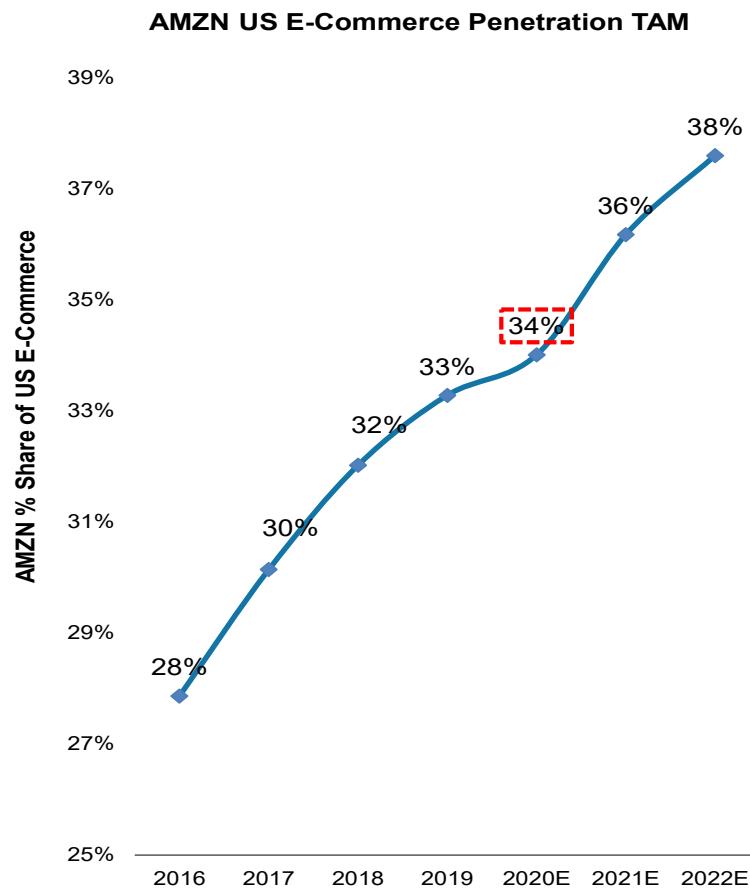
E-Commerce

Still a Core ~\$2.7tn Offline Retail Spend TAM... Shifting Online

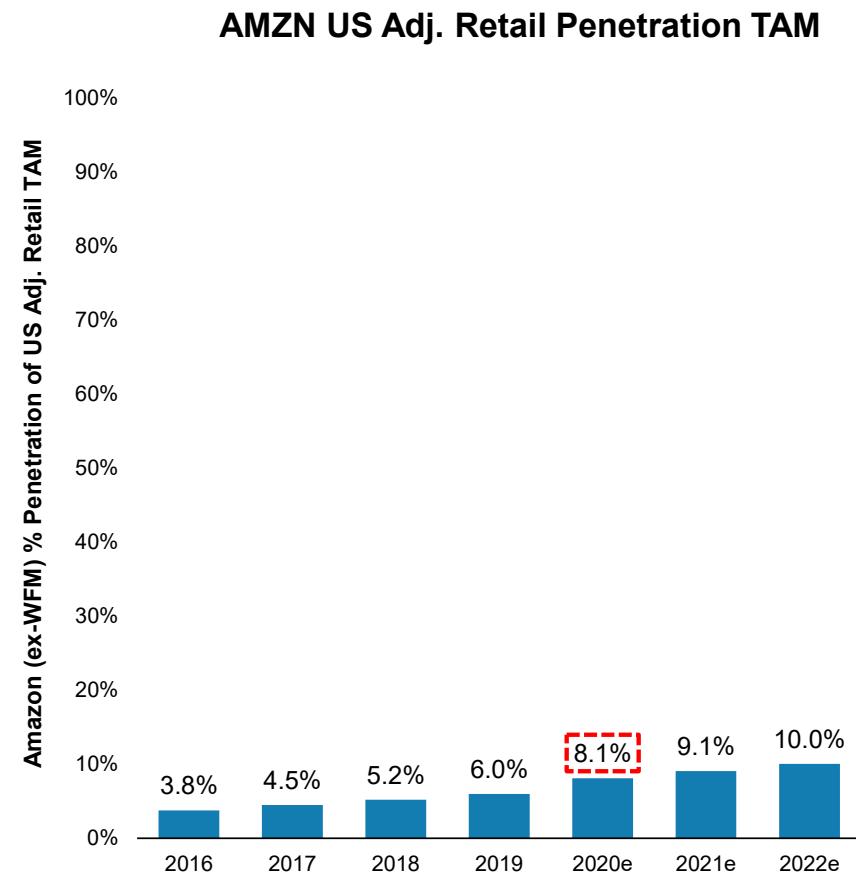


Note: US Adj. Retail Spend = USCB Retail Total (ex- building materials, gasoline stations, motor vehicles, and non-store retailers)
Source: US Census Bureau, comScore, Forrester, Company Data, Morgan Stanley Research

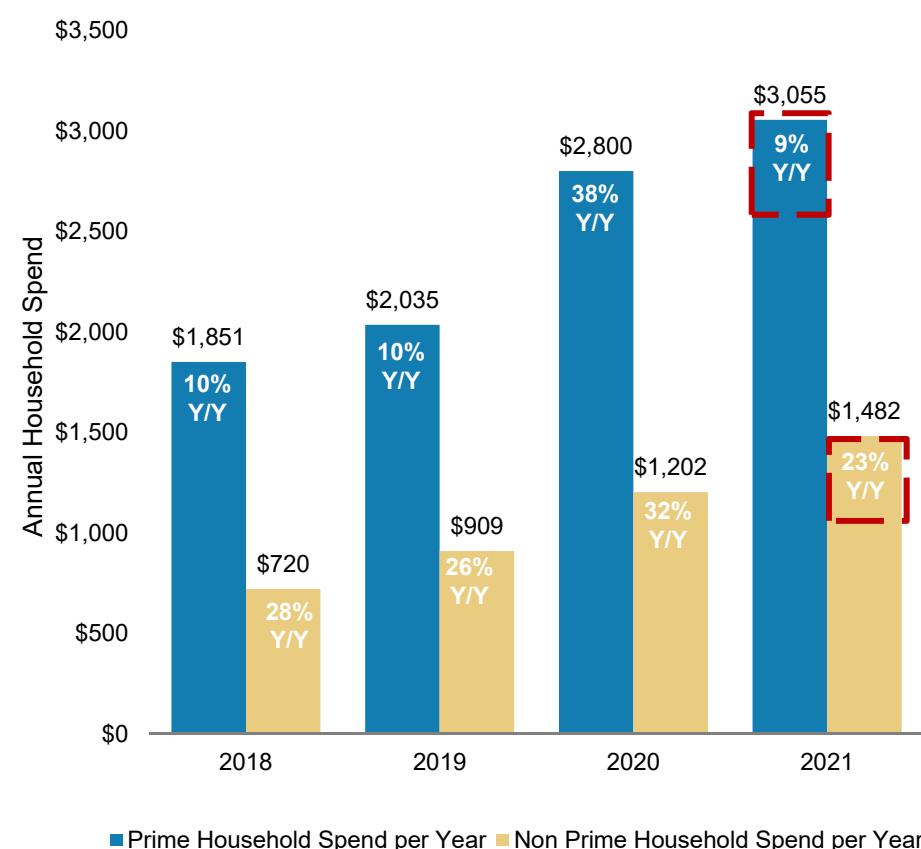
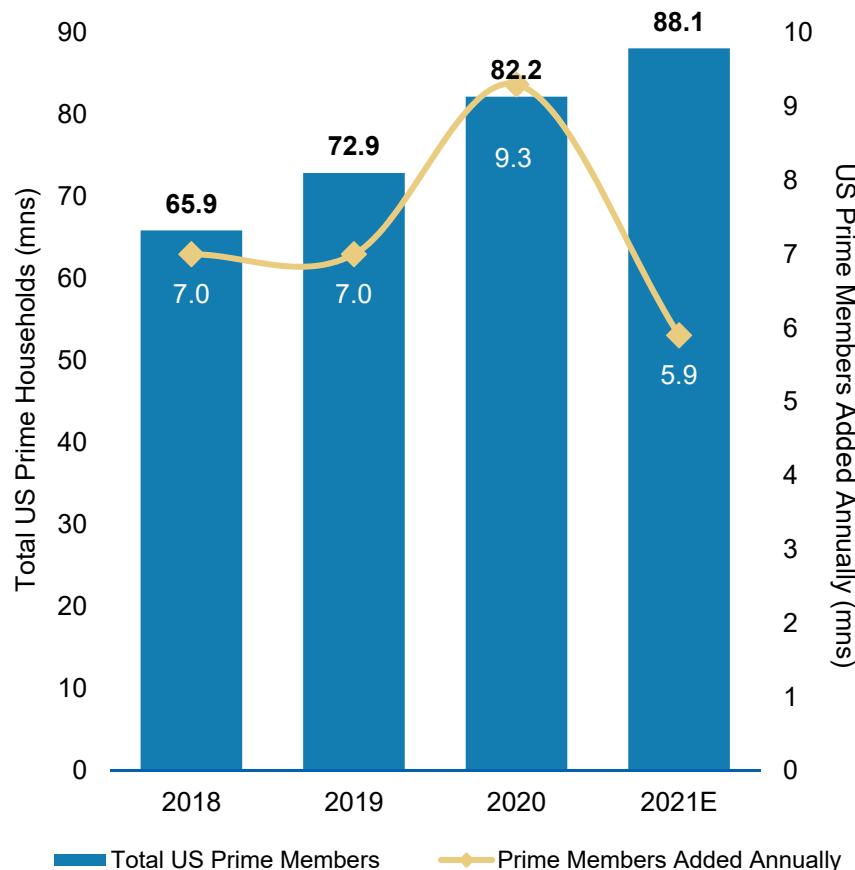
Amazon is 34% of E-commerce, But Only 8.1% of Total US Adjusted Retail



