

## US Internet/Marketing &amp; Advertising Technology

## February Mobile AdTech Update: eco-system improvements continue to roll out

Industry Overview

**How much of a threat is Apple's homegrown adtech?**

Apple has told advertisers it is conducting tests in an effort to learn how it can improve the performance of its Apple Search Ads (aka "ASA"), and a source familiar with the matter said they expect the company to officially introduce the new product in the coming months, according to Business Insider. This action is unlikely to directly impact mobile ad networks that advertise in-app because the improvements to ASA are aimed at better monetization and discovery within its 1P properties (e.g. the App Store, Apple News, etc.) rather than within 3P apps. Although the technology appears aimed at driving app installs, it is still unclear to what extent mobile game developers would allocate ad budget if it is not highly performant for mobile games, as AppLovin (APP) and Unity are.

**3P Data: Android CPIs much higher, iOS CPIs up M/M**

We aggregate 3P CPI data across 7 networks in all app categories in the US to estimate pricing trends. Pricing Android devices saw a notable surge in average CPIs in February, up 30-40% M/M. The improvement could signal that advertisers and adtech partners have adapted to Google's transition from waterfall to real time bidding, which should result in a more efficient market for mobile ads. On iOS, average CPIs also increased M/M despite the muted seasonality. Our count of new game launches appears flattish Y/Y in the quarter, consistent with seasonal weakness in player engagement, but well above trough in 2Q24. Total downloads among the top 500 games were down slightly Y/Y, while the total sessions played were up mid-single digits Y/Y.

**AppLovin: Raise PO to \$77, still cheap, top pick for 2024**

We raise our PO to \$77 from \$68. Our new PO is based on a 14x EV/CY24 EBITDA, slightly above the average of META & GOOGL. We see scope for a continued share price rally driven by broadening investor participation: (1) APP's market cap, ~\$26bn, now exceeds that of 2<sup>nd</sup> tier internet advertising platforms SNAP and PINS; APP offers exposure to performance marketing but with less macro sensitivity because of its mobile gaming focus, (2) APP's valuation (12x EV/BofA CY24 EBITDA as of 15 March) is well below that of AdTech leader The Trade Desk (not covered, 42x EV/Street CY24 EBITDA); we note that consensus estimates of CY24 FCF are over 2x that of TTD, which operates in a different segment of the AdTech (3) APP's FCF is and an order of magnitude higher than almost all other AdTech stocks. The Street's CY25/CY26 Software growth forecasts appear conservative at +16%/+16% Y/Y, and we see potential for upside revisions if the opportunities for eCommerce advertising, non-gaming verticals, expansion into CTV performance advertising are well articulated by management as 2024 unfolds.

**Unity: Strategic reset sets path for growth and profitability**

Unity announced its strategic reset at 4Q results. Key aspects include de-emphasizing professional services and separation of Weta and Luna. Portfolio changes in aggregate account for \$283mn in revenue and slightly negative EBITDA margin. Focus in 2024 is on improving and optimizing Levelplay. We expect benefits in 2H24 based on better use of existing data, new data from Create and new product launches. Reiterate Buy.

18 March 2024

Equity  
United States  
US Internet/Marketing & Advertising  
Technology

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Acronyms:

CPI: Cost per Install

3P: Third Party

Snap: Snap Inc.

PINS: Pinterest

META: Meta Platforms

GOOGL: Alphabet Inc.

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**Refer to important disclosures on page 10 to 13. Analyst Certification on page 7. Price Objective Basis/Risk on page 7.**

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Timestamp: 18 March 2024 09:11AM EDT

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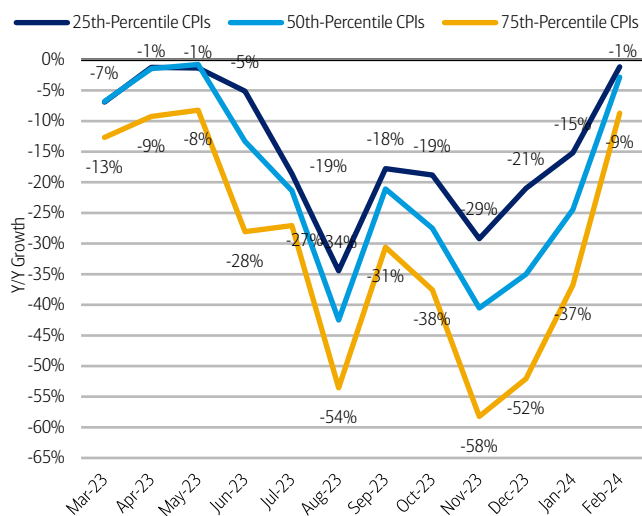
## Pricing February: higher M/M overall, Android spike notably positive

Cost per Install (CPI) and cost per 1000 impressions (CPM) are important indicators because they are related to the expected lifetime value of the gamers who install a game based on an ad served through an ad network.

