



**5G-A x AI:
New Era, New Opportunities,
New Value**

February 2024

Foreword

In the five years since 5G's first commercial launch, the value—not just the amount—of individual consumer traffic has climbed steadily. In the household market, 5G FWA (Fixed Wireless Access) has led the growth.

5G development is now entering the 5G-Advanced (5G-A or 5.5G) stage. At the same time, artificial intelligence (AI) is becoming a key driver for profound changes in human productivity and lifestyle. The development of 5G-A and AI are becoming intertwined. Whereas AI is empowering 5G-A to expand into more Cases, the 5G-A infrastructure is allowing AI to develop to its full potential. Together, 5G-A and AI are creating a new era of 5G A². 5G A² will upgrade traditional connection services, reinvent service supply models, expand network coverage scenarios, improve virtual reality (VR) integration experiences, and create new business values.

This report focuses on the business models and value expansions of 5G in the three markets: Individual, Household, and Industrial. The report then analyzes new opportunities and values brought by the collaborative development between 5G-A and AI. GTI aims to gather the industry's consensus regarding how to realize the full potential of 5G A², and create a much broader value space for the entire industry.

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1. 5G Commercialization Has Achieved Remarkable Results in the Last Five Years

1.1 5G Commercialization is Advancing Rapidly

Since first commercializing in 2019, 5G has achieved significant progress in network rollout, terminal development, and technological evolution.

1.1.1. 5G Networks Are Expanding Rapidly on a Global Scale

The scale of 5G network coverage continues to expand. According to the International Telecommunication Union (ITU), 5G networks now cover 38% of the global population. China, in particular, has built the world's largest commercial 5G network. According to data from China's Ministry of Industry and Information Technology (MIIT), the country's total number of 5G base stations reached 3.282 million at the end of November 2023.

5G networks have become a focal point for investment. GSMA Intelligence forecasts that operators worldwide will invest USD 1.5 trillion in capital expenditures between 2023-2030, with approximately 90% of this investment in 5G to cover 62% of the global population by 2030.

The commercial scope of 5G continues to expand. According to the Global mobile Suppliers Association's (GSA) analysis, 578 operators in 173 countries and regions are investing in 5G as of October 2023. Among these, 290 operators in 114 countries have launched or trialed 5G mobile services and 152 have launched or trialed 5G FWA services.

1.1.2. The 5G Terminal Industry is Booming

GSA data also shows that a total of 224 manufacturers worldwide have announced around 2,036 5G terminals (both commercial and upcoming models), including 1,079 5G smartphones by the end of 2023. Nearly 80% of these terminals are commercially available. Compared to 2022, the number of commercial 5G terminals has increased by 13%. In high-income countries, 5G

smartphones account for over 59% of smartphone sales revenue. In addition to 5G smartphones, FWA and enterprise application terminals (such as modules, industrial or enterprise routers, gateways, or modems) are also showing momentum. In 2023, over 40% of FWA shipments were 5G-enabled, amounting to 13.8 million units, an 86% increase from the previous year.

1.2. 5G Commercial Value is Gradually Realized

1.2.1. Overview of 5G Value

The 5G business model involves operators integrating internal and external resources to provide customers with products and services based on 5G networks, achieving user base increase, market and business expansion, and revenue growth.

The economic, social, and industrial developments in the 5G era provide conditions for innovations in business models. The blooming development of the mobile internet in the 4G era drove rapid growth in operators' traffic revenue. In the 5G era, superior network capability, stronger digitization demand of human-machine-object interactions, and a more integrated industrial cooperation ecosystem have led to richer 5G product services and more diversified 5G charging models.

Business model innovations are happening in all three major markets: Individual, Household, and Industry. In the individual market, new opportunities for network services are emerging to support emerging products and applications. In the household market, new demand in segmented markets is being created for broadband access. In the industry market, new value chain functions are being introduced along three dimensions: industry, scenario, and product services.

Innovations in 5G business models promote the value of the 5G market. The individual market is rising steadily, the household market is experiencing rapid growth in subscriber numbers, and the industry market has

taken the first step in revenue transformation. These three markets together are driving the continuous growth of operators' revenue.

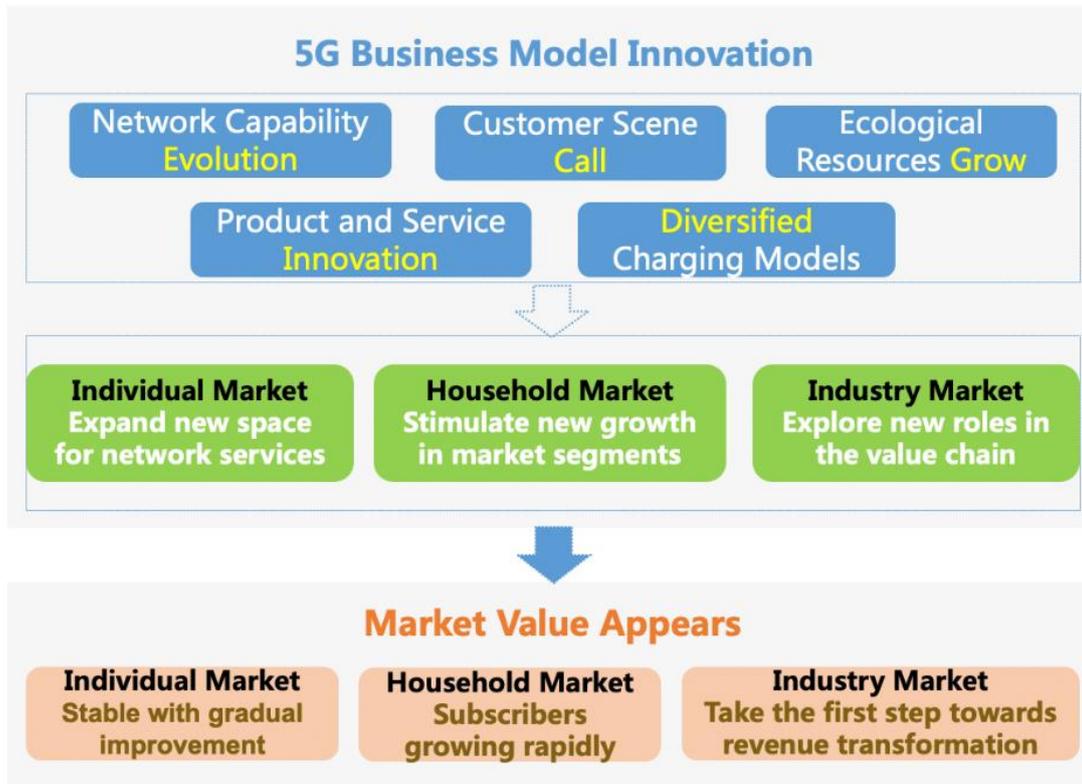


Figure 1. Innovation in 5G Business Models, Driving Market Value Manifestation

The following section begins with an analysis of the individual, household, and industry markets. It then examines 5G's application scenarios, key resource capabilities, monetization models, and successful cases of various types of products and services, before concluding with a bird's eye view of the development of global 5G business models.

1.2.2. 5G Business Model Innovation

1.2.2.1 Individual Market: Expanding New Space for Network Services

The individual consumer market remains the key to operators' 5G revenue base. Operators provide 5G connectivity services, 5G connectivity assurance services, and 5G end-to-end integrated services.

a) 5G Connectivity Services

In terms of connectivity services, data traffic is still the focus of

monetization for global operators, targeting individual customers. The evolution of Internet applications towards cloudification and high definition (HD), in combination with the demand for real-time connectivity of smart terminals, has led to higher network traffic requirements. Compared to the rapid replacement of 3G by 4G network services, 5G and 4G network services will coexist for a long time. **Operators adopt 5G premium pricing, raising the threshold for using 5G packages, and thus making 5G network traffic more valuable.**

[Case 1: Vodafone UK's 5G Connectivity Services Based on Intergenerational Premium Pricing] In Vodafone UK's Pay-as-you-go SIM package, only customers with monthly fees of 20 Euros or more enjoy 5G connectivity services, thereby achieving 5G's premium connectivity relative to 4G.