Source: BEA PCE, Company Data, Morgan Stanley Research



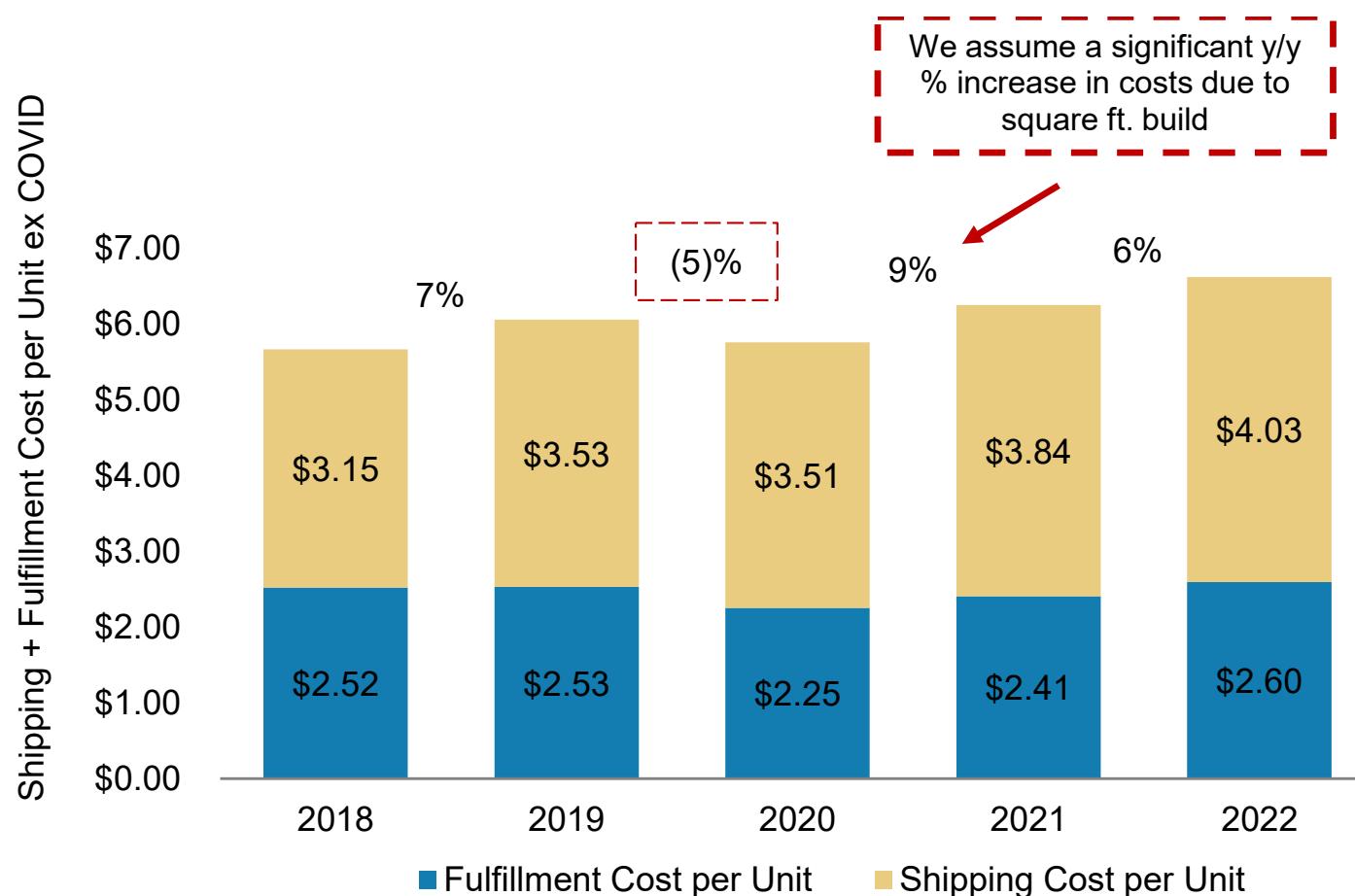
For AMZN, Prime Sub Growth Recently Inflected...



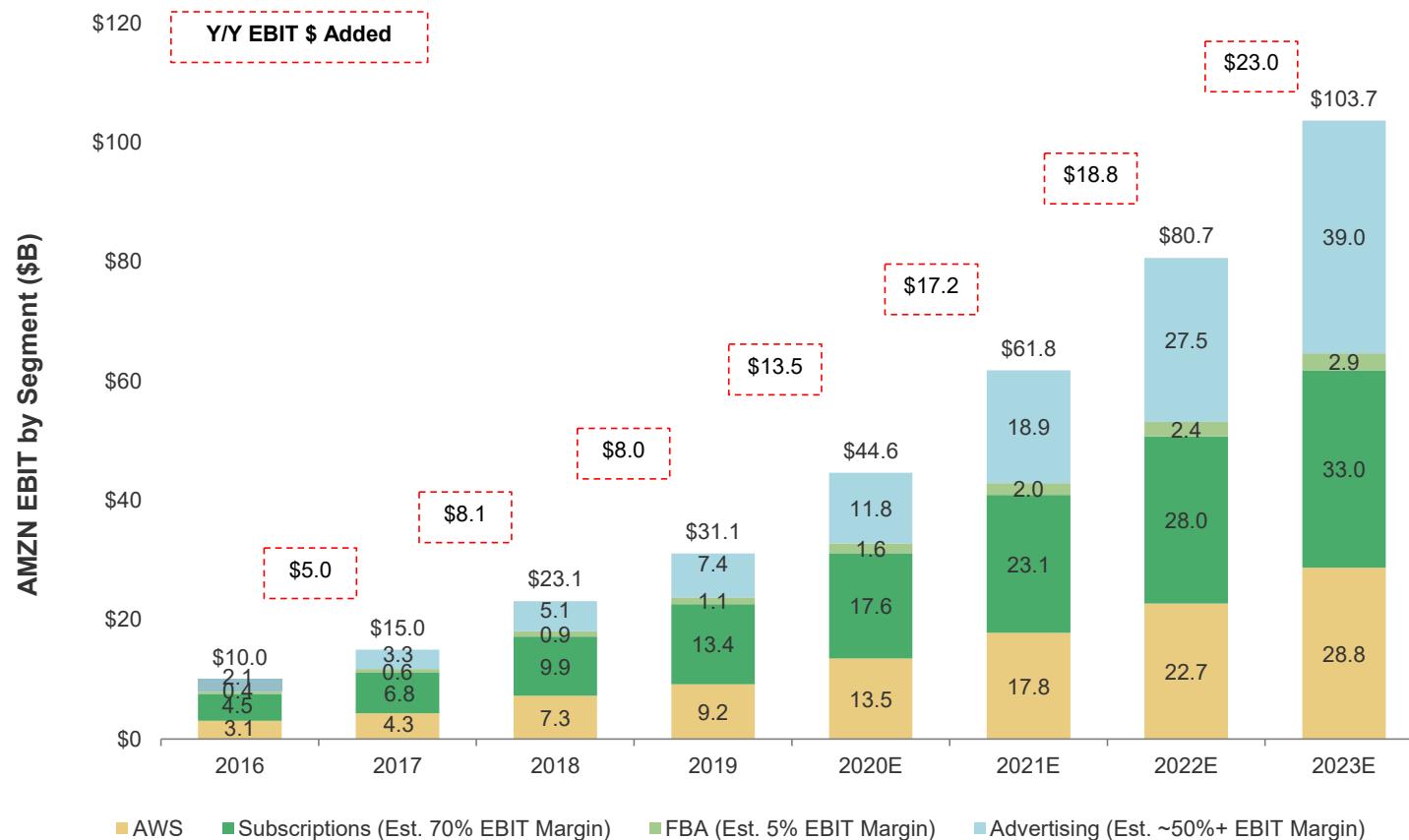
...and Prime Members Spend ~2.3X More than Non Prime Members

| | 2018 | 2019 | 2020 | 2021 |
|--|------------------|------------------|------------------|------------------|
| Total US Households (mns) | 128 | 129 | 128 | 130 |
| % y/y growth | 1% | 1% | 0% | 1% |
| Prime Households (mns) | 65.9 | 72.9 | 82.2 | 88.2 |
| % Prime Households | 52% | 57% | 64% | 68% |
| Implied Non Prime Households (mns) | 61.7 | 55.7 | 46.2 | 41.5 |
| Implied % Non-Prime Households | 48% | 43% | 36% | 32% |
| Prime Household Spend per Year | \$1,851 | \$2,035 | \$2,800 | \$3,055 |
| Y/Y % Growth | 10% | 10% | 38% | 9% |
| Y/Y Abs Growth | \$168 | \$185 | \$765 | \$255 |
| Total Prime Household GMV (mns) | \$121,950 | \$148,379 | \$230,184 | \$269,305 |
| Y/Y % Growth | 22% | 55% | 17% | |
| Non Prime Household Spend per Year | \$720 | \$909 | \$1,202 | \$1,482 |
| Y/Y % Growth | 28% | 26% | 32% | 23% |
| Y/Y Abs Growth | \$158 | \$189 | \$293 | \$280 |
| Total Non Prime Household GMV (mns) | \$44,424 | \$50,619 | \$55,586 | \$61,479 |
| Y/Y % Growth | 14% | 10% | 11% | |
| Bottom-up US GMV (mns) | \$166,374 | \$198,998 | \$285,771 | \$330,784 |
| % Change Y/Y | | 20% | 44% | 16% |
| MS Model US GMV (mns) | 166,374 | 198,998 | 285,771 | 330,784 |
| % Change Y/Y | | 20% | 44% | 16% |

While Scaling Efficiency Is Showing Through



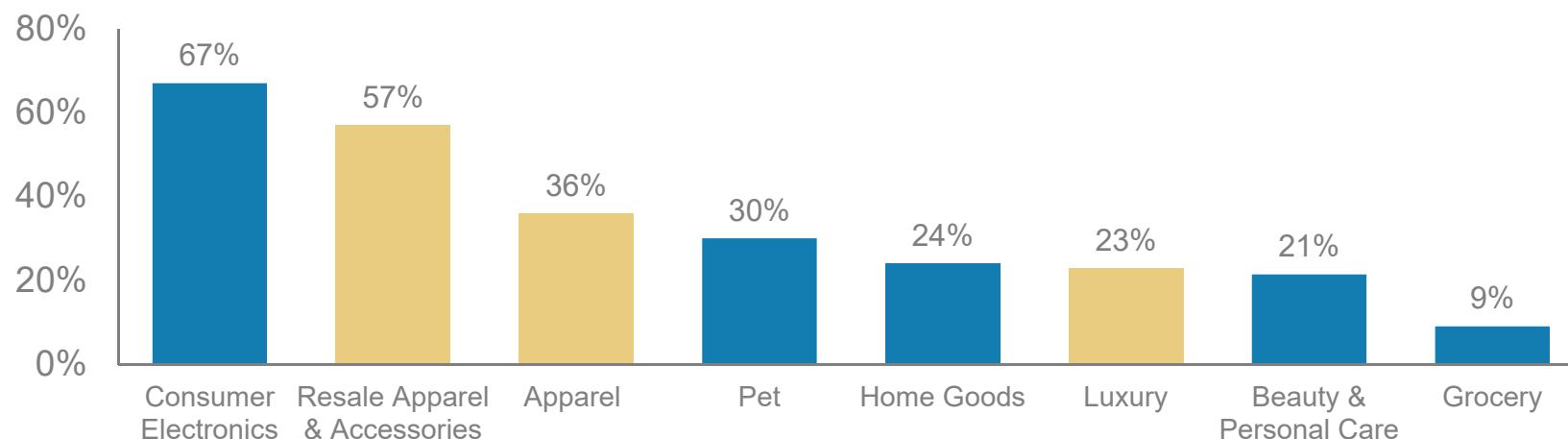
And Amazon's Higher Margin Businesses are Set to Post Record Dollar Growth...Fueling Investment and Profitability



The apparel & accessories end market grows slower than most of the other verticals we cover, making it more important to identify the haves and have-nots

| Total Addressable Market (\$M) | 2021 | 2025 | 4-yr CAGR | LT Average |
|------------------------------------|---------|---------|-----------|------------|
| US Apparel and Accessory Resale | 35,240 | 53,821 | 11.2% | 13.6% |
| Global Online Dating (People, mil) | 643 | 722 | 2.9% | 7.6% |
| US Pet Products/Services | 138,395 | 179,431 | 6.7% | 4.9% |
| US Luxury | 72,274 | 88,037 | 5.1% | 4.2% |
| US Home Furnishings | 313,593 | 348,821 | 2.7% | 3.9% |
| US Apparel | 255,143 | 301,230 | 4.2% | 2.5% |

US eCommerce Penetration - 2020



* LT Average is the average growth rate from 2010-2019, ('12-'19 for online dating and '16-'19 for US Apparel/Accessory Resale)
 Sources: Bain Altagamma, Euromonitor, Company Data, Morgan Stanley Research

