A Spatial Future Materializes

2026 Edition

An ARtillery Intelligence Report

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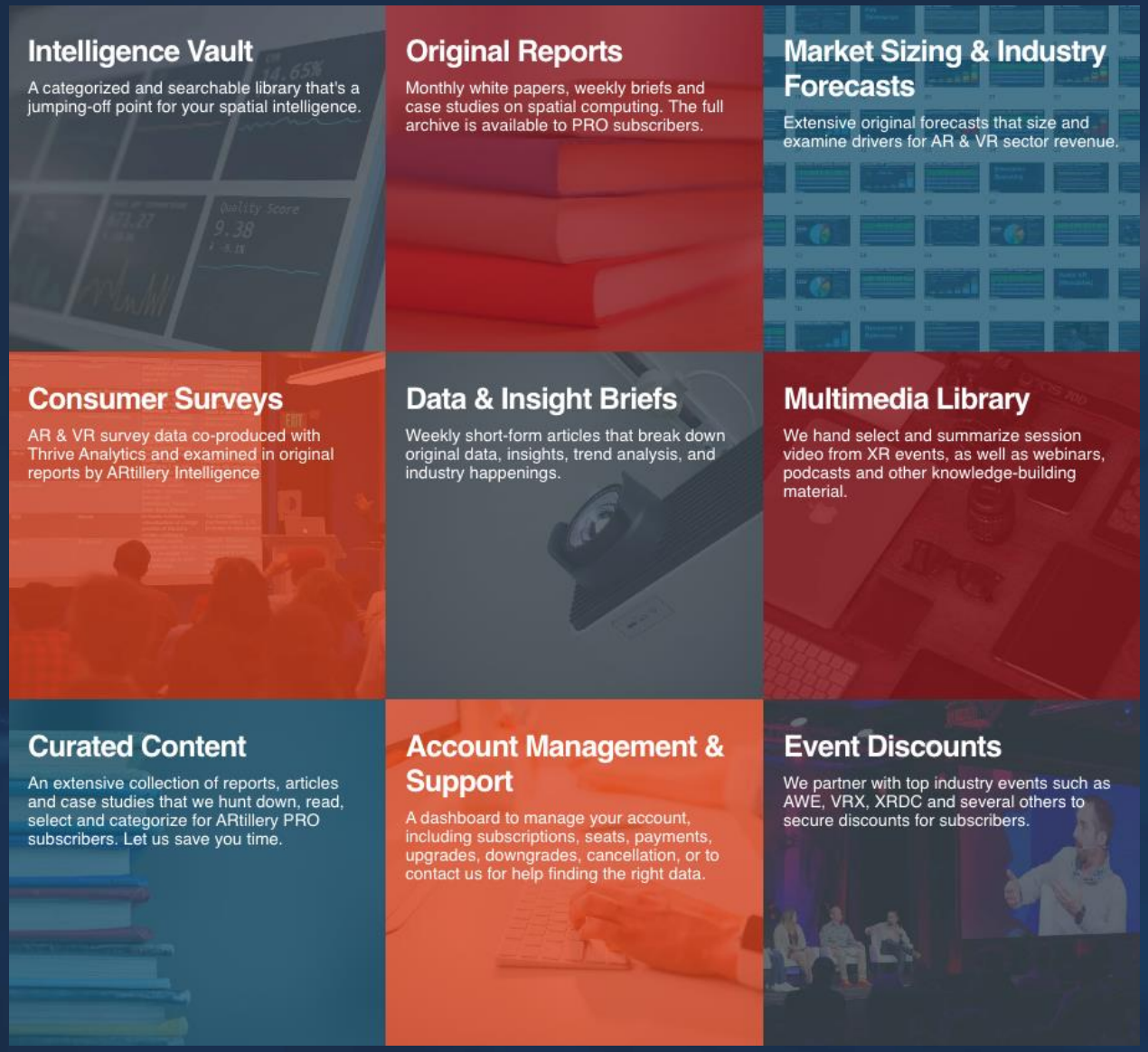

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Executive Summary

Annual Exercise

What's the state of spatial computing? This report represents our annual exercise to define the sector, its players, events, and trajectory.

What did we uncover? Though spatial computing – including AR, VR, & MR (collectively, XR) – faces headwinds, it continues to push forward. Its biggest players are investing tens of billions collectively to realize their self-centric versions of a spatial future. But though self-serving, these players accelerate XR in the aggregate as they fund the industry's expansion, R&D, marketing, and consumer education.

XR Appetites

For example, Meta's spending spree in its Reality Labs division – though recently scaled back to a degree – has struck the right chord with Ray-Ban Meta Smartglasses (RBMS). The device balances technology and style in ways that meet consumers' current XR appetites. In other words, they're more eyewear than technology. This formula, though it has proved elusive to tech giants over the past decade, has been validated through RBMS consumer traction. The market has spoken, to the tune of **10 million+** lifetime units sold. Moreover, they've signaled a model for the right UX balance between visuals and AI.

Intelligent Choice

Sticking with that last point, the intelligence and utility that AI brings to the table lessen AR's reliance on visuals as a selling point. It rather offers intelligent functions such as personal alerts, social signals, shopping & commerce, and world annotation. This utility is met with the style and wearability that's possible when you sidestep AR display systems.

But this AI-reliant and AR-lite approach isn't a silver bullet. It's just one of many paths being forged today. And that device divergence is a mark of an industry moving into adolescence. Indeed, a variety of purpose-built and app-dependent form factors will unlock value and greater appeal than the do-everything bulk that characterized AR's previous generation of flagships. Where will those divergent paths take us? Who's best positioned? And where do VR and mobile AR sit in all this? We'll tackle these questions through numbers and narratives.

"XR continues to push forward while its biggest players invest tens of billions collectively to realize their self-centric versions of a spatial future."

Introduction
Reality Check

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Introduction: Reality Check

Defined by Devices

Like many tech sectors, spatial computing is defined by its devices. And on that measure, we've seen a shakeup in the last two years when it comes to the devices that characterize the industry at large. This is what we call the spatial spectrum, and it continues to diverge and diversify (more on that in a bit).

Herd Mentality

Stepping back for context, the past decade of XR's lifecycle was dominated by consensus around winning formulas for device design. For example, in headworn AR, optical seethrough (OST) was a go-to approach – often involving waveguide-based optical systems – which are perfectly valid, but not a silver bullet.

Why was OST the consensus? Mostly because the most well-funded companies had chosen this path, including Microsoft and Magic Leap. This led to widely-held industry assumptions, and a sort of herd mentality that waveguide-based OST *must* be the approach that will win in AR. This made it difficult for other display technologies to get funding and traction. But we're now seeing a turning point in this narrow-mindedness. And it's happening for one big reason: *the consensus didn't work*. Or at least it was too binary. Those leading devices failed to validate a substantial market. For example, Microsoft HoloLens has retreated from the market, and Magic Leap continues to face challenges in marketing its devices.

Flavors & Formats

The good news is that this means erosion to narrow and binary mindsets, and therefore openness to a wider range of flavors and formats. For example, over the past two years, we've seen the rise of AI glasses like Ray-Ban Meta Smartglasses. These deviate from traditional approaches by eschewing display systems altogether. They rather rely on audio annotations for the physical world – a UX that's experientially meaningful even if graphically devoid. And the device's commercial success, to the tune of **10 million+** lifetime units, has validated this approach.

Those demand signals have not only validated at least one winning formula for XR devices, but have compelled road map pivots from competing tech giants like Samsung, Apple, and Google. For this reason, 2026 will see a culmination of non-display devices reach the market, including those from the increasingly impactful Android XR ecosystem.

"We've seen a shakeup in the last two years among the devices that characterize the XR industry. This is the spatial spectrum, and it continues to diverge and diversify."

Introduction: Reality Check

One Step Further

Joining non-display AI glasses like RBMS, *flat AR* display glasses take the same *style versus visuals* tradeoff a step further towards the visual end of the spectrum. These have simple displays to project flat information or content, which can still be done in a stylistic vessel. For example, Meta Ray-Ban Display glasses offer messaging, navigation, and other utilities through a simplified visual system with a low field-of-view, high-resolution, monocular (one eye) display.

Meanwhile, a subset of flat AR display glasses are "video display glasses" that offer private immersive environments to view 2D content, such as one's media library or streaming apps. Exemplified by VITURE and XREAL, these are proving popular because they offer a simple value proposition that resonates with mainstream audiences. It's all about watching all your existing content… but in a more immersive manner through massive virtual displays.

Endgame

But our focus so far on flat AR display glasses and non-display AI glasses doesn't mean that there isn't a place for highly *dimensional AR*. This is AR that understands its surroundings and integrates visual content accordingly and dimensionally. It's the endgame towards which the above non-dimensional AR formats are driving. And there's a market for it today… albeit smaller. Highly anticipated devices in this category include Snap's Consumer Spectacles.

Passive Immersive

Meanwhile, dimensional AR is present in video passthrough (VPT) devices such as Apple Vision Pro. Also known as mixed reality, these devices achieve dimensional AR by infusing visuals with large field-of-view experiences in enclosed headsets. These excel with elite entertainment experiences as well as social communications and workplace productivity.

Then there's mobile AR. Technically a form of passthrough AR – given that visuals interact with physical objects as rendered through your smartphone camera – it's the most penetrated form of AR today. Though it's not AR's endgame and ideal form, being handheld versus headworn, it scales by piggybacking on an installed base of 3 billion+ global devices. Because it achieves that scale, it's the form of AR adopted and activated most by brand marketers… who are all about maximum reach.

"Dimensional AR understands its surroundings and integrates visual content accordingly. It's the endgame towards which most AR formats today are driving."

Introduction: Reality Check

Masters of None

One key lesson from the preceding pages brings us full circle to the principle teased at the beginning of this section: the XR market continues to diverge and diversify. This involves increasingly purpose-built endpoints rather than the previous XR figureheads – e.g., Microsoft HoloLens – that were "jacks of all trades, masters of none."

The XR era we're entering will be defined by these app-dependent form factors. That's a good thing because they'll be focused and tuned to specific users. They'll in turn find greater traction and appeal. This direction is also supported and fueled by critical tech enablers such as Qualcomm and its expanding array of chips that map to myriad XR form factors.

Horse Race

Another player that will fuel this diversification trend is Google. More specifically, Android XR's market entrance in 2025 has accelerated competition while lowering barriers for XR creation. It will do that by handling the operating system while freeing up device OEMs to do what they do best. By standardizing UX elements (e.g., user interaction mechanics) at the OS-level, it will likewise enable app developers to focus on what *they* do best. In these ways and others, Android XR could do for XR what Android did for the mobile industry over the past few decades.

In that way, the looming XR era could mirror aspects of the smartphone era in that its largest players will be represented by an open platform (Android XR) as well as a highly competitive and astute player focused on vertical integration and finely-tuned elegant design (Apple). This came to be known as the two-horse race of the smartphone era that continues to this day. And though spatial computing could be similar, the difference will be in the number of horses. Joining Apple and Google will be formidable competitors with XR platforms of their own, including Meta and Snap.

Defining Factor

Another thing that could differentiate spatial computing from the mobile industry is that success factors will be different. Not only will the best spatial experiences win – a function of highly-complex computing and design – but AI will be a defining factor. That means whoever has the best and most XR-integrated AI will gain an edge in XR's "face race."

"The XR market continues to diverge and diversify into purpose-built devices… rather than previous XR standards that were 'jacks of all trades, masters of none'."

AI: Making XR Smart

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AI: Making XR Smart

Premium Play

Picking up where the previous section left off, which XR competitors are best positioned with AI? That list is ranked differently than the positioning of players in PC and mobile. For example, though Apple has always had an edge in technological excellence – the always-elite and premium play – it has stumbled in AI. Among other factors, its positioning as a hardware (and privacy-first) player limits its access to rich banks of AI training data enjoyed by Google, Meta and other software-centric players. Its closest thing to AI has historically been Siri… and that's not going to cut it.

Speaking of those other players, Meta has become formative in its AI endeavors, including its work with Llama and other development that's driven by its high-stakes need to improve ad targeting – its core business. A byproduct of that aggressive investment will be superior AI technology that can be integrated in its spatial products. Indeed, it's done the most in that respect given the multimodal AI that's a central value driver in the breakout-hit Ray-Ban Meta Smart glasses. And we'll see AI continue to permeate its XR products in similar ways going forward.

What about Google? It could enjoy the best AI positioning of any player in the XR realm. It has spent the past 25 years as the world's search engine. Its knowledge graph is the world's most extensive data bank of human intelligence and the best AI training set that one could ask for. This includes textual and visual intelligence that flows from Google Images (object recognition), Street View (navigation), and Google Shopping (AR commerce), to name a few properties.

The above players are just a sample. We'll also see the likes of Snap develop AI that drives visual AR products. Indeed, Snap has already gone further than most AR players, including user-facing AR (prompt-based lens activation) and creator-facing AR (streamlining lens creation through gen-AI). It will be a one to watch as AR continues to converge with AI.

On the Horizon

But the truth is that it's too hard to pick winners just yet – in XR, AI, or the intersection of the two technologies. We're in early innings for both. So though the foundational positioning of each player is mirrored in the above narrative, things could change quickly, including players we haven't mentioned. That could include everyone from pure plays like OpenAI to startups on the horizon that we don't know about yet.

"Google has spent the past 25 years as the world's search engine. It's the world's most extensive data bank of human intelligence and the best AI training set that one could ask for."

AI: Making XR Smart

Consumers & Creators

Stepping back, what are we talking about in practical terms when we mention the convergence of AR and AI? One example has already been noted earlier in this report: the multimodal AI at the heart of Ray-Ban Meta Smartglasses. This helps users identify real-world objects, which serves as an intelligent world-annotation feature with ample value, appeal, and breadth of applicability. But there are several other points of intersection between AI and XR, including Snap's *user-facing* and *creator-facing* use cases noted earlier. In fact, we'll start there in delineating AI's roles in XR for both consumers and creators.

The Brains of XR

Starting with consumer XR, AI will be a force multiplier as it serves as the brains of the device. There are several ways it will do this in the typical AR user experience, but a few examples include generating AR content (e.g., lenses) on the fly using text prompts. This brings AR from something that's pre-ordained to a more open-ended and serendipitous set of potential experiences. And we're already seeing hints of this vision, such as Snap's Imagine Lens. Also on the consumer end, AI will serve as a digital assistant for intelligent and ambient AR. This includes making you smarter about your surroundings (e.g., visual search and multimodal AI), or controlling experiences through voice. The former brings all-new utility to XR, lessening reliance on visuals (and all their design challenges) as a central selling point. The latter is meanwhile relevant given headworn AR's lack of physical inputs. AI-enabled voice assistance will be a foundation for natural XR inputs and interactions.

Generative XR

Moving on to creator and developer-facing possibilities, generative AI has the potential to streamline creator workflows. This includes generating 3D models through text prompts, which we call *generative XR.* AI can also serve as a co-pilot to automate several rote and time-consuming aspects of XR experience creation. Already seen in tools such as Snap's GenAI Suite in Lens Studio, this frees up creators to divert and deploy valuable time and skills to their requisite intellectual and creative heavy lifting. This use case carries the benefit of tangible appeal, lessening persistent pain points for developers, and offering the most valuable benefit of all: *time*.

"The multimodal AI at the heart of Ray-Ban Meta Smartglasses identifies real-world objects – an intelligent world-annotation feature with ample value and appeal."

AI: Making XR Smart

Point of Maturity

As the previous few pages examine, AI will continue to amplify and elevate XR. To that end, you'll see it mentioned throughout this report, rather than covered in an exhaustive standalone section. And that editorial orientation reflects its reality: it won't be a standalone phenomenon but rather integrated throughout technology sectors, including spatial computing. Think of that like smartphones. In the first few years of the smartphone revolution, they were a standalone topic and the focus of large conferences, industry associations, and publications. Now they're just a mundane part of the tech fabric. They're plumbing.

Until that point of maturity comes in AI's lifecycle, the technology is noteworthy as a standalone topic, and for its many points of entry into the spatial computing world. We've mentioned a few of them and will circle back to this topic as an analytical layer throughout this report.

The Spatial Spectrum

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The Spatial Spectrum

Defining Devices

Extending from the broader view of the spatial computing industry and the factors driving it today, what does the device spectrum look like? As devices continue to diverge and diversify in the ways noted in a previous section, what are their main categorizations? Before diving into the rest of this report, we'll take this opportunity to define the main device classes in the spatial spectrum...

Image Source: Meta

Spatial Segments: Defining Device Tiers

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Analytical Depth

The XR device spectrum is varied, so we've segmented it into classes within this report in order to engender structure and analytical depth. These categories are defined as follows:

Video Passthrough (MR)

Attributes: This device class includes headsets that physically occlude surroundings but have color passthrough cameras to view the outside world from inside the device. That capability provides the foundation for augmenting physical objects and scenes with digital elements. Also known as mixed reality, it's a highly dimensional and elite form of AR.

Examples: *Meta Quest 3, Apple Vision Pro.*

Non-Passthrough VR

Attributes: This includes VR headsets that may have external cameras for hand tracking but *don't* include full color HD video passthrough. Experiences are fully insular and immersive, such as gaming and entertainment. This device class continues to diminish in size as mixed reality becomes a standard in VR.

Examples: *Bigscreen Beyond 2, PlayStationVR 2*

Optical Seethrough (Dimensional)

This category includes AR devices with seethrough lenses on which graphics are projected. This more advanced and "dimensional" flavor of AR features digital elements that interact with their surroundings through spatial understanding. This hallmark of dimensional AR is enabled by external cameras and software that understand and accommodate spatial geometry. Due to their technical requirements – in both hardware and software – devices in this category are generally bulkier and costlier than flat AR (below).

Examples: *Snap Spectacles, Magic Leap 2*

Optical Seethrough (Flat)

Similar to the above category, this includes AR devices with seethrough lenses on which graphics are projected and displayed. However, it differs from the above category in that graphics don't have spatial understanding nor dimensional interaction with physical objects and spaces. They're rather flat overlays, such as large virtual monitors/displays. Use cases include private entertainment or gaming – mirrored from one's device – or heads-up utilities.