- In November 2023, Google started to transition into real-time bidding on both AdMob and partner mediation platforms (AppLovin MAX, Unity LevelPlay, Chartboost, Digital Turbine Fairbid), a process that will conclude by 1Q24. We expect this change to result in ad pricing improvements over time as real-time bidding introduces more competition into the price discovery process, though we expect some near-term volatility as the ecosystem adapts to the changes.
- CPI (3P estimates) of US Android apps grew 30-40% M/M in February despite generally muted seasonality; Y/Y comps have been improving consistently since November '23, now at single-digit declines Y/Y. We suspect the sequential rise in pricing provides early indications on the impact of Google's real-time bidding transition, as bidders & mediation platforms continue to adapt to the new auction mechanism. We will look for further pricing improvements over the next few months to validate the thesis.
- CPI (3P estimates) of US iOS apps grew 10-15% M/M in February at various price points, and Y/Y declines continued to moderate. We foresee easier Y/Y comps in 2024 as average pricing appears to have rested at trough levels in 2023 after two years of steep declines.

### Exhibit 1: Cost per Install Y/Y Growth, US Android Apps (all categories)

Average Android CPIs (3P ests) grew double-digits sequentially in Feb, with Y/Y comps recovering to almost flat



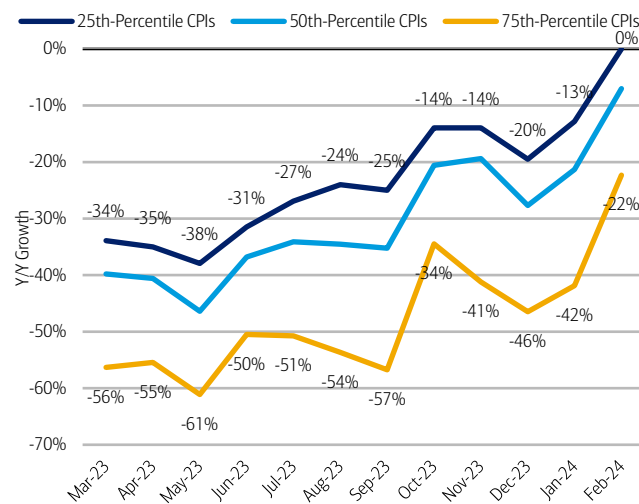
Source: Data.ai

Note: major networks included are AdMob, UnityAds, ironSource, Chartboost, Vungle, AdColony, InMobi

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### Exhibit 2: Cost per Install Y/Y Growth, US iOS Apps (all categories)

Average iOS CPIs (3P ests) grew M/M in Feb despite generally muted seasonality, Y/Y comps continued to improve



Source: Data.ai

Note: major networks included are AdMob, UnityAds, ironSource, Chartboost, Vungle, AdColony, InMobi

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## New launch: Stable since 2023, no inflection just yet

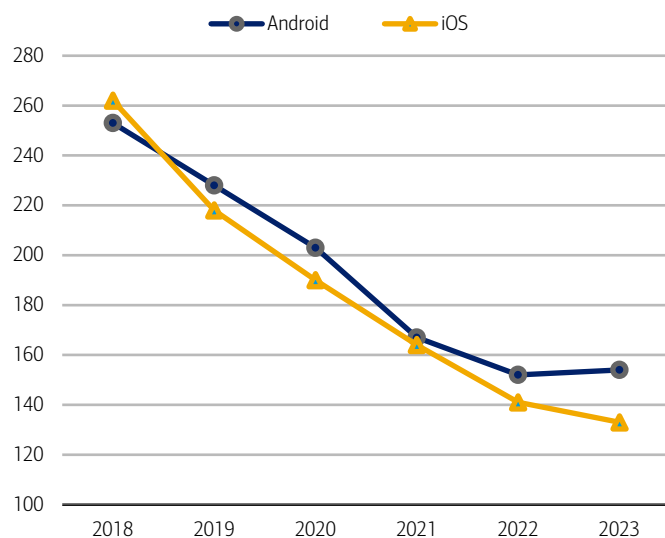
New game launches are important growth drivers of ad network revenues because publishers tend to spend the most on advertising at launch in an effort to reach a scale at which the game can be profitable. Moreover, most mobile games see their revenue flatten or decline after a few years in operation, making new game launches critical to the financial success (and ongoing advertising spend) of any publisher with a portfolio.

We track the number of newly launched games among the top 1500 grossing gaming apps on iOS and Android respectively to gauge the pace and success of new game launches. An acceleration in the pace of new launches could suggest 1) an increase in risk appetite by publishers, 2) an increase in VC/private market funding in mobile gaming, and 3) user targeting may be improving, lowering the bar for scaling new games, both of which could indicate higher industry growth going forward, a positive for Mobile AdTech platforms such as AppLovin, Unity, Vungle, and Digital Turbine.