We prefer businesses that 1) have limited to no inventory risk; 2) operate in either low price point apparel or luxury, 3) are becoming more concentrated vs. fragmented; 4) attractive end market/TAM growth, and 5) gaining market share

| | Inventory Risk | Low or High Price | Concentration | End Market Growth | Market Share Trends |
|------|----------------|-------------------|---------------|-------------------|---------------------|
| FTCH | ✓ | ✓ | ✓ | ✓ | ✓ |
| POSH | ✓ | ✓ | ✗ | ✓ | ✓ |
| TDUP | == | ✓ | ✗ | ✓ | == |
| REAL | == | ✓ | ✗ | ✓ | =/✗ |
| RVLV | ✗ | ✗ | ✗ | ✗ | =/✗ |
| SFIX | ✗ | ✗ | ✗ | ✗ | ✗ |

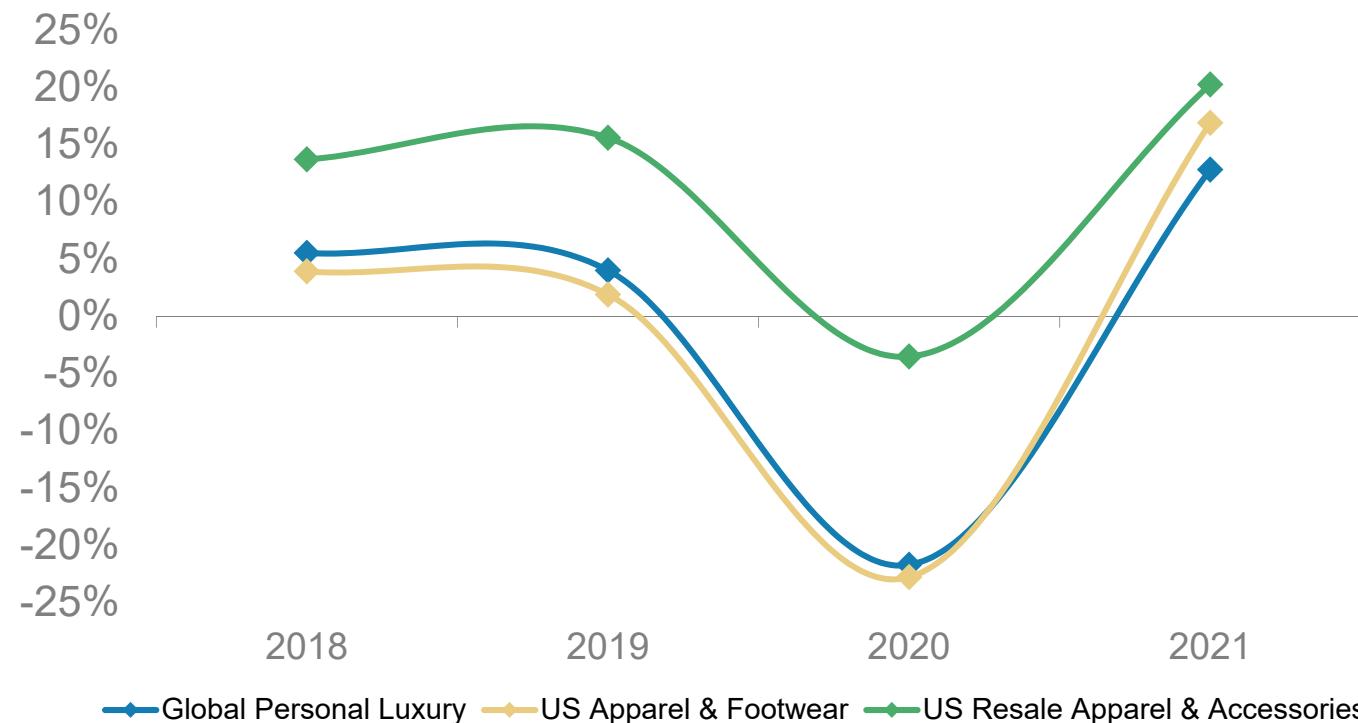
FTCH is our top SMID-cap pick; we are cautious ETSY & SFIX

| | YTD Performance | Rating | Bull | Base | Bear |
|--------------------------|--------------------|-----------|------------|------------|-----------|
| SMID Cap Internet | | | | | |
| FTCH | -26.6% | OW | 120 | 70 | 31 |
| % Upside(Downside) | | | 151% | 46% | -35% |
| POSH | -60.2% | EW | 97 | 52 | 26 |
| % Upside(Downside) | | | 140% | 29% | -36% |
| CSPR | 16.1% | EW | 21 | 9 | 1 |
| % Upside(Downside) | | | 201% | 29% | -86% |
| WW | 20.5% | EW | 67 | 34 | 10 |
| % Upside(Downside) | | | 128% | 16% | -66% |
| REAL | 17.0% | EW | 43 | 25 | 12 |
| % Upside(Downside) | | | 88% | 9% | -48% |
| CHWY | -10.7% | EW | 134 | 83 | 31 |
| % Upside(Downside) | | | 68% | 4% | -61% |
| BMBL | -18.1% | EW | 110 | 57 | 28 |
| % Upside(Downside) | | | 91% | -1% | -51% |
| TDUP | -9.0% | EW | 26 | 16 | 8 |
| % Upside(Downside) | | | 43% | -12% | -56% |
| ETSY | 17.9% | UW | 287 | 123 | 64 |
| % Upside(Downside) | | | 37% | -41% | -69% |
| SFIX | -25.9% | UW | 69 | 25 | 15 |
| % Upside(Downside) | | | 59% | -43% | -66% |

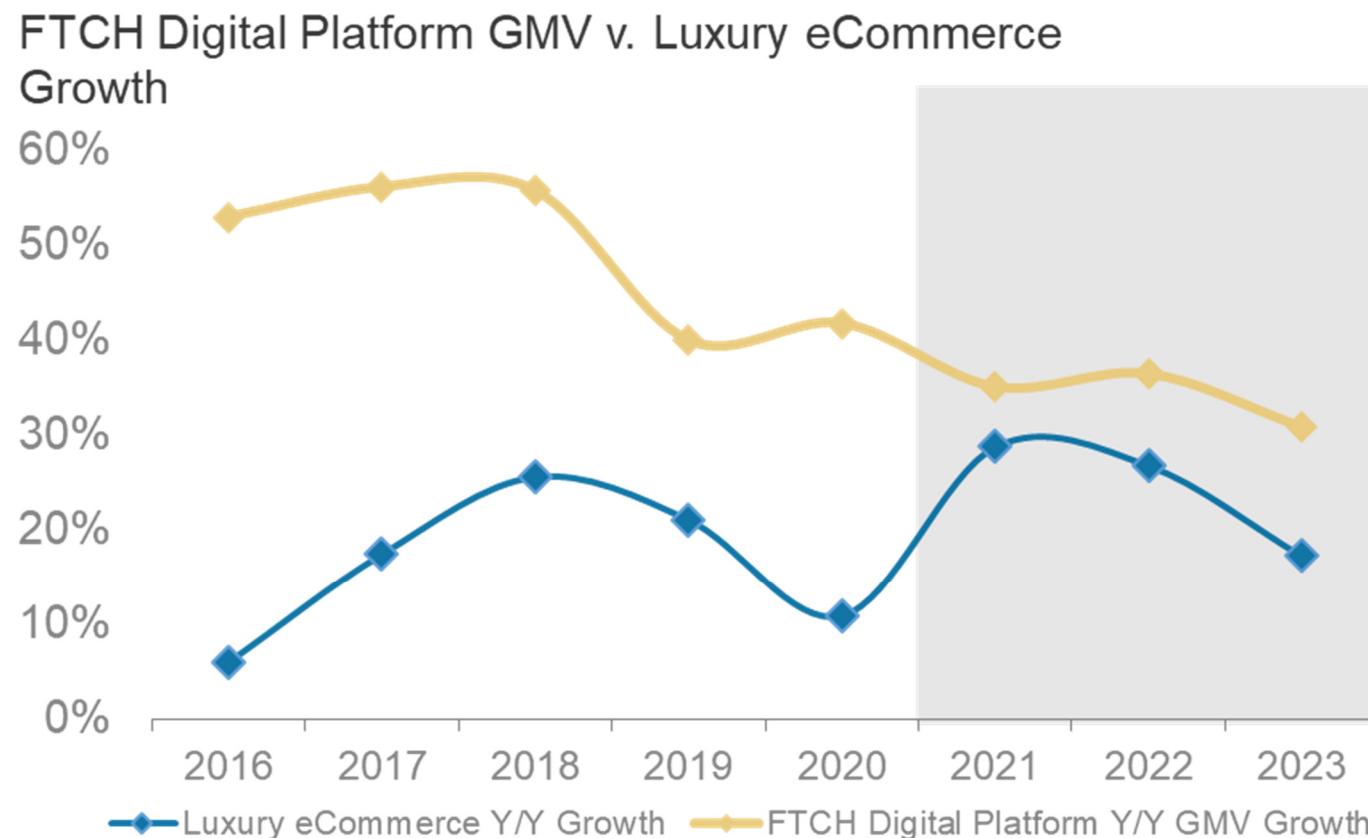
We expect luxury goods to see a sharp bounce back in '21

Our analysis shows despite our expectation for brick & mortar luxury sales to rebound +10% this year (vs. -25% in '20), this still implies luxury eCommerce dollars can grow +25% as the overall industry rebounds +13% this year vs. -22% last year

Growth Rates across Fashion

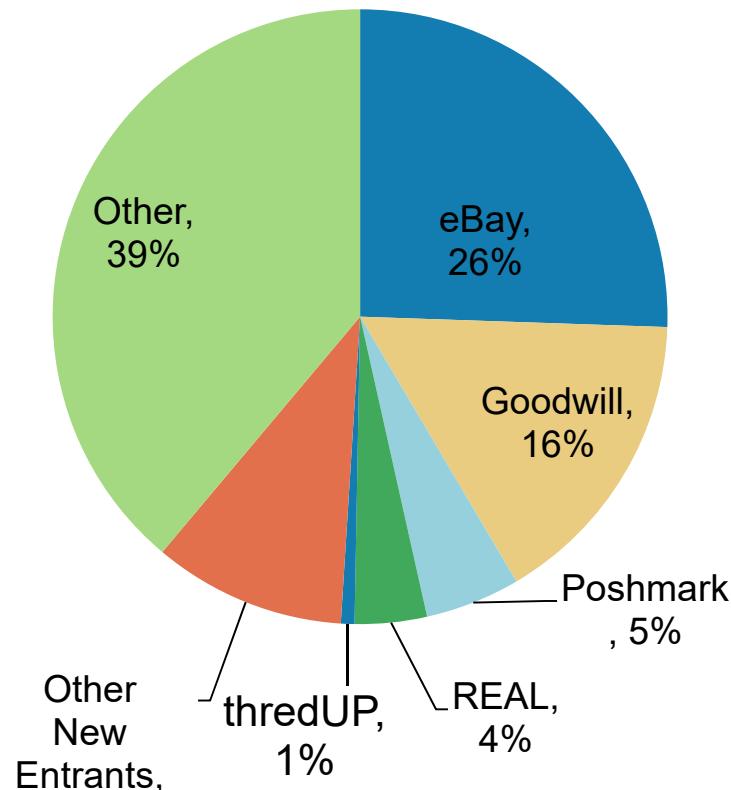


FTCH Digital Platform GMV growth has outpaced overall luxury eComm growth by ~33% on average over the past 5Y vs. guidance's implied +10% in '21, implying potential conservatism



The US resale market has become increasing fragmented; we prefer the asset-lite peer to peer model (POSH) vs. the managed marketplace model (REAL/TDUP)...