UK Vodafone-Pay as you go SIM Packages Services					
Package Type	5G		4G		
Monthly fee	40 Euros	30 Euros	20 Euros	15 Euros	10 Euros
Data per month	Unlimited	100GB	40GB	20GB	7GB

Table 1. Vodafone Pay-as-You-Go SIM Package Services in the UK

b) 5G Connectivity Assurance Services

In the 4G era, a few operators such as Elisa in Finland, have explored the provision of services based on network downlink bandwidth. With 5G, immersive and interactive mobile Internet applications demand higher and more personalized requirements for bandwidth, latency, and other network capabilities. **More operators are now actively exploring different application scenarios when providing bandwidth, latency, and other network assurance services for specific customers through 2C or 2B2C channels, and extending value beyond traffic usage through 5G network capabilities.**

[Case 2: China Mobile's 5G QoS Capability Invocation Service] China Mobile has established a network capability invocation platform for Internet

application service providers using APIs. Game, payment, XR, and other internet service providers can invoke different levels of 5G QoS on this platform to provide network capability assurance for their customers, and to improve customer experience.

China Mobile's 5G QoS Capability Invocation Services
1. Product introduction: By invoking the QoS Guarantee Capability API on the China Mobile Capability Open Platform, customers can provide customized network quality guarantee services such as bandwidth, delay, jitter, and bit error rate, etc., for target CMCC users across the country, effectively improving the business experience.
2. Product functions: QoS guarantee can provide guaranteed wireless network performance for target services such as mobile games, mobile payments, and online live broadcasting, etc., it establishes a dedicated Internet channel for the target service and guarantees the minimum bandwidth of this service in densely populated areas. The guaranteed bandwidth provided includes 100, 200, 300, 400, and 500 kbps, and the uplink and downlink bandwidth can be freely combined.
3. Product pricing: 0.05 RMB/time, enjoy tiered discounts based on quantity

Table 2. China Mobile's 5G QoS Capability Invocation Services

c) 5G End-to-End Integrated Services

Operators provide individual customers with applications such as cloud games, AR/VR, ultra HD videos, content rights for music and reading, and smart terminals such as smartphones, wearable devices, and XR headsets. This is accomplished through R&D or cooperation with third-party applications and terminal manufacturers. By bundling 5G with application rights into the terminals, operators provide integrated services to individual customers. Compared to 4G, operators now provide richer services and more diverse types of smart terminals. Integrated services help to stimulate users' traffic usage as well as increase the value of single-user packages and gain more revenue.

[Case 3: Singtel's Integrated 5G End-to-End Services in Singapore]

Singtel's 5G packages bundle network services with applications/rights and

terminals. For applications/rights, Singtel provides two months of antivirus services, video, and other applications. For terminals, different packages have different terminal subsidies. The top two packages include free iPhone 15s.

Singtel-5G Service Package in Singapore				
Package Type	Data	Voice / SMS	Services	Included Terminal Price
XS	30GB	100 Min / 100 SMS	McAfee antivirus, 2 months free usage of Spotify & Calm	\$625
S	100GB	300 Min / 300 SMS	\$100 Loyalty Vouchers, McAfee antivirus, 2 months free usage of Spotify & Calm	\$485
M	130GB	600 Min / 600 SMS	\$150 Loyalty Vouchers, McAfee antivirus, 1GB Global Roaming Data, 2 months free usage of Spotify & Calm	\$300
L	160GB	800 Min / 800 SMS	\$250 Loyalty Vouchers, McAfee antivirus, 2GB Global Roaming Data, 2 months free usage of Spotify & Calm	\$30
Pro	230GB	1200 Min / 1200 SMS	\$400 Loyalty Vouchers, McAfee antivirus, 3GB Global Roaming Data, 2 months free usage of Spotify & Calm	Free
Family	Unlimited	1800 Min / 1800 SMS	\$500 Loyalty Vouchers, McAfee antivirus, 30GB Global Roaming Data, 3 Mobile Terminals share data, 2 months free usage of Spotify & Calm	Free

Table 3. Singtel's 5G Package Services in Singapore

1.2.2.2 Household Market: Stimulating New Growth by Segments

In the household market, 5G FWA has significantly narrowed the speed gap with fiber access, enabling competitiveness in the household broadband access market. Operators promote 5G FWA in households mainly for two reasons: 1) to seize the fixed broadband market; 2) to provide network access services to household users in areas where laying fiber is not suitable. Types of 5G FWA service include: 5G mobile broadband access services, 5G mobile broadband + home video bundle services, and individual + home converged

network services.

a) 5G Mobile Broadband Access Service

5G FWA can supplement household fixed broadband. Operators generally price based on speed rates. 5G FWA cannot fully replace fixed broadband, it is considered a niche market service.

[Case 4: Austria Hutchison Whampoa Rate-Based 5G FWA Service] Austria Hutchison Whampoa uses a 5G SA (Stand Alone) network to provide unlimited monthly traffic for household customers and classifies its service according to upstream and downstream speed rates.

Austria Hutchison Whampoa 5G FWA Service Packages			
Package Type	Data	Uplink speed	Downlink Speed
FIX Data 150	Unlimited	Maximum 20Mbit/s	Maximum 150Mbit/s
FIX Data 250		Maximum 100Mbit/s	Maximum 250Mbit/s
FIX Data 500			Maximum 500Mbit/s
FIX Data 1000		Maximum 250Mbit/s	Maximum 1000Mbit/s

Table 4. Austria Hutchison Whampoa 5G FWA Service Packages

b) 5G Mobile Broadband + Home Video Bundle Service

Fiber broadband operators often provide broadband + home video integrated services to customers. However, due to concerns that significant increases in video traffic will increase the burden on 5G networks, few operators have launched 5G mobile broadband + home video services.

c) Individual + Home Converged Network Service

5G FWA providers generally also provide mobile network services. Mobile operators bundle FWA services with cellphone plans to provide converged network services to individual customers, to gain market share in household broadband.

[Case 5: T-Mobile US Family Broadband Plan] T-Mobile US customers who also subscribe to the operator’s home internet service plan can enjoy service fee discounts. Depending on the cellphone plan they choose, customers can receive a few months of complimentary video service, such as Netflix, Apple TV+.

T-Mobile US Family Broadband Plans			
Packages	Fee	Device	OTT
5G Home Standalone	\$50/Mon (Auto Pay) \$55/Mon (Auto Pay)		—
5G Home with Go5G, Magenta, or Essential mobile plan	\$40/Mon (Auto Pay)	Wi-Fi 6 5G Router	6-Month Apple TV+ (with Mobile Plans)
5G Home with Mobile Go5G Plus or Magenta MAX mobile plan	\$30/Mo (Auto Pay)		Netflix, Apple TV+ (with mobile plans)

Table 5. T-Mobile US Family Broadband Plan

1.2.2.3 Industry Market: Exploring New Roles in the Value Chain

Compared to 4G, one of the biggest changes brought about by 5G is its extension to the industry market. 5G’s rich application scenarios allow operators to expand a wide range of products and services across many industries.

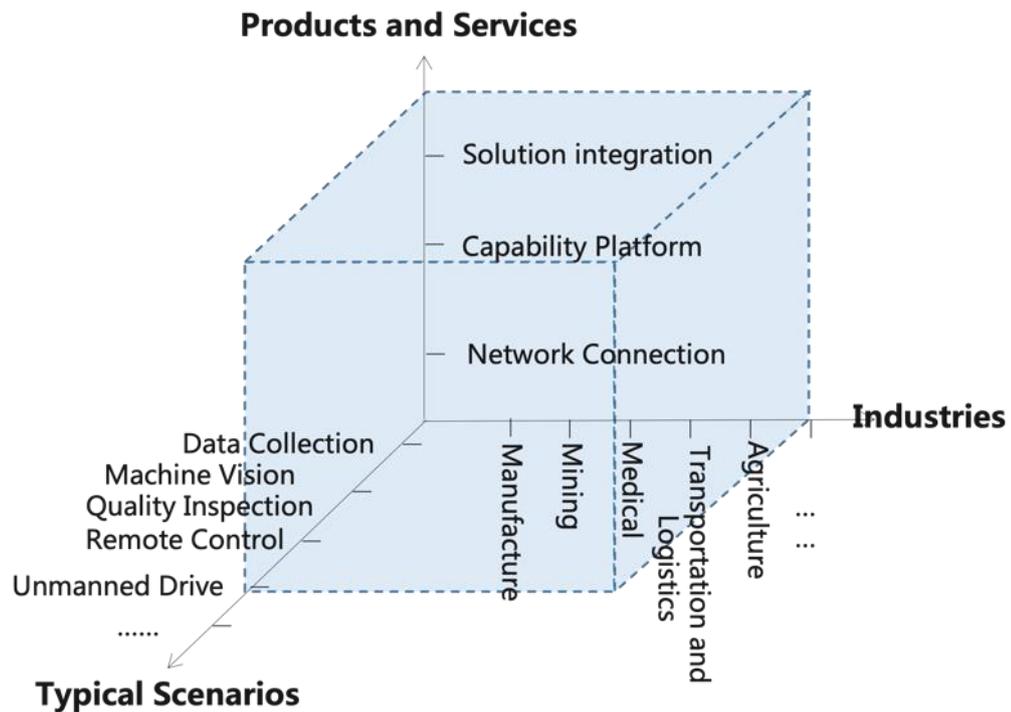


Figure 2. Three-Dimensional Space of 5G Industry Market

From an industry market perspective, each industry is comprised of a large number of enterprises with different production and operation models, digital transformation needs, and paths. 5G private networks can serve thousands of enterprises with customized network designs and services.