Examples: *VITURE Luma Pro, Meta Ray-Ban Display Glasses.*

Non-Display AI Smartglasses

Attributes: This category includes glasses that have no display system at all. Experiential augmentation happens instead through audio content. These devices generally apply AI to achieve a level of utility that compensates for the lack of visuals. For example, multimodal AI lets users speak commands (e.g., "what am I looking at?") and receive audible intelligence that's based on outward cameras and visual sensors. Meanwhile, the lack of a display system enables one of AI smart glasses' most attractive attributes: *style and wearability*. These glasses are often sleek and light, resembling normal eyewear or sunglasses… which makes them mainstream friendly. This is the newest AR category with the most momentum for all the above reasons.

Examples: *Ray-Ban Meta Smartglasses*

Mobile AR

Attributes: This category is defined by AR that happens on smartphones and tablets. It's technically a form of video passthrough AR, as it augments content from the device's camera feed. But the most defining attribute is that the form factor is handheld rather than headworn.

Charting the Spatial Spectrum

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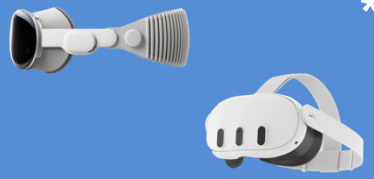
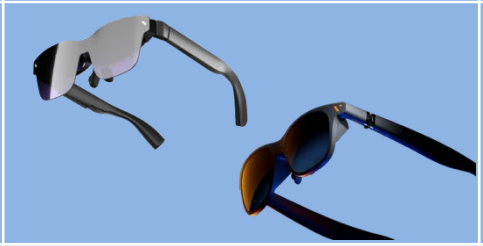
Handheld Headworn

	Mobile	Non-Display (AI Glasses)	Flat (3DoF & Floating)	Dimensional (6DoF & SLAM)
Video Passthrough (MR)				 *
Optical Seethrough (AR)				
Fully Occluded (VR)			 **	

*Includes VR devices that perform passthrough AR, also known as mixed reality. These are categorized as VR, rather than AR, for the purposes of analysis and market sizing.
**Flat VR (3DoF) is a device class facing extinction (e.g., Oculus Go) in favor of flat AR devices likeXreal One, but it could see future development.

XR Devices: A Numbers Game

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XR Devices: A Numbers Game

By the Numbers

Going one level deeper into device tiers and classifications, what's the market size of each? We'll dive into the numbers in the following several pages, including unit sales for key categorizations across the spatial spectrum. As a definitional side note, the following pages examine hardware unit sales only, leaving out software such as XR apps, games, and experiences (covered elsewhere in this report).

XR Device Penetration *Mobile*

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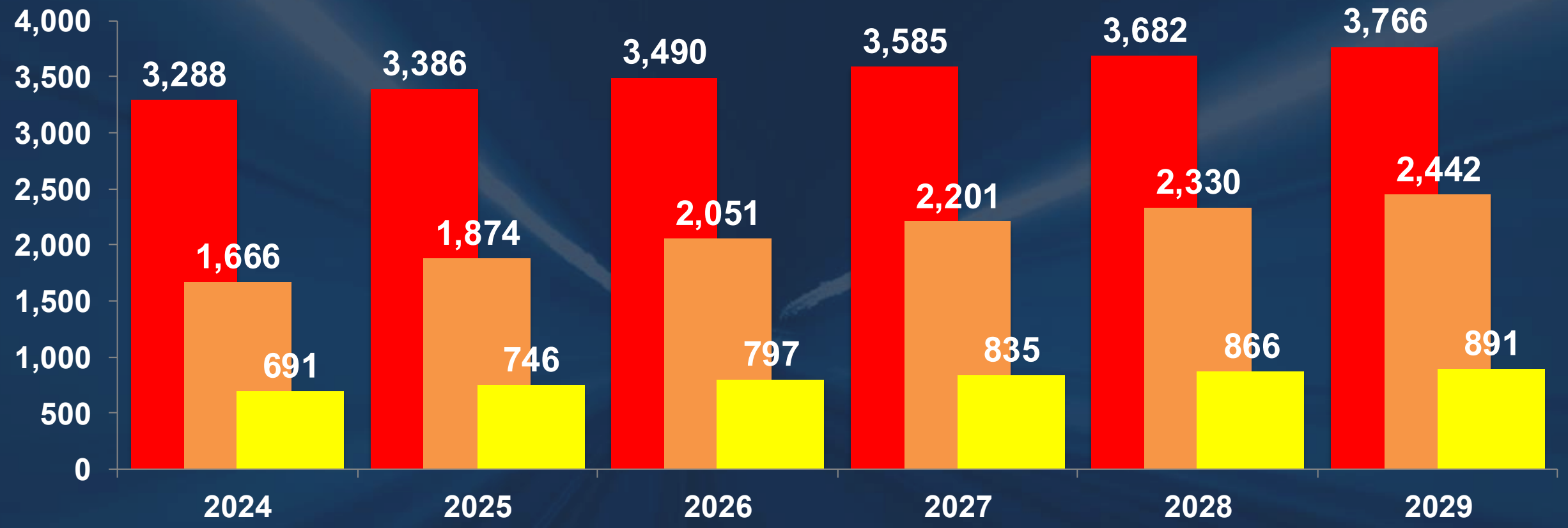
Mobile AR Device Projections

Compatible Units and Users

Millions of Units

Analyst Note: Visual search is a form of mobile AR in which physical objects are identified and contextualized using the smartphone camera and AI (e.g., Google Lens). Informational overlays are then presented to the user. This is a leading format in mobile AR (this report) and headworn AR (separate report).



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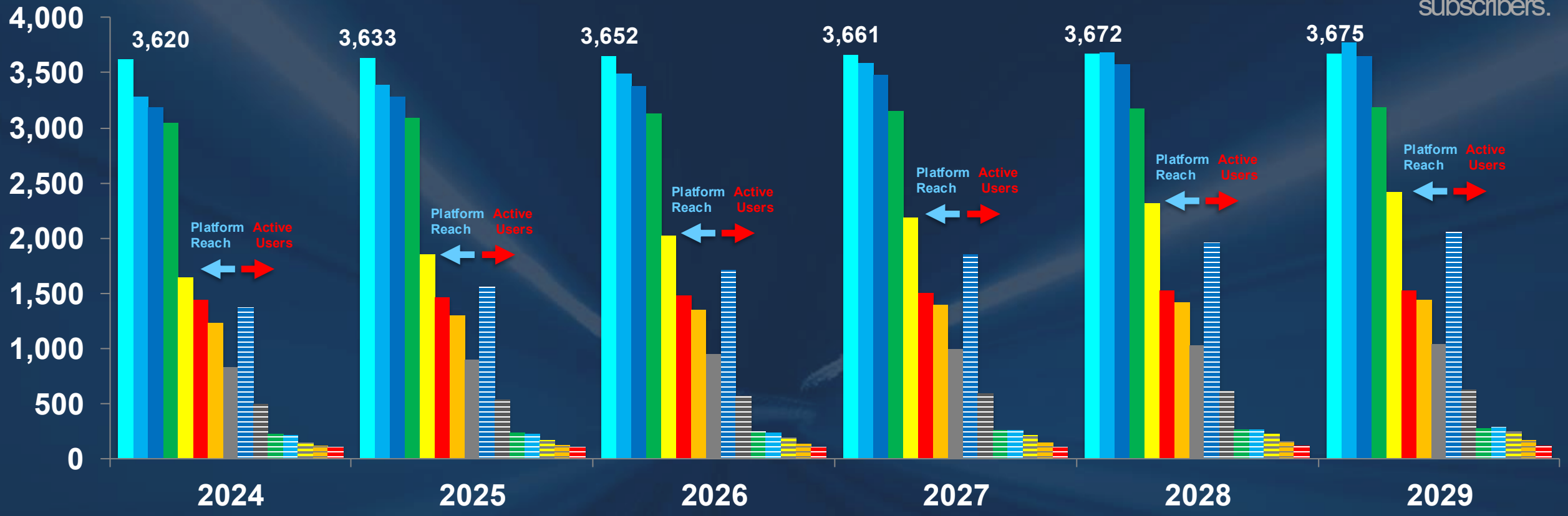
*AR user figures are de-duplicated to factor usage overlap across platforms (see following pages for platform breakdowns).
*See report's introductory section for explanation of visual search and its inclusion in this forecast

Mobile AR Global Penetration

AR-Compatible Devices & Users, Across Platforms*

Millions of Units

Simplified View: Detail available to Pro subscribers.



*Excludes platforms endemic to China.
**Includes iPhones and iPads.
***See separate visual search platform breakdown.
****Includes Facebook & Instagram.

- Smartphones (of any type)
- Web AR (Devices)
- Visual Search (Devices)***
- Meta AR (Devices)****
- ARCore (Devices)
- ARkit (Devices)**
- TikTok (Devices)
- Snap Lenses (Devices)
- Visual Search (Users)***
- Snap Lenses (Users)
- Meta AR (Users)****
- Web AR (Users)
- ARCore (Users)*
- TikTok AR (Users)
- ARkit (Users)**

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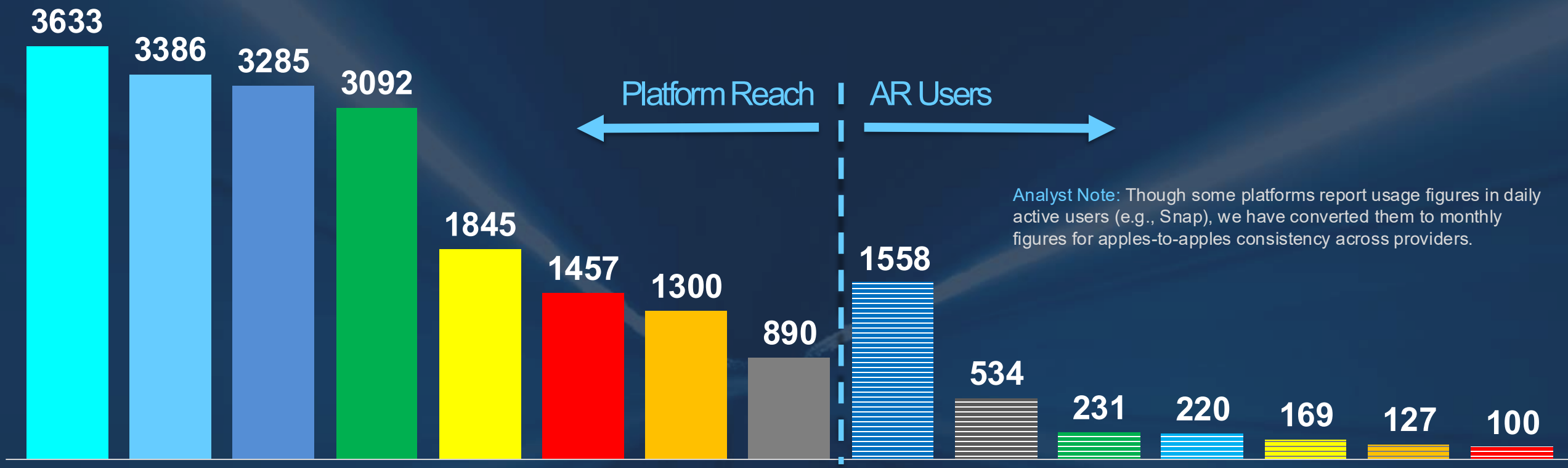
Mobile AR Global Penetration

2025 AR-Compatible Devices & Users, Across Platforms*

Millions of Units



Analyst Note: Though some platforms report usage figures in daily active users (e.g., Snap), we have converted them to monthly figures for apples-to-apples consistency across providers.

*Excludes platforms endemic to China.
**Includes iPhones and iPads.
***See separate visual search platform breakdown.
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- Smartphones (of any type)
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- ARkit (Users)**

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XR Device Penetration *Headworn*

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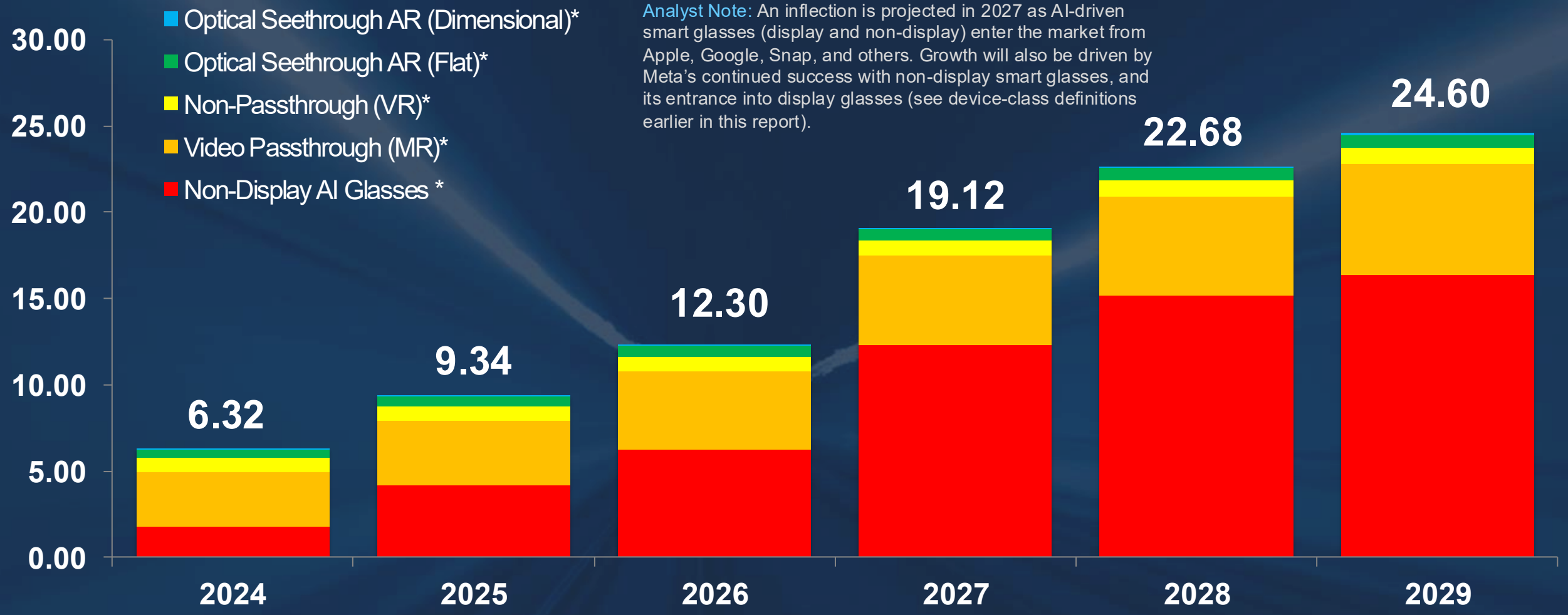
XR Headset Projections

Annual Unit Sales Estimates, by Device Class

Millions of Units

Simplified View: Detail available to Pro subscribers.



Analyst Note: An inflection is projected in 2027 as AI-driven smart glasses (display and non-display) enter the market from Apple, Google, Snap, and others. Growth will also be driven by Meta's continued success with non-display smart glasses, and its entrance into display glasses (see device-class definitions earlier in this report).

*See definitions and examples of each device class earlier in this report.

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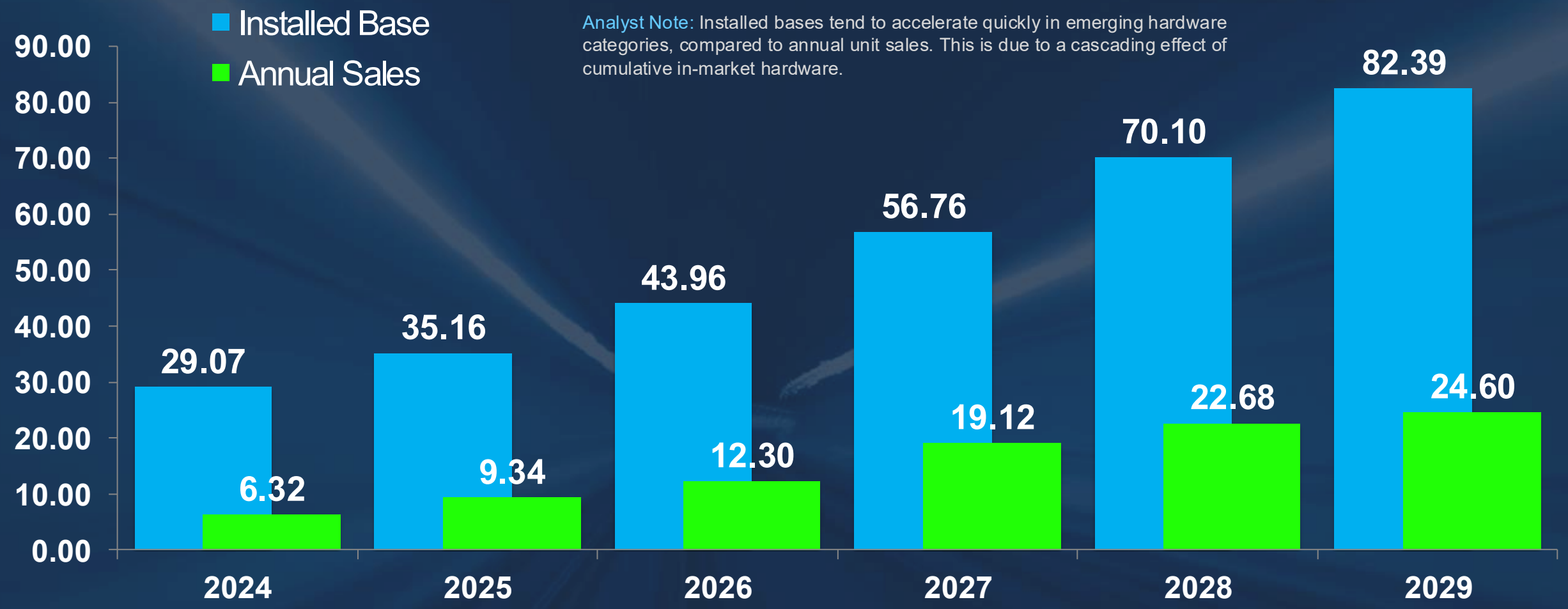
Headworn XR Projections

Unit Sales & Installed Base Estimates

Millions of Units



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XR Headsets: In Perspective

Millions of Units

Global Installed Bases: Smartphones vs. XR Headsets

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Segment Drilldown: Mobile AR

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Segment Drilldown: Mobile AR

Starting Point

Now that we've defined and quantified spatial computing device tiers, it's time to drill down into each, and the subsectors they represent. We'll start here with mobile AR*. This includes a broader look at spending categories beyond the hardware figures examined in the previous section. That includes software, apps, and experiences adopted by consumers as well as brands/enterprises.

