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Technology Stats You Need to Know for 2022

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Stuart Carlaw

ABI Research

Chief Research Officer

From Our Chief Research Officer

At the outset of the COVID-19 pandemic, many aspects of life slowed down or ground to a halt. However, that certainly was not the case with technology. On the contrary, the pandemic quickened the pace of digital transformation, placing technologies at the very center of how people live and work.

That pace shows no signs of slowing down in the year ahead. For corporations, success will continue to be driven by an ability to understand the shifting technology landscape and make the right technology investments. While nobody has a crystal ball, the global team of analysts at ABI Research has the next best thing: data. Our team has combed through millions of data points within our datasets to spotlight some of the most interesting—and impactful—forecasts.

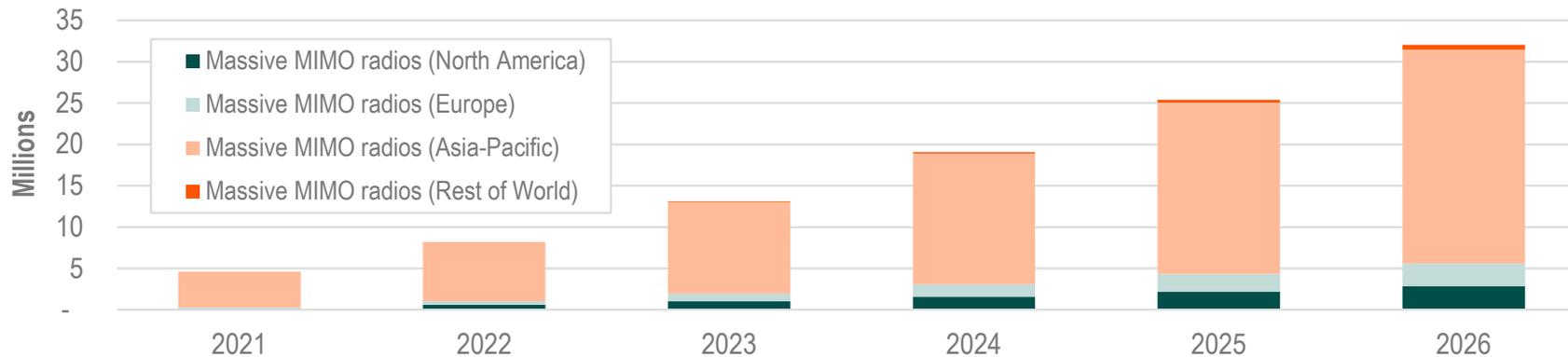
The rise of Open Radio Access Network (Open RAN), an explosion of edge Artificial Intelligence (AI) adoption, a proliferation of smart manufacturing platforms, and a growing concentration on cybersecurity are just some of the many changes on the horizon that are indicative of the more connected, more vulnerable, and, ultimately, more technology-driven world that is emerging.

While there are still fundamental challenges ahead—political tumult, an entrenched endemic, and a broken global supply chain—ABI Research looks forward to providing our clients with the insight and actionable data they need to chart a successful course in 2022 and beyond.



Global massive MIMO deployment is expected to grow at a 6-year Compound Annual Growth Rate (CAGR) of 61%, reaching 32.1 million in 2026, up from 4.4 million in 2021.

Massive MIMO Deployment (Millions Of Units)



Fei Liu

Industry Analyst

With massive MIMO being the key enabler for 5G, operators will continue to deploy massive MIMO globally. Massive MIMO typically refers to 32T32R and 64T64R; 64T64R is better suited for dense urban areas and 32T32R is usually deployed in urban and suburban areas. Worldwide massive MIMO deployment was driven by the Asia-Pacific region, which is expected to lead the future growth due to significant adoption, followed by the United States and Europe.

China, Japan, and South Korea were all early adopters of 5G, and 2020 was the year of 5G acceleration for China. Japan and South Korea favor massive MIMO with 32T32R configurations due to space/weight limitations. China initially deployed 64T64R, but switched to 32T32R when it advanced beyond urban areas for 5G deployments. Semiconductor shortages and high-power consumption may also contribute to the decision to switch. Europe is picking up speed in massive MIMO deployments with 32T32R configurations, and an acceleration is expected from 2023. The United States was initially focusing on Millimeter Wave (mmWave) and only gained access to the C-band in 2021. As the U.S. operators are still deploying 5G networks in dense urban areas, 64T64R massive MIMO is still mainly deployed there. An acceleration of massive MIMO deployments can be expected as of 2023.



The satellite communications Serviceable Addressable Market (SAM) potential for Asia-Pacific will increase from 161.5 million premises in 2021 to 169.0 million premises in 2026.

Asia-Pacific Satellite Communications Addressable Market Potential Premises (Millions)					
2021	2022	2023	2024	2025	2026
161.5	163.0	164.5	166.0	167.5	169.0

The Asia-Pacific market has contrasting high broadband penetrated markets, such as Japan, South Korea, China, and countries, such as India, Indonesia, and the Philippines, where high-speed broadband has yet to gain significant penetration. Many rural communities in the region continue to see significant population growth over the forecast period. Fiber-optic and Fixed Wireless Access (FWA) continue to be rolled out, but face challenges in addressing the rural markets. The SAM potential consists of possible community satellite broadband access deployment opportunities, as well as a smaller number of direct-to-home deployments to households that have the disposable income to afford satellite broadband solutions. In the lower-income areas, service providers may need to amortize the cost of the Customer Premises Equipment (CPE) across the duration of the service contract, or government agencies may need to proactively subsidize the cost of the CPE to make the service more affordable.



Jun Wei Ee
Research Analyst



Open RAN installs will increase from 1.37 million in 2021 to 22.52 million in 2026.

Traditional RAN versus Open RAN Installed Base (Millions)						
	2021	2022	2023	2024	2025	2026
Traditional RAN	66.24	75.05	86.33	99.30	112.36	126.67
Open RAN	1.37	3.79	7.42	12.25	17.46	22.52

Open RAN revenue will not match traditional RAN revenue, but will slowly increase throughout the forecast period. Due to integration and technology development issues, considerable vendor resistance may entirely delay or even kill the Open RAN movement before it reaches a large scale. The industry has now become aware that Open RAN will still need years of development before it can match large vendor performance and cost-efficiency. This has translated to reduced interest in Open RAN in early 2022.

ABI Research expects Open RAN to morph into the next-generation RAN concept, driven mainly by large infrastructure vendors that will be more open in terms of interfacing with other vendors and will include open elements in their proprietary platforms. Ericsson, Huawei, and Nokia, among others, will adapt to Open RAN.



Dimitris Mavrakis

Senior Research Director

5G Core networks stand to create approximately US\$6.5 billion in revenue by 2026 at a CAGR of 43%.

Total 5G Core Revenue (US\$ Millions)						
2021	2022	2023	2024	2025	2026	CAGR
1,101	1,796	2,665	3,725	4,997	6,523	43%

The core network is a source of revenue for Network Equipment Vendors (NEVs), and it constitutes a core strategic asset for Communication Service Providers (CSPs). Increasingly, CSPs are using a public cloud to host the core network, as is the case with AT&T, an operator that is moving the plumbing and inner workings of the core network to Microsoft Azure for Operators (AFO). This may have implications in terms of new growth, but can also determine control over the development of new services for CSPs. With intelligence (service logic) shifting from being centrally controlled by CSPs to residing in end devices/infrastructure (e.g., edge servers), customers can choose different providers or can, in effect, self-provide.

A lack of control (integration) in the core network without some point of lock-in may not be conducive to capturing the value that stands to be created in cellular. It may also serve as a foundation for new value creation. If value erodes in a specific part of a value chain, new value can be created in another part. New value creation will be moderate in the next 5 years, but the jury is still out on who will capture what within the emerging 5G Core network ecosystem.