Our analysis suggests that new launches within the top 1500 US gaming apps have declined consistently since 2018, reaching a new low in 2023. In 2023, the pace of launching new games has appeared largely stable, though the uptick in 3Q23 is a positive sign. Q1 is typically a muted season for marketing new mobile games, and so far the pace of new game launches appears flattish Y/Y. We remain on the lookout for an inflection in new launch activities, which could signal 1) an improvement in user targeting efficiency on Mobile AdTech platforms, 2) a return of confidence among mobile game publishers, and 3) renewed interest from VCs whose investment in the video game industry remains at trough levels since 2019.

### Exhibit 3: Number of New Launches Among Top 1500 Game Apps by Revenue, US iOS & Android, YTD (thru December)

The number of new launches among top gaming apps have consistently declined since 2018; new launches continued to fall in 2023 on iOS, but appeared flat on Android



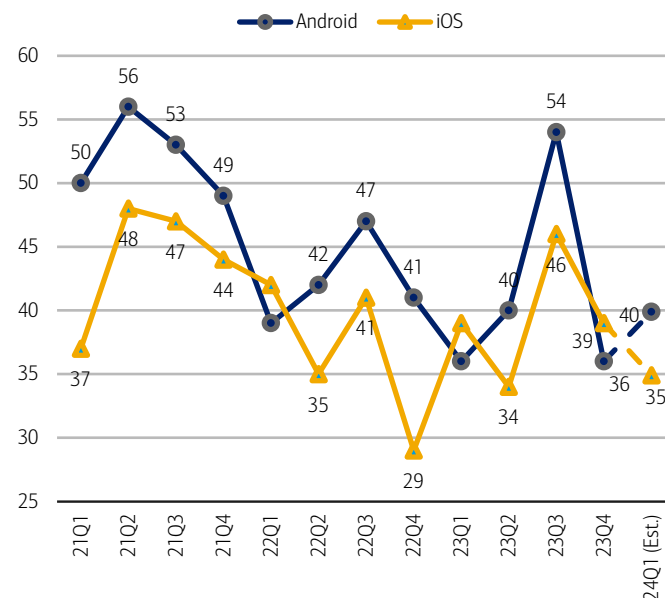
Source: SensorTower, BofA Global Research

Note: New launch defined as a game that was released in the year

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### Exhibit 4: Number of New Launches Among 1500 Game Apps per Quarter, US iOS & Android, QTD as of 3/13/2024

The number of quarterly new game launches has not notably increased since the uptick in 3Q23; we estimate the pace of new launches to be roughly flat Y/Y in 1Q24



Source: SensorTower, BofA Global Research

Note: New launches are defined as games that were released in the quarter

Estimated new launches for the latest quarter is estimated by: new launches (full quarter) = new launches (QTD) / days (QTD) x days (full quarter)

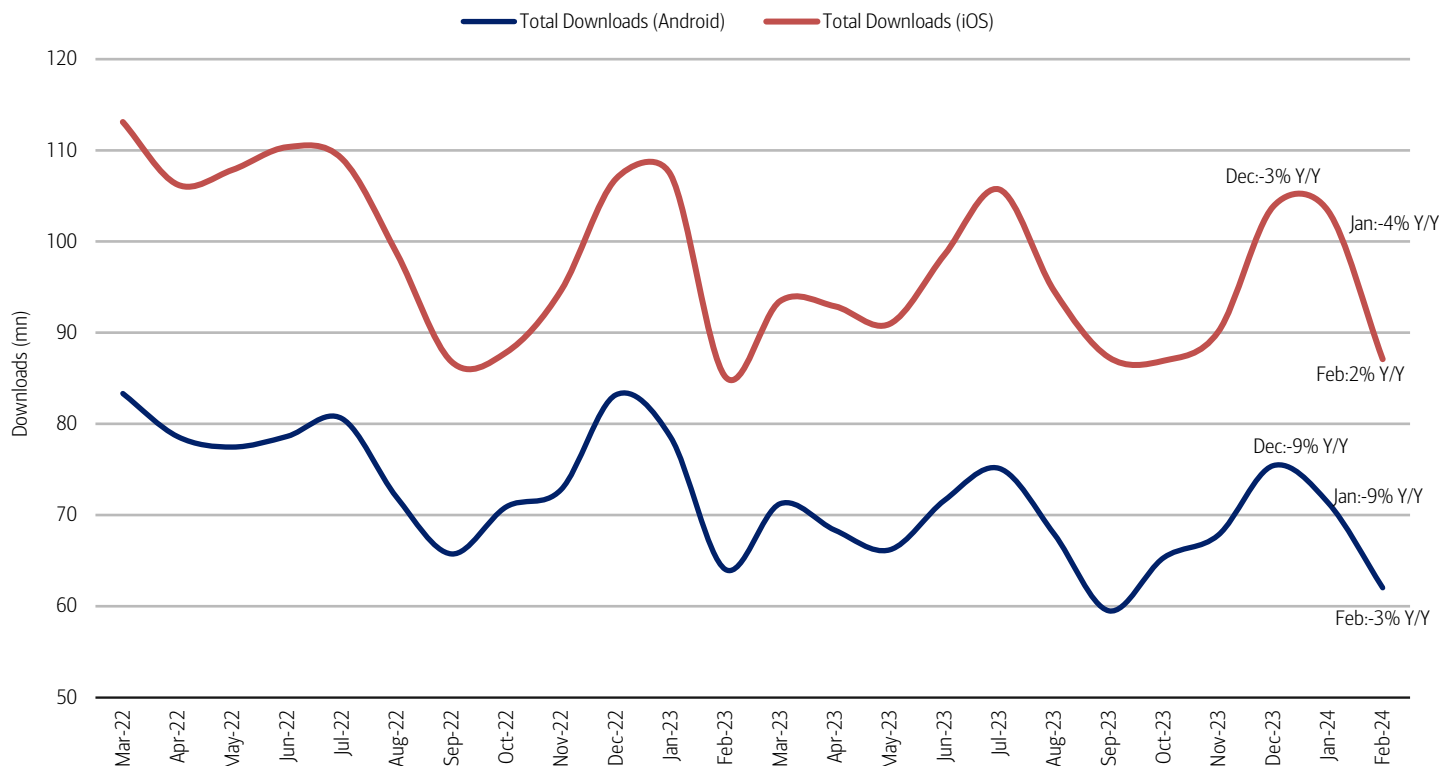
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## Volumes: Stable sequentially with better Y/Y comps