Charting the Spatial Spectrum

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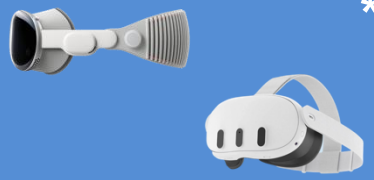
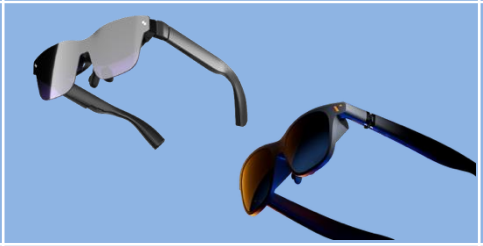
Covered in this Section | Handheld | Headworn

	Mobile	Non-Display (AI Glasses)	Flat (3DoF & Floating)	Dimensional (6DoF & SLAM)
Video Passthrough (MR)				 *
Optical Seethrough (AR)				
Fully Occluded (VR)			 **	

*Includes VR devices that perform passthrough AR, also known as mixed reality. These are categorized as VR, rather than AR, for the purposes of analysis and market sizing.
**Flat VR (3DoF) is a device class facing extinction (e.g., Oculus Go) in favor of flat AR devices likeXreal One, but it could see future development.

Segment Drilldown: Mobile AR

Potential for Scale

When looking at the spatial spectrum and zeroing in on AR, there are two overarching form factors: handheld and headworn. The former is more colloquially known as mobile AR. Though it isn't AR's endgame nor its fully-actualized self (that designation goes to headworn AR), it does have advantages. The biggest one is scale, or at least its potential for scale.

To put some numbers behind that claim, of the **3.6 billion** global smartphones today, **3.2 billion** are compatible with at least one form of AR. Prevalent formats include web AR and lenses & filters delivered in social apps such as Snapchat. More granularity and figures on the mobile AR installed base and relative platform reach can be seen in the previous section.

Steady Rise

Meanwhile, additional market insights can be seen in consumer survey research. According to our consumer mobile AR survey, done in tandem with survey research specialist Thrive Analytics, mobile AR has been experienced by **39 percent** of U.S. adults. This is up from **35 percent** in the previous wave of the research, and is on a steady rise over the past several years (see figures on the next page). Though this is a U.S.-only figure, it is behaviorally and directionally aligned with other major markets such as Europe.

As a qualifying note, the **39 percent** figure above includes visual search such as Google Lens, which continues to break into the mainstream. The figure also measures at least one experience with mobile AR per user. That's meant to start broadly before segmenting and drilling down into factors such as frequency, formats, entry points, and user affinities.

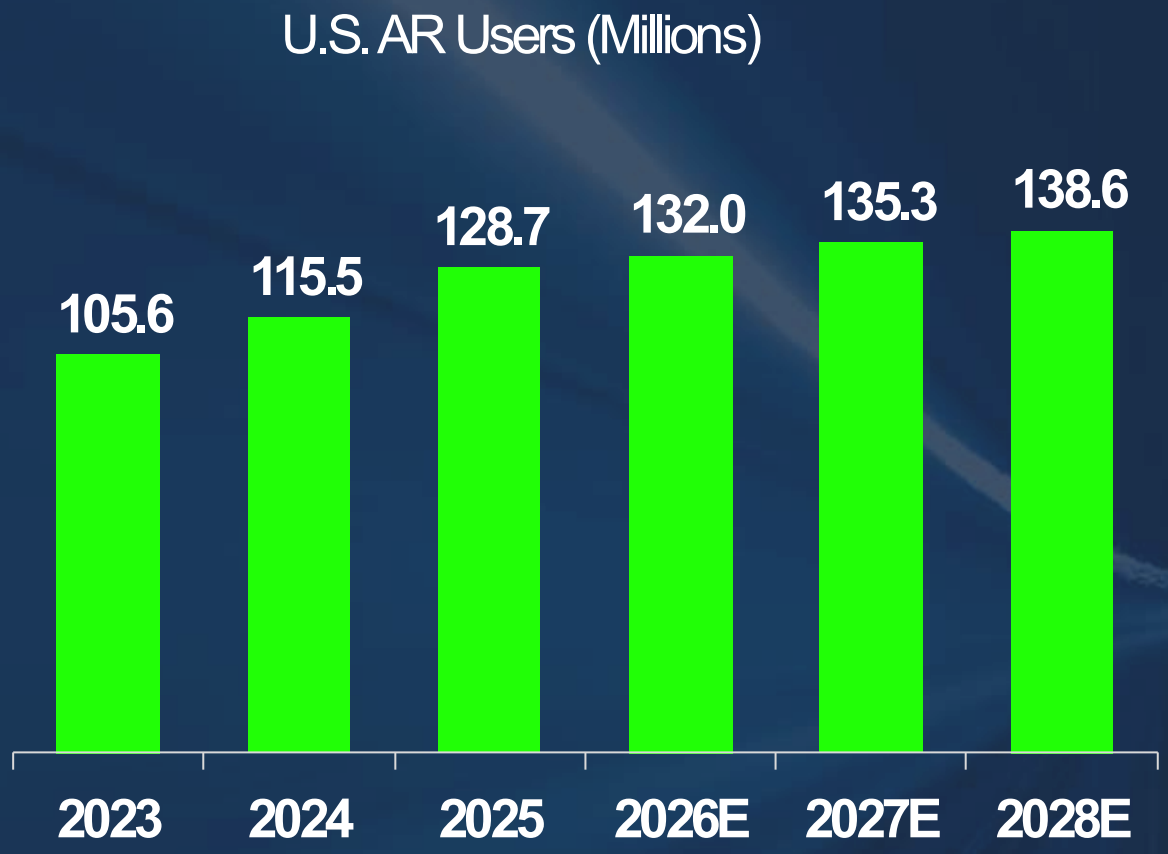
For example, when looking at frequency, **38 percent** of users engage with mobile AR monthly, while **27 percent** do so weekly and **19 percent** do so daily. Also notable in survey sentiments are user satisfaction levels. Specifically, **56 percent** of mobile AR users are either satisfied (**30 percent**) or very satisfied (**26 percent**). That compares with **22 percent** who are either dissatisfied (**12 percent**) or very dissatisfied (**10 percent**). So mobile AR satisfaction is winning out among consumers.

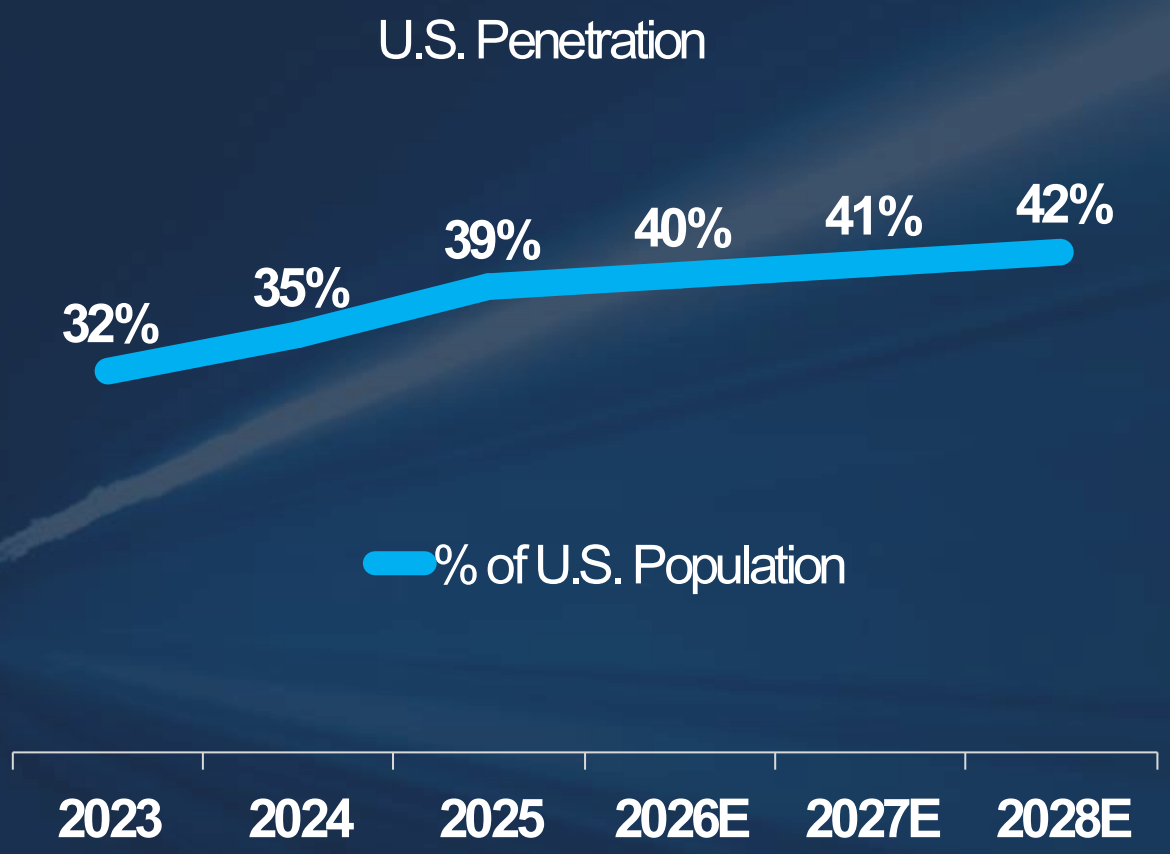
More color around the above figures can be seen in the following pages, while more data points (such as top formats, use cases, and other granularities) can be seen in our full mobile AR consumer survey **report**.

"Though it isn't AR's endgame nor its fully-actualized self mobile AR does offer advantages. The biggest one is scale, or at least its potential for scale."

U.S. Mobile AR Users 2023-2028

User volume estimates and share of overall population





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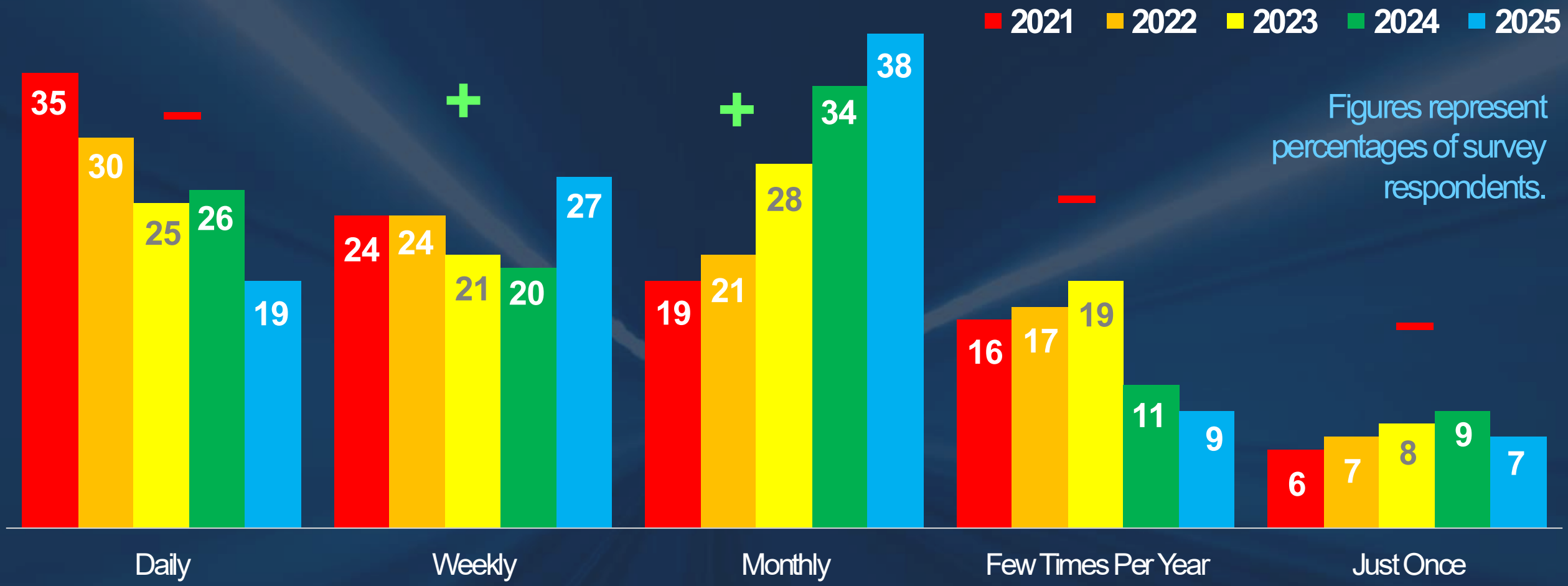
2025 Base = 50,000 U.S. Adults

Mobile AR Frequency

How often do you use mobile AR?



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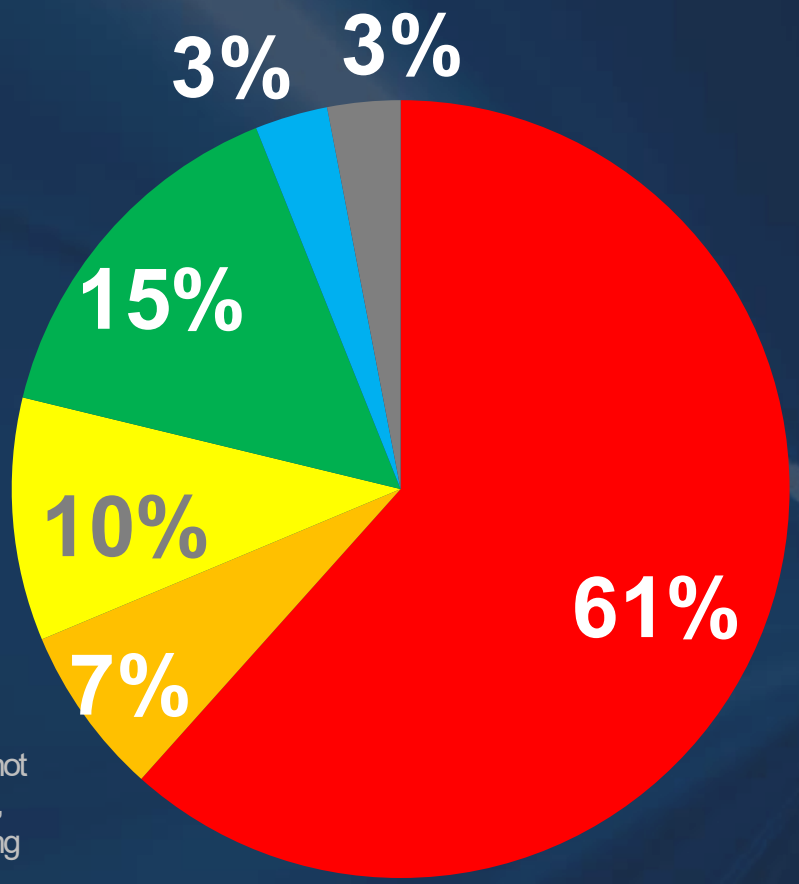
2025 Base = 19,341 U.S. Adults

Mobile AR Usage Frequency

AR Frequency in Terms of the Full Survey Universe



- Non-Users
- Daily Users
- Weekly Users
- Monthly Users
- Semi-Annual Users
- One-Time Users

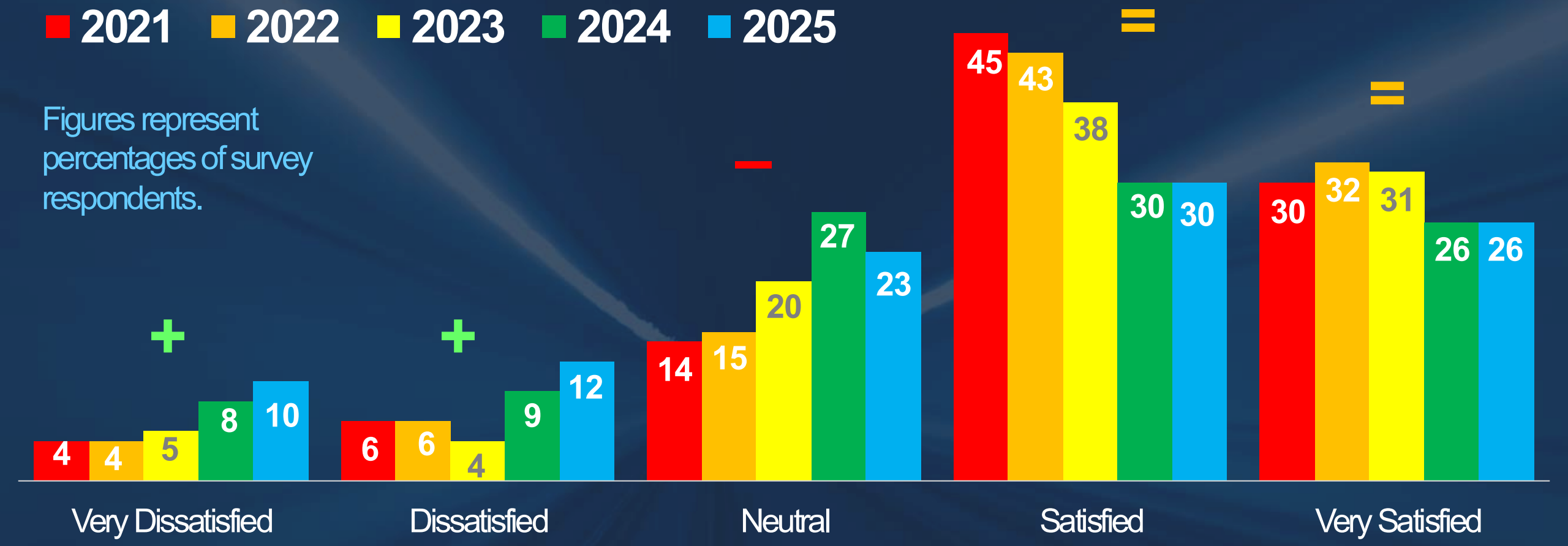
Figures may not add up to 100, due to rounding

ARtillery Intelligence

2025 Base = 50,000 U.S. Adults

Mobile AR Satisfaction

How satisfied are users with mobile AR?



