

Apple

Mixed Reality: Game Changer or High-End Extension

2023 Institutional Investor
II All-America Equity Research Survey

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WWDC event keenly watched for MR headset launch; Engaging developer community to be the objective

Following what is known to have been delayed a few times, Apple is finally expected to launch its MR (Mixed Reality) headset at the upcoming World Wide Developers Conference (WWDC) in early June. Based on the supply chain feedback around readiness for mass production, there still remains some debate around final dates that the headset should ship to consumers; however, we envision the likelihood of a launch announcement at the upcoming WWDC remains high on account of: 1) The MR system is a new platform and Apple will look to actively drive participation of its vast developer community to curate custom content for the platform, making WWDC the most appropriate platform to announce it; and 2) Apple would want a grand launch event for the new platform rather than a more muted launch later this year – the next big launch event is only in September and we believe Apple will try to leverage the reopening led tailwinds from China sooner rather than later.

Mixed Reality rather than pure AR or VR hardware; Services to strengthen differentiation

In industry feedback gathered in relation to the product to-date, **the key differentiation from a Hardware perspective appears to be the ability of the device to provide consumers a VR (Virtual Reality) experience as well as an enhanced AR (Augmented Reality) experience** relative to other products targeting lower-end price points. That said, premium features will be associated with premium pricing and Apple will likely have one of the most premium devices for this category in the market. Before we get into more details, it is key to note that the device launch is likely to be a “test the waters” device followed by more launches that have features and price points more suited to specific use cases.

The other differentiation will be the Services already native to the platform where the consumer will be familiar with use cases from having leveraged the same services on an iPhone or Mac rather than looking for new use cases and third-party content to leverage the headset.

Quick Specifications Based on Early Indications Include:

- **Price:** \$2,000-\$3,000; It will be one of the most expensive AR/VR headsets in the market compared to its peers (Meta Quest 2: \$399, Meta Quest Pro: \$1,499,

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Overweight

AAPL, AAPL US

Price (01 Jun 23):\$180.09

Price Target (Dec-23):\$190.00

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Sony Playstation VR: \$300, HP Reverb G2: \$600, Sony Playstation VR 2: \$550, Pico 4: \$430, Valve Index: \$999, HTC Vive Pro 2: \$1,399).

- **Camera:** 10+ cameras with tracking, pass through images, biometrics, and environmental detection functions. Suppliers likely either Cowell, Genius, or Young Optics for the 1st generation headset.
- **FOV:** 120 degrees.
- **Processor:** Apple M2 Chip (TSMC) RAM: 16GB with Wi-Fi 6E support.
- **Speaker:** Stereo, with no 3.5 mm headphone jack.
- **Display:** Two screens: a micro OLED that will be inside the device, which the consumer will utilize to view, and another OLED on the outside of the device; Anticipate Sony and LGD to be the suppliers of the micro OLED and OLED displays, respectively.
- **Design:** It should look similar to the Meta Quest 2. It features a curved screen on the front, speakers on the side, and a headband that will help fit the device around the consumer's head.
- **Battery:** External, rechargeable by USB-C, and up to 2 hours of battery life (similar to Apple's MagSafe battery pack charger). While Apple has built the battery into the headset itself, there could be a pocket sized, waist-worn battery pack that can be attached by a power-cord so the headset is not as heavy for the user.
- **OS:** Apple's own proprietary operating system.

Mixed reality systems to offer better use cases for native services before building on top with third-party content

Apple's MR headset will likely be used for virtual communication, content viewing, and gaming. The user interface is expected to be identical to that of the iPhone and iPad home screen and we expect Apple to offer some of its native apps, like FaceTime and Mail, on the platform from the start. Additionally, with Apple's broad platform of services, including Arcade for gaming, Fitness+ for Fitness, and Music for Audio, the platform can stand on itself through an embedded ecosystem of services from Apple even before third-party content.

Differentiation through AR experience added to VR experience

VR headsets cut off the user from their environment, enabling them to fully immerse in an experience; however, there has been much debate as to whether consumers are likely to spend more hours in VR or AR. Importantly, Apple's MR headset will include VR and AR features, the latter of which will enable consumers to overlay virtual objects on top of the real world environment, and will likely serve as a learning ground for Apple's next product, which is expected to be AR glasses. The MR headset will allow users to access both AR and VR experiences with ease with a reality dial on the headset, with potentially a feature set to allow users to scan real-world objects and transform them into digital assets.

Competitive landscape includes Meta and HP

Apple's MR headset will compete primarily against the Meta products in relation to volume, while in relation to its premium price point its most direct competitor is Meta Quest Pro, but as shown in Figure 1, the Apple device is expected to match premium specifications in relation to resolution, field of view and weight to go with the premium price. Other competitors include HP Reverb G2, Sony Playstation VR 2, Pico 4, Valve Index, HTC Vive Pro 2, Meta Quest 2, PSVR 2, and HP.