From a scenario service perspective, typical 5G application scenarios such as machine vision quality inspection and data collection are common to different industries. Operators can extract common network requirements from standardized products and services, and provide them to enterprise customers conveniently and quickly.

From a perspective of product and service, operators are considering their role and value creation from a broader perspective. Leveraging 5G connectivity services, operators now collaborate extensively with ecosystem partners, actively extending capabilities to platforms, solution providers, and integrated services. In the process, operators transform themselves from dedicated network operators to platform enablers and solution providers, and thus expanding revenue sources.

a) As a Private Network Operator: Provide Customized Private Networks and Value-Added Network Services to Diversified Customers

a1) 5G Private Network

Many operators worldwide have launched 5G private network services to provide customized network solutions for industry customers. For example, Orange in France provides a 5G private network to steel manufacturer Arcelor Mittal, supporting the deployment of autonomous vehicles and remote control cabins. AT&T in the United States provides a dedicated 5G network to the Dallas-Fort Worth International Airport for airport operations. KT in South Korea deploys a dedicated 5G network in the Parkwon steel ball-bearing factory to support robot operations and remote monitoring and processing of data. The monetization model for 5G private networks typically involves operators bundling network construction, operation and maintenance, and equipment leasing costs, with customers paying on a fixed cycle (e.g., monthly or yearly).

[Case 6: China Mobile Launches Three Modes of 5G Private Network]

Based on in-depth analysis and understanding of industry-specific scenarios, China Mobile has refined the typical network requirements of different industries, proposed differentiated 5G private network solutions, and launched three modes of 5G private networks: Exclusive, Dedicated, and Premium.

The Exclusive Private Network provides public network shared services, mainly for cost-sensitive scenarios. For example, Zhejiang Mobile adopts a shared UPF to rapidly develop SME customers.

The Dedicated Private Network provides the public network with dedicated services for scenarios where production data does not leave the premises. For example, Xianggang Steel company deploys a 5G dedicated private network to realize applications such as unmanned trolleys and data collection. The Premium Private Network provides private network dedicated services for

scenarios with high requirements for isolation and security. (Source: China Mobile)

a2) On-Demand Combination and Customization of Network Value-Added Capabilities

Different industries and enterprises have different demands for network capabilities, security levels, and service guarantees. In response, operators can atomize network capabilities such as bandwidth, speed, connection numbers, latency, isolation, and security, and increase personalized services such as network design and planning, network optimization, network operation and maintenance, and network key guarantee. They provide users with flexible networking and on-demand, customized network services through a multi-dimensional matrix.

The monetization model for network value-added capabilities includes private network construction fees, traffic fees, and network value-added service fees composed of different network atomic capabilities.

[Case 7: China Mobile Launches the "BAF Multidimensional" 5G Private Network Business Model] China Mobile has developed the "BAF Multidimensional" private network business model for enterprise customers, providing customers with multi-quantitative, multi-dimensional, and multi-mode billing schemes. "B" refers to three basic network functions: public network common use, public network dedicated use, and private network dedicated use. "A" refers to 13 value-added network services that can meet personalized needs such as business acceleration and service isolation. "F" refers to customers being able to combine basic network functions with value-added services according to business scenarios and actual needs to achieve flexible customization of network atomic capabilities. (Source: China Mobile)

b) As a Platform Enabler: Integrate Multiple New ICT Technologies to Create a Universal Capability Platform

5G technology intersects and integrates with other emerging ICT technologies such as cloud computing, big data, and artificial intelligence, forming a cross-industry, cross-enterprise universal capability platform. It provides IaaS services based on network and computing resources and universal PaaS capabilities based on IoT, big data, AI, and other ICT technologies for industry digital applications. As an information infrastructure provider, it supports standardized services, rapid development, and flexible deployment of digital scenarios, empowering thousands of industries, and businesses.

The monetization model under this role is mainly platform service fees, which are charged according to various types of capabilities such as computing power, cloud rendering, AI image recognition, usage duration, and call frequency.

[Case 8: Singtel's Paragon Platform Services] Singtel launched its proprietary platform Paragon in February 2022, which integrates 5G slicing, MEC, cloud, and other capabilities. Industry customers can easily develop and deploy 5G intelligent perception and intelligent decision-making applications on this platform, and manage network connections, edge clouds, and applications through self-service to shorten the R&D cycle and enter the market more quickly. Major application scenarios include AR visual sorting, AR training, real-time vehicle location tracking, and immersive mixed reality. In June 2022, Singtel collaborated with Hyundai Motor Group to manage and analyze the electric vehicle manufacturing process of Hyundai's electric vehicle factory based on the Paragon platform, supporting customers in personalizing their chosen vehicles. (Source: GSMA)

c) As a Solution Integrator: Collaborate with Partners to Deliver Integrated Solutions

In addition to providing network connections and common capability platforms, operators can also collaborate with upstream and downstream

partners in the industry chain to integrate internal and external products, platforms, applications, and systems, and serve as system integrators to provide rich digital solutions to industry customers.

Compared with the first two roles, the monetization model under this role has been further expanded, including customized integration service fees, SaaS service fees, etc., as well as revenue sharing based on the usage results of industry customers. To reduce the initial one-time investment of industry customers and ensure sustainable income, operators generally adopt a billing model that combines one-time charges and periodic recurring charges (on a monthly or annual basis). One-time charges mainly include network construction fees, 5G terminals, and initial installation, etc., and periodic charge items mainly include network usage fees, SLA guarantee fees, etc.

[Case 9: China Mobile Gansu Company Provides a Comprehensive Digital Solution for Smart Mines to Jiugang Group] China Mobile's Gansu Company provides Jiugang Xigou Mine with a digital solution from interconnected terminals, networks, platforms to applications to meet the production needs of intelligent, unmanned, and less-manned mines. The cooperative model of integrated services is that telecom operators act as the general integrators, integrating products and capabilities of communication equipment manufacturers, mining equipment manufacturers, and other software service companies. The monetization model is as follows: charging an annual service fee for 5G network, and a one-time integration service fee for unmanned, remote control, and other applications. (Source: 5G Application Matrix, GSMA 5G IN)

1.2.3 Snapshots of Current 5G Market Value

1.2.3.1 Individual Market: A Stable and Rising Base.

5G user numbers and traffic are growing rapidly. In terms of user development, according to Ericsson's analysis, the global 5G user base

reached 1.6 billion in 2023, an increase of 63% over 2022, or nearly 20% of the global mobile user base. China's 5G user base leads globally, with 771 million 5G users in by the end of November 2023, according to MIIT data. Ericsson predicts that by 2029, the global 5G user base will grow from 1.6 billion to 5.3 billion, an increase of over 330%. In terms of traffic growth, total mobile network traffic (including FWA) will reach around 160EB per month at the end of 2023 and 563EB by the end of 2029. 5G's share of mobile data traffic is projected to be 25% at the end of 2023, a 10% increase from 2022, and this share will increase to 76% by 2029.