FY21 Resale GMV by Platform - US



| FY20 | Active | GMV/Rev | AOV | Frequency |
|------|------------|-----------|-------|-----------|
| | Buyers (M) | per Buyer | | |
| EBAY | 185.0 | \$541 | \$40* | 13.5 |
| POSH | 6.5 | \$220 | \$33 | 6.6 |
| TDUP | 1.2 | \$150 | \$47 | 3.2 |
| REAL | 0.6 | \$1,521 | \$442 | 3.4 |

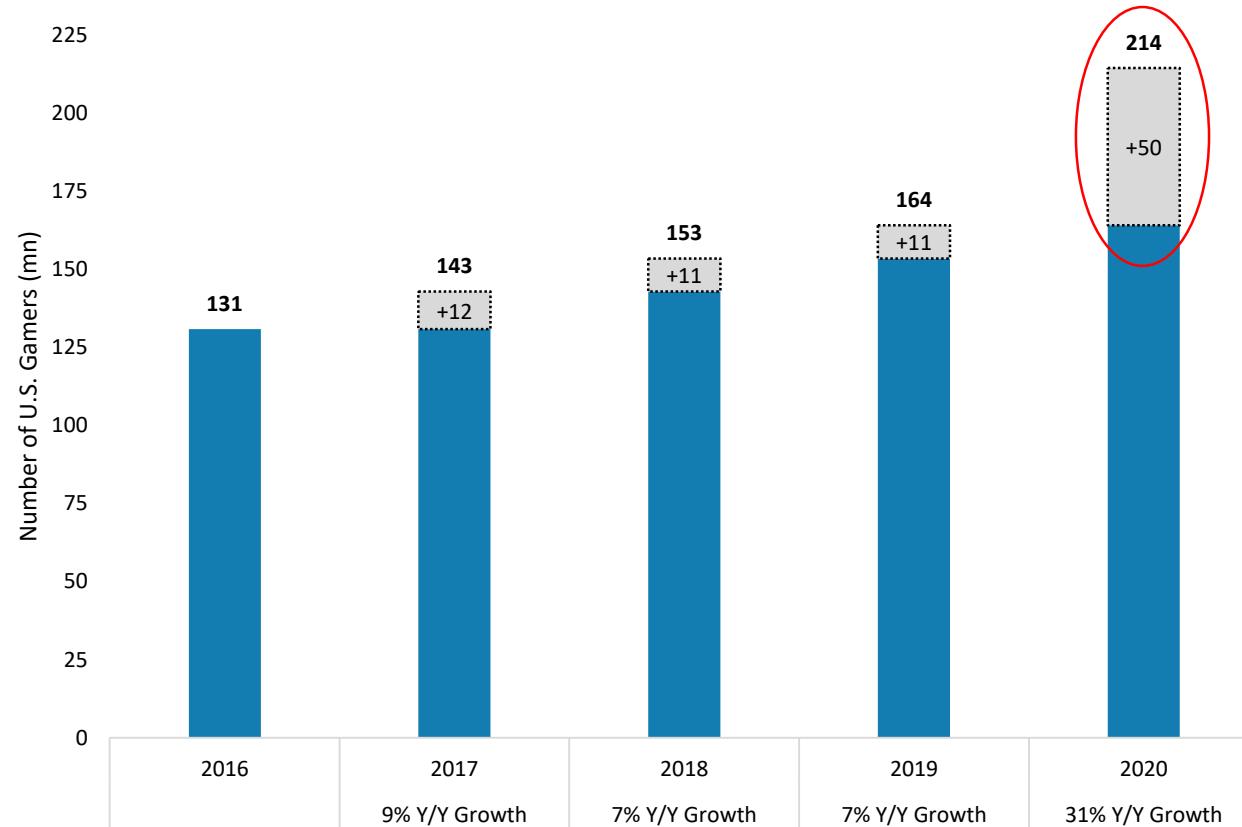
* EBAY AOV is a MS estimate; TDUP based on revenue per buyer
 Sources: Company Data, Morgan Stanley Research

... accordingly, as the competitive landscape heats up, we see risk of increasing customer acquisition costs (CAC) and/or the pressuring of take rates overtime

| Take Rate for Merchants | Gross Take Rate | Processing | Net Take Rate |
|-------------------------|-----------------|-------------|---------------|
| eCommerce | | | |
| TDUP | 81.0% | 2.9% | 78.1% |
| REAL | 35.8% | 2.5% | 33.3% |
| FTCH | 29.6% | 2.5% | 27.1% |
| GRUB | 21.2% | 2.0% | 19.2% |
| POSH | 18.3% | 2.5% | 15.8% |
| ETSY | 16.8% | 2.1% | 14.6% |
| GRPN | 14.3% | 2.5% | 11.8% |
| MELI | 11.5% | 1.4% | 10.1% |
| AMZN | 12.0% | 2.3% | 9.8% |
| EBAY | 11.7% | 2.4% | 9.3% |
| eComm Average | 25.2% | 2.3% | 22.9% |

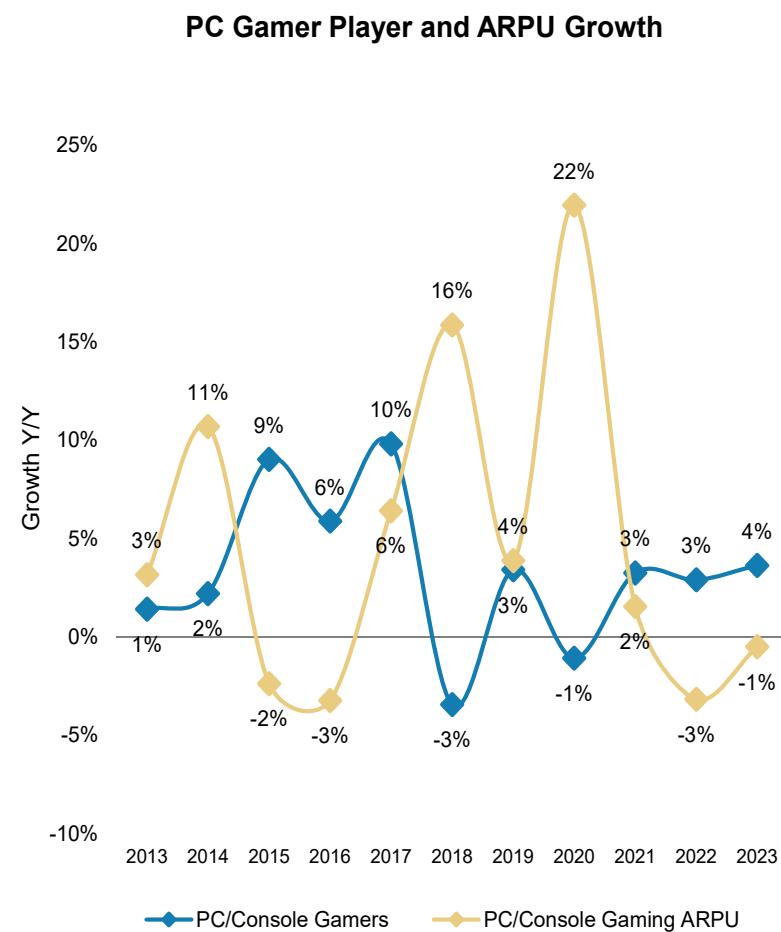
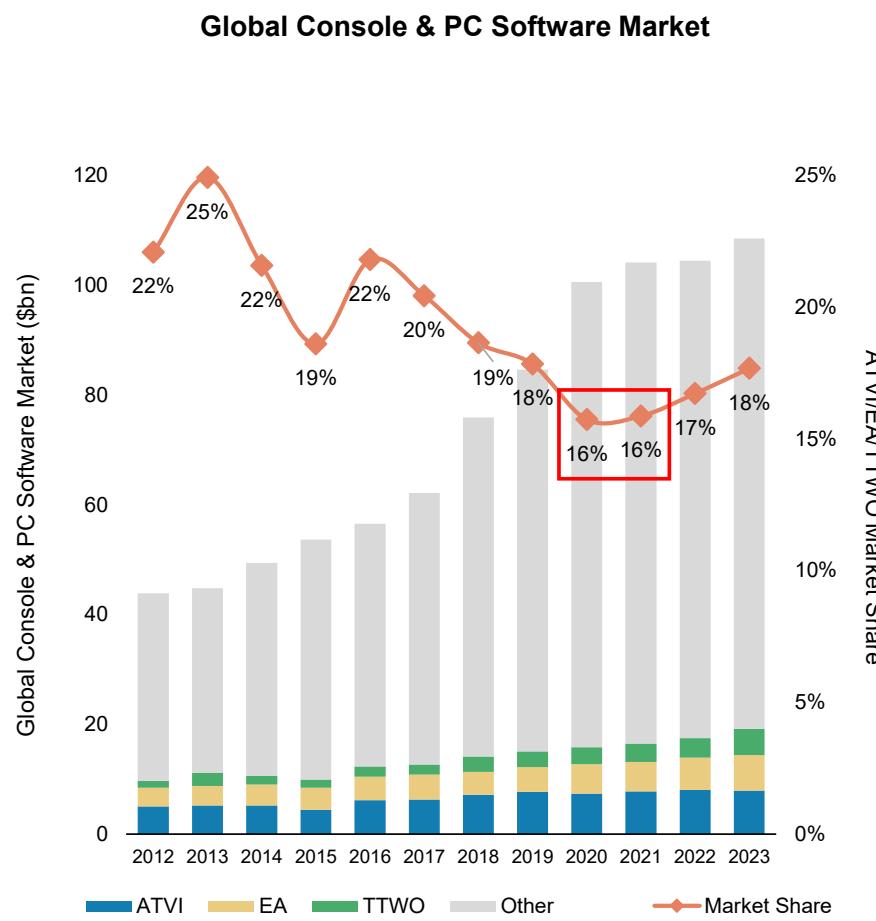
Video Games

But Don't Underestimate the Structural Change In The Gamer Base...As We May Have Pulled Forward 4 Years Of Adoption in the Growth Industry



Note: 2018 figure is a Morgan Stanley Estimate Based on 2017 and 2019 ESA figures
Source: Entertainment Software Association, Morgan Stanley Research

Which Should Translate to More Total Spend...Even if Gamers/Time Churn as the World Reopens