ARtillery Intelligence

2025 Base = 19,341 U.S. Adults

Segment Drilldown: Mobile AR

Think Spatially

Building on the figures in the previous pages, mobile AR's advantages aren't just quantitative but qualitative. Smartphone ubiquity is both a path to scale and it makes mobile AR a stepping stone for AR's headworn evolutions (covered later in this report). To that end, Mobile AR acclimates the world to immersive content at scale, thereby seeding demand for AR glasses. This goes for consumer demand as well as developers who can learn to build spatial experiences and more broadly *think spatially.*

Mobile AR meanwhile does all the above while offering a variety of platforms and user touchpoints. In other words, it's not just about the volume of AR-ready smartphones (quantified in the previous section) but the creation and delivery channels to reach all those devices. To name a few, there are native app development kits for iOS (ARKit) and Android (ARCore). These SDKs democratize and scale AR app creation through ubiquitous operating systems.

Social apps like Snapchat and TikTok have meanwhile gained traction for AR lenses that enhance multimedia sharing. They've correspondingly built free developer platforms to boost lens creation and engagement.

Then there's web AR, including platforms like Niantic Spatial, Zappar, and (increasingly) Snap's Lens Studio. These bring AR to the mobile browser.

Activation Energy

Advantages for this web-based approach include less friction and less "activation energy" to launch AR experiences. This is simply because experiences open within ubiquitous mobile web browsers and don't require specific apps. Conversely, friction is encountered when a user needs to download an app before engaging with a given AR experience. And from the developer perspective, web AR offers greater reach, given that audiences aren't fragmented into specific apps, on which they have to duplicate efforts.

Image Source: Niantic Spatial

"Mobile AR acclimates the world to immersive content at scale, thereby seeding demand for AR glasses. This goes for consumer demand as well as developers."

Segment Drilldown: Mobile AR

Virality & Vanity

In addition to providing (free) enabling tech and creation tools, leading mobile AR platforms continue to establish and standardize AR revenue models. For example, one of the most popular forms of consumer AR so far has been interactive lenses that are distributed through social apps like Snapchat and TikTok. The dynamics and user behavior that surround these lens experiences (e.g., virality, embodiment, interactivity), naturally align with brand sponsorship. For example, lenses for clothing and apparel brands can place products on users, while food & beverage companies develop interactive mini-games featuring their products. That gamification elevates virality, vanity, and other engagement metrics.

And the results show. All the above continues to be validated in campaign performance metrics in case studies.* But the real proof has come through brand adoption. This involves paid distribution through these apps' content discovery mechanisms and social graphs. Beyond paid amplification, brands can also self-distribute AR marketing through their own apps. In total, immersive marketing represents one of the leading AR revenue sub-sectors today, with brand spending estimated to reach **$11.2 billion** by 2029 according to ARtillery Intelligence's Global Mobile AR Forecast.** This is a key revenue source for mobile AR given that consumers haven't adopted paid mobile AR experiences en masse, such as buying apps. In other words, most mobile AR experiences are *brand-sponsored* rather than *user-purchased.*

Incentive Structure

Lastly, all the above is propelled by innovation and investment incentive from the Snaps and TikToks of the world. Not only does brand sponsorship lend itself to AR's inherent qualities, as noted, but advertising happens to be the primary business model of mobile AR leaders, such as Snap and TikTok. This has engendered a constant stream of AR innovations and platform updates, especially for Snap, which has doubled down on AR as an organizational priority and revenue driver. That includes the revenue generation it provides today in mobile AR, but to also lay the groundwork, develop competency, and gain a competitive edge in AR's next era: headworn.

*See ARtillery Intelligence Report: AR Marketing Best Practices & Case Studies, Volume 5.
**See ARtillery Intelligence Report: Mobile AR Global Revenue Forecast 2024-2029.

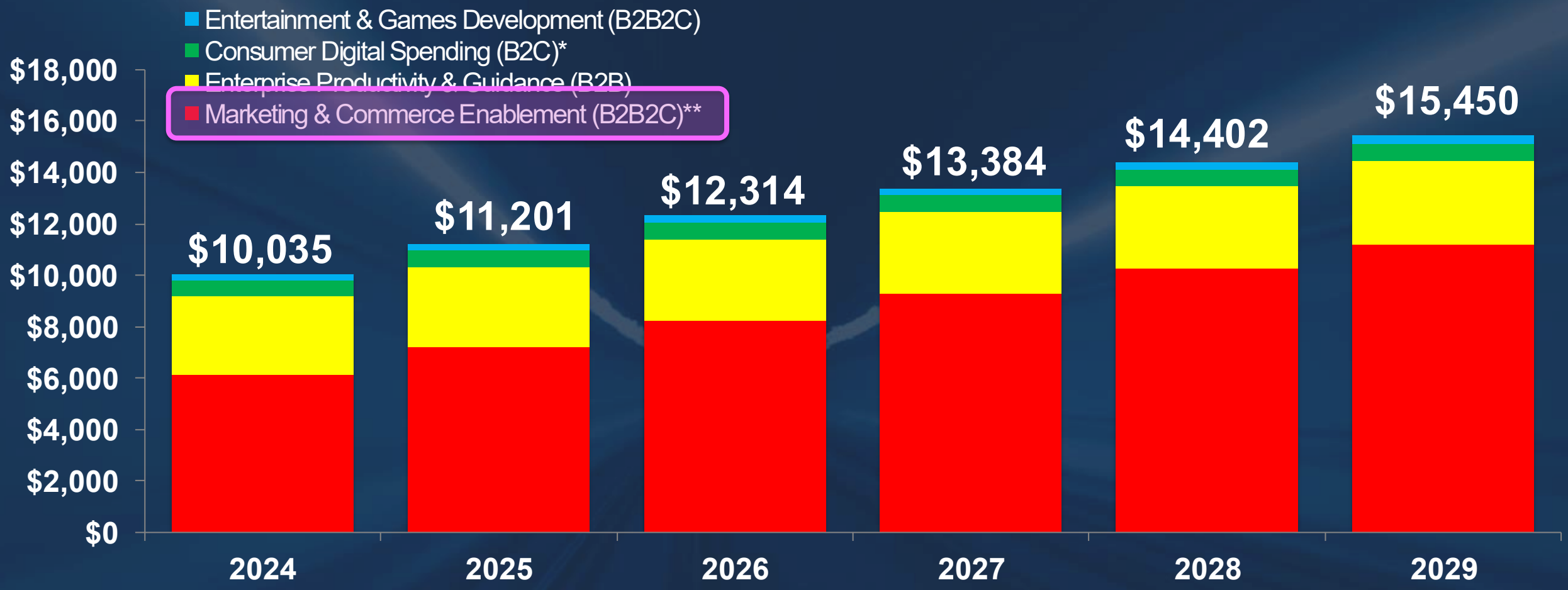
"The dynamics and user behavior that surround these lens experiences (e.g., virality, embodiment, interactivity), naturally align with brand sponsorship."

Mobile AR Revenue Overview

Mobile AR Revenue Estimates, by Source

U.S. $Millions

Simplified View: Detail available to Pro subscribers.



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*Includes digital goods (content, apps & experiences), not physical goods purchased using AR visualization or virtual try-ons.
**Includes software that enables AR-influenced physical-goods purchases, not the transaction value of goods themselves.

Segment Drilldown: Mobile AR

Rare Ability

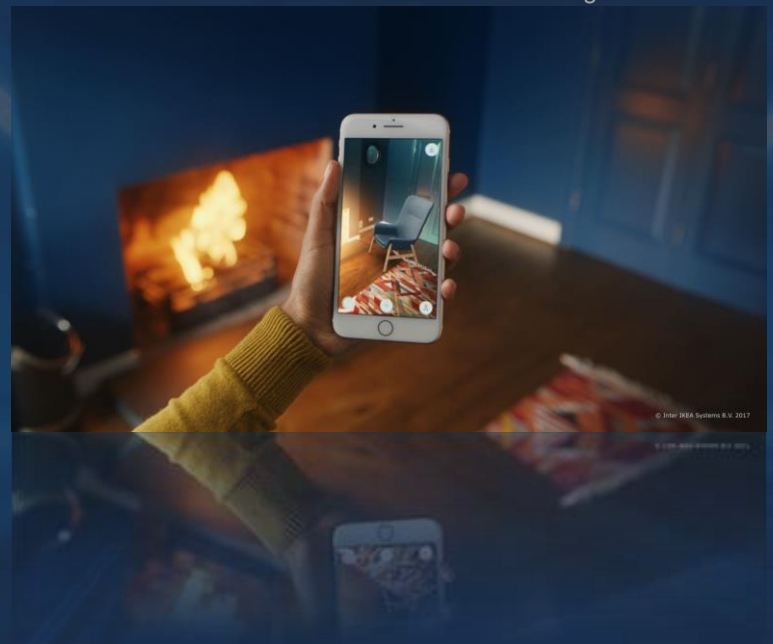
So what's driving all that AR marketing revenue? First, users are demonstrating high engagement with AR lenses to enhance already-popular activities, including media-sharing and enlivened selfies. Second, advertisers are attracted to those eyeballs. More specific to AR's advantages, advertisers are drawn to its ability to let them flex creative muscles and transcend 2D media where they've been confined for years. There's also a strong business case shown in ongoing campaign performance metrics,* as noted.

Zeroing in on that last part, AR has the rare ability to span the traditional marketing funnel. It shines in high-reach branding campaigns as well as lower-funnel consumer action, such as virtual try-ons. The former has cultivated a shopping use case that brings AR beyond marketing and advertising into the territory of direct-response eCommerce. This aligns AR with several other influential consumer trends underway.

Social Commerce

For example, social apps like Snap, TikTok, and Instagram have become go-to places for fashion Inspiration and product discovery. This has in turn led to the social commerce movement, where social feeds are increasingly shoppable and populated with 'buy' buttons. AR has meanwhile come along at the right time to support that behavior. It does so by adding dimension to products through 3D visualization and try-ons. This engenders more confident consumer purchases, which lead to higher conversion rates.

Image Source: IKEA



*See ARtillery Intelligence Report: AR Marketing Best Practices & Case Studies, Volume 5.

"AR has the rare ability to span the traditional marketing funnel. It shines in high-reach branding as well as lower-funnel consumer action, such as virtual try-ons."

Segment Drilldown: Mobile AR

Informational Overlays

Joining social lenses is another mobile AR format that's less penetrated but potentially more opportune in the long run: visual search. It lets users point their phones at objects to identify them through informational overlays. This carries strong user intent – the same factor that makes web search so lucrative. It has the utility of web search but is more visual and thus intuitive. Put another way, visual search inherits the virtues of web search, while finding unique and native value that flows from its visual orientation

Visual search also benefits from *proximity*. Backing up for context, it has been demonstrated in the smartphone era that users' buying intent correlates to their proximity to a given search query (e.g., looking for a place to eat lunch). With visual search, subjects aren't just in proximity, but *in view*. And from the user perspective, they can do things like discover new restaurants through their phone's camera, which can be more natural than tapping text into Google Maps. For that reason, use cases showing early promise include navigation, tourism, and local discovery.

Key Ingredients

Across visual search's potential use cases, common attributes include broad appeal and high frequency… again, just like web search. These factors give visual search a large addressable market in *quantity of users* and *volume of usage*. These are key ingredients for killer apps. Meanwhile, these use cases have another Common attribute: *shopping*. The endgame is monetizable visual searches for shoppable items. Actively holding up one's phone to identify real-world items flows naturally into transactional outcomes.

To put some numbers behind these claims, Google Lens sees **20 billion** visual searches per month, **20 percent** of which are shopping-related. This growth, and its monetization potential, has influenced our market sizing around visual search, including its projected growth and path to more than **$400 million** in revenue by 2029. See the next page for more color.

Meanwhile, amplifying visual search's growth. is another factor: generation Z. The demographic has a high affinity for the camera to interface with the world. And this will only grow as Gen Z collectively gains purchasing power and phases into the adult consumer population. This makes visual search a strong future-proofing move for Google and others.

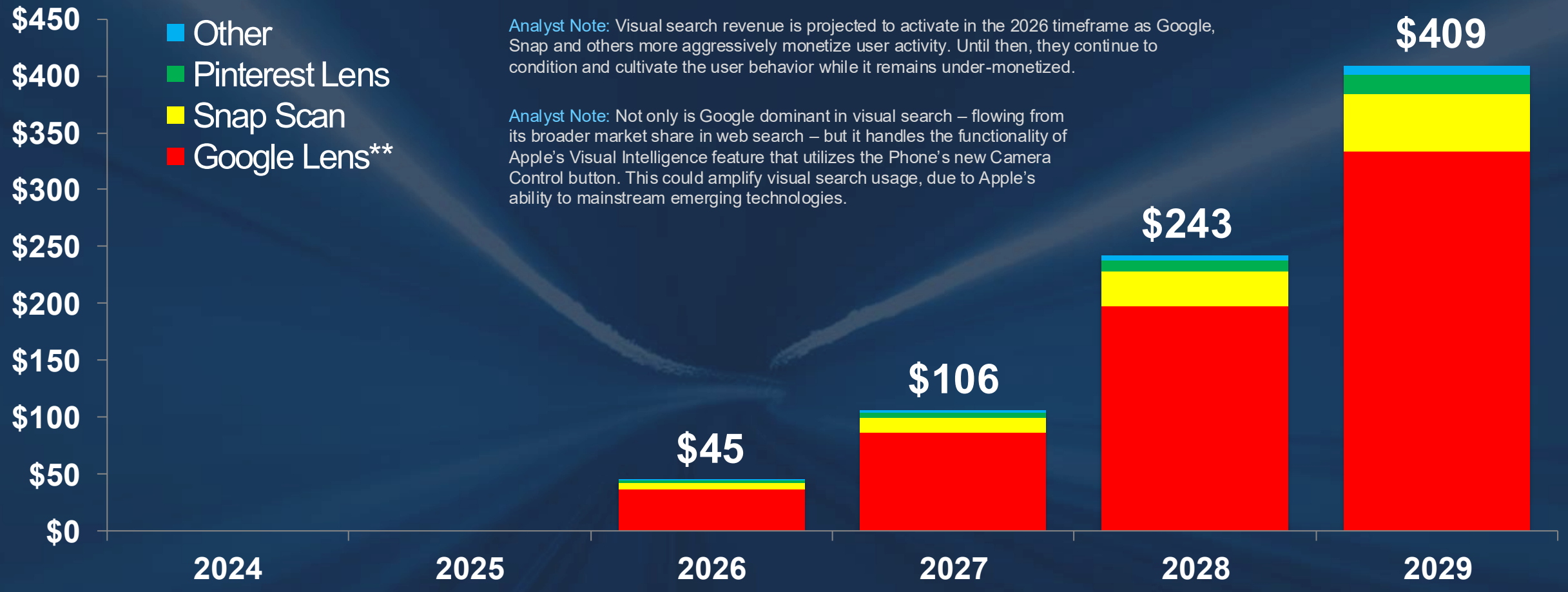
"Visual search lets users discover new restaurants through their phone's camera, which can be more natural than typing or tapping text into Google Maps."

Visual Search Breakdown

U.S. $Millions

Visual Search Estimated Ad Placement*, by Network

Simplified View: Detail available to Pro subscribers.



Analyst Note: Visual search revenue is projected to activate in the 2026 timeframe as Google, Snap and others more aggressively monetize user activity. Until then, they continue to condition and cultivate the user behavior while it remains under-monetized.

Analyst Note: Not only is Google dominant in visual search – flowing from its broader market share in web search – but it handles the functionality of Apple's Visual Intelligence feature that utilizes the Phone's new Camera Control button. This could amplify visual search usage, due to Apple's ability to mainstream emerging technologies.

ARtillery Intelligence

*Includes estimated paid ad placement only. Does not include organic search, agency fees or creation software (see previous section).
*Doesn't include platforms endemic to China and unavailable elsewhere.
**Includes visual searches in Google Lens as well as partners (such as Apple's Visual Intelligence feature).

Segment Drilldown: Mobile AR

Surface Area

All the above has Google salivating over visual search as a way to future proof its core business. And it's the right company to lead the way. Its knowledge graph – built from 25+ years as the world's search engine – engenders a training set for AI image recognition, including products (Google Shopping), general interest (Google Images), and storefronts (Street View). Google is also highly motivated: Along with voice search, visual search offers more surface area for query volume, which correlates to revenue.

As Google drives things forward, ARtillery Intelligence projects visual search to grow from almost no ad revenue today to **$409 million** in 2029, as noted. Though it's under-monetized today – a model that will eventually mirror sponsored results in web search – it could grow to be a leading share of AR ad revenue.

Not Alone

Though Google leads the way in visual search, it's not alone. Snap Scan and Pinterest Lens are visual search tools that map to their parent companies' positioning and personas (e.g., fashion discovery). But beyond Google, influence and impact in visual search will come from its latest entrants: Apple and Meta.

Starting with Apple, it integrated visual search into the Camera Control feature, starting with the iPhone 16. Utilizing a new button (rare for Apple) to take photos, it also lets users conduct a visual search. Not only does this expose visual search to Apple-sized audiences, but it sidesteps a big bottleneck: *activation energy*. A physical button for camera functions eliminates finger taps and friction that otherwise plague visual search.

