Mobile Intelligence Integration Index Report

OMDIA GTI 中移智库

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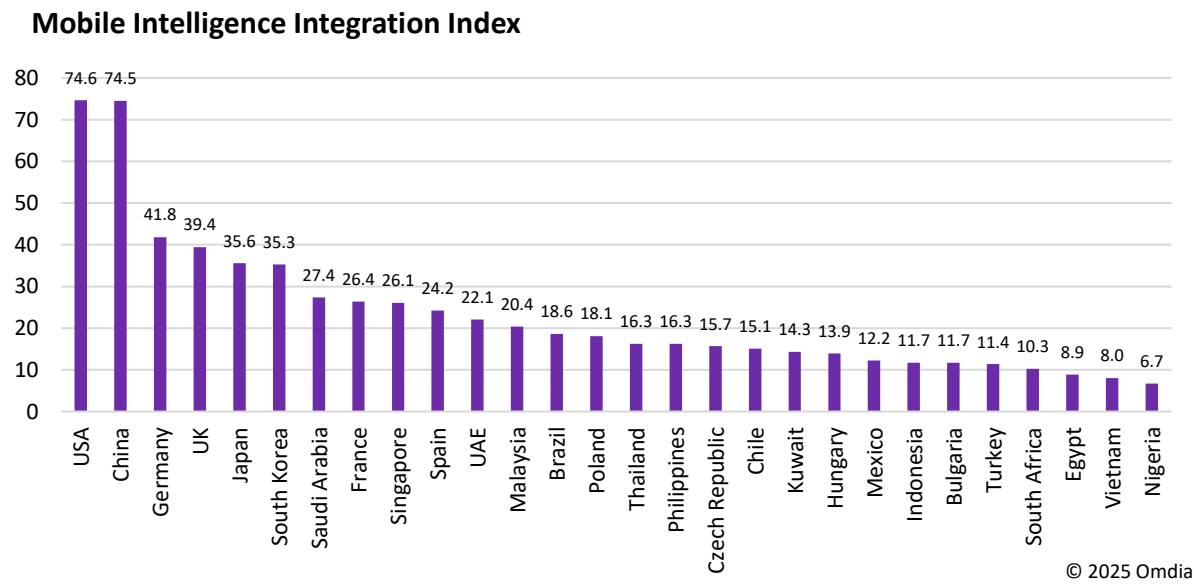
Summary

Artificial intelligence (AI) is evolving to become an integral part of people's lives and work, empowering the digital transformation of society and creating new business opportunities for telecom operators. Meanwhile, mobile broadband is evolving to a new generation, enabling more industrial applications and boosting the convergence of mobile broadband and industrial AI applications. Even though 5G-Advanced's commercial deployments are still at the early stages, initial developments have demonstrated outstanding potential for converging the advanced mobile broadband (MBB) technology and AI-based intelligence solutions.

To support and accelerate the convergence of MBB and AI-based intelligence, GTI and Omdia have worked together to define the Mobile Intelligence Integration Index (MI^3), studying and benchmarking the readiness and maturity of converging MBB and AI computing (i.e., how the world is ready and mature in leveraging MBB and AI capabilities to accelerate digital transformations of enterprises and vertical sectors).

The MI^3 model evaluates a country's development from the perspectives of mobile broadband, AI, computing, and their convergence, to help countries' industry and authorities to understand their mobile broadband and AI computing development status and decide on strategies and policies to promote an intelligent society through converging MBB and AI. 28 countries from Africa, America, Asia-Pacific, Europe, and the Middle East were studied based on the MI^3 model. The chart below shows their ranking.

Figure 1: Country Ranking by the Mobile Intelligence Integration Index



Source: Omdia and GTI

The developments of MBB and AI technologies are now pushing the convergence of MBB and AI into a new stage. AI will play an increasingly crucial role in the evolution of mobile broadband technology, while mobile broadband infrastructure is evolving into a multi-purpose platform that can offer edge computing for AI tasks. The development can create further opportunities for telecoms operators to address emerging scenarios and empower an intelligent society.

To promote and accelerate the development of an intelligent society through converging MBB and AI computing, telecom operators, and relevant government authorities should:

- Rethink business models to provide converged connectivity and computing services, allowing customers to receive more flexible and affordable AI services with guaranteed SLAs.
- Rethink infrastructure strategies to upgrade the architecture of RAN and relevant transport networks for MBB and AI computing convergence to promote the development of an intelligent society.
- Identify key AI applications and foster an ecosystem to seize business opportunities from converging MBB and AI computing for an intelligent society.
- Invest in in-house capabilities or build partnerships for MBB and AI computing convergence to equip telecom operators' technology and business development teams with professional competence.