The traffic revenue of telecom operators continues to grow, and some leading telecom operators have achieved a rebound in user ARPU. According to TechInsights, China Mobile Research Institute (CMRI) has analyzed 15 major operators in 8 countries or regions in Europe, America and Asia. CMRI found that after 5G commercialization, data traffic revenue as a share of total revenue continued to rise in most countries or regions. In terms of ARPU improvement, GSMA Intelligence’s research found that 5G reverses the downward ARPU trend in 6 of the 8 countries. The leading 5G countries in the Asia-Pacific region (such as China, Japan, South Korea, and Australia) have experienced the largest improvement in ARPU after the launch of 5G.

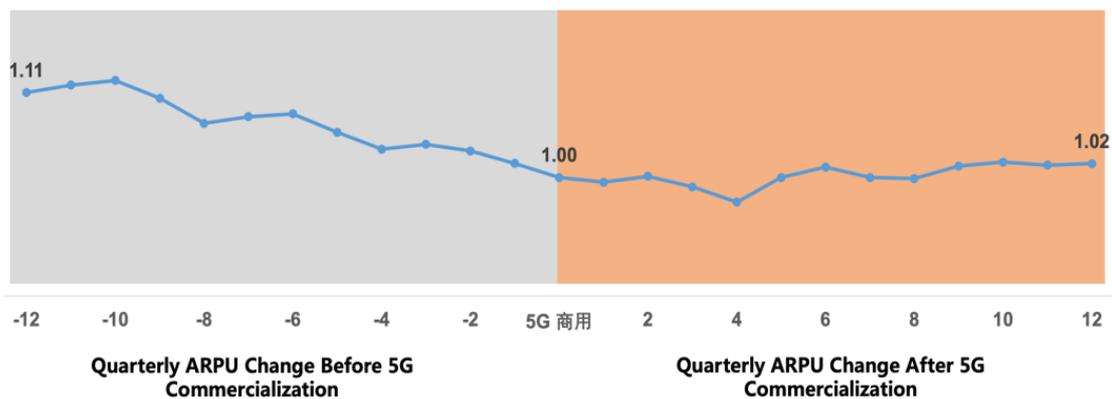


Figure 3: Changes in Mobile ARPU (Quarterly) Before and After 5G Launch

1.2.3.2 Household Market: Rapid Growth in User Numbers

5G FWA user numbers are growing rapidly. GSA reported that 152 operators have launched 3GPP-compliant 5G FWA services by December

2023, up from 109 in June. According to Omdia data, the global 5G FWA user base reached 10.57 million in 2023, 1.9 times higher than in 2022. Currently, the United States has the largest number of 5G FWA users, and it is expected that the number of 5G FWA users in the United States will exceed 13 million by 2028. According to GSMA Intelligence, 5G FWA in countries such as Austria, Australia, Germany, and the United States will account for more than 10% of total fixed broadband connections by 2025.

The potential revenue of 5G FWA is considerable. Omdia reports that global FWA service revenue was \$7.4 billion in 2023, and is expected to reach \$22 billion by 2028, with a compound annual growth rate (CAGR) of 21%. Most of the new revenue comes from 5G FWA.

1.2.3.3 Industry Market: Taking the First Step towards Revenue Transformation

5G applications in the industry are still in the early stages. Operators in most countries are actively expanding point-to-point applications and conducting end-to-end verification and commercial pilots in typical scenarios in key industries.

Chinese operators have begun explorations from points to surfaces and from surfaces to bodies, leading the rest of the world. According to MIIT, there were over 29,000 5G industry virtual private networks and over 94,000 5G application cases in China at the end of 2023. First, coverage of industries continues to increase, and 5G applications have covered 71 of the 97 categories of the national economy, achieving large-scale replication in multiple industries such as industry, mining, electricity, ports, and healthcare. Second, application scenarios continue to expand. Taking the industrial field as an example, 5G applications have moved from peripheral links such as video inspection to core links such as research and development design, production manufacturing, and operation and maintenance management, including 20 typical scenarios such as machine vision quality inspection and on-site assistance assembly. China's "Empowering thousands of industries with 5G" is

moving from ideal to reality.

Although the expansion process varies, most operators view services for digital transformation in industries as the main direction of exploration and value growth in the industry market.

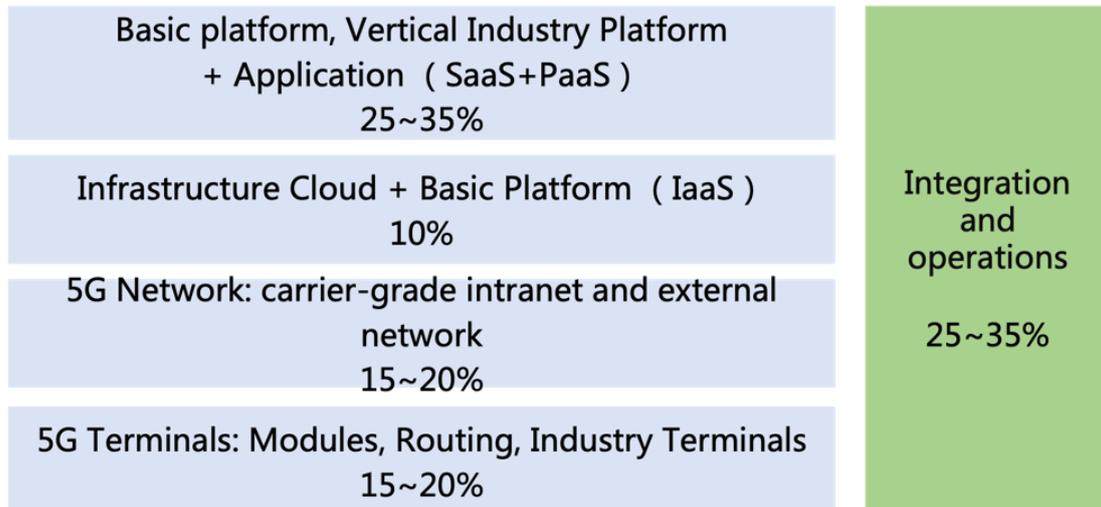


Figure 4. Value Distribution of the 5G Industry Application Chain

1.2.3.4 Three Major Markets Jointly Drive Continuous Growth of Operator Revenue

In the individual consumer market, 5G has reversed the trend of declining traffic revenue from the 4G era, while creating new growth space for operators by integrating applications and terminals to create scenario-based services. In the household market, the rapid development of 5G FWA has expanded the 5G revenue paths for telecom operators. In the industry market, operators are providing digital transformation services based on 5G. In addition to 5G network revenue, they can also obtain platform service revenue and integrated operation revenue, expanding broader growth space.

The revenue of China, the United States, and South Korea has improved significantly since the commercialization of 5G. The United States and South Korea have turned losses into gains, and China has entered a period of rapid growth. In Q3 of 2023 (the fifth year of commercial use of 5G), there is still a 4% revenue growth rate.