Source: Company Data, Morgan Stanley Research

4 Key Positive Secular Trends Remain in Place

More gamers and time spent on games

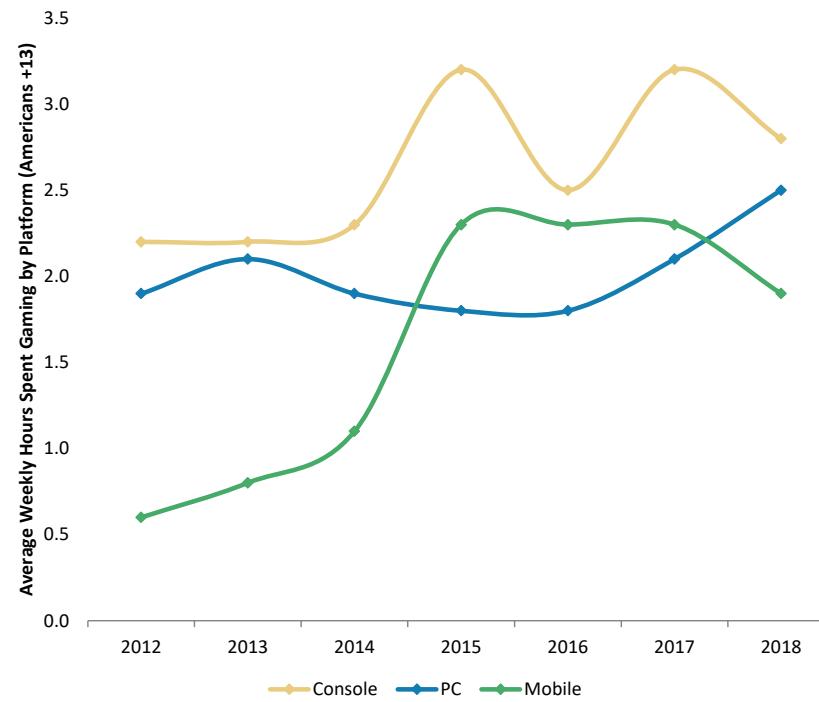
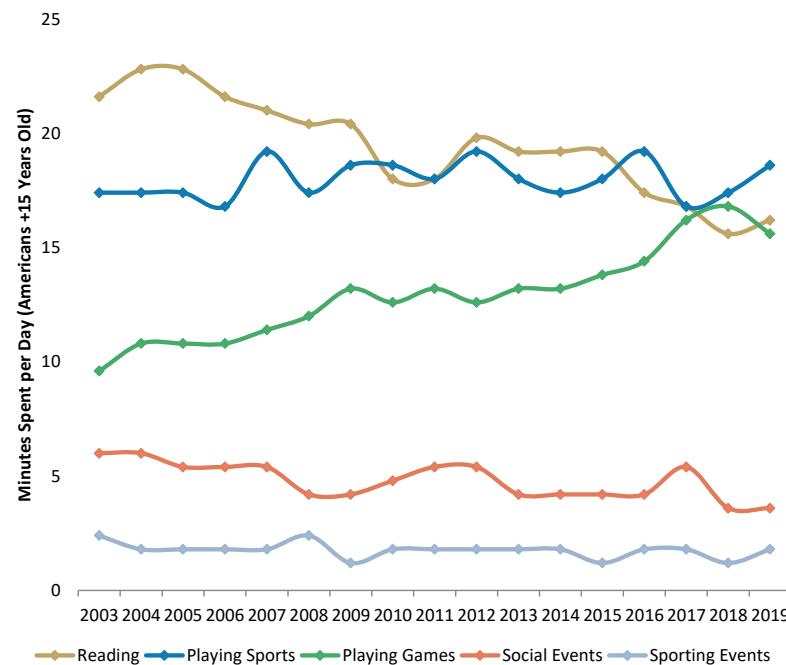
- Need best and fresh content

Global connected, networked play = global consumer opportunity

In-game monetization and digital monetization of that time spent

- Need best and fresh content

eSports: Consumer behavior changing and a global opportunity



Source: BLS, Nielsen, PWC, Morgan Stanley Research

Morgan Stanley

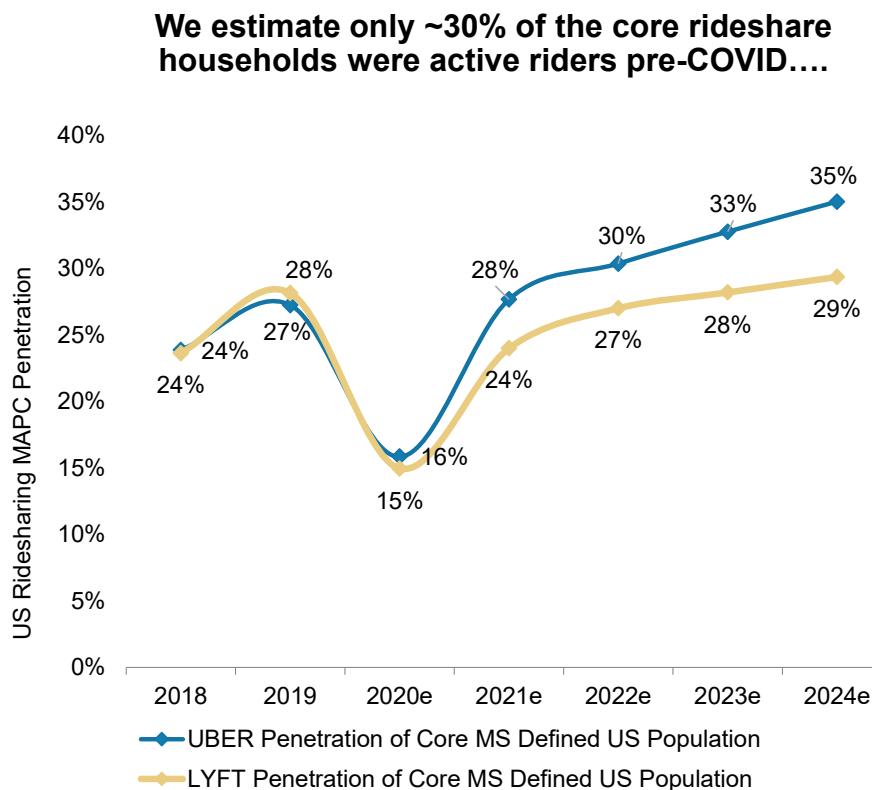
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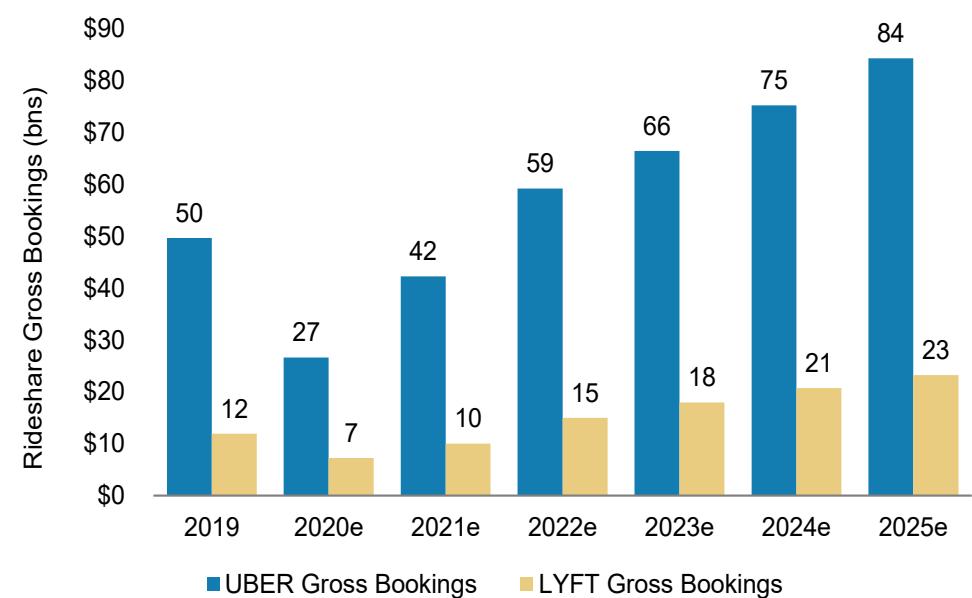
Technology, Media & Telecom Spring Training Teach-In

Rideshare/Travel

First, in Rideshare, We Think Penetration of the Core 18-50 year old \$50K+ Income US Household Remains Low...Which Speaks to the Runway Ahead



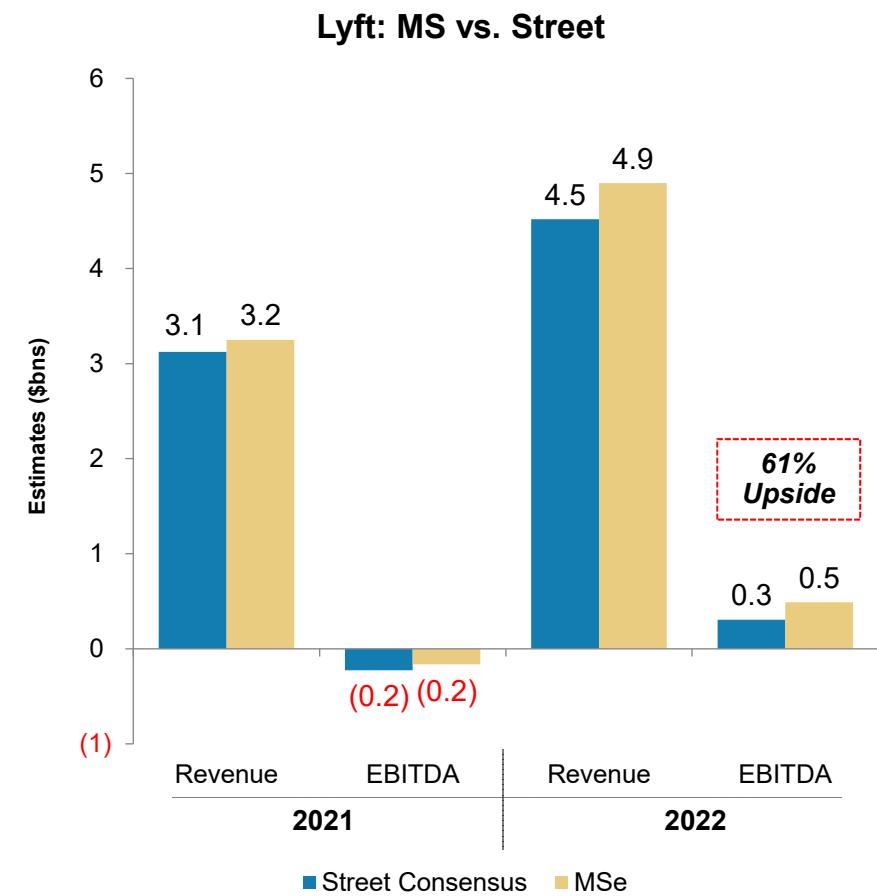
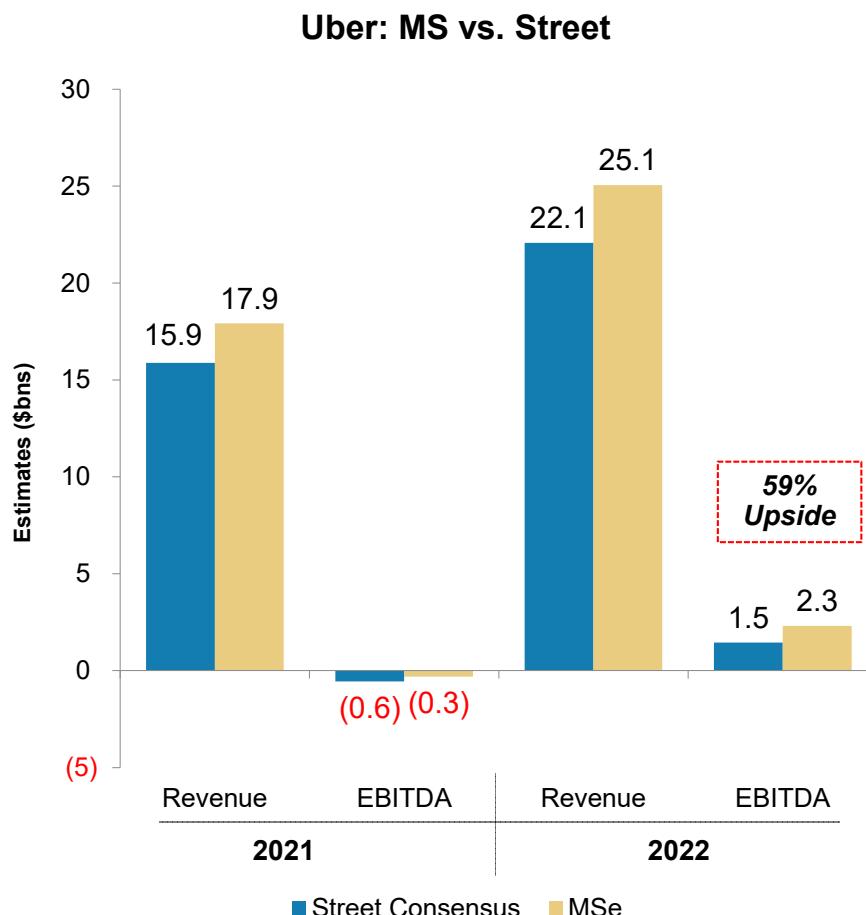
...as we see Uber/Lyft '22 rideshare bookings 19%/26% above '19 levels...as notably both players are already talking to shelter-in bringing in new users and use cases