Don Alusha
Senior Analyst



Shipments of mmWave-enabled phones will grow from 14% of 5G smartphone sales in 2021 to command a 43% share by 2026.

5G mmWave Smartphones Shipments and Market Share						
	2021	2022	2023	2024	2025	2026
Total 5G Smartphones (Millions)	580.34	758.38	914.11	1,045.08	1,186.53	1,301.36
Total 5G mmWave Smartphones (Millions)	81.25	197.18	301.66	418.03	504.27	559.59
5G mmWave Share of Total 5G (%)	14.0%	26.0%	33.0%	40.0%	42.5%	43.0%

The global 5G smartphone market saw phenomenal growth in 2021, reaching more than 580 million units. The increase in sales was driven by an acceleration down the price tiers that improved both affordability and adoption. The increase in 5G mmWave smartphone sales will be boosted by its inclusion in greater numbers of smartphone models, driven by Samsung’s flagship devices and Apple’s iPhones, as well as by an expanding ecosystem momentum. After a slow start, mainly limited to the U.S. market, the impetus behind mobile mmWave continues to build with a number of regions and countries targeting deployments, broadening across North America, Europe, and Asia-Pacific, and gaining support from a growing number of chipset suppliers.

This ecosystem expansion, along with resolving the inherent complexity and high costs of implementation, will aid the extensive growth of 5G mmWave smartphones. Until now, the use of mmWave in smartphones has been limited at best. However, implementing the technology in tight combination with 5G New Radio (NR), sub-6 Gigahertz (GHz), and dual connectivity with Long Term Evolution (LTE) can provide new business opportunities and enhanced mobile experiences and support advanced mobility features. Despite initial market concerns, many technology barriers have since been overcome. 5G mmWave in smartphones is now set to grow extensively, although it will take time to migrate from the high-end to mid-range because of the still prohibitive costs and impact on user experiences. However, mmWave smartphone sales inflection point is expected by 2023, as it is forecast that, by this stage, mobile operators will need to extend their 5G network capacity and performance beyond sub-6 GHz, forcing many to turn to mmWave. From here, the market is to see momentum swing toward mmWave and a notable uptick in available smartphone models as it quickly becomes the only option to increase 5G capacity and provide an extension in performance.



David McQueen
Research Director



Dozens of always-on 5G portable device models will hit the market in 2022 when sales will exceed 12 million, growing to 46.5 million by 2026.

Sales of Always-On Notebooks and Tablets						
	2021	2022	2023	2024	2025	2026
Total Tablets/Notebooks Shipments (Millions)	393.3183	375.6359	345.585	315.4215	298.5179	288.4978
5G Connectivity (Millions)	3.74	12.08	22.28	30.56	39.62	46.53
5G Share (%)	1.0%	3.2%	6.4%	9.7%	13.3%	16.1%



David McQueen
Research Director

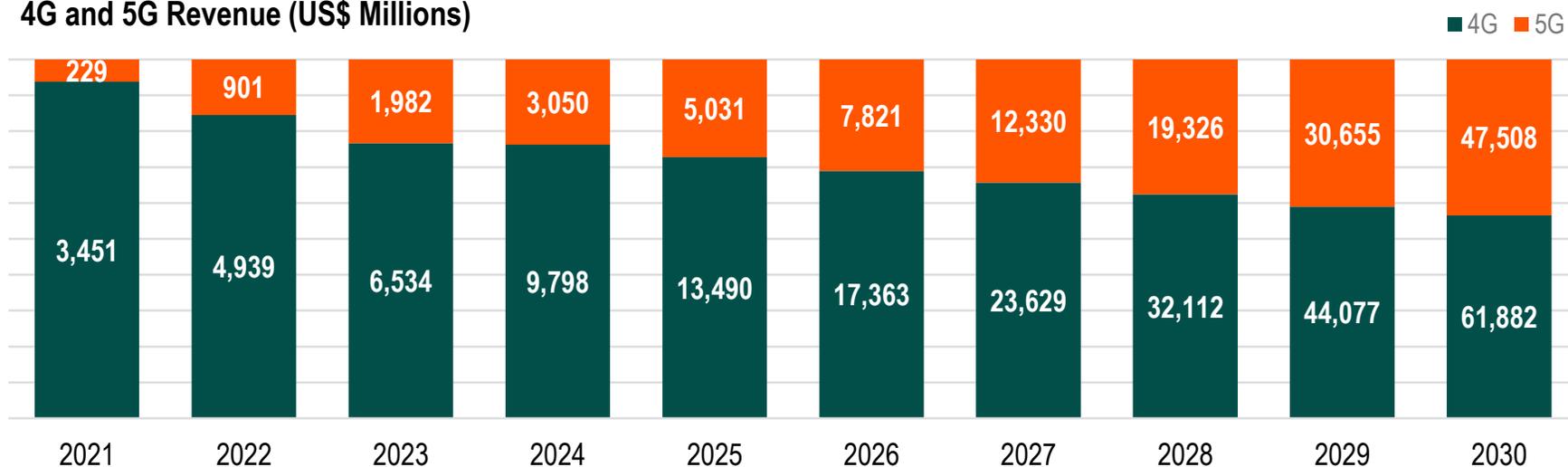
The always-on 5G connected portable device market, including tablets and notebooks, will be buoyed by the emergence of new types of mobile consumer and business applications specifically designed for this type of device, as well as access to a plethora of online mobile applications that can be ported from the smartphone world.

The COVID-19 outbreak was the driver for a short-term spike in demand for tablets and notebooks. These devices have kept healthy shipment levels due to their increased utility, as imposed lockdowns have enforced more remote working, learning, and online entertainment. While both the tablet and notebook markets are expected to continue to return to their typical longer term trends of weakening demand, longer replacement cycles, and general market saturation, the integration of cellular connectivity is expected to grow. Cellular connected tablets and notebooks have only accounted for a small proportion of sales (<1%) due to their mostly nomadic use case and high price differential. But the advent of 5G can bring always-on broadband experiences on the move to new device types beyond smartphones. For the convergence of mobile and notebooks industries to happen, they will both have to position 5G connectivity as a central feature of the design with a focus on improved system performance, long battery life, thin and light designs, and always-on, always-connected experiences.

The cellular-connected notebook market has witnessed a series of false dawns. Now, companies and partnerships from Qualcomm, Intel, MediaTek, Samsung, Huawei, Apple, and others are paving the way to bring engineering, system integration, and connectivity expertise together, which is crucial to the success of 5G notebook and tablet connectivity. The drive from these companies, notably Apple, could be the impetus that the industry craves for bolstering demand in the sector to deliver enhanced, far improved next-generation mobile compute experiences. Other industry device vendors also aim to benefit from their vertical integration and are all looking to establish 5G in their lineups of connected compute devices, including tablet, ultrabook, and notebook products.

The total addressable market for private networks will rise from US\$3.6 billion in 2021 to more than US\$109.3 billion in 2030.