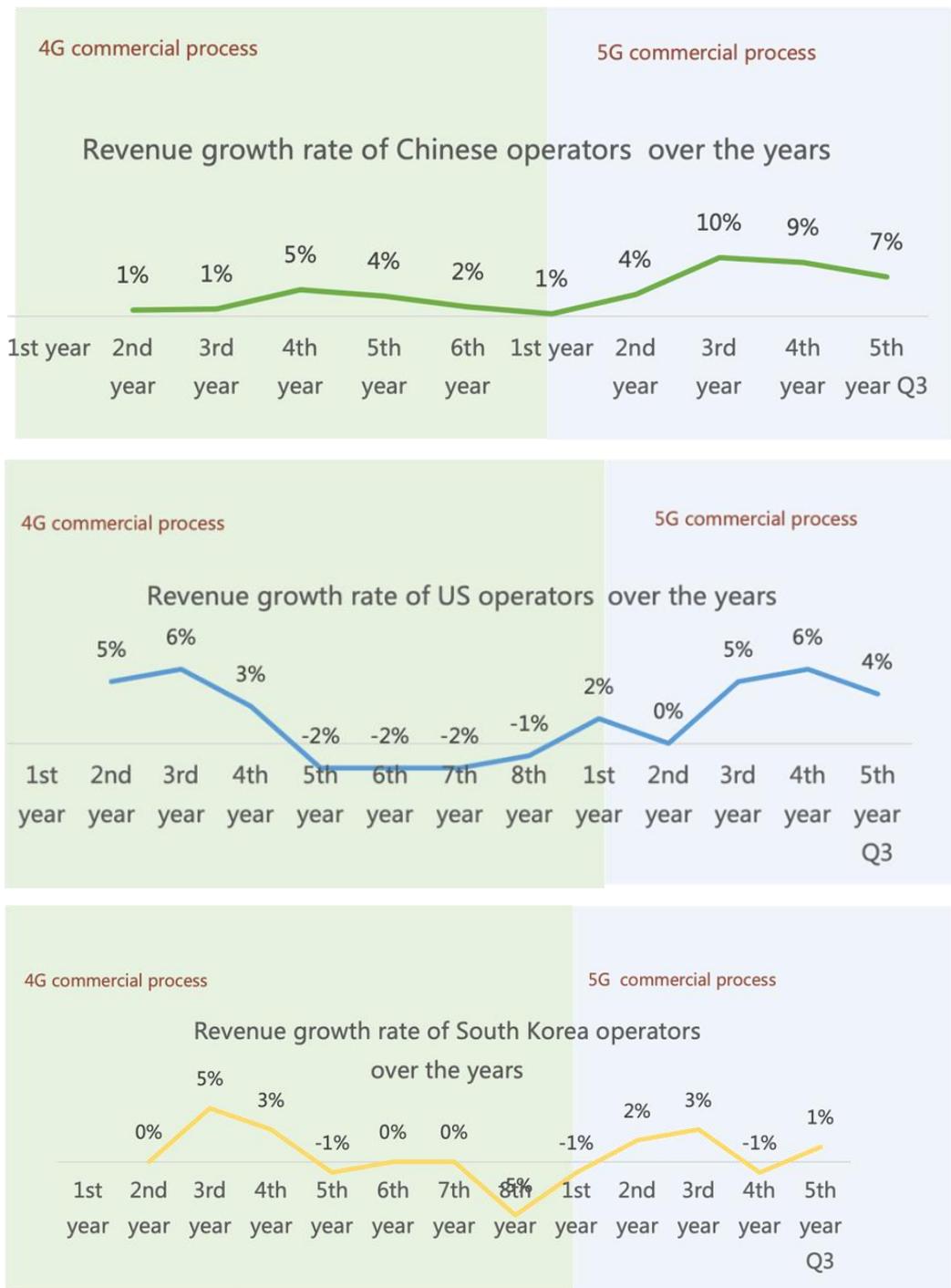


Figure 5: Revenue Growth of Operators in China, the United States, and South Korea

2. 5G-AxAI Promote Each Other, Create a New Era of 5G A²

2.1. 5G Enters 5G-A Stage

Since its inception, 5G has undergone continuous technology iteration and upgrade. Following the commercial launch of the first version of 5G, Rel-15 and Rel-16 have optimized basic performance and improved the capability triangle with intelligent cost reduction and efficiency improvement technologies. Rel-17 introduced customized industry capabilities, expanded coverage in air space and on land, and enhanced network intelligence. Rel-18 is under formulation and is marking the official entry of 5G into the 5G-Advanced. The continuous evolution of 5G technology promotes the continuous upgrade of 5G networks to more functions, better performance, greener and higher intelligence in response to changing market demands.

Global operators are now actively deploying 5G-A, prioritizing it as a strategic direction, and focusing on research and development and commercial promotion. About 30 operators around the world are conducting 5G-A technology testing and verification, and about 10 operators have released their commercial plans for 2024 and 2025. Among them, Middle Eastern operators such as UAE Etisalat and Du, Saudi Arabia operators such as STC and Mobily, are expected to release 5G-A for commercial use in 2024. European operators are actively carrying out standard research and technical verification to prepare for commercial use in 2024. Finnish operator DNA is expected to release 5G-A commercial use in 2024. In addition, countries and regions such as Asia Pacific, North America, and Latin America will also release 5G-A for commercial use.

2.2. AI Enables 5G-A to Expand More Possibilities

2.2.1 Expansion of AI Ubiquitous Business Scale

The omnipotent AI assistant. Generative AI represented by ChatGPT—integrating information acquisition (information support), intelligent services (service support), chatbots (emotional support), and creative tools (production support)—will become everyone's intelligent assistant. Human-to-computer interaction will shift from touch screen-based to natural language-

based, and the content of interaction will expand from text-based to image and video-based. In the future, richer interaction methods such as gesture recognition and eye tracking will emerge, freeing people's hands and facilitating communication with AI assistants anytime, anywhere. AI services will make personalized responses based on AI agents' in-depth understanding of users' behavioral intentions, and complete tasks assigned by users across applications, truly becoming users' assistants.

Massive content generation. On February 15, 2024, OpenAI released an innovative AI Model Sora, which is expected to open a new paradigm for the creation of AI-generated content (AIGC). Sora delivers powerful capabilities for generating videos from text and images. It also generates virtual characters and scenes, language understanding capabilities and physical world simulation capabilities. Soon, such technology will be widely used in media, film, television, games, education, and other fields, greatly improving the efficiency of content production, lowering the threshold for creation, and allowing non-professionals can easily create high-quality video content. In the long term, this type of technology is expected to be further advanced to generate dynamic virtual spaces that can be interactively explored, thus simplifying the development process and cost of complex virtual environments, and allowing more creators and developers to participate in the construction of the metaverse.

Comprehensive intelligent transformation of the industry. The advanced stage of industrial digital transformation is intelligence. Leading companies in various industries are taking the lead in entering the intelligent stage. The focus of this stage is to use AI to process information and data, replacing "human intelligence drive" with "digital intelligence drive", and realizing self-adaptation, self-correction, self-coordination, self-diagnosis and self-repair of systems, machines, equipment, and terminals.

2.2.2. The Implementation of AI on the Terminal Side Promotes the Ubiquity of AI

5G mobile phones are expected to support the terminal-side

implementation of large-scale AI models in the short term. It is estimated that in 2024, 50% of mid- to high-end mobile phones (US\$300-700) and most flagship mobile phones in the Chinese market will support device-side, large-scale AI models. According to Counterpoint Research, global GenAI smartphone shipments will be approximately 47 million units in 2023, are expected to exceed 100 million units in 2024, and grow to 522 million units in 2027. The proportion will increase from the current 4% to 40%, with a compound annual growth rate of 83%.

AI terminals will expand from mobile phones to various forms of terminals, to achieve the ubiquity of AI. According to Canalsy forecasts, the penetration rate of AI-compatible PCs is expected to reach 37% in 2025, and AI-compatible PCs will account for approximately 60% of all PC shipments in 2027. In addition to traditional personal terminals such as mobile phones and computers, new AI-compatible smart terminals and industry terminals with rich forms and different functions will also gradually penetrate.

2.2.3 5G-A x AI Network Capability Enhancement

2.2.3.1 AI Helps 5G-A Networks Achieve Intelligent Connections

5G-A is evolving the industry from traditional handheld terminals to XR, passive IoT terminals, integrated sensing and communication drones, and other new forms of services. This is initiating higher requirements on network guarantee and real-time adjustment capabilities.

AI can achieve multi-objective real-time optimization of different services, generate multi-dimensional air interface parameters and RF adjustment schemes, quickly and accurately meet the needs of various services, improve network resource utilization, and enhance capacity, coverage, and anti-interference of the network. At the same time, AI can realize the overall management of cross-site resource allocation in real-time, further enhancing the overall network capabilities.

2.2.3.2 AI Assists 5G-A Network Intelligent Operation and Maintenance

AI can train and model 5G-A networks, achieve digital expression, computational simulation, virtual and real synchronization, map physical site wireless network quality, business indicators, etc. to the digital world, and detect network problems in real-time or even in advance.

As the number of network sites continues to increase, network optimization task becomes increasingly complex. Intelligent networks can build network-level, user-level, and business-level multi-dimensional experience models in real-time, dynamically monitor and analyze network quality, conduct wireless planning and optimization in advance, and provide network adjustment suggestions to reduce network operation and maintenance complexity.

2.3. 5G-A Must be There Wherever AI Needs it

Diversification of AI terminal carrier: 5G is an important cornerstone of the "connectivity of everything". Whether it is consumer-grade terminals such as mobile phones, VR headsets, AR glasses, service robots, industry terminals such as industrial robots, or intelligent connected-vehicle terminals, 5G-A supports seamless connection for various AI terminals with its ubiquitous communication capabilities in the air, space and ground.

AI promotes changes in human-computer interaction, and 5G-A is the key basis for 24-hour intelligent assistants to be online. With the enrichment of human-computer interaction functions and changes in interaction methods, the duration of human-computer interaction will increase significantly. 5G-A supports multimodal and real-time interaction between humans and machines with its deterministic network capabilities, enabling AI to truly become a 24-hour intelligent assistant.