The volume of downloads of mobile game apps is an indicator of volume of paid installs through mobile ad networks, although the metric includes organic installs as well. Mobile game install volumes appeared to have trended sideways since August '22, and Y/Y declines have slowly moderated since early 2023 as comps eased. In February, game downloads fell M/M in a seasonally weak month, but Y/Y comps improved vs in January.

### Exhibit 5: Monthly Total Downloads of Top US Mobile Games

Total downloads of US top mobile games fell M/M in Feb, a seasonally weak month; Y/Y comps improved vs in Jan



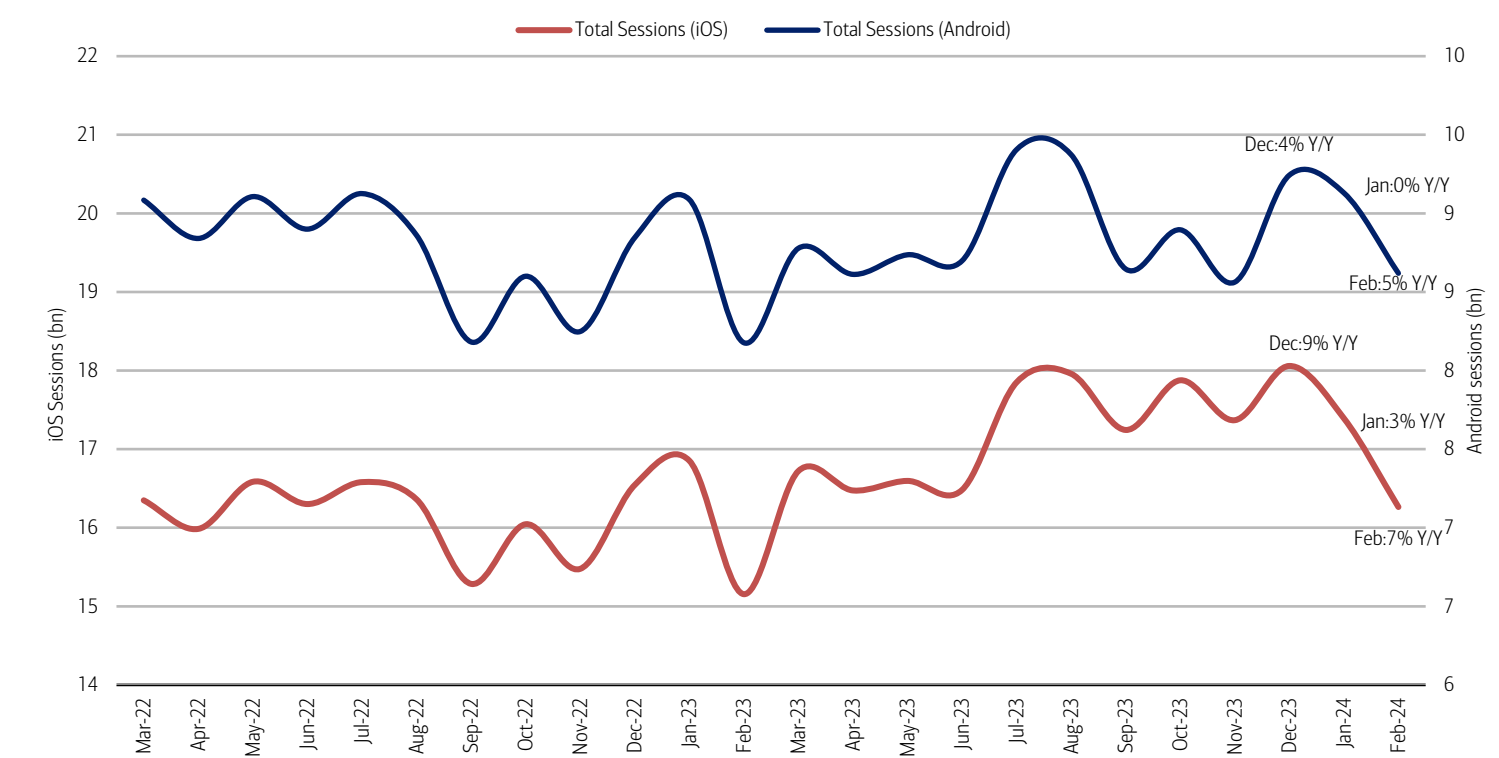
Source: Sensor Tower, BofA analysis of 500 top gaming apps on Android & iOS respectively