4G and 5G Revenue (US\$ Millions)



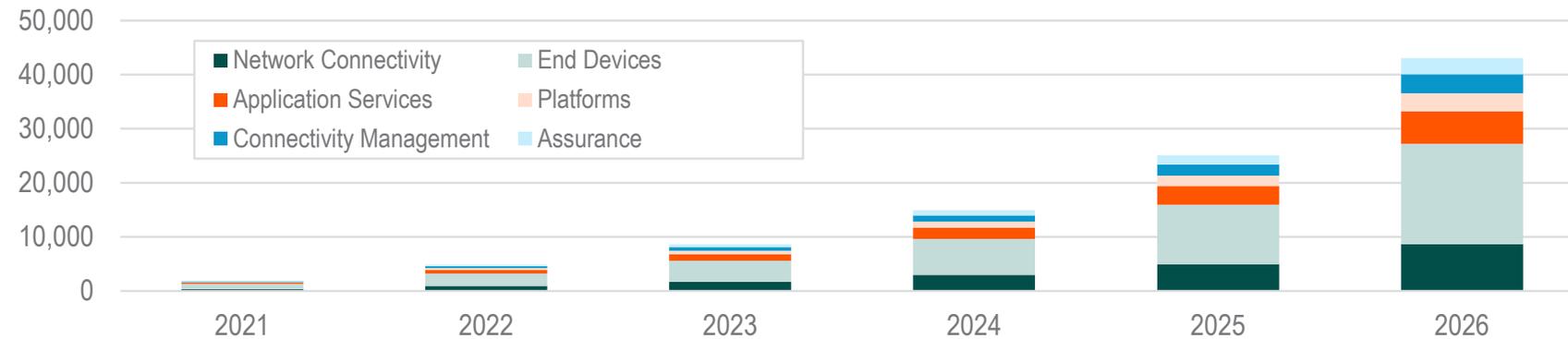
Leo Gergs
Senior Analyst

The Total Addressable Market (TAM) for private networks (including RAN, Mobile-access Edge Computing (MEC), core, and professional services) will increase from US\$3.7 billion in 2021 to more than US\$109.4 billion in 2030, though it will be primarily driven by 4G deployments.

While The 3rd Generation Partnership Project (3GPP) has frozen Release 16 (standardizing Ultra-Reliable Low-Latency Communication (URLLC)), Release 16-capable chipsets and devices have not yet emerged in the market. As enterprises require Time-Sensitive Networking (TSN), as well as high availability and reliability of their connection, they are reliant on Release 16 and are, therefore, waiting for compatible chipsets and infrastructure to enter the market. As this is not expected to happen until 2023 (at the earliest), enterprise 5G will mature much more slowly than previously anticipated.

The 5G enterprise assurance market will be the fastest growing segment of the 5G-to-Business (5GB2B) value chain, with US\$3 billion in revenues by 2026 and a CAGR of 188%.

5G B2B Segment Revenues (US\$ Millions)



Kangrui Ling
Industry Analyst

As 5G adoption increases for enterprise deployments, more opportunities arise for network assurance providers to maintain critical infrastructure, uphold data security measures, provide Operating Support System (OSS) assurance, and create new business opportunities to manage enterprise end devices. This high forecast growth for assurance in the 5G enterprise market is driven by two factors: demand for device assurance and new business creation.

Assurance has traditionally been deployed at scale for public networks. As 5G enters the enterprise sector, more enterprise end devices will be 5G-enabled, and buyers will want assurance for these devices. The second driver is the huge opportunity for new business creation. The entry of 5G into the enterprise space brings about many new opportunities, including the need to provide end-to-end assurance for network slicing, automated self-healing using cloud-native Continuous Integration (CI)/Continuous Deployment (CD) principles, and management and assurance of new end devices, including robotics, autonomous vehicles, monitoring modules, etc. Assurance providers, such as MYCOM OSI or NETSCOUT, will be able to catch this new growth engine by innovating new solutions that are catered to the 5G enterprise space. Close partnerships with Network Equipment Providers (NEPs), mobile operators, and enterprise solution providers are key to bringing 5G assurance solutions into the enterprise space. In this space, assurance providers can capitalize on their strengths to guarantee Service-Level Agreements (SLAs), provide data security measures, and enable End-to-End (E2E) visibility and assurance for enterprise devices, thus enabling the digital transformation ambitions of enterprises for 5G.



The edge AI ecosystem market, a US\$15 billion market in 2021, is expected to grow to close to US\$38 billion by 2026.

Total Annual Edge AI Ecosystem Revenue (US\$ Millions)							
	2021	2022	2023	2024	2025	2026	CAGR
Network Connectivity	15,430.7	19,412.1	22,509.6	27,011.3	32,769.5	38,360.8	
YoY Growth (%)		26%	16%	20%	21%	17%	20%



Lian Jye Su
Principal Analyst

The edge AI ecosystem market, which consists of edge AI chipset suppliers, development platforms, turnkey service providers, and Software-as-a-Service (SaaS) companies, is expected to nearly triple in the next 5 years. Estimated to be a US\$15.4 billion market in 2021, the market is expected to grow to close to US\$38 billion by 2026.

While most AI workloads still reside in the cloud, concerns around connectivity privacy, data governance, and latency are becoming the catalyst for increased edge AI adoption. Significant advancements are seen across the consumer, commercial, and industrial sectors, as edge AI applications become more and more entrenched in day-to-day workflows.

Solution providers are introducing innovative solutions to address the growing market opportunities, such as high-performance, low-power computing processors for Machine Learning (ML), edge computing gateways, developer-friendly AI development platforms, E2E AI design, development, and deployment services, among others. As the market continues to mature, the edge AI market is on track to exceed that of the cloud AI market by 2026.



The consumer immersive market is prospering, with more than 69 million shipments expected in 2026 across both Virtual Reality (VR) Head-Mounted Devices (HMDs) and Augmented Reality (AR) smart glasses.

Consumer AR/VR Shipments							
	2021	2022	2023	2024	2025	2026	CAGR
VR	11,887,747	18,090,336	26,883,746	37,900,536	46,284,304	61,173,175	38.8%
AR	157,565	388,273	977,493	2,829,187	5,574,206	8,518,003	122.1%
Total	12,045,312	18,478,609	27,861,239	40,729,723	51,858,510	69,691,178	42.1%



Eric Abbruzzese
Research Director

Standalone VR headsets make up the overwhelming majority of these shipments. Meta’s standalone Quest 2 headset is expected to have had a record-breaking 2021, and the company’s significant investment in the VR space, alongside the broader immersive ecosystem, certifies that upcoming devices will have a compelling home. Sony’s PlayStation VR 2 will be launching in the next 1 to 2 years, serving a sizable PlayStation installed base, in spite of stock shortages since launch. Apple will also be launching a VR HMD in a similar window, as well as a second immersive device—likely AR or Mixed Reality (MR)—within a 5-year window. Google, Meta, Snap, TCL, Xiaomi, Oppo, and others have confirmed that AR hardware is coming, and those also with software and service plays in immersive are investing there as well.

Successful immersive use cases, so far, have been confined to gaming and some niche social platforms, but companies across markets will be targeting immersive go-to-markets that will need devices. Retail and commerce, education, healthcare, sports and fitness, and media & entertainment will be hungry for a user base, and that user base will finally have a choice in the hardware space and valuable content to make use of that hardware. Metaverse, although nascent and lacking definition, will nevertheless drive cross-device and cross-service demand as it finds purchase, increasing the opportunity and addressable base for all in the process.



Mobile national ID use will grow by more than 250% between now and 2026.

Mobile Identities in Circulation (Millions)						
2021	2022	2023	2024	2025	2026	CAGR
255.4	329.2	406.3	486.1	568.5	653.5	20.7%

The market for mobile national ID solutions is expecting significant growth in the next 5 years. Mobile national ID already constitutes the majority of the Mobile Identity (mID) space, occupying 80% of total mobile identities in circulation in 2021. ABI Research forecasts a user base in excess of 250% of today's figure by the year 2026. This level of growth demonstrates the appetites of governments to continue expanding their digitization strategies and digital platform offerings to citizens, enhancing use cases for ID, and streamlining Citizen-to-Government (C2G) and Government-to-Citizen (G2C) communication lines.