Appealing & Effective

As for Meta's visual search play, the technology is a central selling point in the breakout-hit Ray-Ban Meta Smartglasses. Known as multimodal AI, this is an advanced form of visual search that lets users query the world through voice and visual inputs (hence "multimodal"). This is not only mainstreaming visual search but does so in a more natural form factor – line of sight glasses. That goes back to the above point about activation energy. Visual search will be a lot more appealing and effective when it's ambient and hands free. As such, smart glasses will be the form factor that unlocks visual search… and AR in general.

"With Apple's new Camera Control feature, a physical button for camera functions eliminates finger taps and friction that otherwise plagues visual search."

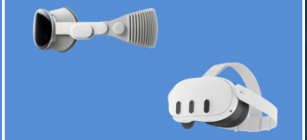
Segment Drilldown: AR Glasses

ARtillery Intelligence

Segment Drilldown: AR Glasses

Shift Focus

The previous section of this report series ended by examining mobile AR. Now we shift focus from handheld to headworn. And we'll start with AR glasses. This category contains the device classes defined earlier as *optical seethrough (dimensional)*, *optical seethrough (flat),* and *non-display smartglasses*. Video passthrough (otherwise known as passthrough AR or mixed reality) conversely includes devices such as Apple Vision Pro and Quest 3, which are examined in a later section on VR.*

	Mobile	Non-Display (AI Glasses)	Flat (3DoF & Floating)	Dimensional (6DoF & SLAM)
Video Passthrough (MR)				
Optical Seethrough (AR)				
Fully Occluded (VR)				

**To maintain definitional consistency and avoid double-counting in market sizing, devices that perform VR and passthrough AR – also known as mixed reality – are categorized as VR, rather than AR glasses, in this report.*

Segment Drilldown: AR Glasses

True Potential

Though mobile AR is a more penetrated format, glasses represent the technology's endgame. The headworn form factor will unlock its true potential. But AR glasses today remain in early stages of development, and challenged by design dilemmas. These challenges lead to deal breakers for consumer markets, such as device bulk, heat, and cost.

Evolutionary Endpoints

To further define the AR glasses landscape, there are various subdivisions. At one end of the spectrum is *dimensional AR,* represented by Snap Spectacles and Magic Leap 2. This is AR's most immersive modality, but it involves higher cost and hardware bulk. Its evolutionary endpoints and scaled adoption are several years away, but we're also seeing glimpses of that future today in devices like Snap Spectacles.

Elsewhere in the AR hardware spectrum is *flat AR*. These are mid-range devices that dial down optical complexity to gain wearability. Devices like VITURE Luma Pro offer private immersive viewing for flat content such as movies and 2D games. Meanwhile, Meta Ray-Ban Display glasses offer flat graphical overlays for utilities like messaging and navigation. The value of that utility is meant to compensate for an understated visual experience. And it's working.

Personal Relevance

Speaking of the tradeoff of visuals for utility, *non-display AI glasses* take that concept a step further with no display system at all. These involve information via audio cues, as seen in Ray-Ban Meta Smartglasses. Here, the value of the UX lies not with its graphical complexity nor dimensionality but rather the personal relevance of the information delivered.

That last part is critical, and leans on an increasingly influential AR value driver: AI. To truly deliver relevant information – thus making up for the lack of graphical richness – AI-driven personalization is applied. We're talking social signals (are my friends nearby?), interest-graph signals (where is the closest coffee shop?), and commerce signals (where do I buy that jacket?). This makes AI the lynchpin of smart glasses, and it's only getting started. Put another way, AR has tapped into AI as a force multiplier at early stages of its evolutionary arc. Smart glasses will therefore piggyback on AI's rapid advancement, while supporting its most valuable endpoint: *Physical AI.*

"Dimensional AR's evolutionary endpoints and scaled adoption are several years away, but we're also seeing glimpses of that future today in devices like Snap Spectacles."

AR Glasses: By the Numbers

Numbers Game

Adding up all the AR glasses categories outlined on the previous few pages, they're projected to grow in unit sales from **2.31 million** in 2024 to **17.22 million** by 2029. This includes a sales inflection in the 2027 timeframe, timed with the first full year of sales for several devices projected on the industry's road map.*

The above figures also compare with VR's less-optimistic but still healthy unit sales projections from **3.99 million** units in 2024 to **7.37 million** in 2029 (see later section). Meanwhile, to put things in perspective, the combined installed base of both device classes is dwarfed (103-1) by a common benchmark for consumer devices: **3 billion+** global smartphones.

To clarify the above AR unit sales estimates, Apple Vision Pro *isn't included*. This is to maintain definitional consistency in placing it in the same category as devices with similar passthrough video capabilities, such as Meta Quest 3. Accordingly, Vision Pro is examined in the VR section of this report.

**More color and analysis on headworn AR sales projections can be found in ARtillery Intelligence's standalone headworn AR forecast, available to ARtillery Pro subscribers*

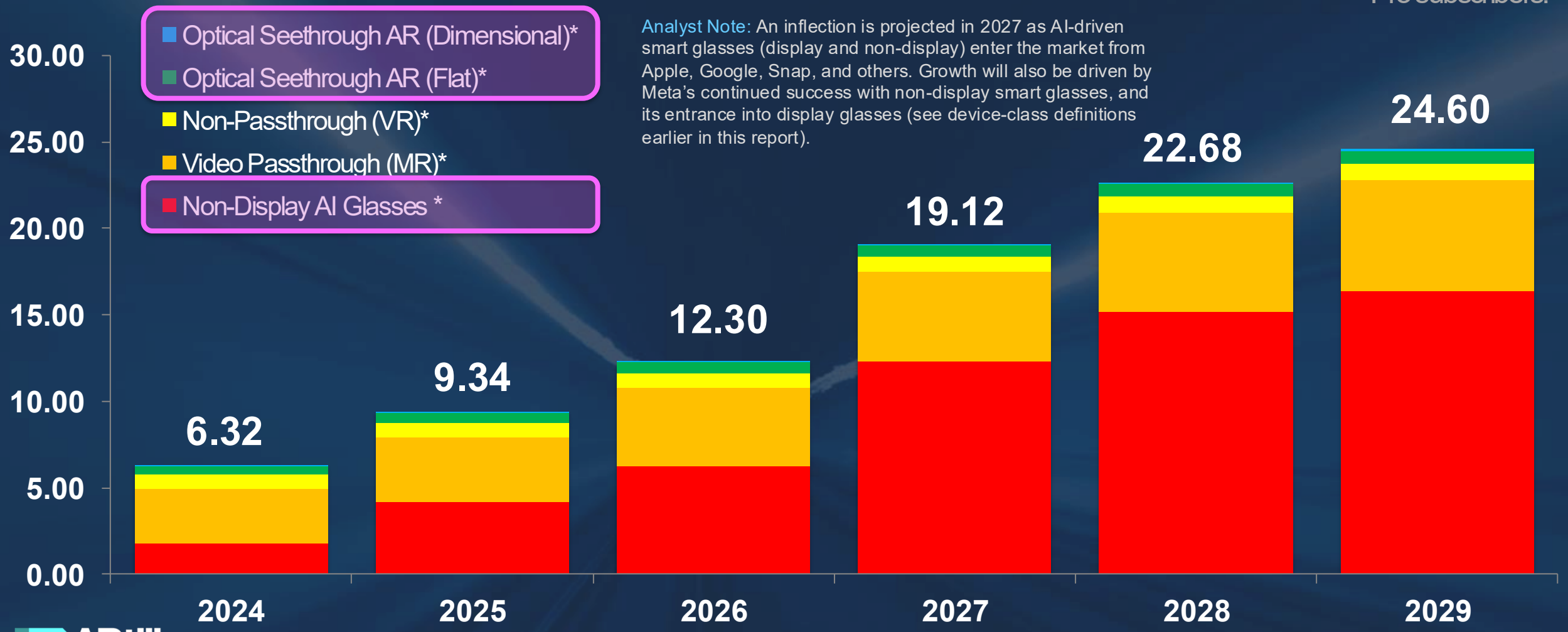
Image Source: Meta

XR Category Projections

Annual Unit Sales Estimates, by Device Class

Millions of Units

Simplified View: Detail available to Pro subscribers.



Analyst Note: An inflection is projected in 2027 as AI-driven smart glasses (display and non-display) enter the market from Apple, Google, Snap, and others. Growth will also be driven by Meta's continued success with non-display smart glasses, and its entrance into display glasses (see device-class definitions earlier in this report).

ARtillery Intelligence

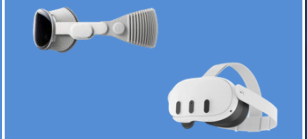
*See definitions and examples of each device class earlier in this report.

Sub-Segment Drilldown: AI Glasses

One Level Deeper

After defining and quantifying the three main subgroupings of AR glasses, let's now go one level deeper into each, starting with non-display AI glasses.

Image Source: Meta

	Mobile	Non-Display (AI Glasses)	Flat (3DoF & Floating)	Dimensional (6DoF & SLAM)
Video Passthrough (MR)				
Optical Seethrough (AR)				
Fully Occluded (VR)				

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Sub-Segment Drilldown: AI Glasses

Inversely Related

Starting with the simplest tier of headworn AR, *non-display AI glasses,* augment experiences via AI-informed audio. But though they're the "simplest," they're not lacking in commercial traction. In fact, they're the most penetrated device class, as quantified earlier. It says a lot about today's AR market that visual UX and sales are inversely related. Among other things, this signals today's consumer appetite for the balance of technology and style on one's face. The hallmarks of this device class include sleek and light hardware, resembling normal eyewear.

Physical AI

As for examples, non-display AI glasses are best represented by the breakout-hit Ray-Ban Meta Smartglasses (RBMS). The device has found a sweet spot in excelling at A/V quality, intuitive media capture, and audible augmentation. As such, it sets the bar for headworn devices that are supported by AI.

Specifically, multimodal AI applies camera-based visual recognition along with voice refinements (e.g., "What am I looking at?") to return audible answers. This is a sophisticated form of visual search – an AR use case that we examined earlier in this report. It also reaches into an immensely valuable and emerging subset of AI noted earlier: *physical AI*. Altogether, RBMS is the embodiment of AI's role as a force multiplier in AR. And its biggest accomplishment is *replacing visuals* as an experiential centerpiece.

Rapid & Robust

Sticking with that last part, the AI-visual tradeoff is meaningful considering the degree to which visual AR glasses (which we'll examine in the coming pages) are challenged by the laws of physics. For example, while digital technologies benefit from the advancement of Moore's Law, optical and display systems at the heart of highly-visual AR interfaces are governed by unwavering design dilemmas. Key factors include the way light moves, and the degree to which optical components can be miniaturized.

Conversely, AI is fueled by software advancement, Moore's Law, and massive investment currently underway. Smartglasses will piggyback on all that advancement, which portends rapid innovation in the category in the near term. Put another way, AI offers a more rapid and robust evolutionary path than AR glasses that have a primary reliance on a visual UX.

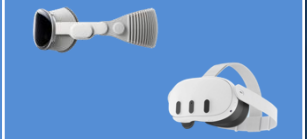
"It says a lot about today's AR market that visual UX and sales are inversely related. This signals today's appetite for the balance of technology and style on one's face."

Sub-Segment Drilldown: Flat AR

Flat & Floating

Moving up the scale of visual UX, the next stage on the smart glasses continuum is *flat AR*. These are seethrough AR glasses with display systems. They therefore come with some of the technical challenges noted on the previous page. However, because flat AR devices don't require scene understanding to dimensionally interact with physical environments, those challenges aren't as great as with dimensional AR (which we'll examine later). Visual elements rather involve flat or floating overlays, such as notifications, utilities; or virtual 2D screens for gaming, entertainment, or productivity.

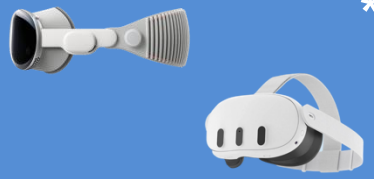
But to further characterize this class of AR glasses requires subdividing it into two categories that continue to gain the most traction. *video display glasses* and *utility display glasses*. Though these sound very similar, they're different in design, use case, and addressable markets. Let's take them one at a time…

	Mobile	Non-Display (AI Glasses)	Flat (3DoF & Floating)	Dimensional (6DoF & SLAM)
Video Passthrough (MR)				
Optical Seethrough (AR)				
Fully Occluded (VR)				

Charting the Spatial Spectrum

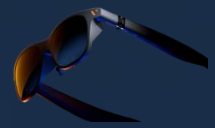
ARtillery Intelligence

Handheld Headworn

	Mobile	Non-Display (AI Glasses)	Flat (3DoF & Floating)	Dimensional (6DoF & SLAM)
Video Passthrough (MR)				 *
Optical Seethrough (AR)			 Utility Display Glasses Video Display Glasses	
Fully Occluded (VR)			 **	

*Includes VR devices that perform passthrough AR, also known as mixed reality. These are categorized as VR, rather than AR, for the purposes of analysis and market sizing.
**Flat VR (3DoF) is a device class facing extinction (e.g., Oculus Go) in favor of flat AR devices likeXreal One, but it could see future development.

Sub-Segment Drilldown: Flat AR



Video Display Glasses

Starting with video display glasses, they feature 2D virtual screens to mirror content from one's PC, smartphone or gaming console. Represented by the likes of VITURE and Xreal, appeal lies in massive virtual screens – perceptually simulating ~150-inch displays at 10 feet away – in a private, immersive environment. In fact, this use case is in greatest demand according to our consumer XR surveys.

This affinity is driven by consumer comfort. In other words, advanced forms of immersive AR and VR are technically more appealing and elite… however, consumers want what they know. And what they know is 2D cinematic content and gaming. It's not only what they *know* but what they *own*. In other words, unlike 6DoF VR, video display glasses don't require the onerous construction of a native content ecosystem. It rather taps into existing media libraries, offering a new and compelling way to experience them.

Stay Focused

In addition to broader and more relatable appeal, video display glasses often carry another advantage: *focus*. Because they sidestep XR's more dimensional and technically-challenged formats, they can be more focused and purpose built. They do one thing and do it well. This is what we've seen so far in devices like VITURE Luma Pro, This deviates from traditional XR approaches that try to do too many things – which results in a "jack of all trades, master of none," dynamic.

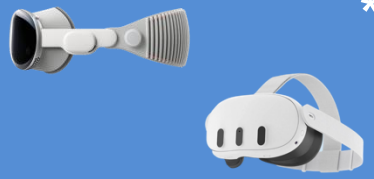
Lastly, all the above boils down to other practical advantages: cost and size. Being purpose-built for screen mirroring and virtual displays – a single use case – lets these glasses achieve lower price points, which further boosts their mainstream appeal. It could be argued that this "single use case" narrows the addressable market for video display glasses. However, if that use case has a big enough market, it can be a prudent strategy. And that's indeed the case here, as entertainment, gaming, and productivity are collectively massive markets.

"Seen from the likes of VITURE, appeal lies in massive virtual screens – perceptually simulating ~150-inch displays at 10-feet away – in a private, immersive environment."

Charting the Spatial Spectrum

ARtillery Intelligence

Handheld Headworn

	Mobile	Non-Display (AI Glasses)	Flat (3DoF & Floating)	Dimensional (6DoF & SLAM)
Video Passthrough (MR)				 *
Optical Seethrough (AR)			 Utility Display Glasses Video Display Glasses	
Fully Occluded (VR)			 **	

*Includes VR devices that perform passthrough AR, also known as mixed reality. These are categorized as VR, rather than AR, for the purposes of analysis and market sizing.
**Flat VR (3DoF) is a device class facing extinction (e.g., Oculus Go) in favor of flat AR devices likeXreal One, but it could see future development.

Sub-Segment Drilldown: Flat AR

Utility Display Glasses

Moving on to the second subdivision of flat AR, *utility display glasses* are similar to video display glasses but are tuned for a different use case. Rather than large virtual displays for traditional 2D content, such as gaming and entertainment, they focus on all-day utilities such as notifications and communications. To put it another way, the video display glasses we just examined are a lean-back medium, whereas utility display glasses are a lean-forward medium.

Another key difference between these two subsets of flat AR is display specifications. Because video display glasses are all about cinematic and gaming experiences, they prioritize screen resolution, color contrast, field of view, and other things that are important in entertainment. Utility display glasses on the other hand don't need a large field of view. In fact, it can be a disadvantage in scenarios involving interaction, presence, and real-world safety.

This limitation was flipped into an advantage in the design of utility display glasses' biggest exemplar to date: Meta Ray-Ban Display Glasses. Knowing that the use case would be all about ambient alerts and communications (more on that in a bit), Meta decided to put more priority on brightness and resolution than on field of view. In fact, the device only has a 20-degree field of view that only displays in one eye (monocular). Once thought to be underwhelming or inferior in AR design, these specifications work well for MRDG because they're tuned to a deliberate use case. This alone is a key lesson for AR design principles, and the divergence of purpose-built devices that has been a theme throughout this report.

Mundane & Mass Market

Another contrarian design decision for MRDG is that its main use cases aren't fantastical (e.g., cartoon monsters, whales, etc.) nor immersive… but rather *mundane*. That sounds like a bad word, but it's not. Mundane is synonymous with large markets and high frequency. eCommerce is mundane… web search is mundane… social feeds are mundane. XR to date has rather been exciting but commercially tepid. Now, some XR players are making it mundane and finding commercial wins. This is shown by Ray-Ban Meta Smart Glasses as examined earlier… and now Meta is applying the same lesson to display glasses.

"Once thought be underwhelming or inferior or in AR design, these specifications work well for Meta Ray-Ban Display Glasses as they're tuned to a deliberate use case."

Sub-Segment Drilldown: Flat AR

Utility & Usability

Sticking with the theme of being intentionally mundane, one of Meta Ray-Ban Display Glasses' intended use cases from the start was communications. This was made clear by its launch demo, and the subsequent comments by several Meta executives. One telling moment was Meta CPO Chris Cox's interview with Bloomberg. When asked to name the one primary intended use case for MRDG, he answered without hesitation: *messaging*.

Getting more specific, what's meant by "communications," and how does that map to MRDG's feature set? It includes visual messaging that's in front of you when you need it, but unobtrusive when you don't. And it's intuitively controlled. That last part brings up MRDG's most differentiated feature: its neural wristband. This will continue to unlock utility and usability in the device as it evolves.