Meanwhile, the global telecom industry can leverage its experience in narrowing the digital divide to help the immature countries improve their intelligent development. Global industry organizations like GTI could become an important international collaboration platform, where leading countries and industry players help immature countries narrow the advanced technology divide.

AI and mobile convergence accelerating

AI empowers digital transformation and creates new opportunities for telecom operators

Artificial intelligence (AI) is evolving to become an integral part of people's lives and work. It empowers the digital transformation of the entire society. Generative AI (GenAI) enables the creation of content, code, and even scientific breakthroughs.

Omdia's research indicated that the AI software market reached $97bn in 2024, a 32% increase from 2023, and will grow at an 18% compound annual growth rate (CAGR) to reach $218bn in 2029. The market for GenAI more than doubled to $15bn in 2024 and will reach $73bn in 2029, a 38% CAGR. Growth is mainly driven by enterprise demands for AI's ability to automate workflows (to save time or costs) and to deliver more personalized content to customers (to improve customer engagement and revenue).

Omdia's *2024 AI Market Maturity Survey* revealed that 59% of enterprises have dedicated AI budgets compared to 55% in both 2023 and 2022. The upward trend for dedicated AI budgets is largely consistent across verticals and regions. The survey also discovered that, while software remains the focal point of AI budgets in 2024, attention is turning to AI compute infrastructure and investing in in-house personnel. Another consumer survey, *Omdia Consumer AI Survey 2024*, indicated that adoption of GenAI has accelerated rapidly and is expected to continue to do so. Over 50% of respondents in all markets state that they use text or image GenAI applications at least occasionally, with nearly half using them regularly. The majority expect their use of AI to increase over the next year, with regular users expecting a more significant increase.

The growth of AI demands and applications creates new business opportunities for telecom operators from various perspectives. First, telecom operators are using AI to improve their productivity, including network management efficiency, customer care service experience, writing and verifying computer codes, contracts, and financial reports, etc.

To meet the growing demands for AI infrastructure, telecom operators actively invest in AI-related infrastructure, including AI data centers and connectivity infrastructure. For example, SK Telecom revealed its AI Infrastructure Superhighway plan in November 2024, including three key areas: AI data centers, graphics processing units-as-a-Service (GPUaaS), and Edge AI. European operators, such as Orange, Swisscom, and Telenor, have partnered with NVIDIA to offer sovereign AI platforms and GPUaaS services. In China, Chinese operators not only deploy hyper-scale AI data centers but also roll out high-speed and low-latency fiber networks to connect all high-demand areas on China's east coast and hyper AI data centers deployed in western China, where energy costs are much lower.

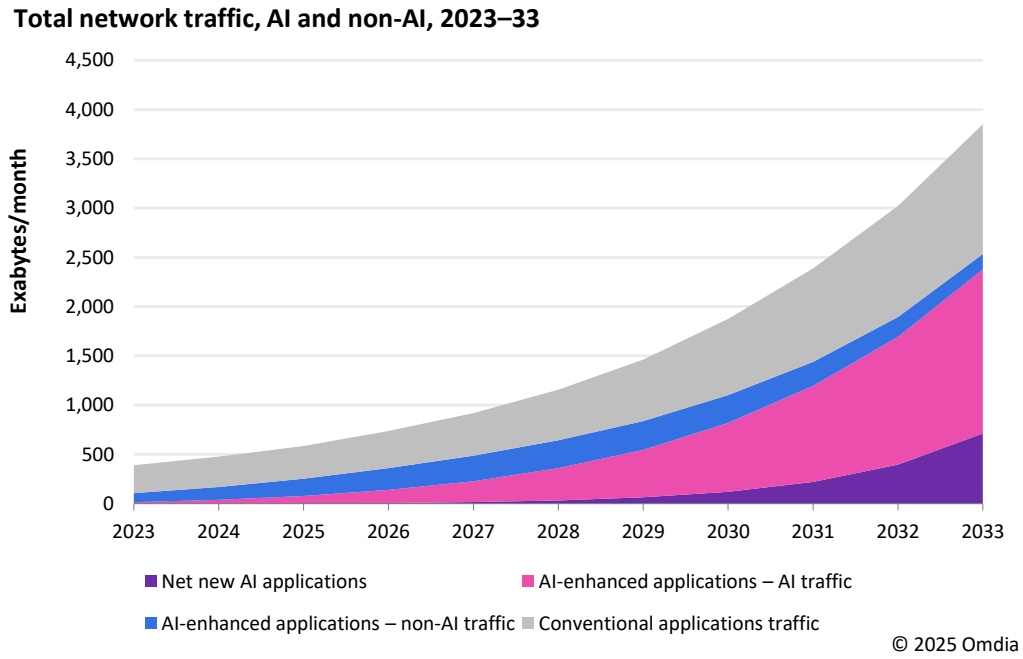
By integrating advanced computing chipsets, such as GPUs, into radio access network (RAN), the RAN can evolve from a connectivity infrastructure to a multi-purpose platform, not only providing