The figure below showcases the differences in product specifications amongst its competitors.

Figure 1: Comparison of Features

Product									
Name	"Apple MR"	Meta Quest 2 (Oculus)	Meta Quest Pro	Sony Playstation VR	HP Reverb G2	Sony Playstation VR 2	Pico 4	Valve Index	HTC Vive Pro 2
Availability									
Release/Announced Date	Jun-23	Oct-20	Oct-22	Oct-16	Nov-20	Feb-23	Oct-22	Apr-19	Jun-21
Affordability									
Price	~\$3,000	\$399	\$1,499	\$300	\$600	\$550	\$430	\$999	\$1,399
Display (Quality of Image)									
Resolution per Eye (Pixels)	2160 x 2160	1832 x 1920	1800 x 1920	960 x 1080	2160 x 2160	2000 x 2040	2160 x 2160	1600 x 1440	2440 x 2440
FOV (Degrees)	120	89	>100	100	114	110	105	110	113
Screen Type	OLED	LCD	LCD	OLED	LCD	4K OLED	LCD	LCD	LCD
Lens	Pancake lenses		Pancake lens			Fresnel lens	Pancake lens	Fresnel lens	Fresnel lens
Sound (Quality of Audio)									
Speaker	Stereo	Yes	Yes	Yes	No (external)	Yes	Integrated stereo speakers	Off ear stereo speakers	Removable stereo headphones
Microphone	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Processing (Reaction Time/Latency)									
Processor	Apple M2	Snapdragon XR2	Snapdragon XR2+				Snapdragon XR2		
Screen Refresh Rate (Hz)	120 Hz	120 Hz	90 Hz	120 Hz	90 Hz	120 Hz	90 Hz	144 Hz	120 Hz
Sensors	LIDAR				4 built-in				
Tracking	Hand and eye tracking	Hand only	Eye, face, hand	None	None	Eye tracking	Hand tracking	None	None
RAM	16GB	6 GB	12 GB LPDDR5				8 GB LPDDR4		
Feel (Physical Comfort)									
Weight	100-400g	503 g	722 g	600 g	499 g	560 g	586 g	809 g	850 g
Accessories/Setup									
Standalone/Tethered	Standalone; Tethered	Standalone	Standalone	Tethered	Tethered	Tethered	Standalone	Tethered	Tethered
Controllers	Motion controllers	Oculus Touch X 2	Motion Controllers	DualShock 4, Playstation Move	Motion Controllers	Motion controllers	Pico controllers	Index Controllers	Motion controllers
Base Stations	Yes	No	No	No	No	No	No	Yes	Yes
Battery Life	2 hours	3 hours	2 hours				3 hours		
Charge Time		2.5 hours							
Content									
Platform	Apple Store	SteamVR; FB acct required	Meta Quest	Playstation 4	SteamVR	Playstation 5	Pico Store	SteamVR	SteamVR
Operating System	Proprietary OS	Android 10	Android	Playstation 4	Microsoft?	Playstation 5			
Storage		128 GB and 256 GB	256 GB				128 GB and 256 GB		

Source: J.P. Morgan.

Volume projections are lackluster for the initial device with premium pricing

The feedback from the supply chain implies that volume expectations set by Apple for the first generation product is in the 100K-200K range, with the large variance likely representative of the “test the waters” strategy from Apple to figure out the appetite for a new platform as well as the likely direction to go with in relation to the second generation product. The implied volume equates to roughly ~\$500 mn of revenue for Apple on an annual basis from the product, less than ~1% and immaterial from a revenue perspective.

Despite modest near-term implications, the transformational nature of the platform should make it a game changer

The volume implications near-term look modest and likewise the revenue projections for the new device. That said, the market opportunity long-term appears to be underappreciated on two key fronts, including:

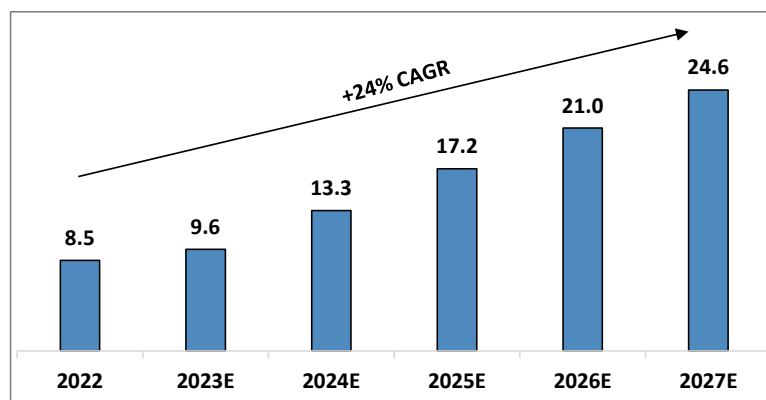
1. Use of premium devices by Enterprise and Commercial customers for services based business use cases. We expect the opportunity to encompass broader use cases, including Enterprises leveraging the platform for training.
2. Use of devices by consumers for recreational purposes, but with more price effective devices likely to be launched as soon as 2025. Importantly, we see the opportunity for an expanding installed base, which not only strengthens the ecosystem, but also offers Services revenue opportunity at high margins.