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# Engagement: Positive Y/Y since July

Engagement with mobile games (total times an app is opened) is an important indicator of the supply of impressions available for ad networks to serve ads to. Based on 3P estimates, player engagement on top iOS games seems to have slowly trended upwards since July 2023. On Android, aggregate player engagement appears stable since 2022. In February, Y/Y comps of player engagement continued to improve despite the weak seasonality, and have been positive since July.

**Exhibit 6: Monthly Aggregate Engagement with Top US Mobile Games**  
Overall player engagement fell M/M in Feb on seasonality, Y/Y growth accelerated vs in Jan



Source: Sensor Tower, BofA analysis of 500 top gaming apps on Android and iOS  
Note: Aggregate engagement based on total player sessions on top 500 iOS & Android gaming apps

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**Exhibit 7: Stocks mentioned**  
Prices and ratings for stocks mentioned in this report

BofA Ticker	Bloomberg ticker	Company name	Price	Rating
APP	APP US	AppLovin	US\$ 63.13	C-1-9
U	U US	Unity	US\$ 26.09	C-1-9

Source: BofA Global Research

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## Investment Rationale

### AppLovin

APP is a market leader among mobile ad networks operating in the mobile gaming app install market, where its Axon machine learning engine helps app advertisers identify high paying users and offers superior Return on Ad Spend. We view APP as well positioned to grow and retain share in the App Install Ad market over the long term, with the staged rollout of its new generation ML engine Axon 2.0 driving continued growth in 2023.

## Price objective basis & risk

### AppLovin (APP)

Our \$77 PO is based on our SOTP framework valuing APP's Software segment at \$75 and the Gaming Segment, including both in-game advertising and in-game consumer spend, at \$2/share. Our Software valuation is 14x FY24 EBITDA, inline with META , which we view as the key barometer of the overall health of the mobile ad ecosystem and an important valuation anchor. Our Gaming segment valuation is based on an enterprise value that is 5x FY24 Gaming Segment EBITDA , inline with Casual Mobile Game Publisher peers.

Upside risks to our PO are new dovish monetary policy and regulation that would reduce Apple's or Google's control over their own mobile ecosystems. Downside risks to our PO include a recession, and a tightening of financial conditions brought about by the Fed. Policies by Google and Apple, pertaining to their mobile platforms, that would debase broker ad networks' value proposition are also downside risks, and a major resurgence of Facebook on iOS would also negatively affect APP stock.

### Unity (U)

Our \$45 PO is based on a 11x 2025E EV/Revenue multiple (0.7x growth adjusted). Our growth adjusted multiple is a discount to the design software peer group. We believe a discount multiple is warranted based on lower revenue visibility and profitability, partially offset by Unity's entrenched competitive position and various levers for growth.

Downside risks to our PO are slower than expected recovery in Unity's monetization tool, increased competition, greater than expected churn rate, and greater than expected pull back in ad spend and mobile gaming usage.

## Analyst Certification

I, Omar Dessouky, CFA, hereby certify that the views expressed in this research report accurately reflect my personal views about the subject securities and issuers. I also certify that no part of my compensation was, is, or will be, directly or indirectly, related to the specific recommendations or view expressed in this research report.