Growing tractions in Asia-Pacific projects, most notably in China and India, as well as expansion in Malaysia and the Philippines, largely contribute to the high growth anticipated. Additionally, increasing adoption of existing projects in Europe is driving growth in the market. Emerging South American applications are also contributing; they include the Argentinian mobile national ID, which continues to be issued and has accelerated during the COVID-19 pandemic.



Lucas Stewart
Research Analyst



Devices with foldable screens will reach nearly 10% of all smartphone sales by 2030.

Shipments of Foldable/Flexible Displays (Millions)										
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Shipments	8.9	15.5	23.9	34.6	48.3	64.6	84.3	107.3	133.6	163.2
% of Total Smartphones	0.7%	1.1%	1.6%	2.2%	3.1%	4.0%	5.2%	6.5%	8.1%	9.8%

The use of flexible/folding Organic Light-Emitting Diode (OLED) screen technology has made tentative steps into the smartphone market for the past couple of years. A great deal of technology and hardware innovation needed to be perfected and properly executed, notably around hinge mechanisms and crease-less displays, if the promise of a seamless and intuitive User Experience (UX) was to be upheld. Folding smartphone models, based on unfold-to-tablet design, were among the first to market, but delays due to inadequate technology implementations resulted in poor UXs.

However, with these problems now mostly resolved, the addition of more innovative designs, such as fold-to-compact models, the folding form factor with its enhanced functionality, and evolution in device experiences, will see an increase in popularity, despite still having relatively high price points. Consequently, a significant change in market availability and breakthrough of many more flexible screened devices is expected in 2022. These will potentially encompass rollable designs from a wide number of vendors with the hope that these new form factors will become popular and increase replacement rates. Market penetration is expected to increase, due to these improvements and the introduction of more competitive pricing. Then, foldable smartphones will be seen as having established a firmer hold than that of gimmicky, high-priced niche trends. With Original Equipment Manufacturers (OEMs), such as OPPO, already creating more affordable foldable smartphones and Apple expected to release its foldable device by 2023, such moves will undoubtedly help grow the sector's addressable market, while also improving scale for the supply chain.



David McQueen
Research Director



The wearables market will continue to be dominated by smartwatches, as shipments are projected to reach 236.55 million by 2026, at a CAGR of 19.7%, leading the smart accessory market.

Smartwatch Shipments (Millions)						
2021	2022	2023	2024	2025	2026	CAGR
96.31	113.64	134.10	160.25	193.90	236.55	19.7%

Despite the introduction of 5G networks as a premium feature, many device types in the wearables and accessories sector will not become completely self-connected; instead, they will still need to be tethered to a smartphone or hub. The 5G attach rate for wearables and accessories will remain low at about 0.6% by 2026 and will be mainly related to sectors such as smartwatches and headsets. High-data gathering, and low-power efficiency will be the key strengths for these smart gadgets, increasing both demand and popularity, particularly in the healthcare industry.



Filomena Iovino

Research Analyst



Wireless headset shipments are expected to reach 723 million units shipped worldwide in 2026.

Wireless Headset Shipments (Millions)						
2021	2022	2023	2024	2025	2026	CAGR
502.07	546.79	581.39	640.44	686.30	723.10	7.6%

Wireless headset shipments are expected to reach nearly 502.1 million at the end of 2021, and the forecast reveals steady growth with more than 723 million of units shipped worldwide in 2026. Features like noise cancellation technology will improve the UX and offer a more extensive range of future use cases. Furthermore, as voice control becomes the dominant User Interface (UI) for hands-free control of smartphones and smartwatches, true wireless headsets will also become significant drivers for the growth and adoption of voice assistants.



Filomena Iovino

Research Analyst



Critical infrastructure cybersecurity spending will increase from US\$105.99 billion in 2021 to US\$145.78 billion in 2025 at a CAGR of 8.3%.

Critical Infrastructure Cybersecurity Spending (US\$ Billions)					
2021	2022	2023	2024	2025	CAGR
105.99	116.06	126.51	135.99	145.78	8.3%

Industries pushing digital transformation strategies are increasingly focused on the security of critical infrastructure, with high spenders in financial services and the Information and Communications Technology (ICT) space at the forefront of the movement. While other segments, especially in industrial and utilities, have traditionally been on the lower end of that spending forecast, there has been a strong uptick in interest post-pandemic, as remote management and digital services are increasingly leveraged. In parallel, cyberthreats (especially of the ransomware and supply chain attack kind) have grown exponentially over the last 2 years to take advantage of vulnerabilities revealed by increased remote management, driving operators in those industries to reassess risks and prioritize security spending. Spending on critical infrastructure cybersecurity is set to grow at a steady pace over the next few years.



Michela Menting
Research Director



Open-loop EMV cards in use in the Asia-Pacific region will increase from 6.3 million in 2021 to 24.6 million in 2026.

Open-Loop EMV Payment Cards in Use (Millions)						
2021	2022	2023	2024	2025	2026	CAGR
6.3	8.7	12.1	15.6	19.6	24.6	31.6%

The number of open-loop EMV cards in use in the Asia-Pacific region will increase from 6.3 million in 2021 to 24.6 million in 2026. The future for both open- and closed-loop transit is secured in the variety of ticketing ecosystems on offer. This movement for the market will be key because, for those who do not carry a contactless payment card or do not wish to use it in a transport system, closed-loop EMV can still play a role in an EMV-centric ecosystem. By issuing pre-paid fare cards with EMV branding but issued by the Public Transit Operator (PTO) itself the end user can still partake in an EMV ticketing system without the need to use their payment card.

India has experienced a significant drive in open-loop acceptance in six major cities, which will drive the number of open-loop EMV cards in ticketing use in the country from 1.1 million in 2020 to 9.6 million in 2025. We will also see the beginning of closed-loop EMV in the country, starting in Ahmedabad, Kochi, and Bangalore from 2024, landing at 0.4 million cards issued in the first year of these programs.



Sam Gazeley
Research Analyst



EMV payment card shipments in 2026 will be 3.18 billion, up from 2.79 billion in 2022.

EMV Payment Card Shipments (Millions)					
2021	2022	2023	2024	2025	2026
2,995.1	2,790.4	3,001.3	3,187.2	3,203.9	3,179.24

Most EMV payment card shipments will occur across the Asia-Pacific and the Middle East & Africa regions, with priority being placed on Tier One issuers and regions where the increases felt in card Average Selling Prices (ASPs) can be better managed. Despite recording another year of issuance decline, the payment cards market reacted well and was able to minimize the impact, thanks to closer collaboration with issuing banks and by using existing stock levels to minimize supply impacts. Better than expected activity was seen in Latin America, alongside a continuation of low-level growth in Europe, with near-counterbalanced significant market reductions in North America, which declined Year-on-Year (YoY), driven by the United States and its reissuance cycles. Overall, 2021 results were better than expected, with shipments in the 2.99 billion range achieved.

In 2022, with stocks now largely depleted, the exact extent of the chip shortage impact will be felt. Driven by recovering economies, as well as the continued upward trajectory of hyper-connectivity and subsequent requirement for computing power, the demand for chips exceeded all expectations in 2021, and it is already clear that supply cannot currently keep up with increasing demand. Now the payment cards market is beginning to understand the impacts of the chip shortage. Chip shortage expectations were initially very pessimistic, with ecosystem players believing that a significant impact should be expected in 2021, with a continuation of a negative market theme playing into 2022 and remaining a market challenge even as late as 2023.



Phil Sealy
Research Director



Hyperscaler deployed edge server shipments will increase from 88,364 units in 2022 to 214,705 units in 2026.