AI triggers massive computing, 5G-A is the core engine for real-time collaboration between cloud-edge-end computing. AI, together with

other information technologies such as XR, spatial video, spatial computing, and digital twins, is driving the convergence of virtual digital space and the real world. Dynamic environment modeling, real-time motion capture, image rendering processing and other means of constructing the virtual world make computing ubiquitous. 5G-A networks, with their wide coverage, high reliability, low latency, real-time connectivity, sensitive perception of business needs, and flexible scheduling capabilities based on computing power, can support real-time collaborative computing and real-time decision-making of cloud-edge-end computing.

3. 5G A² Create New Opportunities and Bring New Value

3.1. New Connections: AI Helps Call Services Migrate from Communication Connections to Service Connections

5G New Calling is based on video calls, combined with AI, media processing and other technologies on the network side to bring users a new intelligent video call experience.

5G new calls use AI to generate communication content, such as customized avatars, language recognition and real-time translation. AI has also revolutionized call interaction methods, allowing real-time recognition of faces and gestures, AR markers, etc.

For individual customers, the AI capabilities of 5G new calls not only improve communication efficiency, and help the elderly and disabled people to eliminate the digital divide, but also make communication more interesting and improve user experience. It will help telecom operators to maintain their traditional voice services.

For industry customers, AI helps to achieve a closed-loop service that includes the entire process of content interaction, visual menus, identity authentication, and online signing during calls, create a unified portal for various enterprise services, and realize the migration from communication connections to service connections. Meet requirements of various industry application scenarios, such as government services, medical assistance, and enterprise after-sale service.

[Case 10: China Mobile Jiangsu Company New 5G Calling Trial] China Mobile Jiangsu company's 5G new call service has been in pre-commercial trial. An important function of the trial is the light-up screen application, which plays a preset video during the call. The video can show a person's real or virtual image. The government or corporate public image promotion or advertising, as well as real-time text, pictures and other information published by sales. These functions can improve the efficiency and fun of voice interaction, and bring

visualized, personalized value to customers.

As of February 16, 2024, China Mobile Jiangsu company has developed more than 2.7 million new 5G call individual users, and the MOU value of new call users has increased by more than 20% on average. According to a comparative analysis of data from 500,000 new 5G call users between November 2023 and January 2024, the proportion of video call users increased from 16% to 40%, and the average video call minutes increased by 87 minutes.

For industry applications, it has introduced two ecosystem partners, Volcano Engine and Meitu Xiuxiu, and is preparing to develop 400,000 small and micro merchant advertisers.



Figure 6. The interface of 5G New Call Service

3.2. New Services: AI Helps Create Customized and Integrated Services

3.2.1 Provide customized services based on user personalization

With the support of AI, 5G-A networks can realize intelligent perception services, intelligent scheduling capabilities, and intelligent operation and maintenance, meet users' personalized demand, and realize personal business

experience operation and maintenance, as well as the intelligent connection of everything in the industry.

For individual customers, AI automatically generates corresponding strategies based on the user distribution, business distribution, and experience requirements of each community, using a one-stop-one policy approach to more refined guarantees for different business experiences and support experience management.

For industry customers, it can realize flexible provisioning, intelligent operation and maintenance of 5G-A networks, and customized network guarantees for customers' intelligent applications.

[Case 11: China Mobile Hubei Company Live Broadcast Service Guarantee Test Based on 5G-A Smart Base Station] With the vigorous development of e-commerce live broadcast business, the network requirements from upstream live broadcast scenarios are also increasing. China Mobile Hubei company and Huawei company conducted a live broadcast guarantee experimental test on a 5G-A smart base station. The test successfully verified the 5G-A smart base station's ability to accurately identify services and trace quality differences, and realize automatic optimization of network guarantee parameters. The average speed of upstream live broadcast users in the test area increased by 35%, and the proportion of live broadcasts in 1080P HD increased by 14%.

3.2.2 Create Integrated Services Based on Industry Intelligent Application Scenarios

As the intelligent transformation of the industry deepens, the demand of industry customers for intelligent applications has gradually become stronger. Typical intelligent application scenarios such as AI design, quality inspection, AI inspection, and AI training are penetrating thousands of industries. Intelligent applications require the integration of a series of technical capabilities such as computing power, algorithms, data, and network connections, as well as the

integration of terminal hardware, application software, and operating systems. Operators can provide industry customers with integrated solutions that integrate terminal, network, computing, data and intelligence technical capabilities.

[Case 12: China Mobile Provide 5G AI Quality Inspection Solution] Hang Gang Lace company mainly produces lace and lace fabrics. It is a typical labor-intensive industry. The company relies on employee experience in the inspection process, resulting in problems such as unstable quality control, high cost of inspector training, etc. China Mobile teamed up with Hang Gang Lace and Huawei to integrate AI defect detection algorithms, 5G edge computing and other technologies to create a 5G edge defect detection solution. The recall rate and precision rate of this solution have reached the "double 9" standard, which is much higher than the industry's manual recall rate and precision rate of 70%. The human-machine PK test results show that within the specified time, human inspector finished 86.5 meters lace inspection, and 8 defects were detected; AI inspection of the same pattern reached 143.5 meters, and 26 defects were detected. It is estimated that 10 AI inspection equipment can replace 25 quality human inspectors, increase the yield rate from 80% to 92%, and save more than 3 million RMB in labor costs¹.

3.3. New Scenario: Building an AI-Enabled Three-Dimensional Smart Network

The combination of 5G-A and AI can build three-dimensional smart networks on the ground and at low altitude space, generating more new network application scenarios.

3.3.1 5G A² Promote Autonomous Driving Towards High-end Intelligence

Autonomous driving is the product of the deep integration of new-generation information technologies such as mobile communications, AI, and

¹ Case study and data source: <https://mp.weixin.qq.com/s/p0RY1dvE4tAVJieUTFyzdA>

high-performance computing. It is the main direction of intelligent and networked development in the current global automotive and transportation field. Autonomous vehicles are equipped with a variety of sensors to sense the surrounding environment and use AI and other technologies to achieve autonomous vehicle control and the planning of driving paths.

Currently, L4 unmanned logistics vehicles have achieved large-scale operations in many cities in China, becoming the first application for large-scale implementation in the autonomous driving industry. Autonomous vehicles require massive AI training data and continuous optimization of iterative models. In the traditional solution, manual data copying, manual screening, and manual annotation are costly and inefficient, seriously affecting the iteration cycle of the training model. The development of large AI models will, on the one hand, promote the automatic annotation of massive data and greatly improve the efficiency of autonomous driving training; On the other hand, based on its strong analysis ability, it can realize the intelligent perception and prediction of complex states, which is closer to the real state of human driver than previous rule-based algorithms.

5G-A's large uplink and low-latency network capabilities support AI massive data upload, cloud training, and vehicle/edge collaborative reasoning. 5G-A and AI jointly promote autonomous driving towards high-end intelligence, and help to achieve the large-scale implementation of "vehicle-road-cloud integration". In 2029, the global autonomous driving market will reach 2,057 billion RMB².

[Case 13: China Mobile Provides AI Autonomous Driving Solutions for Unmanned Logistics Car Companies] China Mobile partners with Huawei and autonomous vehicle companies to develop and implement 5G-A + AI solutions for connected vehicles. The solution mainly has three major capabilities:

² 'Domestic and international situation - China's Autonomous Vehicle Market Research and Market Assessment Report 2023-2029: Co-Development Industry Research Institute, 2022

1) Large bandwidth of massive data uploads. The connected vehicle collects hundreds of GB of training data such as videos and pictures every day. The 5G-A network provides a stable uplink bandwidth of more than 30M, enabling data to be automatically uploaded daily, instead of weekly copied offline in the past, it improves the iteration efficiency of the autonomous driving model from "weekly" to "daily."

2) Integration of cloud and edge AI training and reasoning. At the edge computing node, based on the timing fusion of Huawei Ascend large computing power clusters, integrated BEV large model pre-training technology, to complete the training of mainstream autonomous driving models and adaptation of inference models, such as Yolo X, PillarNet, and Lane ATT, and enabling automatic cleaning and automatic annotation of data at edge nodes, reducing the amount of data sent back to the central for AI training.