**US - Enterprise Software Coverage Cluster**

Investment rating	Company	BofA Ticker	Bloomberg symbol	Analyst
<b>BUY</b>				
	8x8	EGHT	EGHT US	Michael J. Funk
	Adobe	ADBE	ADBE US	Brad Sills
	Alarm.com	ALRM	ALRM US	Michael J. Funk
	Amplitude, Inc.	AMPL	AMPL US	Koji Ikeda, CFA
	Asana	ASAN	ASAN US	Michael J. Funk
	BILL	BILL	BILL US	Brad Sills
	CCC Intelligent Solutions	CCCS	CCCS US	Michael J. Funk
	Dynatrace	DT	DT US	Koji Ikeda, CFA
	Elastic NV	ESTC	ESTC US	Koji Ikeda, CFA
	GitLab Inc.	GTLB	GTLB US	Koji Ikeda, CFA
	Global-e Online Ltd.	GLBE	GLBE US	Koji Ikeda, CFA
	HubSpot	HUBS	HUBS US	Brad Sills
	Informatica Inc.	INFA	INFA US	Koji Ikeda, CFA
	Intapp Inc.	INTA	INTA US	Koji Ikeda, CFA
	Intuit	INTU	INTU US	Brad Sills
	JFrog Ltd	FROG	FROG US	Koji Ikeda, CFA
	MeridianLink, Inc.	MLNK	MLNK US	Koji Ikeda, CFA
	Microsoft Corporation	MSFT	MSFT US	Brad Sills
	Monday.com	MNDY	MNDY US	Michael J. Funk
	MongoDB Inc	MDB	MDB US	Brad Sills
	nCino, Inc.	NCNO	NCNO US	Adam Bergere
	NICE Ltd.	NICE	NICE US	Michael J. Funk
	NICE Ltd.	NCSYF	NICE IT	Michael J. Funk
	PagerDuty	PD	PD US	Koji Ikeda, CFA
	PowerSchool Holdings, Inc.	PWSC	PWSC US	Koji Ikeda, CFA
	RingCentral	RNG	RNG US	Michael J. Funk
	Salesforce.com	CRM	CRM US	Brad Sills
	ServiceNow	NOW	NOW US	Brad Sills
	UiPath	PATH	PATH US	Brad Sills
	Unity	U	U US	Michael J. Funk
	Weave	WEAV	WEAV US	Michael J. Funk
	Workday Inc.	WDAY	WDAY US	Brad Sills
	Zeta Global	ZETA	ZETA US	Koji Ikeda, CFA
	ZoomInfo	ZI	ZI US	Koji Ikeda, CFA
<b>NEUTRAL</b>				
	Autodesk	ADSK	ADSK US	Michael J. Funk
	Bentley Systems	BSY	BSY US	Michael J. Funk
	BigCommerce Holdings, Inc.	BIGC	BIGC US	Koji Ikeda, CFA
	Coveo	YCVO	CVO CN	Koji Ikeda, CFA
	Datadog Inc	DDOG	DDOG US	Koji Ikeda, CFA
	DocuSign	DOCU	DOCU US	Brad Sills
	Freshworks, Inc.	FRSH	FRSH US	Adam Bergere
	HashiCorp	HCP	HCP US	Brad Sills
	Jamf	JAMF	JAMF US	Koji Ikeda, CFA
	Lightspeed Commerce Inc.	LSPD	LSPD US	Koji Ikeda, CFA
	Lightspeed Commerce Inc.	YLSPD	LSPD CN	Koji Ikeda, CFA
	Oracle Corporation	ORCL	ORCL US	Brad Sills
	Paycom	PAYC	PAYC US	Adam Bergere
	Paylocity	PCTY	PCTY US	Adam Bergere
	Shopify, Inc.	SHOP	SHOP US	Brad Sills
	Snowflake	SNOW	SNOW US	Brad Sills
	Veeva Systems, Inc.	VEEV	VEEV US	Brad Sills
	Vertex, Inc.	VERX	VERX US	Brad Sills
	Zoom Video Communications	ZM	ZM US	Michael J. Funk
<b>UNDERPERFORM</b>				
	AvidXchange, Inc.	AVDX	AVDX US	Brad Sills
	Blackbaud, Inc.	BLKB	BLKB US	Koji Ikeda, CFA
	BlackLine, Inc.	BL	BL US	Koji Ikeda, CFA
	C3.ai	AI	AI US	Brad Sills
	Confluent	CFLT	CFLT US	Brad Sills
	CS Disco, Inc.	LAW	LAW US	Koji Ikeda, CFA
	Dropbox	DBX	DBX US	Michael J. Funk
	Enfusion, Inc.	ENFN	ENFN US	Koji Ikeda, CFA



**US - Enterprise Software Coverage Cluster**

Investment rating	Company	BofA Ticker	Bloomberg symbol	Analyst
	Five9	FIVN	FIVN US	Michael J. Funk
	Guidewire Software, Inc.	GWRE	GWRE US	Michael J. Funk
	Smartsheet	SMAR	SMAR US	Michael J. Funk
	Twilio	TWLO	TWLO US	Michael J. Funk

**RSTR**

	Splunk	SPLK	SPLK US	Brad Sills
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**US - Internet Coverage Cluster**