Hyperscaler Deployed Edge Server Shipments					
	2022	2023	2024	2025	2026
North America	51,415	63,939	74,608	82,478	87,414
Latin America	263	395	589	872	1,286
Europe	10,485	14,713	20,331	27,691	37,177
Asia-Pacific (including China)	23,592	33,930	46,971	62,513	79,928
Middle East & Africa	2,608	3,607	4,928	6,655	8,900
Total	88,364	116,584	147,428	180,210	214,705



James Stuart
Senior Analyst

Current edge server discussions are heavily dominated by hyperscaler deployments. The hyperscalers are targeting the low-hanging fruit in areas where early demand can provide a Return on Investment (ROI). Server shipment forecasts show that while there is moderate growth for hyperscalers (as shown in the table above), the exponential growth in edge server deployments will be seen in the carrier and enterprise deployed sectors of the market.

As edge computing gains traction, demand for in-the-field services will grow. This is where the carriers find themselves in a position to leverage their real estate footprint and meet the surging demands for edge compute services. It is not yet clear how the carriers will deliver these services, but it is likely that they will choose to collaborate with technology partners; however, those partners have yet to be selected. This is a huge opportunity for which all technology and services companies must have a strategy in place.



Spending on smart manufacturing will grow from US\$345 billion in 2021 to more than US\$950 billion in 2030.

Smart Manufacturing Spending (US\$ Millions)									
2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
345,158.93	388,995.71	454,005.35	500,699.23	551,604.16	609,695.61	682,350.00	759,489.27	848,947.77	950,288.54

As manufacturers advance their digital transformation initiatives, they drive up spending on smart manufacturing with investments in factories that adopt Industry 4.0 solutions like Autonomous Mobile Robots (AMRs), asset tracking, simulation, and digital twins. While most of the revenue today is attributed to hardware, the greater reliance on analytics, collaborative industrial software, and wireless connectivity (Wi-Fi 6, 4G, 5G) will drive value-added services revenue — connectivity, data and analytic services, and device and application platforms — to more than double over the forecast.

The main activity in all industries is supporting the shift to digital threads through better data management and enrichment throughout the manufacturing life cycle. A typical data backbone allows manufacturers to operate more efficiently across teams and departments. Increasingly, more data sources (including spatial data) can be cross-compared and overlain in real time for more contextual and predictive operations. The most advanced manufacturers are starting to think along these lines, while the majority have already begun their digital transformation journey, though they have yet to fully scale.



Ryan Martin
Research Director



The industrial software market will grow from US\$49.6 billion in 2021 to US\$87.9 billion in 2026, at a 12.1% CAGR.

Industrial Software Spending (US\$ Millions)						
2021	2022	2023	2024	2025	2026	CAGR
49,640	55,229	62,879	69,952	77,983	87,852	12.1%

At the same time, SaaS-enabled solutions within the industrial software domain will grow from between 5% and 8% of the market today to 32% by the end of the forecast. This includes everything from Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), and demand planning to Computer-Aided Design (CAD), Product Lifecycle Management (PLM), and quality control.

Before and without SaaS, industrial software applications lived on-site, often in digital silos or isolation. This architecture is a challenge when work is forced off-site. As a result of the pandemic, adoption of certain SaaS solutions has more than doubled in the last 12 months, driven by the need for better data continuity, collaboration, and regulatory compliance among internal and external stakeholders. SaaS enables flexible collaboration, faster innovation, and greater productivity at a lower Total Cost of Ownership (TCO). There is no software to install, manage, or upgrade with a SaaS solution. Users simply open a web browser, log in, and get to work with access to the latest version of the file. The same applications can be accessed across multiple devices, whether computer, smartphone, tablet, or HMD, enabling teams to collaborate on projects, documents, and designs in real-time with an awareness of everyone else's presence and changes, instead of working on copies of files checked out and downloaded from a server. This means more seamless collaboration and a better way for organizations to share knowledge and innovate. Leading vendors offering these solutions include Autodesk, Dassault Systèmes, PTC (Onshape, Arena), and Siemens.



Ryan Martin
Research Director



Industrial blockchain and distributed ledger technologies revenue will increase from US\$639 million in 2021 to US\$2.13 billion in 2025 at a CAGR of 35.1%.

Industrial Blockchain and Distributed Ledger Technologies Revenue (US\$ Millions)					
2021	2022	2023	2024	2025	CAGR
639	1,019	1,312	1,685	2,130	35.1%

Industrial blockchain and distributed ledger technologies continue to be a slow-burning market, punctuated by a recurring volatile cycle of hype every 18 months in the broader blockchain ecosystem (particularly with cryptocurrencies). Currently, the interest in Non-Fungible Tokens (NFTs) is boosting interest in blockchain more generally, although the eventual fallout will ultimately negatively affect all blockchain applications, not just consumer ones. However, this cycle has its benefits, separating the wheat from the chaff and strengthening survivors. Industrial blockchain applications, particularly those centered around trade finance, supply chain and logistics management, tracking and tracing, and provenance, continue to improve and mature, with sustained interest from a subset of the industrial market. The advent of Industry 4.0 and the Industrial Internet of Things (IIoT) will positively impact ventures in industrial blockchain, as the technology charms itself slowly but surely into an increasing number of industrial digital transformation strategies.



Michela Menting

Research Director



The robotics software market is expected to grow from US\$5 billion in 2021 to US\$19 billion in 2026 at a CAGR of 31.2%.

Total Annual Robotics Software Revenue (US\$ Millions)							
	2021	2022	2023	2024	2025	2026	CAGR
Robotics Software	4,926.0	7,489.7	9,616.9	12,314.3	15,603.7	19,117.5	
YoY Growth (%)		52%	28%	28%	27%	23%	31.2%

If one feature of the robotics market characterizes it appropriately, it is fragmentation. Different vendors offer different and, indeed, quite particular solutions with no obvious interconnections and, thus, limited reach. ABI Research expects resolution of some of these problems in the next 5 to 10 years. Cloud robotics will significantly improve automation in industry, especially when ML and simulations become established practices, both in the cloud and at the edge. A new breed of hardware-agnostic robotics software developers is bringing new capabilities, such as zero-code/low-code programming, quick onboarding, motion planning templates, real-time simulation environments, integration of ML, and digital twin synchronization, to all types of robots and components. These features will further drive large-scale robotics deployments, increasing demand for robotics software.



David Lobina
Research Analyst



Internet of Things (IoT) security revenue, boosted by device management investments, will reach US\$23.9 billion by 2027.

IoT Security Revenues - Segmentation by Technology (US\$ Millions)								
	2021	2022	2023	2024	2025	2026	2027	CAGR
Digital Security	6,687	8,814	11,442	14,820	18,867	23,890	28,263	26.2%

The increased heterogeneity of IoT device specifications, digital footprint, and computing power, combined with network variability, bandwidth capacity, communication, and encryption requirements, have created a complex, interconnected environment forcing digital security operations to be tackled across the entire supply chain with increased attention toward application-specific requirements. This complexity has forced IoT implementers to further increase device, network, application, and data security investments, which are concentrated at the earlier stages of the IoT device management chain in order to provide a secure foundation for IoT fleets. In turn, this will safeguard network integrity and data reliability in later management stages, thus establishing a trust anchor and protecting revenue streams down the line that should ensure a positive ROI.

Due to the complexity to the IoT ecosystem, IoT security is meant to be tackled on an application and vertical basis, rather than a universal approach. Each market has its own unique sets of device management challenges and revenue-generating security applications. There are no E2E security options, so forging powerful partnerships is key. A plethora of IoT market players can tackle IoT security requirements and secure their market foothold based on their expertise. This includes leading IoT cloud service providers like Microsoft Azure, Amazon Web Services (AWS), and Google Cloud; gateway experts like Cradlepoint and MultiTech or middleware players like Eurotech and Skynet; industrial security providers like Dragos and Honeywell; Supervisory Control and Data Acquisition (SCADA) and industrial control systems players like Schneider Electric, Siemens, and ABB; communication experts like Cisco and Ericsson; and, of course, key digital identity experts targeting different sections of IoT security like Thales, IDEMIA, Entrust, Device Authority, GlobalSign, and DigiCert.