3) Collaboration of vehicle-side computing, through Ascend AI computing located at Edge UPF, achieves a balance of computing between the car and the cloud. Combined with the ultra-low latency characteristics of 5G-A, the vehicle realizes the integrated decision-making of bicycle sensing and collaborative control, solving the problem of insufficient computing power on the vehicle.

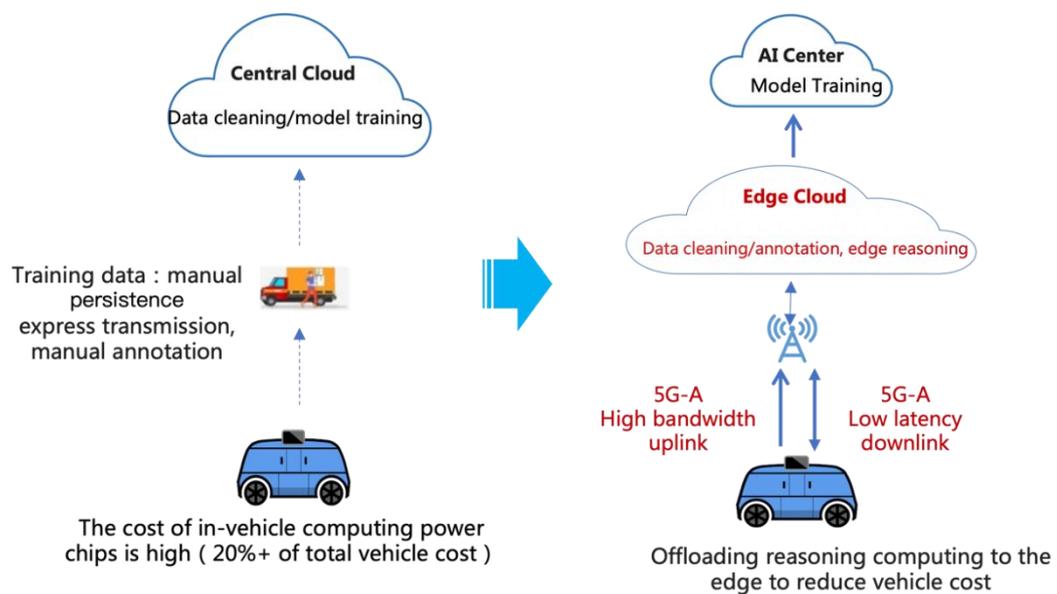


Figure 7: 5G-A + AI Connected Vehicle Solution

3.3.2 5G A² Creates New Smart Low-Altitude Business Economy

Low-altitude economy refers to a comprehensive economic system that relies on low-altitude airspace, including various manned and unmanned aircraft, it is an effective supplement to ground transportation. Low-altitude space is a natural resource, and its conversion into economic resources requires safety management measures. Regarding communication, it is necessary to support such as drone communication and manual takeover. In terms of perception, it is necessary to intelligently identify low-altitude drone route trajectories and specific route trajectory deviations to ensure that the airspace is visible and manageable. A series of AI + sensing and communication technologies such as sensing and communication RCS large model database, AI trajectory and behavior prediction, and AI algorithm channel modeling can improve low-altitude route operation efficiency and detection accuracy, ensure the safety of routes, and help create new capabilities for low-altitude space management and efficient services hosted by AI. The market size of China's industrial drone is expected to reach 314 billion RMB in 2027³.

[Case 14: China Mobile ISAC and AI Integration] China Mobile has joined forces with industry partners to enhance the capabilities of 5G-A sensing and communication integration in the low-altitude economy further by introducing AI technology.

First, object recognition is more accurate. The traditional perception of detected objects relies on point cloud imaging to generate RCS features, which are matched by the RCS fixed feature database to determine the object category. China Mobile took the lead in proposing and introducing a large sensing and communication model database, to label and train massive object recognition features so that the accuracy of future object recognition will be greatly improved, and ensure that the false alarm rate is within 5%.

³ 'White Paper on Low-altitude Network Information Service Capabilities' : China Mobile (Chengdu) Industry Research Institute, China Mobile Communications Research Institute, 2023

The second is to make applications more intelligent. Currently, the perception and identification of drones on the route can only achieve real-time tracking and presentation of the trajectory. After the introduction of AI functions, it can predict the trajectory and behavior, and provide early warning before the drone deviates from the route or collides, improving safety management.

The third is eliminating spectrum interference, reducing network cost and improving network efficiency. Different from traditional channel modeling, China Mobile introduces AI channel modeling and interference elimination methods to solve the interference problem of multipath reflection and reduce the occupation of spectrum resources.

3.4. New Experience: Use AI to Improve the Immersive Space Experience that Integrates Reality and Virtuality

In the 5G A² era, the immersive space experience of virtual and real integration will bring new opportunities for business innovation.

3.4.1 Naked-Eye 3D: Experience Three-Dimensional Space without Wearing Equipment

Naked-Eye 3D allows users to experience three-dimensional space without wearing equipment. AI eye-tracking technology allows unlimited viewing angles. 300ms fast eye tracking, visual angles up to 70 degrees, and accurate measurement distances to millimeters, creating the best vision effect. At the same time, using AI to convert 2D to 3D can help break through the bottleneck of content production, and reduce 3D content production costs. Naked-eye 3D can be widely used in many scenes such as film and television, games, phone calls, and advertising. 3D content requires approximately 1.5-4 times the bandwidth of corresponding 2D content, which can further promote the growth of 5G traffic.

[Case 15: China Mobile Zhejiang Company Creates a Naked-Eye 3D New Experience] China Mobile Zhejiang Company and Huawei have created 5G+

intelligent game viewing experience spaces in five cities hosting The Asia Games. Based on the cloud computing platform and AI intelligent algorithm, 2D video sources and live content are converted into 3D formats in real-time, allowing users to watch the games without wearing glasses. Pads and mobile phones can "enter" the 3D game venues, and truly feel the immersive experience, from the past "watching the game" experience, changed to the "immerse in the game" experience.

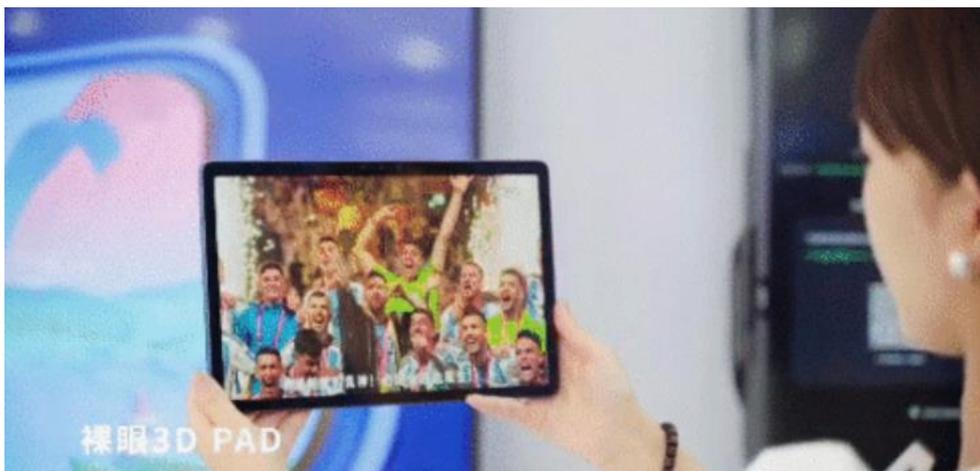


Figure 2. 3D Naked-Eye Game Watching on PAD

3.4.2 MR: Turn on Spatial Computing, Realize the Integration of the Digital World and the Physical World

XR turns on spatial computing and realizes the integration of the digital world and the physical world. On the one hand, AI has redefined virtual reality interaction methods and can realize three interaction methods: eye control recognition, gesture recognition, and voice input, replacing the past joystick control. On the other hand, AI enables leapfrog development in multimodal content generation such as text, voice, pictures, videos, and 3D models.