connectivity but also offering AI computing services. This can meet enterprise demands for proximate AI computing resources and create new revenue streams for telecom operators.

Based on enhanced infrastructure and internal capabilities, telecoms operators can also provide customers with AI applications and services. In November 2024, SK Telecom unveiled A* (Aster), an AI personal assistant service, and aims to expand the service to the global market. Swisscom offers GenAI Studio to enterprises, allowing clients to access GenAI services via API interfaces on Swisscom's AI Platform and create their own GenAI-based applications and systems. Some telecoms operators have developed, or are developing, large language models (LLMs). China Mobile, China Telecom, Softbank, and KT have developed their own LLMs for Chinese, Japanese, and Korean languages respectively. The Global Telco AI Alliance (GTAA), a joint venture of Deutsche Telekom, e&, Singtel, SK Telecom, and SoftBank is to develop and launch a multilingual, telecoms-focused LLM to help telecoms operators provide better customer service through digital assistants and other AI tools. It is expected to operate in Korean, English, German, Arabic, and other languages.

The proliferation of AI applications drives the growth of AI-related traffic. Omdia forecasts that, in 2025–33, AI traffic will have about 73% CAGR. Omdia forecasts 2031 as the crossover point where global AI network traffic exceeds conventional traffic. Smaller, cost-effective open models like DeepSeek are expanding AI innovation and competition, particularly driving AI deployments on edge equipment. Therefore, Omdia forecasts that the net new AI traffic destined for the network edge will grow by 130% CAGR in 2025-33.