Dimitrios Pavlakis
Senior Analyst



By 2026, LTE will account for more than 90% of all cellular IoT modules shipped.

Total Cellular M2M Shipments by Air Interface, End-User Basis (Millions)							
	2021	2022	2023	2024	2025	2026	CAGR
2G & 3G	94	79	59	40	25	11	-35%
LTE (Cat 1+, LTE-M, NB-IoT)	255	326	413	529	674	853	27%
5G	0.4	2	6	16	37	69	181%
Total	349	407	478	585	737	933	22%



Jamie Moss
Research Director

5G is the first 3GPP-standardized technology to support the IoT from the outset. So why did LTE account for nearly-three quarters of all cellular IoT modules shipped in 2021, a share set to increase to more than 90% by 2026? To be clear, all cellular IoT will become 5G in time. But what about 5G actively driving demand for new IoT connections? The IoT is a market of efficiency, that thrives off the maximal availability and affordability of mature technologies. 5G is not there yet, nor will be for some years to come. Connected cars, and fixed wireless terminal applications are the low-hanging fruit for 5G, being markets that hunger for raw throughput.

For other IoT applications 5G's utility is more nuanced, in manufacturing and healthcare for example, where time-critical services benefit from low latency, especially in private networks. But these are sectors that do not adopt technologies on a whim and require extensive industry testing first. For most other use cases, established and yet-to-be established, LTE is "good enough", just as Wi-Fi has been. And herein lies 5G's problem. It needs to be as available and as affordable as LTE, and is likely to receive no premium for its abilities above and beyond LTE. LTE-M and NB-IoT have become part of the 5G standard and will constitute an inherited market without technology migration, becoming 5G mMTC. But otherwise, markets must anticipate NR RedCap in 3GPP release 17, and low-cost RedCap in Release 18 - which may yet cause their own confusion and hesitation for device OEMs - for 5G to stand up to the mainstream use of LTE in the IoT.



Revenue from asset visibility software in the pharmaceutical space will grow from US\$139.87 million in 2021 to US\$353.12 million in 2026.

Asset Visibility Software and Services Revenue in the Pharmaceutical Industry (US\$ Millions)

2021	2022	2023	2024	2025	2026	CAGR
139.87	176.38	208.23	247.77	291.95	353.12	20.4%

Revenue from asset visibility software in the pharmaceutical space (encompassing manufacturer and distributor supply chain operations) will grow from US\$139.87 million in 2021 to US\$353.12 million in 2026. COVID-19 brought the pharmaceutical supply chain into sharp focus, as actors along the supply chain faced shortages and delays of supplies and medicines, and as the rollout of the COVID-19 vaccine required the highest levels of speed and efficiency. While the vaccine rollout was successful from a logistics perspective, it also demonstrated the value of solutions for building agility and resilience, reducing overhead and damaged product costs, and improving speed and efficiency, particularly as supply chain challenges continue into 2022. Real-time asset visibility tools play a foundational role in building these solutions, enabling enterprises to track and monitor products, assets, and vehicles in both closed-loop and open-loop supply chains. Increasingly, visibility software from platforms ingesting IoT device data or aggregating carrier information is becoming an essential tool and the foundation for supply chain digital twins.

Higher revenue will come from the non-cold chain market due to its much greater size by volume and revenue, though adoption of visibility technologies in the cold chain will happen at a faster rate and will address different use cases, such as risk management. Suppliers offering asset visibility or supply chain optimization technology tools must stop thinking in silos and understand instead how the supply chain technology market will evolve and with whom they must work to position themselves competitively and take advantage of this significant opportunity.



Tancred Taylor
Research Analyst



Device and application platform services revenue for LPWA-LTE technologies like Narrowband IoT and Cat-M are forecast to reach almost US\$13 billion in the top three application segments by 2026.

LPWA-LTE Revenue for Device and Application Platform Services (US\$ Millions)
Application Segments: Asset Tracking, Smart Meters, and Home Security and Automation

2021	2022	2023	2024	2025	2026	CAGR
3,311	4,942	6,466	8,365	10,380	12,999	31%

Device and application platform services revenue for Low-Power Wide Area (LPWA)-LTE technologies like Narrowband IoT (NB-IoT) and Cat-M are forecast to reach almost US\$13 billion in the top three application segments by 2026.

The top three application segments are asset tracking, smart meters, and home security and automation. Use cases are predominantly for small footprint devices with low throughput applications. Battery preservation is an important reason that the LPWA-LTE technology is dominant in these application segments. A driver of LPWA-LTE growth is User Datagram Protocol (UDP)-based messaging protocols like Constrained Application Protocol (CoAP), which have less data packet loss than their Transmission Control Protocol (TCP)-based counterparts. Another driver of growth and adoption is Lightweight Machine-to-Machine (LwM2M), which is an application layer initially designed to function on top of CoAP, standardizing functions for device management applications that are a substantial component of the device and application platform services bucket. Thus, greater adoption expands the overall opportunity for players in this bucket to almost US\$13 billion in these top three segments.



Abdullah Haider
Research Analyst



By 2026 there will be 634,858 Bluetooth indoor positioning and Real-Time Location System deployments globally, achieving an almost 2.5X increase since 2021.

Bluetooth Indoor Positioning and RTLS Implementations

2021	2022	2023	2024	2025	2026	CAGR
262,332	313,658	376,631	452,522	546,662	634,858	19.33%

ABI Research forecasts that, by 2026, there will be 634,858 Bluetooth indoor positioning and Real-Time Location System (RTLS) deployments globally, growing from just over 262,332 in 2021, achieving an almost 2.5X increase during this time.

For RTLS and indoor positioning tasks, Bluetooth Low Energy (BLE) is becoming an increasingly vital technology with many implementations that target multiple market segments and use cases. An increasing interest in RTLS across manufacturing, healthcare, and warehousing and logistics enterprises, among others, combined with key Bluetooth features, such as minimal power consumption, very low hardware costs, strong accuracy, and high levels of interoperability among major vendors, have led many in the space to invest in BLE RTLS and indoor positioning solutions. Furthermore, within the existing base of RTLS implementations, higher tag volumes are being driven by larger-scale deployments and broader usage of tags in a variety of form factors, enabled by a wide range of Bluetooth solution providers.

Advances in the Bluetooth specification (e.g., Bluetooth 5.1 Angle of Arrival (AoA) and Angle of Departure (AoD) techniques, enabling sub-meter precision) and the ability to leverage Bluetooth-enabled Wi-Fi access points for location services are expanding the Bluetooth location ecosystem, providing additional signal coverage and additional market reach. Universal smartphone compatibility provides further interoperability for affordable indoor positioning solutions, combined with BLE beacons, while the demand for more open, interoperable, and scalable RTLS ecosystems places Bluetooth in a strong position to take advantage of the need for digital transformation enabled by indoor positioning across numerous market verticals.



Andrew Zignani
Research Director



Content Delivery Network (CDN) revenue will increase from US\$10.4 billion in 2021 to US\$25.2 billion in 2030.