Investment rating	Company	BofA Ticker	Bloomberg symbol	Analyst
<b>BUY</b>				
	Alphabet	GOOGL	GOOGL US	Justin Post
	Alphabet	GOOG	GOOG US	Justin Post
	Amazon.com	AMZN	AMZN US	Justin Post
	AppLovin	APP	APP US	Omar Dessouky, CFA
	DoorDash	DASH	DASH US	Michael McGovern
	DoubleVerify Holdings, Inc.	DV	DV US	Omar Dessouky, CFA
	Electronic Arts	EA	EA US	Omar Dessouky, CFA
	Integral Ad Science Holding Corp.	IAS	IAS US	Omar Dessouky, CFA
	LegalZoom	LZ	LZ US	Michael McGovern
	Match Group	MTCH	MTCH US	Curtis Nagle, CFA
	Meta Platforms Inc	META	META US	Justin Post
	Pinterest	PINS	PINS US	Justin Post
	RH	RH	RH US	Curtis Nagle, CFA
	Roblox Corp. Class A	RBLX	RBLX US	Omar Dessouky, CFA
	Squarespace, Inc.	SQSP	SQSP US	Michael McGovern
	Uber	UBER	UBER US	Justin Post
	Udemy Inc	UDMY	UDMY US	Curtis Nagle, CFA
	Vivid Seats	SEAT	SEAT US	Curtis Nagle, CFA
	Wayfair	W	W US	Curtis Nagle, CFA
	Wix.com	WIX	WIX US	Michael McGovern

**NEUTRAL**

	ACV Auctions	ACVA	ACVA US	Curtis Nagle, CFA
	Airbnb	ABNB	ABNB US	Justin Post
	Beyond Inc	BYON	BYON US	Curtis Nagle, CFA
	Booking Holdings Inc	BKNG	BKNG US	Justin Post
	Bumble	BMBL	BMBL US	Curtis Nagle, CFA
	Digital Turbine, Inc	APPS	APPS US	Omar Dessouky, CFA
	Duolingo	DUOL	DUOL US	Curtis Nagle, CFA
	eBay	EBAY	EBAY US	Justin Post
	Etsy, Inc.	ETSY	ETSY US	Curtis Nagle, CFA
	Expedia	EXPE	EXPE US	Justin Post
	Instacart	CART	CART US	Justin Post
	Magnite, Inc.	MGNI	MGNI US	Omar Dessouky, CFA
	Snap	SNAP	SNAP US	Justin Post
	Take-Two Interactive	TTWO	TTWO US	Omar Dessouky, CFA
	Zillow	ZG	ZG US	Curtis Nagle, CFA
	Zillow	Z	Z US	Curtis Nagle, CFA

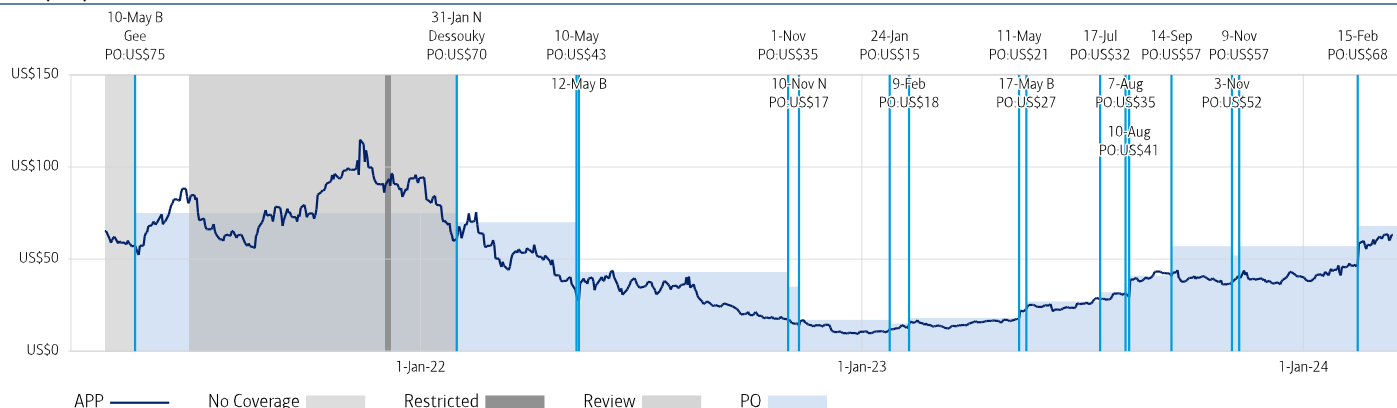
**UNDERPERFORM**

	Chewy Inc	CHWY	CHWY US	Curtis Nagle, CFA
	Lyft, Inc.	LYFT	LYFT US	Michael McGovern
	Opendoor Technologies	OPEN	OPEN US	Curtis Nagle, CFA
	Peloton	PTON	PTON US	Curtis Nagle, CFA
	Playtika	PLTK	PLTK US	Omar Dessouky, CFA
	Redfin Corp	RDFN	RDFN US	Curtis Nagle, CFA
	Shutterstock	SSTK	SSTK US	Curtis Nagle, CFA

# Disclosures

## Important Disclosures

### AppLovin (APP) Price Chart



The Investment Opinion System is contained at the end of the report under the heading "Fundamental Equity Opinion Key". Dark grey shading indicates the security is restricted with the opinion suspended. Medium grey shading indicates the security is under review with the opinion withdrawn. Light grey shading indicates the security is not covered. Chart is current as of a date no more than one trading day prior to the date of the report.