Sizing the opportunity – Currently less than 9 mn unit market with VR the lion’s share

As outlined in the figures below, the VR market was about 8.5 mn units in 2022, while the AR market was only 0.3 mn units, which in aggregate equates to a total market that is less than 9 mn units.

Figure 2: VR Unit Outlook

mn units

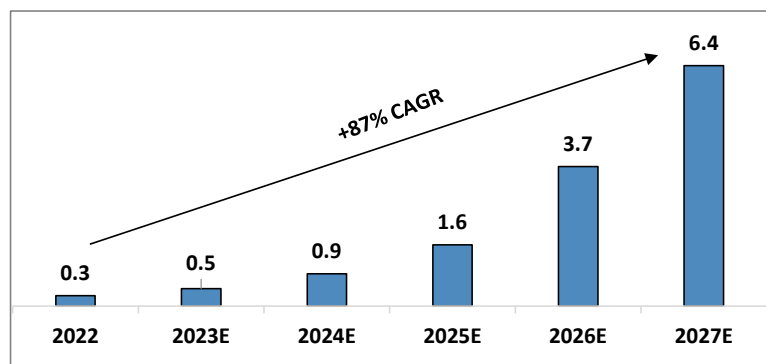


Source: IDC.

Importantly, VR units account for the lion's share of the volume opportunity in 2022, and while VR units are expected by industry analysts to expand by ~4 mn units each year in the near-term, we would not be surprised if the mix between AR and VR devices is more balanced in the long-term with a likely lower price point as well as better AR innovation expected to hit the market later in the decade.

Figure 3: AR Unit Outlook

mn units



Source: IDC.

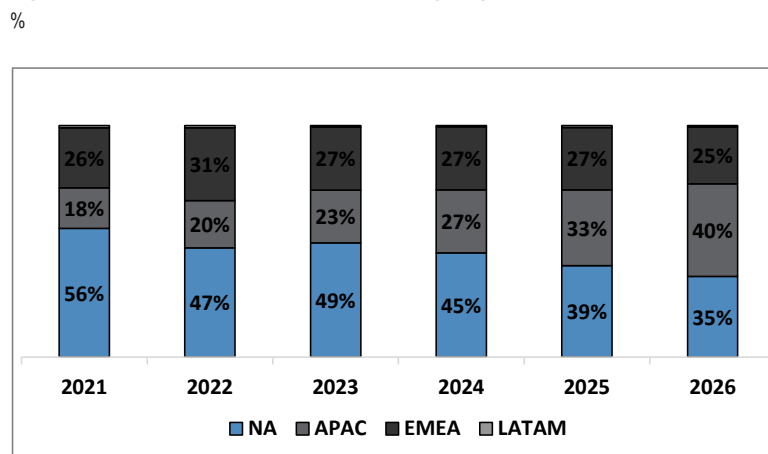
Expect AR and VR units to track to ~50 mn by 2030 and equate to a ~\$25 bn market

Industry analysts forecast AR and VR units to expand at a +30% CAGR from less than 9 mn units in 2022 to 30 mn+ units in 2027. Importantly, even if we assume consumer spending on AR and VR devices continues to be slower following the current macro headwinds, and impacts the aforementioned growth rate, we estimate units can conservatively track to ~50 mn by 2030, which assumes a more moderate annual growth rate closer through the forecast period. For context, the ~50 mn units of AR and VR devices implies a 1:6 ratio to PCs sold annually or a 1:26 ratio to smartphones sold annually, which appears realistic in our view when considering a likely sizeable price reduction for products as volumes scale. If we assume a blended price of ~\$500 per device, we estimate the addressable market opportunity will be in the ~\$25 bn range by 2030, with the mix between AR and VR likely settling out based on consumer preferences.

With most volumes likely to come from North America and China, Apple is better positioned to replicate robust market share in VR/AR

As outlined by industry analysts, the market volume forecasts are led by expectations for a stronger uptick in North America and China, relative to other regions. The figure below shows that North America and APAC (which we believe to be largely China) should account for ~70% of total shipments. With Apple's share of smartphones in North America close to ~50%, in combination with rising market share in relation to smartphones in China and PCs in North America, we believe Apple will be well positioned as its market relevance in other consumer devices will likely help drive success in the AR and VR market – particularly as the Services offering on the platform appears to be an extension of the ecosystem already created through PCs and Smartphones.