Content Delivery Network Revenue (US\$ Billions)									
2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
10.4	11.3	12.3	13.4	14.6	16.0	17.7	20.1	22.4	25.2

For all the hype the metaverse receives around virtual worlds and assets, it is the build-up to this interconnected future where the physical and digital are merged that deserves more attention. Trends across digital media and advertising, immersive, hybrid workforces, and evolutions in technology (i.e., 5G advanced and upcoming 6G) are all coming together to change how we consume content, work, access services, and communicate. These changing markets, especially as they come together, will create tremendous demands on networks (i.e., data and ultra-low latency connections) and computational resources. One market that stands to benefit from this build-up to the metaverse is the CDN market.

The CDN market needs to be viewed as more than content delivery; it has already expanded to security (content, service, and enterprise) and application acceleration/edge computing, and should be seen as part of a multi-network edge that also includes devices, telco/MEC, and cloud edges. The CDN edge will slot between the telco/MEC and cloud edges. For CDN companies, applications like low-latency streaming (sub-1 second), personalization, and application acceleration that benefit from localized resources, but do not require the lowest levels of latency offered by MEC, will create expanded opportunities for CDNs. Further development of the foundational building blocks of the metaverse, coupled with the arrival of consumer-class smart glasses, will accelerate opportunities at the edge, creating a positive shift (in the 2026 time frame) in the revenue growth curve depicted in the CDN revenue forecast—as long as the CDN vendors adequately invest in their edge computing solutions. It is still early days and years before the metaverse begins to reach a state a maturity, but the build-up still represents significant opportunity for those companies that keep an eye on this future and invest during this time.

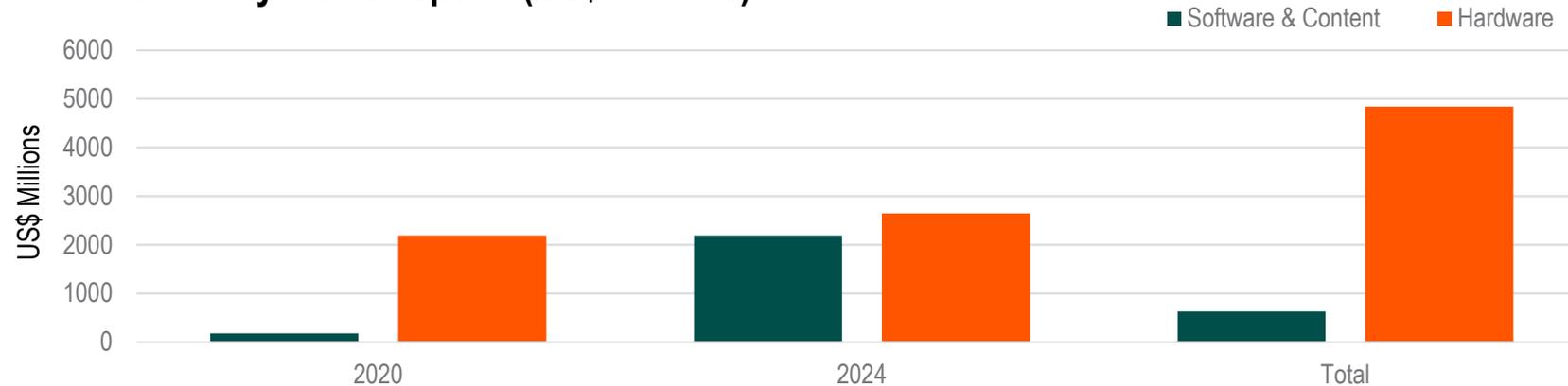


Michael Inouye
Principal Analyst



In 2024, the Extended Reality (XR) market spend will hit US\$4.84 billion, up from US\$630 million in 2020.

Extended Reality Market Spend (US\$ Millions)



Jake Saunders

Vice President
Asia-Pacific & Advisory Services

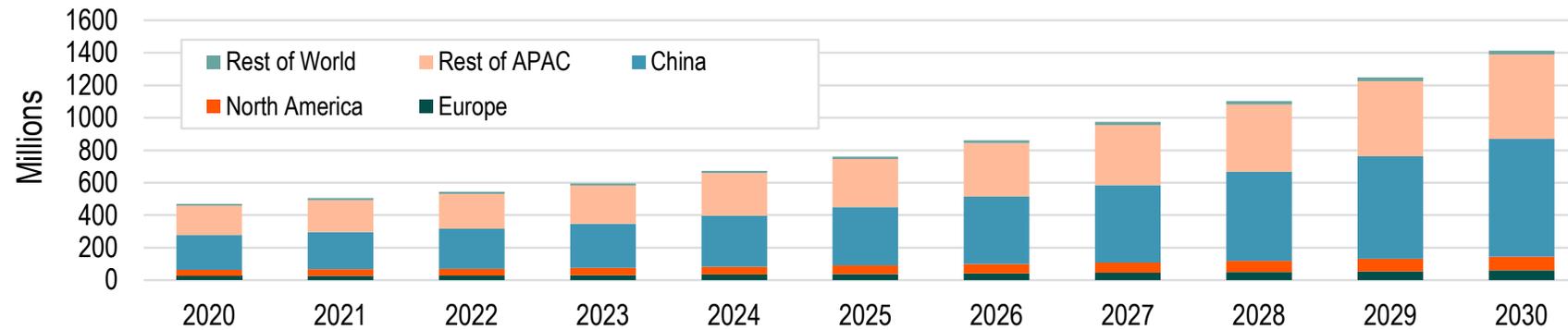
In 2024, the Extended Reality (XR) market spend will hit US\$4.84 billion, up from US\$630 million in 2020; 54.7% will derive from hardware, and the rest will be from software and content.

A rich ecosystem is developing with notable innovators, such as Nreal, VIVE, and Pico, producing XR kits for consumers and businesses.



Surveillance cameras in urban areas are expected to reach over 1.4 billion by 2030 at a CAGR of 11.6%.

Surveillance Cameras in Urban Areas by Region



Lindsey Vest
Research Analyst

In the next five years there will be over a billion CCTV cameras in operation in urban areas. This massive number of cameras is not only significant because of the sheer volume but also because of increased capabilities due to AI, machine learning, computer vision, 5G and other smart city technologies. These capabilities, along with the increased adoption of digital twins, form a crucial step in smart city data management and utilization. CCTV cameras are currently used to retroactively solve crimes, to track road traffic crimes, and to enable some forms of continuous monitoring. However, as the number of cameras increases along with the capabilities of VMS (video management systems), these cameras will become more powerful city assets. Their new use cases will include anticipatory flagging of suspicious behavior, increased capability to monitor activity such as ticket dodging, and other video analytics.

While computer vision offers major smart city opportunities, there are still many privacies and legislative challenges ahead. The EU is a world leader in privacy and regulation, and is currently looking at the legislation surrounding AI, a draft of which was published in April 2021. It will be important for technology companies to not only look at the opportunities that increased surveillance capabilities brings but also any pending regulation.



The Matter specification, which is still unpublished, will be supported within 117 million smart home device shipments by the end of 2022.

Smart Home Matter Compliant Hardware Shipments by Type (Millions)

	2022	2023	2024	2025	2026	2027	2028	2029	2030
Devices	109.90	169.92	270.96	380.82	473.42	622.90	863.22	1,243.04	1,590.55
Controllers	6.88	14.38	21.69	31.49	34.66	37.08	38.68	40.14	36.89
Total	116.78	184.30	292.66	412.31	508.08	659.97	901.90	1,283.18	1,627.44



Jonathan Collins

Research Director

The Matter specification, which is still unpublished, will be supported within 117 million smart home device shipments by the end of 2022. With a host of major players, technology suppliers, and partners already pledged to delivering Matter compliant offerings, the specification will dominate the smart home landscape within five years. By 2027, more than half of the world's key smart home devices will ship supporting Matter.