Ridesharing: We Continue to Rely on Use-Case Modeling... With Social and Travel Trips Set to Drive the Recovery and Offset Lower Commutes

| UBER Bottom Up Use Case | 2019 | 2020 | 2021 | 2022 | LYFT Bottom Up Use Case | 2019 | 2020 | 2021 | 2022 |
|---|--------|--------|--------|--------|---|--------|-------|--------|--------|
| Social (bars / restaurants / concerts/ sports events) | 16,248 | 8,084 | 15,553 | 22,707 | Social (bars / restaurants / concerts/ sports events) | 5,081 | 2,763 | 4,538 | 7,392 |
| Y/Y Growth | | -50% | 92% | 46% | Y/Y Growth | | -46% | 64% | 63% |
| % Total Rides Bookings | 33% | 30% | 37% | 38% | % Total Rides Bookings | 43% | 38% | 45% | 49% |
| % vs 2019 | -50% | -4% | 40% | | % vs 2019 | -46% | -11% | 45% | |
| Commutes to / from work | 15,904 | 9,186 | 11,630 | 14,296 | Commutes to / from work | 3,571 | 2,122 | 2,439 | 3,231 |
| Y/Y Growth | | -42% | 27% | 23% | Y/Y Growth | | -41% | 15% | 33% |
| % Total Rides Bookings | 32% | 35% | 27% | 24% | % Total Rides Bookings | 30% | 29% | 24% | 22% |
| % vs 2019 | -42% | -27% | -10% | | % vs 2019 | -41% | -32% | -10% | |
| Airport | 7,455 | 2,503 | 5,459 | 8,789 | Airport | 1,190 | 507 | 827 | 1,434 |
| Y/Y Growth | | -66% | 118% | 61% | Y/Y Growth | | -57% | 63% | 73% |
| % Total Rides Bookings | 15% | 9% | 13% | 15% | % Total Rides Bookings | 10% | 7% | 8% | 10% |
| % vs 2019 | -66% | -27% | 18% | | % vs 2019 | -57% | -30% | 20% | |
| Other Travel Rides | 5,020 | 1,685 | 3,676 | 5,918 | Other Travel Rides | 960 | 417 | 667 | 1,157 |
| Y/Y Growth | | -66% | 118% | 61% | Y/Y Growth | | -57% | 60% | 73% |
| % Total Rides Bookings | 10% | 6% | 9% | 10% | % Total Rides Bookings | 8% | 6% | 7% | 8% |
| % vs 2019 | -66% | -27% | 18% | | % vs 2019 | -57% | -30% | 20% | |
| All Other | 5,074 | 5,156 | 5,975 | 7,469 | All Other | 1,100 | 1,443 | 1,534 | 1,765 |
| Y/Y Growth | | 1.6% | 16% | 25% | Y/Y Growth | | 31.2% | 6.3% | 15.0% |
| % Total Rides Bookings | 10% | 19% | 14% | 13% | % Total Rides Bookings | 9% | 20% | 15% | 12% |
| % vs 2019 | 2% | 18% | 47% | | % vs 2019 | 31% | 40% | 60% | |
| Total Rides Bookings | 49,700 | 26,614 | 42,293 | 59,179 | Total Rides Bookings | 11,902 | 7,252 | 10,006 | 14,979 |
| Y/Y Growth | | -46% | 59% | 40% | Y/Y Growth | | -39% | 38% | 50% |
| % vs 2019 | -46% | -15% | 19% | | % vs 2019 | -39% | -16% | 26% | |

And When We Get to '22, We See Larger Bookings Bases Flowing Over Lower Opex For Healthy EBITDA Beats



Note: Data as of April 20, 2021

Source: Visible Alpha, Company Reports, Morgan Stanley Research

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Disclosure Section (Cont.)

Global Stock Ratings Distribution

(as of March 31, 2021)

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For disclosure purposes only (in accordance with FINRA requirements), we include the category headings of Buy, Hold, and Sell alongside our ratings of Overweight, Equal-weight, Not-Rated and Underweight. Morgan Stanley does not assign ratings of Buy, Hold or Sell to the stocks we cover. Overweight, Equal-weight, Not-Rated and Underweight are not the equivalent of buy, hold, and sell but represent recommended relative weightings (see definitions below). To satisfy regulatory requirements, we correspond Overweight, our most positive stock rating, with a buy recommendation; we correspond Equal-weight and Not-Rated to hold and Underweight to sell recommendations, respectively.

| STOCK RATING CATEGORY | COVERAGE UNIVERSE | | INVESTMENT BANKING CLIENTS (IBC) | | | OTHER MATERIAL INVESTMENT SERVICES CLIENTS (MISC) | |
|--------------------------|-------------------|---------------|----------------------------------|-------------------|----------------------------|---|--------------------------------|
| | COUNT | % OF TOTAL | COUNT | % OF TOTAL IBC | % OF RATING CATEGORY | COUNT | % OF TOTAL OTHER MISC |
| | Overweight/Buy | 1510 | 43% | 417 | 47% | 28% | 666 |
| Equal-weight/Hold | 1435 | 41% | 377 | 42% | 26% | 658 | 43% |
| Not-Rated/Hold | 4 | 0% | 2 | 0% | 50% | 4 | 0% |
| Underweight/Sell | 527 | 15% | 95 | 11% | 18% | 210 | 14% |
| TOTAL | 3,476 | | 891 | | | 1538 | |

Data include common stock and ADRs currently assigned ratings. Investment Banking Clients are companies from whom Morgan Stanley received investment banking compensation in the last 12 months. Due to rounding off of decimals, the percentages provided in the "% of total" column may not add up to exactly 100 percent.

Analyst Stock Ratings

Overweight (O). The stock's total return is expected to exceed the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.

Equal-weight (E). The stock's total return is expected to be in line with the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.

Not-Rated (NR). Currently the analyst does not have adequate conviction about the stock's total return relative to the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.

Underweight (U). The stock's total return is expected to be below the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.

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In-Line (I): The analyst expects the performance of his or her industry coverage universe over the next 12-18 months to be in line with the relevant broad market benchmark, as indicated below.

Disclosure Section (Cont.)

Cautious (C): The analyst views the performance of his or her industry coverage universe over the next 12-18 months with caution vs. the relevant broad market benchmark, as indicated below.

Benchmarks for each region are as follows: North America - S&P 500; Latin America - relevant MSCI country index or MSCI Latin America Index; Europe - MSCI Europe; Japan - TOPIX; Asia - relevant MSCI country index or MSCI sub-regional index or MSCI AC Asia Pacific ex Japan Index.

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April 2021

Technology, Media & Telecom Spring Training Teach-In

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INDUSTRY COVERAGE: IT Hardware

| COMPANY (TICKER) | RATING (AS OF) | PRICE* (04/26/2021) |
|------------------------------------|----------------|---------------------|
| Erik W Woodring | | |
| Garmin Ltd (GRMN.O) | E (01/07/2015) | \$141.65 |
| GoPro Inc (GPRO.O) | U (01/23/2018) | \$11.42 |
| Logitech International SA (LOGI.O) | O (11/11/2020) | \$114.98 |
| Resideo Technologies Inc (REZN.N) | E (03/16/2021) | \$30.73 |
| Vivint Smart Home Inc (VNTN.N) | E (08/11/2020) | \$12.70 |
| Katy L. Huberty, CFA | | |
| Apple, Inc. (AAPL.O) | O (05/26/2009) | \$134.72 |
| CDW Corporation (CDW.O) | O (02/03/2021) | \$183.11 |
| Cricut Inc (CRCT.O) | O (04/19/2021) | \$23.95 |
| Dell Technologies Inc. (DELL.N) | O (07/16/2020) | \$100.38 |
| Hewlett Packard Enterprise (HPE.N) | E (01/15/2019) | \$16.23 |
| HP Inc. (HPQ.N) | O (12/15/2020) | \$34.33 |
| IBM (IBM.N) | E (01/16/2020) | \$141.57 |
| NCR Corp. (NCR.N) | O (11/30/2020) | \$41.96 |
| NetApp Inc (NTAP.O) | O (12/15/2020) | \$77.15 |
| Nutanix Inc (NTNX.O) | E (05/28/2019) | \$27.45 |
| Pure Storage Inc (PSTG.N) | E (05/18/2017) | \$21.36 |
| Seagate Technology (STX.O) | O (04/09/2018) | \$93.27 |
| Sonos Inc. (SONO.O) | O (01/28/2019) | \$42.37 |
| Teradata (TDC.N) | E (12/15/2020) | \$53.07 |
| Xerox Corp (XRXN) | U (02/03/2021) | \$24.42 |

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* Historical prices are not split adjusted.

INDUSTRY COVERAGE: Semiconductors

| COMPANY (TICKER) | RATING (AS OF) | PRICE* (04/26/2021) |
|--|----------------|---------------------|
| Craig Hettenbach | | |
| Amphenol Corp. (APH.N) | E (08/23/2020) | \$68.98 |
| Analog Devices Inc. (ADI.O) | ++ | \$160.64 |
| Broadcom Inc. (AVGO.O) | O (11/19/2019) | \$471.85 |
| Cree Inc (CREE.O) | E (12/07/2020) | \$119.02 |
| Impinj Inc (PI.O) | E (06/19/2017) | \$57.02 |
| Maxim Integrated Products Inc. (MXIM.O) | ++ | \$97.67 |
| Microchip Technology Inc. (MCHP.O) | O (10/19/2020) | \$159.16 |
| NXP Semiconductor NV (NXPI.O) | E (04/08/2021) | \$205.02 |
| ON Semiconductor Corp. (ON.O) | U (08/09/2018) | \$43.80 |
| Qnovo Inc (QRVO.O) | O (06/16/2020) | \$198.97 |
| Sensata Technologies Holding N.V. (ST.N) | O (12/13/2020) | \$60.05 |
| Silicon Laboratories Inc. (SLAB.O) | E (01/19/2021) | \$154.48 |
| Skyworks Solutions Inc (SWKS.O) | E (11/28/2018) | \$199.66 |
| Synaptics Inc. (SYNA.O) | O (02/24/2021) | \$139.52 |
| Te Connectivity Ltd (TEL.N) | E (09/23/2019) | \$135.17 |
| Texas Instruments (TXN.O) | U (04/13/2020) | \$191.36 |

Joseph Moore

| | | |
|---------------------------------------|----------------|----------|
| Advanced Micro Devices (AMD.O) | ++ | \$85.41 |
| Ambarella Inc (AMBA.O) | O (03/29/2016) | \$104.38 |
| Intel Corporation (INTC.O) | O (01/14/2021) | \$58.76 |
| Marvell Technology Group Ltd (MRVL.O) | E (09/14/2015) | \$47.32 |
| Micron Technology Inc. (MU.O) | O (01/23/2020) | \$87.84 |
| NVIDIA Corp. (NVDA.O) | ++ | \$619.12 |
| Qualcomm Inc. (QCOM.O) | O (06/16/2020) | \$138.96 |
| Teradyne Inc (TER.O) | O (12/10/2020) | \$133.43 |
| Western Digital (WDC.O) | O (01/23/2020) | \$71.41 |
| Xilinx (XLNX.O) | ++ | \$133.96 |

Stock Ratings are subject to change. Please see latest research for each company.