Figure 4: VR Hardware Shipment Forecasts by Region



Source: IDC.

Assuming Apple's smartphone share is replicated in North America and China implies 7-9 mn units and \$7 bn+ revenue opportunity

Assuming the AR and VR market tracks to ~50 mn units by 2030, and North America and China account for ~35 mn units, we estimate Apple's units can track to ~7 mn if the company can replicate its smartphone market share of ~50% in North America and ~15% in China, with EMEA likely representing an additional opportunity of ~2 mn units. We estimate the 7-9 mn unit outlook for Apple would equate to a revenue opportunity closer to \$7 bn+ by 2030 from hardware alone.

Reasonable path to 20 mn installed base by end-of-decade

Assuming a reasonable ramp to about 7-9 mn devices through to the end-of-the-decade, we estimate the installed base of devices can amount to 20 mn by the end of the decade. While the Services opportunity on the new Platform likely will ramp over time, assuming Services revenue per year at half of the current monetization of \$40/year implies a Services revenue opportunity of \$400 mn per year.

Installed base to expand over time and support the high margin opportunity in Services

Assuming a useful life similar to mobile devices, we estimate the installed base can over time amount to ~40 mn devices, which should offer Apple a solid Services revenue opportunity on this new platform.

For example, Apple derives roughly \$40/year on each device in its 2 bn installed base through its Services portfolio, which in most cases we see replicable on a new platform, like MR devices, implying that the aspirational revenue opportunity on ~40 mn devices would be \$1.6 bn per year and most importantly translating to a solid profit opportunity given the high margins.

To that end, based on our simplistic math, we estimate Apple's AR and VR related revenue to exceed \$7 bn and equate to EPS in the range of \$0.10-\$0.15 or roughly account for ~\$3 to the price target based on current valuations.

What will be measure of success at the launch event for the MR headset?

Typically Apple's product launch events are known to be "sell-the-news" events as the average investor has perceived most recent product launches as only incremental innovation. That creates the likelihood of the upcoming event being different; although, we believe the measure of success will be:

- 1) Standing up the product on a stand-alone basis with a slate of Services already native to the platform** to help consumers and investors visualize the use cases; and
- 2) Innovation and feature sets appearing disruptive** where adoption in different form factors like AR glasses opening up opportunities for a transformative platform in the future.

Investment Thesis, Valuation and Risks

Apple (*Overweight; Price Target: \$190.00*)

Investment Thesis

We rate AAPL shares Overweight given our favorable outlook on iPhone and Services revenues relative to investor expectations, catalysts to accelerate revenue growth, and upside risk to our base forecast for ~10% earnings CAGR. We see upside in several aspects of the business as well as financials that remain underappreciated by investors, namely the transformation of the company to Services, growth in the installed base, technology leadership, and optionality around capital deployment—all of which together lead us to expect double-digit earnings growth and a modest re-rating for the shares.

Valuation

Our December 2023 price target of \$190 is based on a P/E multiple of ~27x on our CY24 earnings estimate. Apple shares have traded closer to 30x P/E following the re-rating on account of Services growth as well as expectations of better execution on the product cycle, which we expect to be a multiple investors are willing to return to attributing to the shares, with beats driven by more sustainable secular drivers in iPhone and Services with a larger installed base, higher share in 5G smartphones, and better Services monetization—all together turning out to be a strategic advantage for the company.

Risks to Rating and Price Target

Industry Downside Risks

Deceleration or contraction in the handset and smartphone market could be faster than expected. Economic conditions or shifting consumer demand could cause greater than expected deceleration or contraction in the handset and smartphone markets. This would negatively impact Apple's prospects for growth, and the shares may fail to achieve our price target as a result.

Increase in competitive pressures in international markets. Apple is increasingly participating in international markets, such as China and India, where local players, which are better situated, could leverage their position and pull on levers such as pricing to make the market more competitive. In addition, tariffs enacted by local governments may further hurt Apple's ability to compete effectively in international markets.

Company-Specific Downside Risks

Investment in new business strategies and acquisitions could be fruitless. Apple has historically invested in new business strategies and acquisitions. As such, success in these investments has low visibility at this time and could lead to greater than expected liabilities and expense. Additionally, new investments could have a negative impact on current operations by distracting management.

Key man risk around departure of chief executive officer. While risks related to departure of management executives appear considerably lower relative to the past, we believe the execution on strategic priorities under CEO Tim Cook's leadership still presents modest risk to the share price, although we see a strong group of executives to support business performance without disruptions.

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Apple (AAPL, AAPL US) Price Chart



Source: Bloomberg Finance L.P. and J.P. Morgan; price data adjusted for stock splits and dividends.
Initiated coverage May 01, 1999. All share prices are as of market close on the previous business day.

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