Figure 2: Network traffic forecast, 2023-33



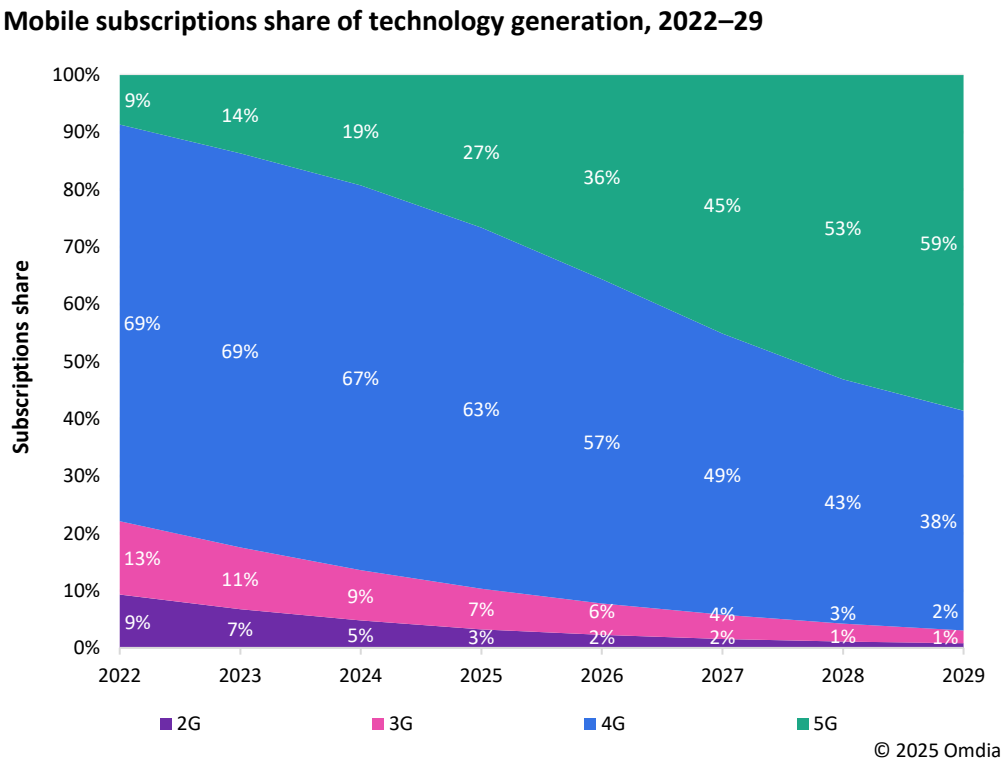
Source: Omdia

Mobile broadband evolving to a new generation

Since the initial deployments in 2019, 229 commercial 5G networks had been launched by the end of 2024, according to Omdia's data. Omdia predicts that 5G will reach a significant milestone of 3 billion subscriptions by mid-2025, just over five years after its launch, making it the second-fastest uptake globally among mobile technology generations, surpassed only by 2G.

The potential for 5G growth remains substantial. With various enterprise use cases, IoT applications, and 5G standalone yet to make a significant impact, industry expectations suggest that 5G will continue to experience considerable growth in the coming years. The global 5G landscape is set to expand significantly, with an anticipated 516 networks providing 5G connectivity by 2029. Omdia projects more than 8.3 billion active 5G mobile subscriptions by 2029, accounting for 59% of all subscriptions.

Figure 3: Mobile subscriptions share of technologies, 2022-29



Source: Omdia

The success of 5G depends on both availability and demand. 5G's future growth potential lies in its ability to revolutionize various aspects of our digital lives. Enhanced AR/VR experiences, seamless cloud gaming, advanced video communication, and the emergence of smart homes and cities are all set to benefit from 5G's capabilities, fueling consumer interest and uptake. In the enterprise sector, introducing tablets and laptops with built-in 5G modems presents a significant opportunity for device manufacturers, given the wide range of business applications possible.

Omdia's *Enterprise 5G Survey 2024* revealed that 73% of enterprises plan to increase 5G spending. The top spending areas will focus on 5G mobility for workers and upgrading existing contracts with new services like traffic priority. Network slice creation, lower power consumption, and real-time communication have premium monetization potential, with 28% of enterprises willing to pay 41% or more.

Some enterprises have leveraged the local or regional spectrum to deploy their own private wireless networks to support their business operations and enable digital transformations. According to Omdia, private 5G was the dominant or one of the key technologies in 86% of announced private wireless network deployments in 2024. Manufacturing led all industries in private-network announcements in 2024, accounting for 25% of the total. Transport, logistics, energy, and mining followed. Ports, airports, mines, and oil and gas sites remained prime deployment scenarios for private wireless networks.

Since 2024, leading operators have started to deploy 5G-Advanced and have leveraged advanced technology to seek new monetization opportunities. 5G-Advanced's speed and latency improvements improve the performance of data-intensive apps and enable telecom operators to test new monetization strategies, such as

- Differentiated tariffs based on customer segmentation.
- Speed tiers of up to 2Gbps for gamers, live streamers, etc., and 3Gbps for businesses.
- Speed and low latency guarantee (using priority scheduling).
- Data prioritization (using 5G QoS Identifier [5QI]).
- Improvement in the performance of data-intensive apps.

5G-Advanced's capabilities, such as enhanced uplink bandwidth, shortened latency, high-precise positioning, and integrated sensing and communication (ISAC), can also enable more industrial applications, particularly boosting the convenience of mobile broadband and industrial AI applications.

Initial deployments illustrate great potential of mobile broadband and AI convergence

Even though 5G-Advanced's commercial deployments are still in the early stages, initial developments have demonstrated the great potential of converging advanced mobile broadband (MBB) technology and AI-based intelligence solutions.

At Mobile World Congress (MWC) 2025, China Mobile, Huawei, and Leju Robotics jointly unveiled the world's first humanoid robot equipped with 5G-Advanced technology. 5G-Advanced's high-bandwidth capabilities enable large-scale data collection, accelerate the robotics development cycle, and help adapt humanoid robots' deep learning models to the diverse needs of various industries. 5G-Advanced solution can also enable humanoid robots to achieve precise location tracking in large-scale environments without additional equipment. "With broader bandwidth, ultra-low latency, and a more intelligent network architecture, 5G-Advanced provides a solid technological foundation for the multi-scenario applications of humanoid robots," according to Leju.