Understandable & Relatable

Stepping back, why is communications a smart starting point? Let's take messaging as an example: It's a mass-market play that's understandable, relatable, sticky, and high-frequency. It's also inherently multi-user and synchronous, which accelerates adoption via network effect (Meta's jam).

A focus on communications also accomplishes something that's strategically sound for any emerging tech: to let it piggyback on something more established. This is the anti-metaverse approach, in that the thing being sold is something everyone understands… and it exists today. Our friend Charlie Fink likes to say that (paraphrasing), AR does best when it takes the things we already do and makes them better. This supports approaches that don't force a learning curve or intimidation factor. They make the familiar more functional. And that's Meta's plan here.

Meanwhile, other potential MRDG killer apps include having a viewfinder for media capture. This was one of the most requested features in Ray-Ban Meta Smartglasses, as it's often used for taking pictures and video. Having a way to visually frame what you're capturing is a big upgrade. We'll also see use cases develop over time, such as the Qualcomm AR1+ Gen-1-powered vision for an ambient AI assistant that goes where you go, sees what you see, and makes you smarter about your world. This unlocks the holy grail of physical-AI endpoints that were noted earlier.

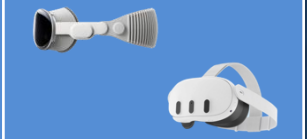
"Meta's focus on messaging in MRDG is the anti-metaverse approach, in that the thing being sold is something everyone understands… and it exists today."

Sub-Segment Drilldown: Dimensional AR

Added Dimension

Moving on to the third and final flavor of AR glasses, dimensional AR is the most visually-rich and aspirational device class.

Image Source: Magic Leap

	Mobile	Non-Display (AI Glasses)	Flat (3DoF & Floating)	Dimensional (6DoF & SLAM)
Video Passthrough (MR)				
Optical Seethrough (AR)				
Fully Occluded (VR)				

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Sub-Segment Drilldown: Dimensional AR

Aspirational & Ambitious

Throughout this report, we've characterized dimensional AR as the approach that led to the overly-ambitious – and ultimately commercially-underperforming – devices that defined XR's previous generation (e.g., Magic Leap, HoloLens, etc.). By putting the category in that light, we don't mean to disparage it but rather to characterize and contrast the newly-inspired "toned-down" approaches that were examined in the preceding pages.

But our focus so far on flat-AR display glasses and non-display AI glasses doesn't mean that there isn't a place for highly *dimensional AR*. This is AR that understands its surroundings and integrates visual content accordingly and dimensionally. It's the endgame towards which the above non-dimensional AR formats are driving. And there's a market for it today… albeit smaller. Highly anticipated devices in this category include Snap's Consumer Spectacles.

Meanwhile, dimensional AR is present in video passthrough (VPT) devices such as Apple Vision Pro. Also known as mixed reality, these devices achieve dimensional AR by infusing visuals with large field-of-view experiences in enclosed headsets. These excel with elite entertainment experiences and workplace productivity, as we'll examine later in this report.

Landmark Moment

Back to dimensional AR in optical seethrough devices, it's a limited market today. Magic Leap has pivoted to the enterprise, as did Microsoft HoloLens…before retreating from the market altogether. That leaves a gap that's been filled by Snap Spectacles and Meta Orion. However, Snap Spectacles are available only to developers (prior to consumer Specs in late-2026), and Meta Orion is a prototype… available to no one.

This is why Snap's release of its widely-available consumer spectacles this year (via its Specs Inc. subsidiary) is a landmark moment. Snap enters this market segment uncontested, considering that it's a consumer-geared optical-seethrough device with dimensional AR. No other device on the market ticks all those boxes. We may see others enter to challenge Snap in the near term, such as Apple, Meta, and devices built on Android XR. Indeed, Snap's performance will reveal demand signals and market factors that we (and its competitors) will watch closely.

"Magic Leap pivoted to the enterprise, as did Microsoft HoloLens… before retreating from the market altogether. That leaves a gap that's being filled by Snap Spectacles."

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Segment Drilldown: VR

ARtillery Intelligence

Segment Drilldown: VR

Switch Gears

After covering AR's main modalities – mobile and headworn – we now switch gears to VR. Like we examined for AR glasses, there are subdivisions in VR. These include the device classes defined earlier in this report as *video passthrough* and *non-passthrough VR*.

Video Passthrough – otherwise known as passthrough AR or mixed reality – includes devices such as Apple Vision Pro and Quest 3. The former is sometimes categorized as AR, but we classify it as VR* due to its functional commonalities with devices such as Meta Quest 3.

Meanwhile, non-passthrough VR represents a shrinking but still-important category that prioritizes weight and comfort over passthrough video capabilities. These headsets, such as Bigscreen Beyond, are purpose built for immersive VR gaming & entertainment, rather than mixed reality.

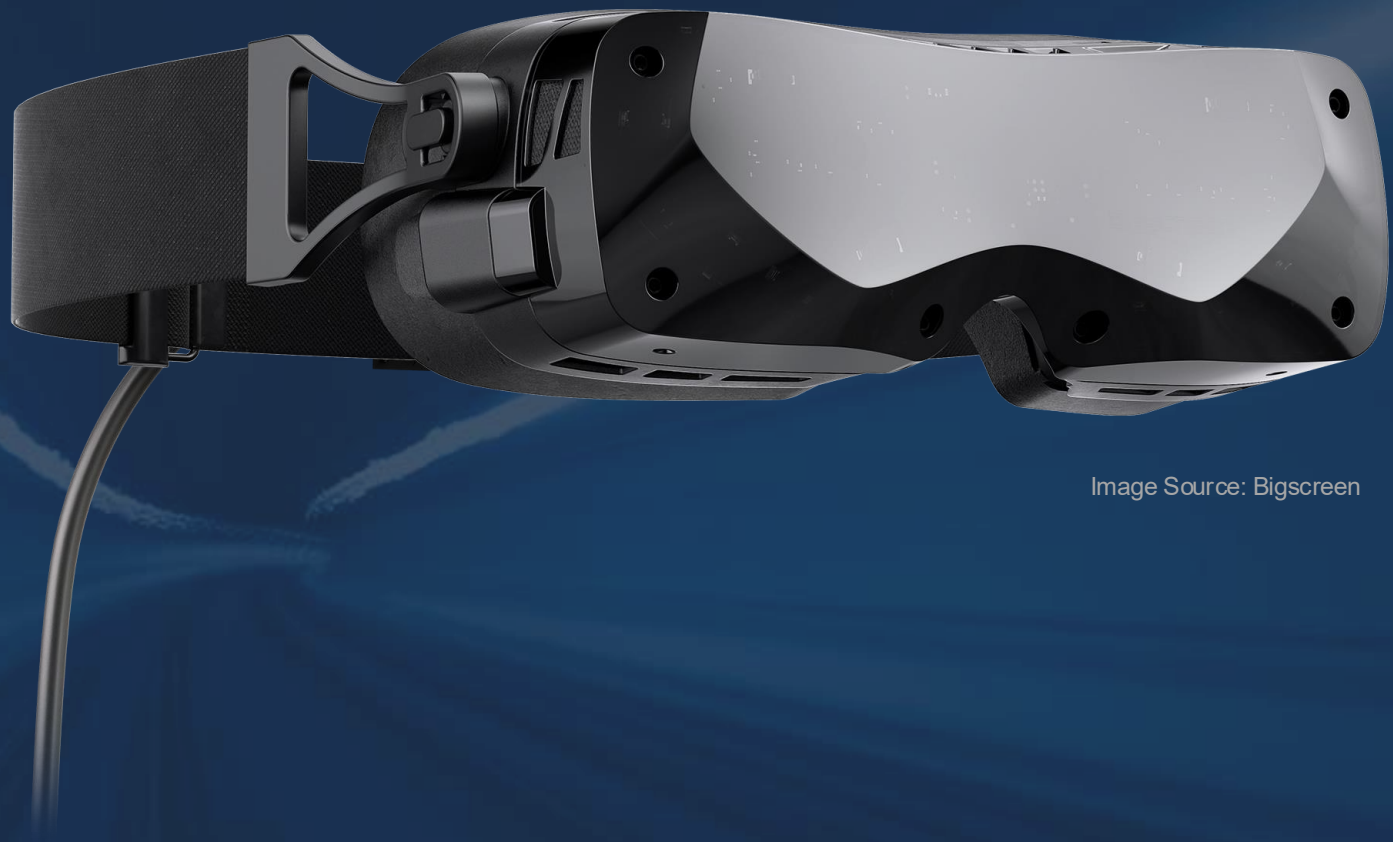

Image Source: Bigscreen

**To maintain definitional consistency and avoid double-counting in market sizing, devices that perform VR and passthrough AR – also known as mixed reality – are categorized as VR, rather than AR, in this report and going forward.*

Charting the Spatial Spectrum

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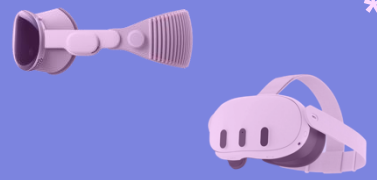
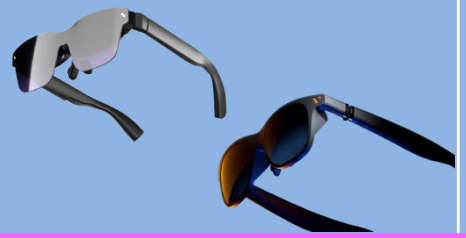
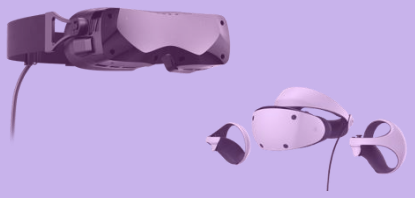
Handheld Headworn

	Mobile	Non-Display (AI Glasses)	Flat (3DoF & Floating)	Dimensional (6DoF & SLAM)
Video Passthrough (MR)				 *
Optical Seethrough (AR)				
Fully Occluded (VR)			 **	

*Includes VR devices that perform passthrough AR, also known as mixed reality. These are categorized as VR, rather than AR, for the purposes of analysis and market sizing.
**Flat VR (3DoF) is a device class facing extinction (e.g., Oculus Go) in favor of flat AR devices likeXreal One, but it could see future development.

Segment Drilldown: VR

Saturation Point

Backing up, VR is a promising technology whose mainstream embrace always seems to be just around the corner. Though it has applicability in gaming, entertainment, and enterprise functions, it's not the computing revolution that was heavily touted in two separate XR hype cycles over the past decade.

VR's headwinds can be seen in the past few Meta earnings announcements, among other places. The narrative in these earnings continues to be that AI-driven smart glasses (examined earlier in this report) are the bright spot in terms of revenue growth. VR meanwhile sees slowing, or sometimes declining, revenue growth as the device category may have reached a saturation point, relative to the consumer market's current demand levels. That demand could grow in the future but has approached a ceiling today.

Multi-Surface Play

If VR does have a bright spot to counter the above, it's Meta's continued investment levels that reinforce its resolve in the technology. Though it has retracted these investment levels to a degree, Meta remains committed to the long-term vision of VR as not only a discrete technology, but as part of a broader multi-surface play for spatial computing.

Double-Edged Sword

While all the above dynamics shape the future of VR at Meta, another factor looms: AI. Like its role in AR glasses that we examined earlier, AI will shape VR's evolution. However, for Meta's VR efforts, AI represents a double-edged sword. On one hand, investment in AI is prioritized over the capital-intensive efforts of Meta's Reality Labs (MRL) division. On the other hand, VR could ultimately piggyback on AI.

Starting with the former, Meta, like many tech giants, is building a full AI stack to maintain control over its destiny. Mark Zuckerberg learned the hard way during the smartphone era that failing to own the user touchpoint meant ceding positioning and leverage to Apple and Google. MRL was thus created to own the XR stack, and the same approach is in play for AI.

This is strategically sound but has massive CapEx requirements, which have meant moving budget from MRL. But there's a bright side, as noted: Meta's headworn devices could be elevated in the longer term as they're a key piece of that full-stack AI puzzle.

"VR sees slowing, or sometimes declining, revenue growth as the category reaches a saturation point, relative to the consumer market's current demand levels."

Segment Drilldown: VR

Reframing VR

But it's not just about Meta. Though it continues to lead the way – as its investments act as the pace car for the VR competitive field – there are other notable players. For example, Steam Frame could *reframe* how VR devices work, and how content is distributed – just like Valve did in 2D gaming many years ago. And in the standalone category, competing with Quest 3, is the venerable VIVE XR Elite. At the higher end of the VR device spectrum also sits Samsung's Galaxy XR, and of course, Apple Vision Pro. The latter deserves its own drilldown (more on that later).

Mixed Signals

What most of the above devices have in common is mixed reality, which has become a standard in VR. Also known as passthrough AR, mixed reality is characterized by color passthrough cameras that display the outside world inside the headset. This not only achieves better presence and situational awareness but is a foundation for bringing AR into VR.

In doing so, one advantage of mixed reality is that it broadens VR's appeal and breadth of use cases, including experiences that interact with the physical world, as well as those that are occluded and insular. These expanded use cases include everything from workplace productivity (think: floating virtual monitors) to gaming that interacts with one's space.

Control & Contrast

Beyond expanded use cases, mixed reality has some advantages over the AR *functionality* in optical seethrough (OST) glasses that were examined earlier. Though video passthrough isn't AR's endgame nor its ideal self – due to bulkier hardware that precludes all-day wearability – it offers a few technical benefits.

Among video passthrough's advantages is full control of every pixel of a VR display. This means greater definition, contrast, and field of view. See-through AR is conversely bound by physics, such as manipulating (and often losing) light through waveguides and optical combiners. And because the background in optical seethrough AR is the physical world, it's difficult to recreate the color black as you can with pixels on a display – especially if OLED. This leads to low contrast and washed-out images. Features like local dimming help when competing with natural light, but several physical challenges persist.

"Though video passthrough isn't AR's endgame nor its ideal self – due to bulkier hardware that precludes all-day wearability – it offers a few technical benefits."

Segment Drilldown: VR

Table Stakes

Sticking with mixed reality, its torch is predominantly carried by Meta, given the positioning and priorities seen in Quest 3 and 3s. But to be fair, Meta isn't first to market with mixed reality and passthrough AR. Hardware from Varjo, for example, has been available for years, with high-quality color passthrough AR.

But Meta's entrance – propelled by its signature loss-leader pricing – has introduced the *element of affordability* to the mixed-reality market. The practical result is to bring mixed reality to a wider addressable market. Another practical outcome is that Meta has established a new standard with mixed reality. Given its influence on the VR market – a sort of pace car as noted earlier – it has made mixed reality table stakes. This has in turn driven competition and a feature arms race that's ultimately good for consumers.

As we predicted in last year's report:

> *[Meta] will make mixed reality table stakes in VR. In other words, as consumers get a taste for mixed reality, it will be difficult for other VR players to compete without it.*

The Bad News

But it's not all good news. Mixed reality has suffered from VR's broader declines noted earlier. Conversely, it could be argued that mixed reality failed to elevate VR in the ways that it promised... or at least it failed to tell that story convincingly to the VR market.

Whichever technology is to blame for the other's underperformance, the fact is that they are together in a bit of a trough. This could alleviate in time, given that advanced VR and mixed reality are arguably before their time – at least relative to mainstream culture's current readiness for immersive interfaces.

But until VR's market grows, it's saturated in terms of approaching the ceiling of current consumer demand levels. Those demand levels could expand into more mainstream population segments in time, but it's clear that such growth will be gradual. And in the meantime, VR mostly resides within finite gaming, enthusiast, and early-adopter markets.

"Though it wasn't first, Meta's entrance – propelled by its signature loss-leader pricing – has introduced the element of affordability to the mixed-reality market."

VR: By the Numbers

In Perspective

Building from the narrative on the previous pages, let's now quantify the VR market. In short, VR devices are projected to grow in unit sales from **3.99 million** units in 2024 to **7.37 million** in 2029. That compares with headworn AR's more-optimistic estimated unit sales growth from **2.31 million** in 2024 to **17.22 million** by 2029 (see earlier section). Meanwhile, as noted earlier, the combined installed base of both device classes is dwarfed (103-1) by a common benchmark for consumer devices: **3 billion+** global smartphones.

See more color in the following pages…

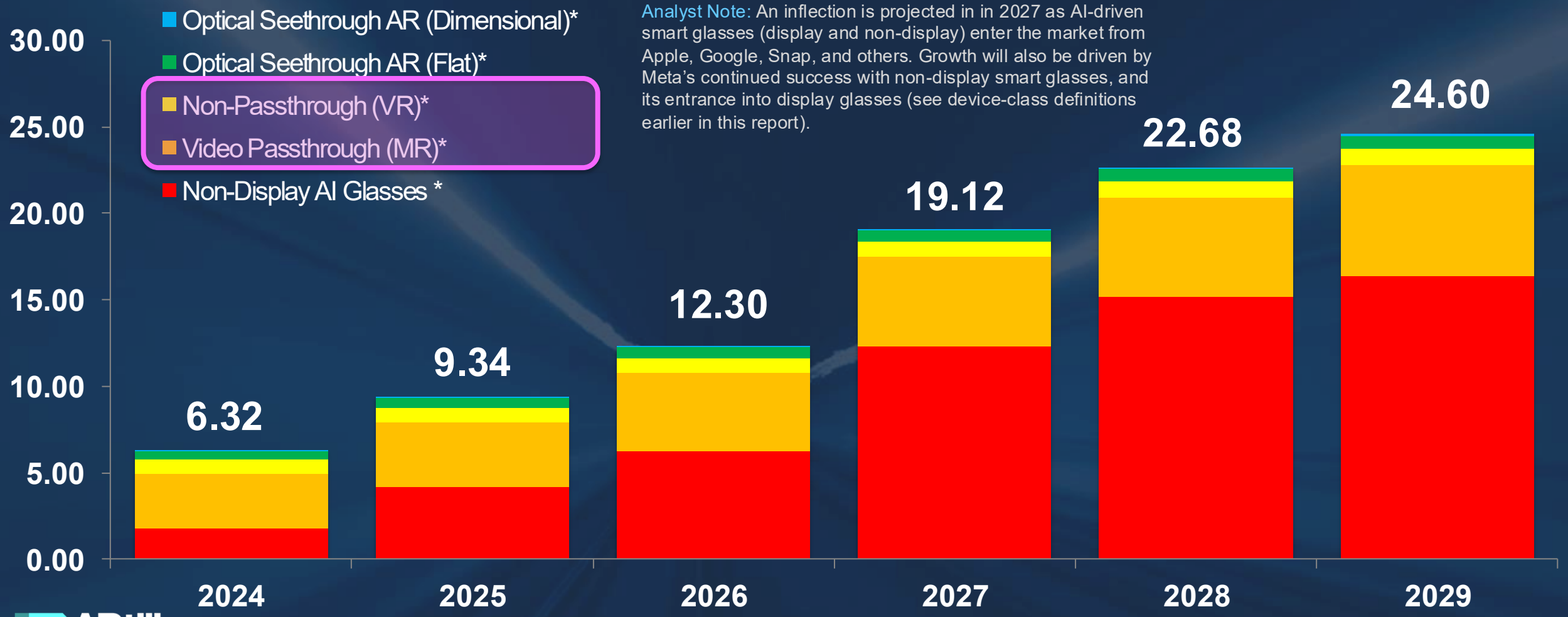
Image Source: Meta

XR Category Projections

Annual Unit Sales Estimates, by Device Class

Millions of Units

Simplified View: Detail available to Pro subscribers.