[Case 16: China Mobile Creates Multiple 5G VR Offline Immersive Experience Spaces] China Mobile partners with Sky Limited Entertainment, ZTE, and Qualcomm to create 5G VR offline immersive experience spaces in multiple cities in China. To solve the problems of heavy backpack equipment, poor heat dissipation, and short battery life of backpack equipment in indoor

ultra-dense immersive XR experience, as well as the network performance challenges such as high capacity, low latency, and mobility of dozens of concurrent users, we proposed an innovative solution with 5G-A intelligent service perception, Frame multi-dimensional connectivity enhancement, joint intelligent beam management, and China Mobile's self-developed 5G private network all-in-one product, deployed 5G private network in VR venues, provide users with immersive experiences such as VR cinemas, VR roller coasters, and VR parachuting, which can satisfy the needs of different scenarios such as parent-child interaction, popular science, and entertainment.



Figure 9. 5G+XR Multiplayer Immersive Game Experience

[Case 17: China Mobile Meta Convention Center, Creates a "Cloud Exhibition" for the World VR Industry Conference] The Meta Convention Center (MCC), a self-developed solution of China Mobile Migu, is a virtual and real digital event space created by integrating 5G, AI, cloud rendering, big data, AI digital human etc. technologies. AI modeling replicates the physical world and generates a new digital space. Large models upgrade the speech and text interaction of AI digital humans to achieve virtual and real interaction. On the other hand, cloud-based real-time audio and video communication capabilities enable real-time voice calls, and AI subtitles support users' multi-language real-time translation, enabling cross-language barrier-free communication. Meta Convention Center provides cloud rendering services and Metaverse event solutions for the World VR Industry Conference, such as AI virtual scene

customization, real-time audio and video conferencing, online social functions, etc., it improves the virtual-real interactive experiences for industry exhibition summits, corporate marketing, academic competitions, and blog posts.



Figure 10. World VR Industry Conference Meta Convention Center

3.5 New Value: 5G A² Creates New Business Value

After 5G is commercialized, operators' traffic revenue continues to grow, FWA develops rapidly, and the industry market develops gradually. With the beginning of the 5G A² era, 5G-A and AI will promote 5G monetization and will create a broader value space for operators.

First, the number of connections and traffic are further stimulated. According to Ericsson analysis, global mobile phone data traffic is expected to reach 403EB in 2029. According to IHS data, the penetration rate of smart cockpits in newly launched cars globally in 2025 is expected to reach more than 59%. The development of intelligent applications and smart terminals will promote the continued growth of 5G network connections.

Second, the demand for network capabilities increases. According to IDC data, the global VR/AR market space is expected to reach USD 51 billion in 2026, and according to Midia Research data, global game revenue will reach USD 301 billion in 2030. The scale development of businesses with high demand for network capabilities will generate more demand for 5G-A network capability assurance.

Third, value-added service innovation. Regarding 5G new call services, Juniper Research predicts that mobile video call users will account for approximately 50% of the total mobile users in 2025, and global 5G voice users will reach 2.5 billion in 2026. Therefore, the number of new 5G call users is expected to grow significantly. In terms of digital intelligence services, it is expected that the global industry market's digital intelligence transformation expenditure will reach USD 3.4 trillion in 2026, with a five-year compound annual growth rate (CAGR) of 16.3%. The vast growth space of 5G new businesses and industry-integrated services will bring more incremental revenue to operators.

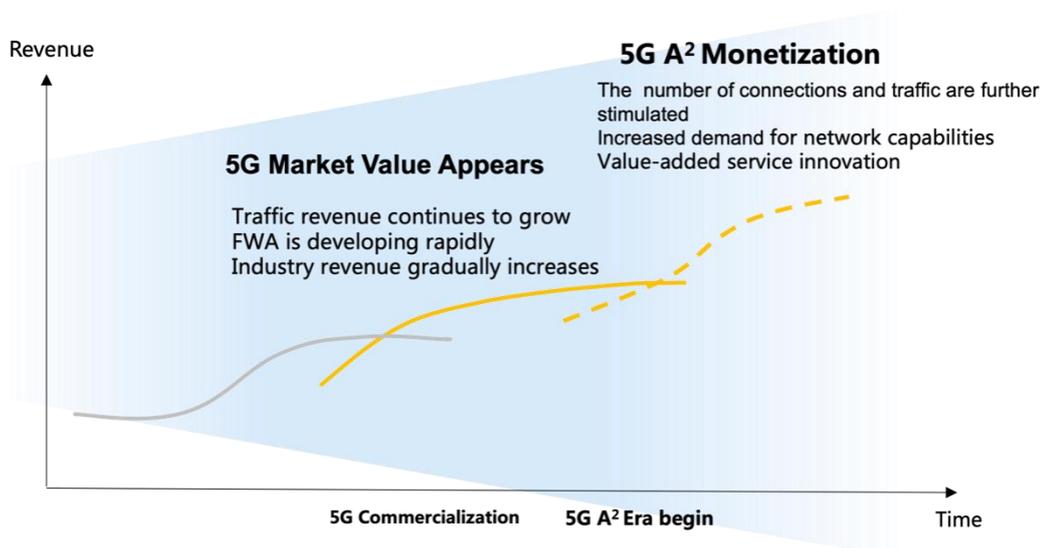


Figure 11. 5G Monetization Stage

4. Global Industry Cooperation Recommendations

Successive 5G releases are accelerating the new round of technological revolution and industrial transformation. As a key information infrastructure supporting the intelligent upgrading of the economy and society, 5G is integrating and developing with various industries, with enormous potential market value.

5G is continuously unlocking more new services and applications while constantly innovating business models. To better unleash the commercial value of 5G, GTI recommends global cooperation in three areas: research and development, business model innovation, and industrial ecosystem cooperation.

For product research and development, GTI suggests broad technology exchanges and joint research in the promotion and integration of new-generation information technologies including communication networks, cloud computing, big data, artificial intelligence, security, and blockchain. The aim is to jointly create and share digital intelligence applications, accelerate the launch of 5G characteristic products and industry solutions, and thereby cultivate new industries, new business models, and new modes of information services.

For business model innovation, GTI proposes establishing a global platform to share best practices of 5G commercialization. The aim is to promote the uses of 5G new call, 5G messaging, cloud XR, etc. in the consumer market, and to accelerate industry applications for smart factories, smart mines, and smart power in the industry market.

For ecosystem cooperation, GTI recommends fostering an open and inclusive effort among equipment makers, telecom operators, terminal manufacturers, and application providers. The aim is to jointly build a new digital and intelligent application ecosystem, promote the integration of information services into various industries, and share the new global digital and intelligent services market.

List of Abbreviations

Abbreviations	Definition
4G	The 4th Generation Mobile Communication
5G	The 5th Generation Mobile Communication
5G-A	5G Advanced
AI	Artificial Intelligence
API	Application Programming Interface
APP	Application
AR	Augmented Reality
ARPU	Average Revenue Per User
CPE	Customer Premise Equipment
FWA	Fixed Wireless Access
IaaS	Infrastructure as a Service
ICT	Information and Communications Technology
IT	Information Technology
ITU	International Telecommunications Union
MEC	Mobile Edge Computing
MES	Manufacturing Execution System
OT	Operation Technology
PaaS	Platform as a Service
RedCap	Reduced Capability
SaaS	Software as a Service
SLA	Service Level Agreement
VR	Virtual Reality
XR	Extended Reality

Reference

- [1] China Academy of Information and Communications Technology. White paper: '5G Application Innovation and Development' - Insights from the 2023 Sixth "Blooming Cup" 5G Application Collection Competition [R]. 2024.
- [2] 5G Application Phalanx, GSMA 5G IN. 5G Business Model Innovation and Development White Paper [R]. 2023.
- [3] IDC. "IDC Global Semi-Annual Digital Transformation Spending Guide" [R].
- [4] China Academy of Information and Communications Technology. 5G Application Innovation and Development White Paper - Insights from the 2023 Sixth "Blooming Cup" 5G Application Collection Competition [R]. 2024.
- [5] 5G Application Square, GSMA 5G IN. 5G Business Model Innovation and Development White Paper [R]. 2023.
- [6] IDC Global Semi-Annual Digital Transformation Spending Guide[R].2023.
- [7] China Mobile and other 67 industry chain companies. 5G-Advanced New Capabilities and Industrial Development White Paper [R]. 2022.
- [8] China Mobile (Chengdu) Industrial Research Institute, China Mobile Communications Research Institute. Low-altitude network information service capability white paper [R]. 2023.
- [9] Gongyan Industry Research Institute. Current situation at home and abroad - 2023-2029 China autonomous vehicle market research and market assessment report - Gongyan.com [R]. 2022.

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