China Mobile Zhejiang Branch also works with Unitree Robotics to connect humanoid robots with Deepseek or China Mobile Jiutian's AI models through the 5G-Advanced network. Empowered by LLMs, city halls have used humanoid robotics to facilitate government affairs services.

In addition to connecting robots, 5G-Advanced is also used to connect drones with AI models from the cloud. Local governments in Zhejiang province, China, have introduced a drone-based marine inspection platform. By linking to a large-scale AI vision model on the cloud, the drones can autonomously perform marine inspections ten times more efficiently and improve work efficiency. So far, the system has been deployed for more than 20 professional inspection routes and completed 360,000 intelligent analyses.

All these applications showcase the great potential of converging 5G-Advanced and industrial intelligence solutions. The convergence is expected to significantly accelerate digital transformation and build a solid foundation for the future intelligent society.

MI^3 measures the maturity of MBB and AI convergence

Motivation and objective

As discussed above, the convergence of mobile broadband, particularly 5G-Advanced, and AI computing will accelerate industry digital transformation and create new revenue opportunities and service paradigms for telecom operators. To capitalize on this opportunity, telecom operators must promote the convergence of MBB and AI applications. However, this convergence will hardly be realized without a mature mobile broadband and AI computing ecosystem, respectively.

Telecoms operators should understand the maturity and readiness of both MBB and AI computing ecosystems to converge the two sectors. Then, operators can decide their business and technology strategies accordingly. National regulators and authorities also need to determine the country's policies for industry development and regulations based on market insights. Meanwhile, market potential and dynamics analysis can help investors identify opportunities and risks.

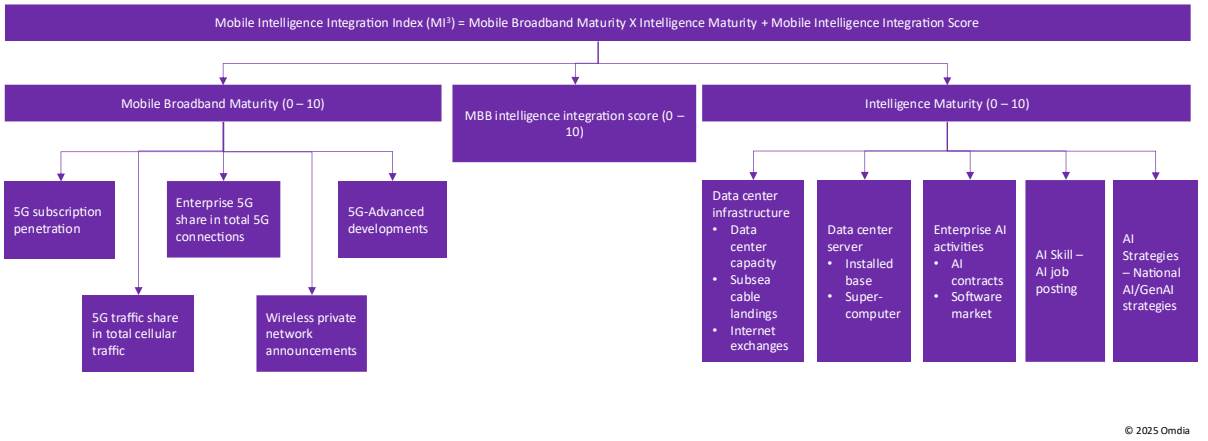
To support and accelerate the development of an intelligent society by converging MBB and AI computing, GTI and Omdia have worked together to study and benchmark the readiness and maturity of converging MBB and AI computing (i.e., how the world is ready and mature in leveraging MBB and AI capabilities to accelerate digital transformations of enterprises and vertical sectors).

The Mobile Intelligence Integration Index (MI^3) was developed to measure the maturity of MBB and AI computing ecosystems in selected countries, benchmark readiness for convergence, and support further analysis of market opportunities, risks, and relevant development strategies.

Methodology

The MI^3 is an index developed to indicate a country's readiness and maturity in converging mobile broadband and AI technologies for an intelligent society. The model evaluates the country's development from three perspectives: mobile broadband, AI and computing, and their convergence.

Figure 4: MI^3



Source: Omdia and GTI

For mobile broadband development, a country's 5G subscriptions and 5G traffic share in total cellular traffic are scored to reflect the overall 5G development status. As the study focuses on industry transformation, the enterprise's share of total 5G connections and the number of wireless private network announcements are also considered. Whether or not a country is deploying 5G-Advanced is also introduced as a factor to assess the country's progress in the mobile technology frontier.