Analyst Note: An inflection is projected in in 2027 as AI-driven smart glasses (display and non-display) enter the market from Apple, Google, Snap, and others. Growth will also be driven by Meta's continued success with non-display smart glasses, and its entrance into display glasses (see device-class definitions earlier in this report).

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*See definitions and examples of each device class earlier in this report.

Device Spotlight: Apple Vision Pro

Raison d'être

To provide one representative example of the VR market, we'll go deeper into one device and its dynamics: Apple Vision Pro. Representing the high end of the VR market's capabilities, what can the device do, and what's its market potential? More importantly, what's its raison d'être, and what's driving Apple to invest so heavily in the device? The answers to these questions can reveal insights about the broader spatial computing market and its trajectory.

	Mobile	Non-Display (AI Glasses)	Flat (3DoF & Floating)	Dimensional (6DoF & SLAM)
Video Passthrough (MR)				 *
Optical Seethrough (AR)				
Fully Occluded (VR)			 **	

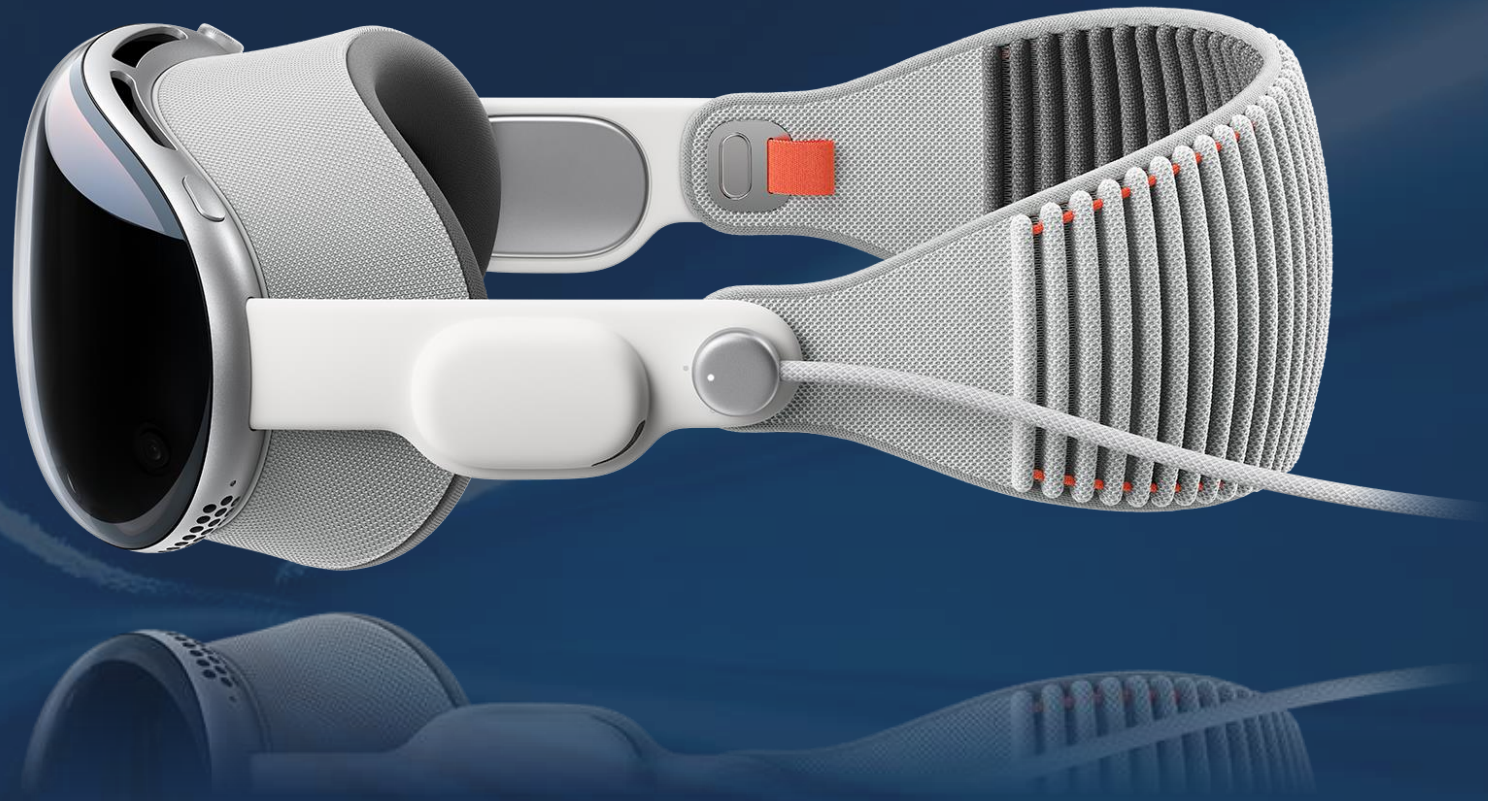


Image Source: Apple

Segment Drilldown: VR

In Service

Beyond Meta, HTC, and others noted in the preceding pages, one can't invoke mixed reality without acknowledging Apple Vision Pro (AVP). In fact, much of the preceding mixed-reality analysis applies to AVP, however the device stands on its own at the high end. But it should be seen as one evolutionary step in Apple's spatial computing long game. Apple even admits that it's "not a mass-market product" today.

Stepping back, Apple's game plan these days – with AVP and beyond – is to both boost its core iPhone business and to diversify revenue as that business matures. As smartphones reach maturity and revenue deceleration, Apple must find other ways to maintain revenue growth, and do so at massive scale.

This is the main objective for Apple's wearables and services divisions. For wearables, revenue each quarter mostly offsets year-over-year iPhone revenue declines or slowing growth (depending on the quarter). Meanwhile, services (e.g., Apple TV, Apple Music) are growing fast with total users exceeding **1-billion** and quarterly revenues that likewise offset decelerating iPhone revenue growth.

Consequently, wearables and services hold a great deal of importance, investment, and political capital in Cupertino. So any product that supports these underlying efforts is canonized at Apple. We mention those dynamics here because Vision Pro is one such device. It acts in service of both these endeavors.

Looming Question

But one question that continues to loom over AVP is what's its main draw and primary function? This is otherwise known as a killer app, and they often take years to develop as we witnessed with the iPhone and other tech cycles. Meanwhile, clues for AVP killer apps can already be seen in the use cases that Apple has signaled – both explicitly and implicitly.

For example, productivity & collaboration, capturing memories (a la spatial video), and entertainment are positioned as central use cases. Entertainment includes private immersive viewing environments, such as in-home and in-flight gaming & cinema. And several signs point to another potentially-valuable subset of entertainment for AVP: spectator sports.

"Wearables and services hold a great deal of importance, investment, and political capital at Apple. So any products that supports these efforts are canonized."

Segment Drilldown: VR

Sporting Chance

Sticking with spectator sports, it's a front runner for Vision Pro's killer app. It has mass appeal and natural monetization which, again, aligns with Apple's central revenue diversification goals. It also aligns with other Apple efforts underway, such as the integration of MLS, MLB, and NBA in its entertainment portfolio.

Sports also represent a potentially-meaningful product/market fit. In other words, immersive tech taps into the visceral and participatory nature of spectator sports. That value is amplified wherever front-row seats carry a premium. It's all about the squeaking hardwood in basketball or the sound of slapshots and bodies smashing into boards in hockey.

Apple has already begun to realize this vision, including immersive front-row experiences for the 2026 NBA season. This is something we predicted in last year's edition of this report:

> *These fan experiences were the promise of NextVR and its early work with teams like the Golden State Warriors. And guess what… Apple acquired NextVR in 2020 to seed this evolutionary path. Other moves in that master plan include securing broadcast rights such as MLS and MLB, with NBA rumored to be next.*

Augmented Fandom

For fans, Vision Pro's virtual front-row treatment won't exactly match the in-person experience, but it can immerse them in the action for a fraction of the price, time, and effort. In other words, these options aren't mutually exclusive. Both IRL and virtual modalities will coexist as Vision Pro augments the fan experience. It will take years to achieve this goal at scale, given Vision Pro's still cost-prohibitive status for most consumers. But this is where Apple is aiming.

The unit economics also work. As a component of its existing entertainment subscriptions, Apple could sell virtual front-row seats for a nominal amount (think: $9 per month for a season pass). This model is scalable as a digital subscription product and could reach a sizable market of sporting superfans. For example, demand will scale beyond the geographic constraints of a given team and the practical ability for far-flung fans to attend games at a given arena. There's a massive NBA following in China for example.

"Spectator sports are a front runner for Vision Pro's killer app. It has mass appeal and natural monetization, which aligns with Apple's central revenue diversification goals."

Segment Drilldown: VR

Waiting & Watching

Coming full circle to Apple's broader goals, how do the use cases and device positioning examined on the previous pages hit that target? For one, entertainment (including sports) aligns with Apple's expanding subscription businesses, which in turn aligns with its revenue-diversification imperative noted earlier. It's also a use case that everyone can understand – an *approachability principle* that underpins almost everything that Apple releases.

Driving that approachability principle is Apple's financial obligation to reach massive markets to maintain revenue growth at such a large scale. This is a common challenge among tech giants and the markets they choose to enter (think: Amazon and healthcare). In these cases, a given market has to be large enough to move such a large needle.

Furthermore, Apple – as it often does – has been waiting and watching the AR sector for the past several years and observing its mistakes. And one of the biggest mistakes has been AR's tendency to get stuck in techy territory, including esoteric messaging and acronyms. So when looking for killer apps to drive Vision Pro's wider demand, an elite entertainment experience was a natural choice.

Reality Check

To pause for a moment, we fully recognize the irony in the previous statements. All the talk of approachability and mass-market principles may sound odd when talking about a niche device like Vision Pro. Again, Apple is honest that it isn't a mass-market device. But that's precisely why it wants to reach the largest possible market. This is necessary to counterbalance headwinds AVP faces due to its price tag and techy status – both antithetical to mass-market scale.

As for what's next, though all the above drivers and dynamics hold true, Apple is also a realist. The market has spoken, and it isn't ready en masse for a device as revolutionary and costly as Vision Pro. However, Apple will unlikely turn its back on the device. We project it will scale back to a degree and redeploy resources and investment elsewhere, while it rests on Vision Pro's assets and learnings to drive its broader spatial competing play – including AI-driven smart glasses in 2026 or 2027. Meanwhile, Vision Pro could continue to find traction in enterprise markets that map to its strengths; and where sales blockers like device bulk and price elasticity don't loom as large.

"Entertainment and sports are use cases that everyone can understand – an approachability principle that underpins almost everything that Apple releases."

Focus on the Enterprise

Bits Versus Atoms

To end this section on VR – and pick up where the previous Vision Pro analysis left off – we'll take a look at the technology's enterprise endpoints. Though most of the discussion around VR is often in the context of consumer markets, we can't ignore the real traction and value creation that occur in enterprise environments. This primarily includes VR's value in immersive training. There, it has demonstrated value in both its efficacy (experiential memory retention) and cost effectiveness (logistics in deploying bits versus atoms). Enterprise XR also extends beyond VR. AR is likewise a part of the enterprise discussion, involving things like line-of-sight guidance and productivity.

Image Source: Apple

Focus on the Enterprise

XR at Work

Everything examined so far in this report has a consumer-heavy focus in terms of products, proposed use cases, and overall context. But one downside of consumer markets is the design dilemma that we've discussed throughout this report: it's difficult to balance a robust UX with style and wearability.

While these challenges are being hammered out, XR has found some traction in the enterprise. In these workplace environments, style crimes aren't as big a factor, and a clear business case exists.* This includes industrial functions where AR's line-of-sight guidance makes enterprises more effective and operationally efficient. And with VR, its immersive and interactive capabilities simulate workplace scenarios, pursuant to experiential learning. Since this section of our report is focused on VR, we'll zero in on the latter.

High Impact

To quantify VR's efficacy in immersive training, HTC tells ARtillery Intelligence that enterprise executives report high impact from their deployments so far. Figures vary per industry but are as high as 91 percent of executives signaling positive results.

Here are a few proof points to that effect:

Among 400 U.S. financial services executives:
- 84% report improved employee skill development.
- 77% report improved customer experiences.
- 80% report operational efficiencies.

Among 400 U.S. healthcare executives:
- 91% report more effective training coordinators.
- 86% report more confident employees.
- 75% report faster training completion.

Among 400 active-duty military trainers
- 81% report more confident trainees.
- 76% report faster training completion.
- 77% report a better sense of safety and readiness.

Among 400 manufacturing executives
- 95% report improved safety.
- 75% report positive ROI from XR investments.
- 74% plan to invest more in XR.

*See ARtillery Intelligence Report: Enterprise AR Best Practices & Case Studies, Volume 4.

"HTC tells ARtillery Intelligence that enterprise executives report high impact from VR training and skills development – as high as 91 percent signaling positive results."

Focus on the Enterprise

By the Numbers

For all the reasons on the previous page, ARtillery Intelligence has estimated that spending on enterprise XR productivity will grow from **$13.18 billion** in 2024 to **$26.17 billion** in 2029. This is led by immersive training in VR headsets.

More HR Than XR

But even though XR boasts these advantages, it's easier said than done to execute. Practical and logistical barriers persist – such as organizational inertia, politics, and fear of new technology (read: job security) among front-line workers.

For example, the biggest stumbling block for enterprise XR is the dreaded "pilot purgatory." This is when the technology is adopted at the pilot stage but never progresses to full deployment. It's the biggest pain point in enterprise XR, and there are many reasons for it…most of them cultural. For example, the enthusiasm of the C-suite –driven by unit economics and operational efficiencies – isn't matched by end users, due to factors noted above.

So the name of the game isn't just the efficacy of the technology itself, but change-management practices, internal comms, device management programs, and other factors that can reduce friction and ensure more adoptive outcomes. As we often say, successful enterprise programs are more about HR than XR.

ARtillery Intelligence publishes a report series that features enterprise XR case studies,* including tactics for avoiding pilot purgatory. An upcoming report will advance the narrative with a fresh batch of case studies – currently in Volume 5 of the series – that represent the latest challenges and strategies in enterprise XR. Stay tuned for that report later in 2026.

Image Source: HTC

"Spending on enterprise XR productivity is projected to grow from $10.91 billion in 2024 to $22.45 billion in 2029. This is led by immersive training."

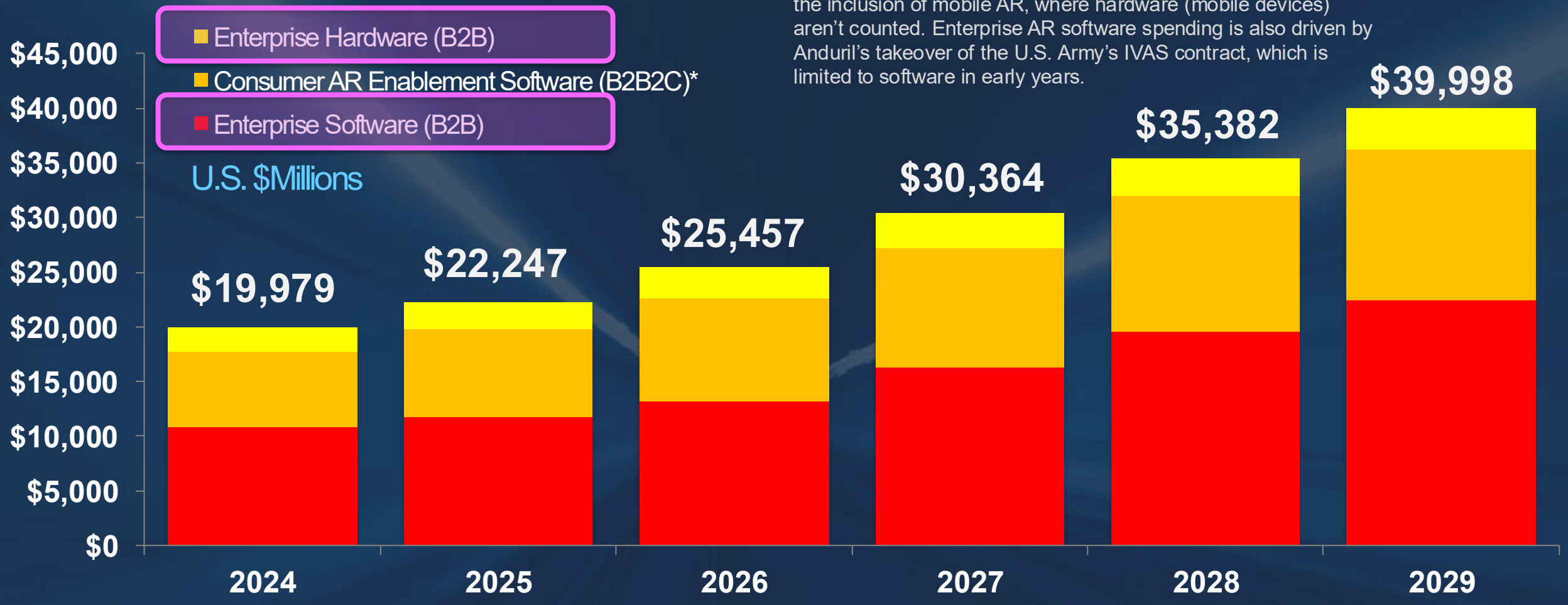
*See ARtillery Intelligence Report: Enterprise AR Best Practices & Case Studies, Volume 4.