### Unity (U) Price Chart



The Investment Opinion System is contained at the end of the report under the heading "Fundamental Equity Opinion Key". Dark grey shading indicates the security is restricted with the opinion suspended. Medium grey shading indicates the security is under review with the opinion withdrawn. Light grey shading indicates the security is not covered. Chart is current as of a date no more than one trading day prior to the date of the report.

### Equity Investment Rating Distribution: Media & Entertainment Group (as of 31 Dec 2023)

Coverage Universe	Count	Percent	Inv. Banking Relationships <sup>R1</sup>	Count	Percent
Buy	35	53.85%	Buy	15	42.86%
Hold	15	23.08%	Hold	8	53.33%
Sell	15	23.08%	Sell	7	46.67%

### Equity Investment Rating Distribution: Technology Group (as of 31 Dec 2023)

Coverage Universe	Count	Percent	Inv. Banking Relationships <sup>R1</sup>	Count	Percent
Buy	215	53.09%	Buy	111	51.63%
Hold	97	23.95%	Hold	45	46.39%
Sell	93	22.96%	Sell	24	25.81%

### Equity Investment Rating Distribution: Global Group (as of 31 Dec 2023)

Coverage Universe	Count	Percent	Inv. Banking Relationships <sup>R1</sup>	Count	Percent
Buy	1895	53.62%	Buy	1083	57.15%
Hold	832	23.54%	Hold	454	54.57%
Sell	807	22.84%	Sell	383	47.46%

<sup>R1</sup> Issuers that were investment banking clients of BofA Securities or one of its affiliates within the past 12 months. For purposes of this Investment Rating Distribution, the coverage universe includes only stocks. A stock rated Neutral is included as a Hold, and a stock rated Underperform is included as a Sell.

**FUNDAMENTAL EQUITY OPINION KEY:** Opinions include a Volatility Risk Rating, an Investment Rating and an Income Rating. **VOLATILITY RISK RATINGS**, indicators of potential price fluctuation, are: A - Low, B - Medium and C - High. **INVESTMENT RATINGS** reflect the analyst's assessment of both a stock's absolute total return potential as well as its attractiveness for investment relative to other stocks within its Coverage Cluster (defined below). Our investment ratings are: 1 - Buy stocks are expected to have a total return of at least 10% and are the most attractive stocks in the coverage cluster; 2 - Neutral stocks are expected to remain flat or increase in value and are less attractive than Buy rated stocks and 3 - Underperform stocks are the least attractive stocks in a coverage cluster. An investment rating of 6 (No Rating) indicates that a stock is no longer trading on the basis of fundamentals. Analysts assign investment ratings considering, among other things, the 0-12 month total return expectation for a stock and the firm's guidelines for ratings dispersions (shown in the table below). The current price objective for a stock should be referenced to better understand the total return expectation at any given time. The price objective reflects the analyst's view of the potential price appreciation (depreciation).

Investment rating	Total return expectation (within 12-month period of date of initial rating)	Ratings dispersion guidelines for coverage cluster <sup>R2</sup>
Buy	≥ 10%	≤ 70%
Neutral	≥ 0%	≤ 30%
Underperform	N/A	≥ 20%

<sup>R2</sup>Ratings dispersions may vary from time to time where BofA Global Research believes it better reflects the investment prospects of stocks in a Coverage Cluster.

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Price Charts for the securities referenced in this research report are available on the [Price Charts website](#), or call 1-800-MERRILL to have them mailed.

BofAS or one of its affiliates acts as a market maker for the equity securities recommended in the report: AppLovin, Unity.

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The issuer is or was, within the last 12 months, an investment banking client of BofAS and/or one or more of its affiliates: AppLovin, Unity.

BofAS or an affiliate has received compensation from the issuer for non-investment banking services or products within the past 12 months: AppLovin, Unity.

The issuer is or was, within the last 12 months, a non-securities business client of BofAS and/or one or more of its affiliates: AppLovin, Unity.

BofAS or an affiliate has received compensation for investment banking services from this issuer within the past 12 months: AppLovin, Unity.

BofAS or an affiliate expects to receive or intends to seek compensation for investment banking services from this issuer or an affiliate of the issuer within the next three months: AppLovin, Unity.

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