Major smart home players Amazon, Apple, Google, Samsung, as well as key component and service providers ranging from NXP to Tuya have all supported the development of the specification and have announced plans to support Matter across their offerings. Matter will significantly change and drive consumer smart home adoption and use but smart home hardware vendors must assess the value and investment that Matter compliance requires, as well as the strategic impact on their roadmaps and their place in the market.



Infotainment subscriptions that generate revenue for car OEMs will fall from 36% in 2020 to 25% in 2026.

Percentage of Infotainment Subscriptions Generating Revenue					
2021	2022	2023	2024	2025	2026
36%	31%	28%	27%	26%	25%

Carmakers have been making significant investments in next-generation embedded infotainment systems, but their infotainment subscription revenue model is failing to yield financial results. To compete against free mirroring solutions (e.g., CarPlay, Android Auto) and drive higher customer engagement, car OEMs are increasing infotainment services free trial periods, with some even offering free for life connectivity. As a result, the ratio of paid infotainment subscriptions (i.e., subscriptions that generate revenue to car OEMs), which is already low due to high churn rates, will decline further in the coming years.

Infotainment systems have become an important purchase criterium that can drive higher sales. Still, an effective plan of action must be developed to monetize them during the vehicle’s lifecycle and justify ROI. Monetization from delivering new features, apps, updates, and performance enhancement OTA or from smart commerce platforms offering in-vehicle payments are among the most promising strategies.



Maite Bezerra
Industry Analyst



Autonomous mobile robot shipments for last mile delivery will increase from 7,000 in 2021 to 309,000 in 2030.

Shipments of Autonomous Mobile Robots for Last Mile Delivery (Thousands)

2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	CAGR
7	14	25	40	59	89	124	169	229	309	52.32%

The challenges of last-mile delivery include shrinking delivery timelines and profitability concerns with approximately 50% of all shipping costs attributed to last mile. There are scaling issues based on available staff and fleet. It is critical that businesses fully optimize the final leg of the transportation journey to, not only materially reduce the cost of delivery, but also to offer a consistent end customer experience. Government exemptions at the federal and state levels have allowed for miles of real-life operations for at least the next several years. The U.S. DOT granted exemptions for autonomous vehicles to be deployed on public roads.

Companies are designing and enhancing form factors that are fully autonomous or at least remote controlled, from sidewalk robots to smaller road-based vehicles. Nuro inked deals and multiple trials with companies like Domino's, FedEx, Kroger, 7-Eleven, and others and is valued at US \$8.6 billion. Starship Technologies, which operates in the US, UK Germany, Switzerland, and Estonia continues to expand to over 20 universities, as well as Tesco and other partners, with a valuation of US \$5 billion. Providers also include Udelv, Kiwibot, Amazon Scout, and several other start-ups.



Susan Beardslee
Principal Analyst



Shipments of collaborative robots to warehouses worldwide is expected to cross 47,000 by 2026 at a CAGR of over 37%.

Collaborative Robots Shipments to Warehouses (Millions)

2021	2022	2023	2024	2025	2026	CAGR
9,807	13,165	18,967	26,004	34,352	47,631	37.2%

This represents dramatic growth over the under 10,000 units shipped to warehouses globally last year and the just over 2,000 collaborative robots shipped in 2020.

Collaborative robots play an important role in achieving flexible automation in warehousing operations. They are specifically designed to assist human employees as they perform various order fulfillment and replenishment tasks within the warehouse. They increase the efficiency of human workers and help close labor gaps to enable the smooth running of facilities during short-term peaks in order volume. Flexible, safe, and easily programmable, they are ideal for warehousing operations, which tend to be dynamic, and are very scalable. Collaborative robots have the ability to carry out multiple tasks with maximum precision, whereas typical warehouse robots only perform one task at a time. They are also able to perform better with every iteration through machine learning and are more mobile and lightweight than conventional robots. As collaborative robots offer various possibilities to enhance warehouse operations and perform better than comparable solutions, it's not surprising that they are surging in popularity and will continue to do so in the coming years.



Adhish Luitel
Industry Analyst



Global 5G Security revenue will grow from US\$2.067 billion in 2021 to US\$11.689 billion in 2026 with a CAGR of 41.4%.

5G Network Security Revenue (US\$ Millions)						
2021	2022	2023	2024	2025	2026	CAGR
2,067	2,907	4,004	5,629	7,968	11,689	41.4%

Network Security Technologies (i.e., Firewalls, IDS/IPS, SIEM, Anti-DDoS, etc.) will be in strong demand to secure the 5G mobile infrastructure and to provide new security value propositions to enterprise clients, especially as URLLC and mMTC applications emerge. There is a significant opportunity to meet the enterprise market demand for network cybersecurity through various sales models (direct sales as well as through partnerships) with plenty of room for a rich and diverse vendor ecosystem to thrive, from pure-play cybersecurity vendors to communication service and network equipment providers to hyperscalers.



Michela Menting
Research Director

Worldwide eSIM shipments will grow from 412 million in 2021 to 872 million in 2026.

eSIM Shipments (Millions)					
2021	2022	2023	2024	2025	2026
412.0	460.1	524.2	637.0	760.9	872.0

Despite the market growing 12% between 2020 and 2021, post chip shortage annual growth was in the 45% range, demonstrating this limiting growth factor. In 2020 the eSIM market experienced a low level of impact from COVID-19. The result was not a market decline but a limiting impact on growth. This limiting growth theme is expected to continue in the early parts of the forecast period, as it relates to the chipset shortage.

For 2022, the focus remains firmly fixed on the chip set shortage and potential impacts on the eSIM market. Overall, ABI Research's expectations are that the eSIM market will not be impacted by the chip shortage directly, though it will be indirectly impacted. If OEMs cannot procure other components, then device manufacturing will be slowed, which will result in an indirect market impact. Although supply of eSIMs may be healthy, the market risk is being presented by other chip component types and their subsequent availability.



Phil Sealy
Research Director



Global revenue for the Hardware Security Module (HSM) will grow from US\$772 million in 2021 to US\$1.247 billion in 2026 at a CAGR of 10%.

Hardware Security Module (HSM) Revenue (US\$ Millions)						
2021	2022	2023	2024	2025	2026	CAGR
772	852	939	1,034	1,135	1,247	10%

The HSM market is seeing significant expansion, with new applications, expanded service offerings, and new form factors responding to emerging demands and driving innovation in what has been a traditionally monolithic market. Demand for PKI and root of trust injection in IoT environments, continued stable growth in blockchain applications, pandemic-related requirements for remote management, and deployment for identity and access management underlie some of the key developments around flexibility, scale, and configurability. Vendors are competing more intensely on new feature sets and cloud-based capabilities as demand for HSM capabilities continue to rise beyond the traditional financial, government, and enterprise domains in industries including automotive, retail, manufacturing, and telco.



Michela Menting
Research Director



China's total economic contribution from Wi-Fi is expected to grow to US\$726.3 billion by 2026, achieving a CAGR of about 33.3% from 2021.

Economic Contribution of Wi-Fi In China (US\$ Billions)						
2021	2022	2023	2024	2025	2026	CAGR
172.63	249.67	345.50	452.38	592.06	726.31	33.3%

The Chinese Wi-Fi ecosystem is expected to continue growing over the next five years, making up about 21% of the global total economic contribution from Wi-Fi. China is both a manufacturing powerhouse and a huge consumer market for Wi-Fi products and services. IoT applications in various industries, such as smart homes and warehousing, have pushed further adoption and use of Wi-Fi to generate productivity gains and efficiency. Additionally, as China continues to adhere to a strict COVID-19 policy, the home environment and its connectivity will bolster the demand for the Wi-Fi technology in short term to allow quality remote working.



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