* Historical prices are not split adjusted.

INDUSTRY COVERAGE: Semiconductor Capital Equipment

| COMPANY (TICKER) | RATING (AS OF) | PRICE* (04/26/2021) |
|---------------------------------|----------------|---------------------|
| Joseph Moore | | |
| Applied Materials Inc. (AMAT.O) | E (08/09/2018) | \$137.30 |
| KLA Corp (KLAC.O) | E (02/28/2020) | \$335.81 |
| Lam Research Corp (LRCX.O) | O (06/16/2020) | \$643.17 |

Stock Ratings are subject to change. Please see latest research for each company.

* Historical prices are not split adjusted.

INDUSTRY COVERAGE: Telecom & Networking Equipment

| COMPANY (TICKER) | RATING (AS OF) | PRICE* (04/26/2021) |
|------------------------------|----------------|---------------------|
| James E Fauchette | | |
| Avon Enterprise Inc (AXON.O) | O (01/15/2021) | \$159.29 |
| Trimble Inc. (TRMB.O) | E (09/21/2015) | \$84.12 |

Disclosure Section (Cont.)

Meta A Marshall

| | | |
|---|----------------|----------|
| Arista Networks (ANET.N) | O (10/30/2020) | \$321.07 |
| Avaya Holdings Corp (AVYAN) | E (12/15/2020) | \$30.32 |
| Bandwidth Inc (BAND.O) | E (04/05/2021) | \$137.71 |
| Casa Systems Inc (CASA.O) | E (01/17/2019) | \$9.03 |
| Ciena Corporation (CIEN.N) | E (04/16/2020) | \$54.31 |
| Cisco Systems Inc (CSCO.O) | O (07/09/2020) | \$51.64 |
| CommScope Holding Company Inc (COMMO) | O (06/05/2019) | \$16.82 |
| Corning Inc (GLW.N) | E (01/08/2020) | \$46.07 |
| F5 Networks Inc (F5V.O) | O (07/09/2020) | \$210.74 |
| II-VI Incorporated (IVI.O) | E (12/15/2020) | \$77.85 |
| Infinera Corp (INFR.N) | E (11/13/2018) | \$9.74 |
| Juniper Networks Inc (JNPR.N) | U (01/08/2020) | \$25.56 |
| Lumentum Holdings Inc (LITE.O) | O (12/15/2020) | \$94.50 |
| Motorola Solutions Inc (MSI.N) | E (04/12/2021) | \$190.20 |
| Plantronics Inc. (PLT.N) | E (02/05/2021) | \$41.25 |
| Viasat Solutions Inc (MAV.O) | E (05/20/2015) | \$16.95 |
| Zebra Technologies Corporation (ZBRA.O) | U (04/21/2021) | \$498.50 |

Stock Ratings are subject to change. Please see latest research for each company.

* Historical prices are not split adjusted.

INDUSTRY COVERAGE: IT Services

| COMPANY (TICKER) | RATING (AS OF) | PRICE* (04/26/2021) |
|--|----------------|---------------------|
| James E Fauchette | | |
| Accenture Plc (ACN.N) | O (02/26/2020) | \$289.52 |
| Cognizant Technology Solutions Corp (CTSH.O) | O (01/29/2021) | \$79.56 |
| DXCM Technology Company (DXC.N) | E (01/29/2021) | \$31.65 |
| Endava PLC (DAVAN) | E (06/15/2020) | \$90.20 |
| EPAM Systems Inc (EPAM.N) | O (08/12/2020) | \$458.83 |
| TELUS International (Cda) Inc. (TIXT.N) | E (03/01/2021) | \$29.51 |
| TTEC Holdings, Inc. (TTEC.O) | E (07/23/2020) | \$105.35 |

Stock Ratings are subject to change. Please see latest research for each company.

* Historical prices are not split adjusted.

INDUSTRY COVERAGE: Software

| COMPANY (TICKER) | RATING (AS OF) | PRICE* (04/26/2021) |
|--|----------------|---------------------|
| Hamza Fodderwala | | |
| CyberArk Software Ltd (CYBR.O) | O (10/01/2020) | \$153.80 |
| FireEye Inc (FEYE.O) | E (10/28/2020) | \$20.90 |
| McAfee Corp (MCFE.O) | O (11/16/2020) | \$25.72 |
| NortonLifeLock Inc (NLOK.O) | O (02/01/2021) | \$22.61 |
| Proofpoint Inc (PFPT.O) | ++ | \$172.70 |
| Qualys Inc (QLYS.O) | U (02/09/2021) | \$108.33 |
| Rapid7 Inc (RPD.O) | E (08/11/2015) | \$87.39 |
| SailPoint Technologies Holdings Inc (SAIL.N) | O (10/01/2020) | \$52.61 |
| Secureworks Corp (SCWX.O) | E (09/09/2020) | \$13.82 |
| Tenable Holdings Inc (TENB.O) | O (01/15/2019) | \$43.12 |
| Varonis Systems, Inc. (VRNS.O) | O (10/27/2020) | \$57.19 |

Josh Baer, CFA

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|------------------------------------|----------------|---------|
| 2u Inc (TWOU.O) | E (11/24/2020) | \$42.42 |
| Box Inc (BOXN) | O (08/04/2020) | \$22.21 |
| CDK Global Inc (CDK.O) | O (06/08/2020) | \$54.48 |
| Chegg Inc (CHGG.N) | O (11/25/2019) | \$95.97 |
| Coursera, Inc. (COUR.N) | O (04/26/2021) | \$47.75 |
| DigitalOcean Holdings Inc (DOCN.N) | E (04/19/2021) | \$43.42 |
| Lightspeed POS Inc. (LSPD.N) | E (02/18/2021) | \$71.05 |
| Sabre Corp (SABR.O) | E (03/16/2021) | \$15.68 |

Keith Weiss, CFA

| | | |
|---|----------------|------------|
| Adobe Inc. (ADBE.O) | O (04/29/2019) | \$515.70 |
| Akamai Technologies, Inc. (AKAM.O) | E (04/29/2020) | \$109.75 |
| Alassian Corporation PLC (TEAM.O) | O (01/13/2020) | \$236.50 |
| Autodesk (ADSK.O) | E (01/15/2019) | \$299.34 |
| Check Point Software Technologies Ltd. (CHKP.O) | U (01/13/2020) | \$117.36 |
| Cloudflare Inc (NET.N) | E (06/18/2020) | \$84.76 |
| Fortinet Inc. (FTNT.O) | E (04/10/2018) | \$203.90 |
| Intuit (INTU.O) | O (10/05/2020) | \$418.29 |
| Microsoft (MSFT.O) | O (01/13/2016) | \$261.55 |
| Okta, Inc. (OKTA.O) | E (02/04/2019) | \$285.35 |
| Oracle Corporation (ORCL.N) | E (01/15/2019) | \$74.50 |
| Palantir Technologies Inc. (PLTR.N) | U (12/02/2020) | \$24.11 |
| Palo Alto Networks Inc (PANW.N) | O (10/10/2017) | \$361.47 |
| Qualtrics (XM.O) | E (02/23/2021) | \$41.02 |
| Salesforce.com (CRM.N) | E (11/12/2020) | \$235.46 |
| ServiceNow Inc (NOW.N) | O (11/12/2020) | \$559.21 |
| Shopify Inc (SHOP.N) | E (10/05/2020) | \$1,166.00 |
| Slack Technologies, Inc. (WORK.N) | E (12/09/2020) | \$42.75 |
| Snowflake Inc. (SNOW.N) | E (10/12/2020) | \$237.75 |
| Splunk Inc (SPLK.O) | E (04/27/2021) | \$134.00 |
| VMware Inc (VMW.N) | E (01/15/2019) | \$161.82 |
| Workday Inc (WDAY.O) | O (04/14/2020) | \$259.24 |
| Zscaler Inc (ZS.O) | E (06/18/2020) | \$196.69 |

Disclosure Section (Cont.)

Meta A Marshall

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|--------------------------------------|----------------|----------|
| 8x8 Inc (EGHT.N) | E (01/13/2020) | \$34.84 |
| Five9 Inc (FVN.O) | O (12/17/2020) | \$179.95 |
| RingCentral Inc (RNG.N) | O (12/17/2020) | \$330.51 |
| Twilio Inc (TWLO.N) | O (09/19/2019) | \$400.68 |
| Vonage Holdings Corp (VG.O) | E (08/18/2020) | \$14.14 |
| Zoom Video Communications Inc (ZM.O) | E (05/13/2019) | \$336.42 |

Roy D Campbell

| | | |
|-----------------------|----------------|---------|
| Karooooo Ltd (KARO.O) | O (04/27/2021) | \$37.00 |
|-----------------------|----------------|---------|

Sanjit K Singh

| | | |
|-------------------------------------|----------------|----------|
| Alteryx Inc (AYXN) | E (04/01/2021) | \$87.51 |
| Appian Corp (APPN.O) | U (04/14/2020) | \$136.46 |
| C3.ai (AIN) | U (01/04/2021) | \$72.49 |
| Citrix Systems Inc (CTXS.O) | E (10/23/2020) | \$140.60 |
| Cloudera Inc (CLDR.N) | O (06/03/2020) | \$13.02 |
| Datadog, Inc. (DDOG.O) | E (10/14/2019) | \$93.14 |
| Datto Holding Corp. (MSIP.N) | E (11/16/2020) | \$25.56 |
| Domo Inc (DOMD.O) | O (12/17/2020) | \$67.34 |
| JFrog Ltd. (FROG.O) | E (10/12/2020) | \$52.50 |
| MongoDB Inc (MDB.O) | O (12/17/2020) | \$321.23 |
| New Relic Inc (NEWR.N) | E (04/14/2020) | \$66.35 |
| NICE Ltd. (NICE.O) | O (12/17/2020) | \$243.00 |
| Nuance Communications Inc. (NUAN.O) | O (01/13/2020) | \$53.24 |
| PagerDuty, Inc. (PD.N) | E (05/06/2019) | \$45.05 |
| Solarwinds Corp (SWLN) | E (11/13/2018) | \$18.39 |
| Sumo Logic Inc (SUMO.O) | E (10/12/2020) | \$19.96 |