Enterprise XR Revenue Projections

Enterprise XR Spending Estimates, by Category

Simplified View: Detail available to Pro subscribers.

Analyst Note: Software spending is dominant partly because of the inclusion of mobile AR, where hardware (mobile devices) aren't counted. Enterprise AR software spending is also driven by Anduril's takeover of the U.S. Army's IVAS contract, which is limited to software in early years.



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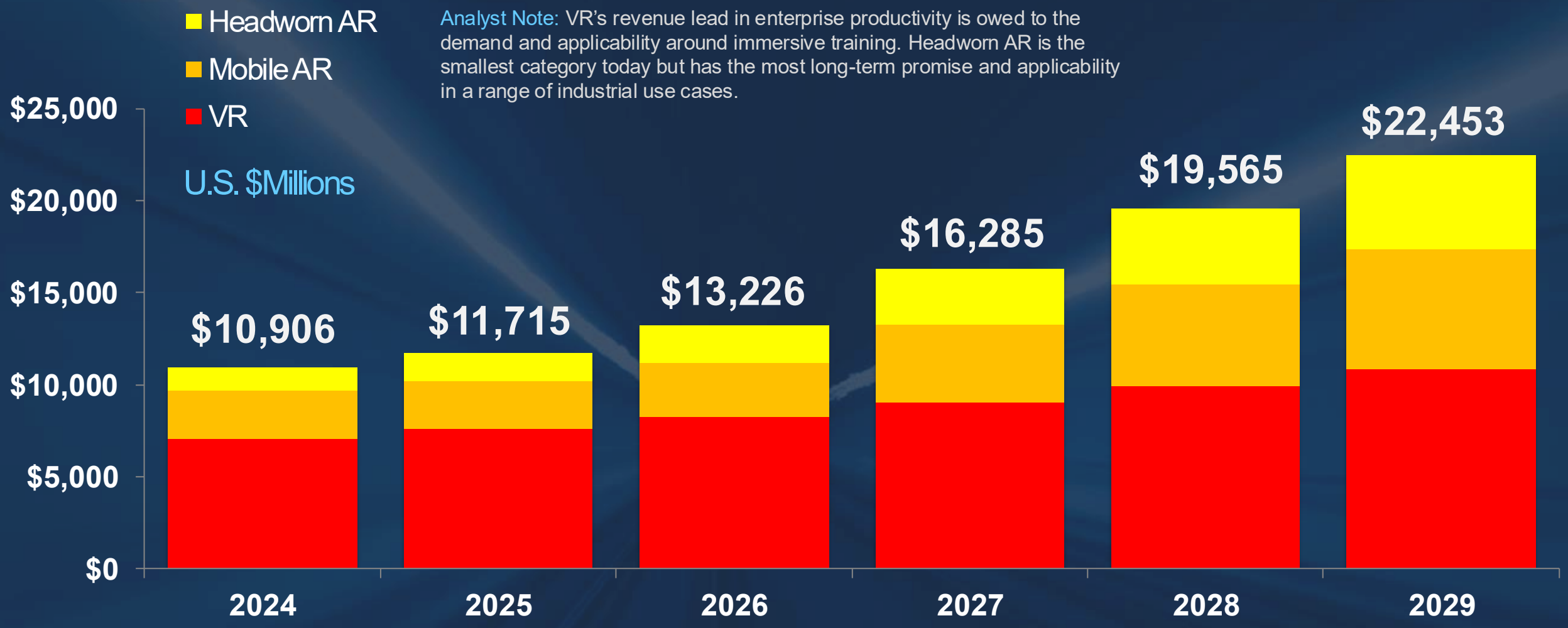
*includes technology that enables immersive product experiences and transactional/eCommerce functionality.
*Includes immersive, marketing, commerce and experience-creation software, excluding other overhead like developer salaries.
*Includes LBVR game licenses.

Enterprise XR Productivity

Enterprise XR Productivity Software Spending*, by Form Factor

Simplified View: Detail available to Pro subscribers.



Analyst Note: VR's revenue lead in enterprise productivity is owed to the demand and applicability around immersive training. Headworn AR is the smallest category today but has the most long-term promise and applicability in a range of industrial use cases.

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* Includes software only, excluding XR creation overhead such as developer salaries or consulting fees.

Final Thoughts: The Road Ahead

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Final Thoughts: The Road Ahead

Common Refrain

This report examined several device classes in the "spatial spectrum." They include everything from passthrough video to optical seethrough devices and non-display AI glasses. But these delineations aren't meant to signal winners and losers. There will rather be several competitors as diverging formats coexist and map to an expanding range of XR use cases.

This thesis intentionally deviates from a tendency in the tech press to name everything as an 'xyz killer.' For example, a common refrain is that every new pair of smart glasses that hits the market is a Ray-Ban Meta Smartglasses killer.

Use-Case Driven

To tug a bit more on that thread, we'll illustrate it with an anecdote. During Snap's Partner Summit last year, we moderated a panel discussion on Spectacles. One audience question stood out: Why did Snap choose an optical seethrough approach after Apple and Meta have both chosen – and thus presumably validated – mixed reality and video passthrough approaches?

The question represented a common attitude towards binary winners and losers. Even in thoughtful XR circles, there's a bit of a consensus that passthrough AR is attractive today, but an eventual dead end. The thought is that it has optical advantages, as examined earlier in this report, but seethrough AR wins in the long run due to wearability and social acceptability.

Though this binary/linear mindset is well intentioned, we see an XR world of parallel evolutionary paths, where development and deployment of each modality is use-case-driven. Video passthrough and optical seethrough will coexist, while applied to the functions and use cases where they respectively shine.

History Repeats

One accelerant for this trend will be Android XR. Among other things, the broadly-defined and versatile platform will accelerate competition while lowering barriers for XR creation. It will do that by handling the operating system while freeing up device OEMs to do what they do best. By standardizing UX elements at the OS-level, it will likewise enable app developers to focus on what *they* do best. In these ways and others, Android XR could do for XR what Android did for the mobile industry over the past few decades.

"Though this binary and linear construct has merit, we foresee an XR world of parallel paths, where development and deployment for each modality are use-case-driven."

Final Thoughts: The Road Ahead

Non-Sequential

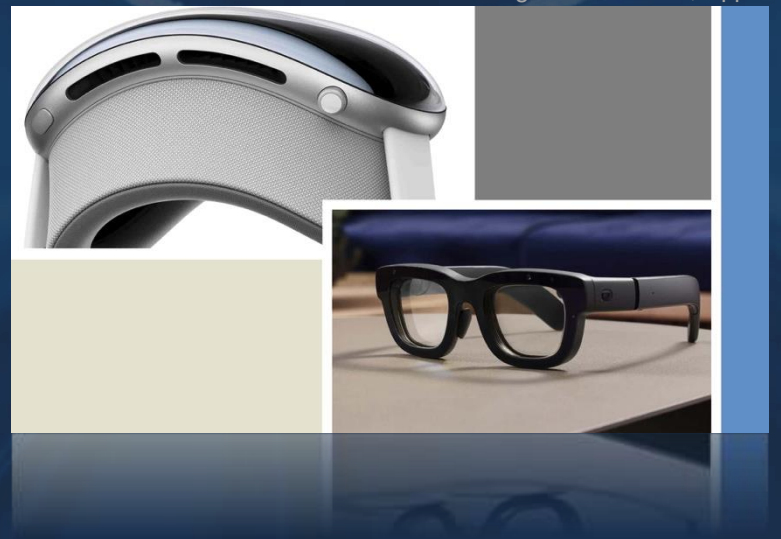
To expand on the purpose-built use cases that were teased on the previous page, let's look at the respective strengths of video passthrough versus optical seethrough. The former is tuned to lean-back entertainment, given its display performance, field of view, high contrast, and full-pixel control. The latter is tuned to socializing, driving, situational presence, or generally being seen in public. That last part is why AR proponents consider optical seethrough the long-run winner… and they aren't wrong given the need for all-day wearability and stylistic viability. But it's wrong to think that video passthrough is just a stepping stone towards that end. Think: parallel, not sequential.

Evolutionary Lanes

This binary compulsion to name winners and losers in XR manifests in another fallacy: that all formats will one day converge and meet in the middle for an ultimate killer device. For reasons already stated, video passthrough and optical seethrough will advance within their own evolutionary lanes. By definition, this engenders more divergence than convergence, as they each become their best self, rather than finding common denominators. The latter would present a hybrid dilemma – compromising each end of the spectrum for a "master of none" result.

Just think: most people use laptops and phones versus ditching both to do *everything* on a tablet. Needing the right tool for the job will always be a thing. Put another way, due to limitations in physics – unassisted by Moore's Law – optical seethrough can't be as good as video passthrough for entertainment. And video passthrough can't compete for the "all-day" stuff. Of course, breakthroughs and flying-car level futurism can shift the course of technical realities, but that will happen on a scale of decades, not years.

Image Source: Meta, Apple



"It's wrong to think that video passthrough and mixed reality are just steppingstones towards all-day optical-seethrough AR Glasses. Think: parallel, not sequential."

Final Thoughts: The Road Ahead

Two Hype Cycles

Speaking of "decades," most of this report focused on the present and near-term outlook for spatial computing. But what about the longer-term? Indeed, when talking about emerging tech, the discussion should include both short and long-run perspectives. In that light, one key lesson learned from *two* XR hype cycles over the past decade is that it's ill-advised to set overblown expectations. Many companies and investors got burned from believing that AR and VR's revolutionary impact was much larger and more imminent than it was... an expensive miscalculation.

Consumers have also been turned off by this hype. That's not because these technologies aren't compelling, but they've been disappointing relative to their hyped promises. Magic Leap One is an example... and the company has paid dearly for it.

Viable Price Point

With that backdrop, what's the timeline for fully actualized AR and VR? When will we get all-day AR glasses that offer both graphically-robust UX and stylistic wearability? In some ways, this was achieved considering Meta Orion. However, it comes in the form of a prototype with a $10,000 bill of materials. The question is when a Meta Orion-like device reaches the market at a *viable* price point.

The consensus is that such a milestone could be reached sometime in the 2030s. For example, Snap CEO Evan Spiegel is one executive who's been realistic about this longer time horizon in his public statements. Meta CEO Mark Zuckerberg has also begun to publicly acknowledge this reality. These are positive steps as previous generations' proponents – including Zuckerberg's younger self – were more aggressive in their XR future gazing.

XR's Best Self

The effect of those past hyperboles to the XR market has been a disservice in setting expectations too high. Executives who have made such statements have been burned, as noted, so many have learned to the hard way to take a more measured approach. We'll hopefully see more of this as it models the right behavior for the rest of the XR industry. The sooner we all come to terms with longer timelines for XR endpoints – including generalist tech press that still often parades XR's world-changing impendence – the more we'll set the technology up to be its best self.

"It's not because XR isn't compelling, but it's been disappointing relative to its hyped promises. Magic Leap's One is an example... and the company has paid dearly for it."

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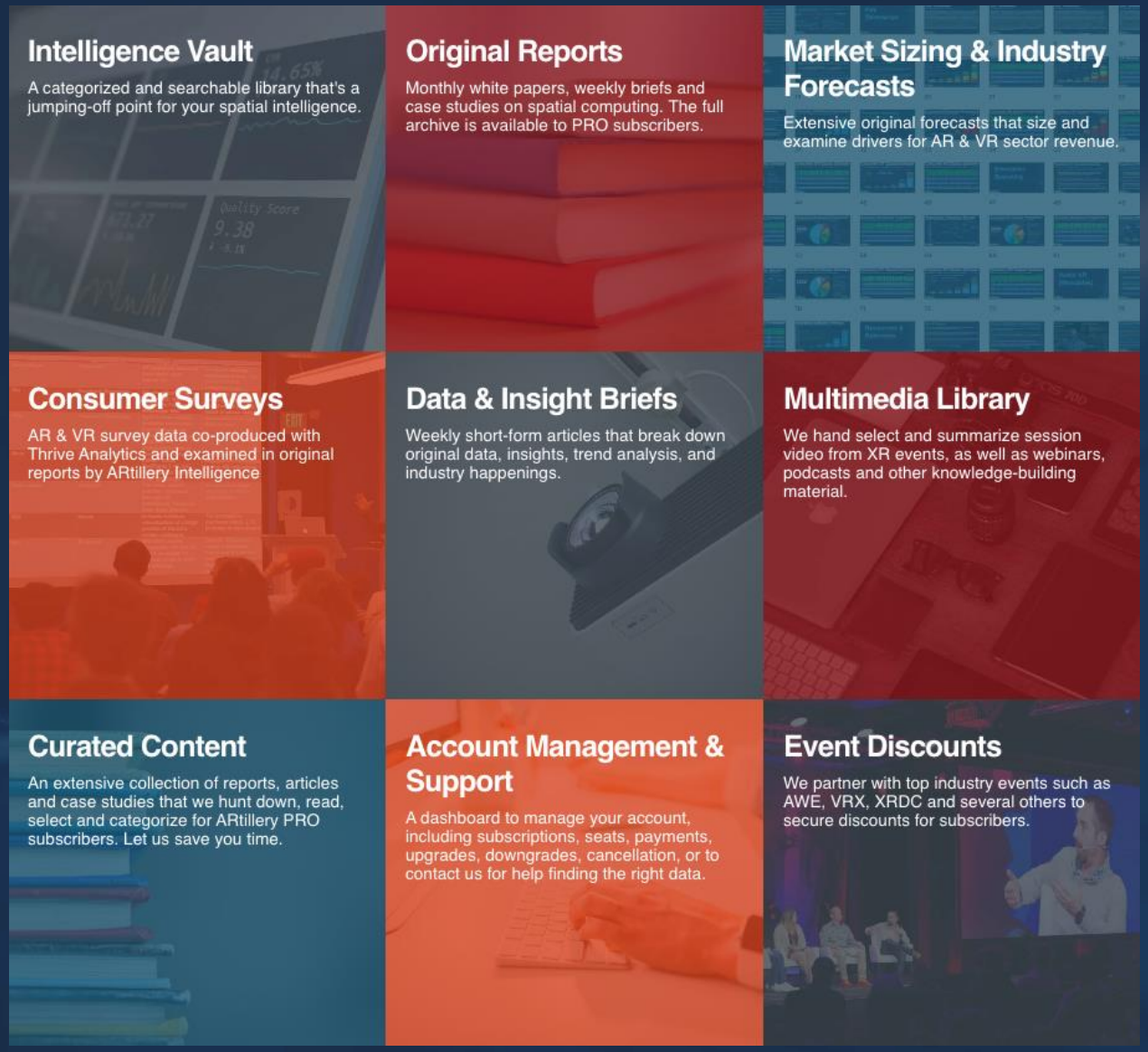

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ARtillery Intelligence chronicles the evolution of spatial computing (AR & VR). Through writings and multimedia, it provides deep and analytical views into the industry's biggest players, opportunities, and strategies.

Run by analysts and former journalists, coverage is grounded in a disciplined and reportorial approach. It also maintains a business angle: Though there are fun and games in spatial computing, cultural, technological, and financial implications are primary.

Products include the ***AR Insider*** publication and the ***ARtillery PRO*** research subscription, which together engender a circular flow of knowledge. Research includes monthly narrative reports, market-sizing forecasts, original consumer survey data, and multimedia – all housed in a robust intelligence vault.

Learn more here.

"Though there are fun and games in spatial computing, cultural, technological, and financial implications are primary."

About Intelligence Briefings

ARtillery Intelligence Briefings are monthly installments of spatial computing data and analysis. They synthesize original data to reveal opportunities and dynamics of spatial computing sectors. In addition to data, a layer of insights is applied to translate market events and raw figures into concrete insights.

More information, past reports, and editorial calendar can be seen here.

ARtillery Intelligence

About the Author

Mike Boland was one of Silicon Valley's first tech reporters of the Internet age as a staff reporter for Forbes (print) starting in 2000. He's been an industry analyst covering emerging and immersive tech since 2005; and is now Chief Analyst of ARtillery Intelligence and Editor of AR Insider.

Mike is a frequent speaker at industry conferences such as AWE, XRDC, Lens Fest, and the VR/AR Global Summit. He has authored more than 200 long-form reports and market-sizing forecasts on the tech & media landscape. He contributes regularly to news sources such as TechCrunch, Business Insider, and Huffington Post.

A trusted source for tech journalists, his comments have appeared in A-list publications, including The New Yorker, The Wall Street Journal, and The New York Times.

Further background, history, and credentials can be read here.

Methodology

ARtillery Intelligence follows disciplined best practices in market sizing and forecasting, developed and reinforced through its principles' 20 years in research and intelligence in tech sectors. This includes the past 10 years covering AR & VR as a primary focus.

This report focuses on XR revenue projections in various sub-sectors and product areas. ARtillery Intelligence has built financial models that are customized to the specific dynamics and unit economics of each. These include variables like unit sales, company revenues, pricing trends, market trajectory, and several other micro and macro factors that ARtillery Intelligence tracks.

This approach primarily applies a *bottom-up* forecasting methodology, which is secondarily vetted against a *top-down* analysis. Together, confidence is achieved through triangulating revenues and projections in a disciplined way. For more information on what's included and not included in the forecast (a key consideration when evaluating the findings) see the next page.

More about ARtillery Intelligence's market-sizing methodology can be seen here and more on its credentials can be seen here.

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