Stan Zlotsky, CFA

| | | |
|-------------------------------------|----------------|----------|
| Anaplan Inc (PLAN.N) | O (02/16/2021) | \$64.25 |
| Aeana Inc (ASAN.N) | E (10/26/2020) | \$34.17 |
| Avalara, Inc. (AVLR.N) | O (04/06/2021) | \$152.59 |
| BigCommerce Holdings, Inc. (BIGC.O) | U (08/31/2020) | \$55.96 |
| Coupa Software Inc (COUP.O) | O (04/14/2020) | \$273.23 |
| DocuSign Inc (DOCU.O) | O (10/05/2020) | \$234.36 |
| HubSpot, Inc. (HUBS.N) | O (03/25/2020) | \$572.87 |
| Liveramp Holdings Inc (RAMP.N) | O (07/15/2019) | \$50.15 |
| PROS Holdings Inc (PRO.N) | E (02/18/2020) | \$47.12 |
| Smartsheet Inc (SMTR.N) | O (05/22/2018) | \$63.49 |
| Sprout Social Inc (SPT.O) | E (11/17/2020) | \$67.78 |
| Veeva Systems Inc (VEEV.N) | O (01/13/2020) | \$283.51 |
| Vertex Inc. (VERX.O) | U (04/07/2021) | \$22.31 |
| Workiva Inc (WK.N) | E (12/17/2020) | \$98.98 |
| Yext Inc (YEXT.N) | U (01/15/2019) | \$14.56 |
| Zendesk, Inc (ZEN.N) | O (09/10/2015) | \$153.52 |
| ZoomInfo Technologies Inc (ZI.O) | O (11/18/2020) | \$53.04 |
| Zuora Inc (ZUO.N) | U (04/14/2020) | \$17.07 |

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INDUSTRY COVERAGE: Internet

| COMPANY(TICKER) | RATING (AS OF) | PRICE* (04/26/2021) |
|--|----------------|---------------------|
| Brian Nowak, CFA | | |
| Activision Blizzard Inc (ATVI.O) | O (09/23/2016) | \$94.24 |
| Airbnb Inc (ABNB.O) | E (01/04/2021) | \$174.88 |
| Alphabet Inc. (GOOGL.O) | O (08/11/2015) | \$2,309.93 |
| Amazon.com Inc (AMZN.O) | O (04/24/2015) | \$3,409.00 |
| Blue Apron Holdings Inc (APRN.N) | E (07/24/2017) | \$6.28 |
| Booking Holdings Inc (BKNG.O) | E (01/09/2019) | \$2,458.25 |
| Compass, Inc. (COMP.N) | O (04/26/2021) | \$18.00 |
| Critto SA (CRTO.O) | E (01/26/2016) | \$38.77 |
| Despegar.com Corp (DESP.N) | E (10/16/2017) | \$13.81 |
| eBay Inc (EBAY.O) | E (12/12/2018) | \$81.58 |
| Electronic Arts Inc (EA.O) | E (01/12/2018) | \$143.79 |
| Expedia Inc. (EXPE.O) | E (01/09/2019) | \$176.68 |
| Facebook Inc (FB.O) | O (04/27/2016) | \$303.04 |
| Groupon, Inc. (GRPN.O) | E (03/05/2018) | \$46.66 |
| GrubHub Inc. (GRUB.N) | E (04/18/2018) | \$70.83 |
| Jumia Technologies AG (JMAN) | E (08/19/2019) | \$33.27 |
| Lyft Inc (LYFT.O) | E (10/24/2019) | \$63.06 |
| Pinterest Inc (PINS.N) | O (08/09/2020) | \$76.73 |
| Playtika Holding Corp (PLTK.O) | O (02/09/2021) | \$28.45 |
| Quotient Technology Inc. (QUOT.N) | U (12/19/2019) | \$16.90 |
| Roblox Corporation (RBLX.N) | O (04/05/2021) | \$74.90 |
| Snap Inc. (SNAP.N) | O (02/21/2021) | \$60.02 |
| Take-Two Interactive Software (TTWO.O) | O (02/01/2018) | \$176.43 |
| TRIVAGO NV (TRVGO.O) | E (09/28/2017) | \$3.73 |
| Twitter Inc (TWTR.N) | E (04/17/2018) | \$86.72 |
| Uber Technologies Inc (UBER.N) | O (06/04/2019) | \$57.61 |
| Yelp Inc (YELP.N) | U (01/10/2019) | \$40.58 |
| Zillow Group Inc (Z.O) | E (04/18/2018) | \$141.19 |

Lauren Schenk

| | | |
|-----------------------------|----------------|----------|
| Bumble Inc (BMBL.O) | E (03/08/2021) | \$60.36 |
| Casper Sleep Inc (CSPR.N) | E (03/02/2020) | \$8.95 |
| Chewy Inc (CHWY.N) | E (04/16/2020) | \$82.62 |
| Etsy Inc (ETSY.O) | U (12/05/2019) | \$205.18 |
| Farfetch Ltd. (FTHC.N) | O (11/17/2020) | \$50.54 |
| GoHealth Inc (GOHC.O) | E (08/09/2020) | \$12.25 |
| Match Group Inc (MTCH.O) | ++ | \$152.50 |
| Poshmark Inc (POSH.O) | E (02/08/2021) | \$45.23 |
| RealReal Inc (REAL.O) | E (11/17/2020) | \$23.82 |
| SelectQuote Inc (SLQT.N) | E (06/15/2020) | \$31.01 |
| Stitch Fix Inc (SFIX.O) | U (11/17/2020) | \$45.30 |
| ThredUp Inc. (TDUP.O) | E (04/20/2021) | \$17.97 |
| WW International Inc (WW.O) | E (04/07/2021) | \$29.07 |

Matthew Cost

| | | |
|------------------------------|----------------|----------|
| Glu Mobile Inc (GLUU.O) | ++ | \$124.99 |
| SciPlay Corporation (SCPL.O) | E (05/28/2019) | \$18.90 |

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April 2021

Technology, Media & Telecom Spring Training Teach-In

Disclosure Section (Cont.)

INDUSTRY COVERAGE: Telecom Services

| COMPANY (TICKER) | RATING (AS OF) | PRICE* (04/26/2021) |
|---------------------------------------|-----------------|---------------------|
| Simon Flannery | | |
| Anterix Inc (ATEX.O) | E (11/11/2019) | \$46.09 |
| AT&T, Inc. (T.N) | E (12/17/2020) | \$30.91 |
| BCE Inc. (BCT.TO) | E (03/05/2021) | C\$57.87 |
| Cincinnati Bell Inc. (CBB.N) | NA (06/23/2020) | \$15.43 |
| Globalstar Inc (GSAT.A) | U (01/22/2021) | \$1.36 |
| Gogo Inc (GOGO.O) | E (02/23/2021) | \$11.16 |
| LUMEN TECHNOLOGIES INC (LUMN.N) | U (01/28/2021) | \$13.06 |
| Rogers Communications, Inc. (RCIb.TO) | E (12/17/2015) | C\$61.10 |
| Shaw Communications Inc (SJRb.TO) | E (10/23/2020) | C\$35.15 |
| Telephone & Data Systems (TDS.N) | O (06/18/2019) | \$23.41 |
| TELUS Corp. (T.TO) | O (04/30/2018) | C\$25.75 |
| T-Mobile US, Inc. (TMUS.O) | O (04/17/2020) | \$132.50 |
| US Cellular Corporation (USMN) | O (06/18/2019) | \$35.28 |
| Verizon Communications (VZN) | E (12/12/2018) | \$56.94 |
| Viasat Inc (VSAT.O) | E (12/15/2017) | \$48.78 |

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* Historical prices are not split adjusted.

INDUSTRY COVERAGE: Media

| COMPANY (TICKER) | RATING (AS OF) | PRICE* (04/26/2021) |
|---|----------------|---------------------|
| Benjamin Swinburne, CFA | | |
| Cinemark Holdings, Inc. (CNKN) | E (10/05/2017) | \$22.28 |
| Clear Channel Outdoor Holdings, Inc. (CCO.N) | E (11/02/2020) | \$2.38 |
| Discovery Inc. (DISCK.O) | E (07/20/2009) | \$32.99 |
| Fox Corporation (FOXA.O) | O (10/15/2018) | \$38.20 |
| iHeartMedia Inc (IHTM.O) | E (08/26/2019) | \$19.58 |
| Interpublic Group (IPG.N) | E (10/15/2018) | \$29.72 |
| Lamar Advertising Co. (LAMR.O) | O (11/02/2020) | \$99.88 |
| Liberty Braves Group (BATRK.O) | E (05/09/2018) | \$28.40 |
| Liberty Formula One (FWONK.O) | E (04/13/2020) | \$46.83 |
| Live Nation Entertainment Inc. (LYV.N) | E (10/08/2019) | \$82.62 |
| Madison Square Garden Entertainment Corp (MSGN.N) | ++ | \$91.71 |
| Madison Square Garden Sports Corp (MSGSN.N) | O (03/26/2021) | \$184.55 |
| MSG Networks Inc (MSGN.N) | ++ | \$16.31 |
| Netflix Inc (NFLX.O) | O (06/17/2014) | \$510.30 |
| Omnicom Group Inc. (OMC.N) | U (10/16/2017) | \$80.74 |
| OUTFRONT MEDIA INC (OUT.N) | E (04/20/2020) | \$24.06 |
| Roku Inc. (ROKU.O) | U (12/02/2019) | \$368.63 |
| Spotify Technology SA (SPOT.N) | O (04/30/2018) | \$298.02 |
| ViacomCBS Inc (VAC.O) | E (01/24/2020) | \$41.82 |
| Walt Disney Co (DIS.N) | O (01/30/2017) | \$184.27 |
| Warner Music Group Corp. (WMG.O) | O (12/17/2020) | \$38.41 |
| World Wrestling Entertainment Inc (WWE.N) | E (01/31/2020) | \$55.62 |

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* Historical prices are not split adjusted.

Thomas Yeh

| | | |
|---|----------------|---------|
| AMC Networks, Inc. (AMCX.O) | E (11/02/2020) | \$52.31 |
| Lions Gate Entertainment Corp. (LGFb.N) | E (11/02/2020) | \$12.67 |
| New York Times Co (NYT.N) | O (10/14/2020) | \$47.23 |

Stock Ratings are subject to change. Please see latest research for each company.

* Historical prices are not split adjusted.

INDUSTRY COVERAGE: Cable/Satellite

| COMPANY (TICKER) | RATING (AS OF) | PRICE* (04/26/2021) |
|---|----------------|---------------------|
| Benjamin Swinburne, CFA | | |
| Astute USA Inc (ATUS.N) | E (12/16/2020) | \$35.13 |
| Charter Communications Inc. (CHTR.O) | O (04/13/2020) | \$652.57 |
| Comcast Corporation (CMCSA.O) | O (11/08/2018) | \$54.32 |
| DISH Network (DISH.O) | E (01/17/2018) | \$43.08 |
| Liberty Broadband Corporation (LBRDK.O) | E (12/12/2014) | \$158.15 |
| Liberty SiriusXM Group (LSXMK.O) | O (03/15/2019) | \$46.96 |
| Sirius XM Radio Inc. (SIRI.O) | E (03/15/2019) | \$6.36 |

Stock Ratings are subject to change. Please see latest research for each company.

* Historical prices are not split adjusted.

INDUSTRY COVERAGE: Communications Infrastructure

| COMPANY (TICKER) | RATING (AS OF) | PRICE* (04/26/2021) |
|-----------------------------------|----------------|---------------------|
| Simon Flannery | | |
| American Tower Corp. (AMT.N) | E (12/12/2018) | \$252.99 |
| Crown Castle Corp. (CCI.N) | O (11/11/2009) | \$186.10 |
| CyrusOne Inc (CONE.O) | O (05/28/2013) | \$74.64 |
| Digital Realty Trust Inc. (DLR.N) | E (06/24/2020) | \$148.23 |
| Equinix Inc. (EQIX.O) | E (05/13/2009) | \$716.97 |
| QTS Realty Trust Inc (QTSN) | O (09/19/2019) | \$65.99 |
| SBA Communications (SBAC.O) | E (09/19/2019) | \$296.78 |
| Uniti Group Inc (UNIT.O) | U (12/12/2018) | \$11.16 |

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