A country's AI industry maturity and computing infrastructure readiness are evaluated from enterprise AI activities, AI skills, national AI strategies, data center infrastructure, and data center servers.

We also built an expert committee to score each country's convergence of mobile broadband and AI computing capabilities. The table below summarizes the scoring methodology.

Table 1: Mobile Intelligence Integration Index (MI^3) Methodology

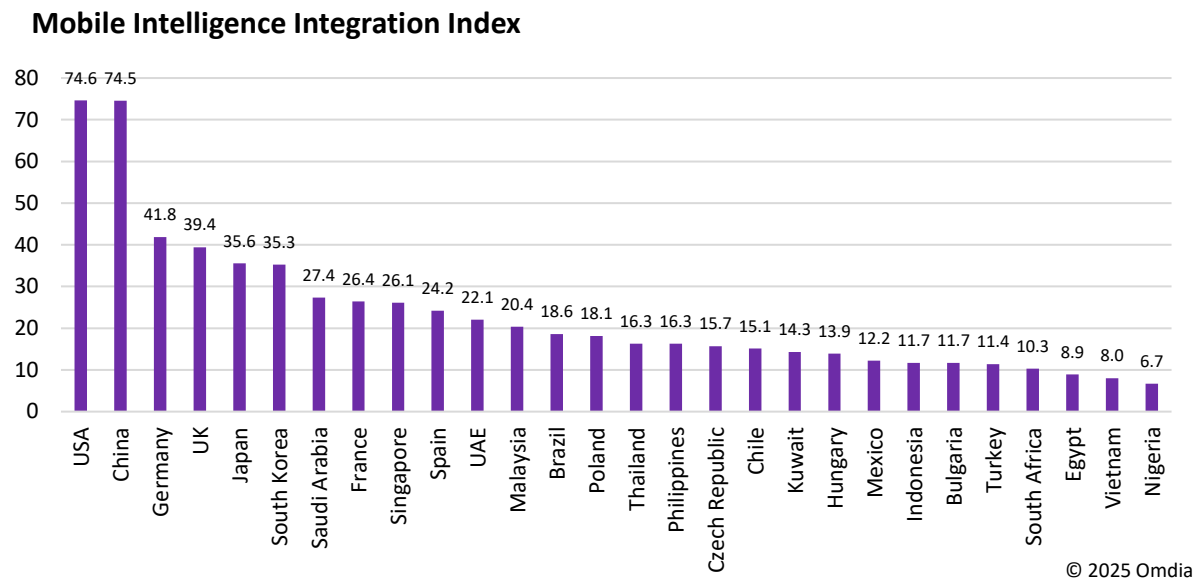
Metric	Sub-metric	Score range
Mobile Broadband Maturity Score = Average ((1.1) – (1.4)) x (1.5)	(1.1) 5G subscription penetration	0 – 10
	(1.2) 5G traffic share in total cellular traffic	0 – 10
	(1.3) Enterprise 5G share in total 5G connections	0 – 10
	(1.4) Number of Wireless private network announcements	0 – 10
	(1.5) 5G-Advanced factor: If 5G-Advanced is deployed, an adjustment factor is given.	1.2 or 1.0
Intelligence Maturity Score = Average ((2.1) – (2.5))	(2.1) Data center infrastructure: Based on data center capacity, subsea cable landings, Internet exchanges	0 – 10
	(2.2) Data center server: Based on server installed base and super-computer capacity	0 – 10
	(2.3) Enterprise AI activities: Based on the number of AI contracts and AI software market size	0 – 10
	(2.4) AI Skill: Based on AI job posting	0 – 10
	(2.5) AI Strategies: Based on a country's strategies on AI or generative AI	0 – 10
Mobile Intelligence Integration Score	GTI and Omdia established an expert committee. Experts independently score each country. The average of the experts' scores is calculated as the final score of the metric.	0 – 10
Final Score = (1) x (2) + (3)		

Source: Omdia and GTI

Ranking and findings

Based on the MI^3 model, we studied and benchmarked 28 countries from Africa, the Americas, Asia-Pacific, Europe, and the Middle East. The chart below shows their ranking.

Figure 5: MI³ Ranking



Source: Omdia and GTI

Based on the benchmarking, the 28 countries can be categorized into four groups. The table below summarizes the categorization.

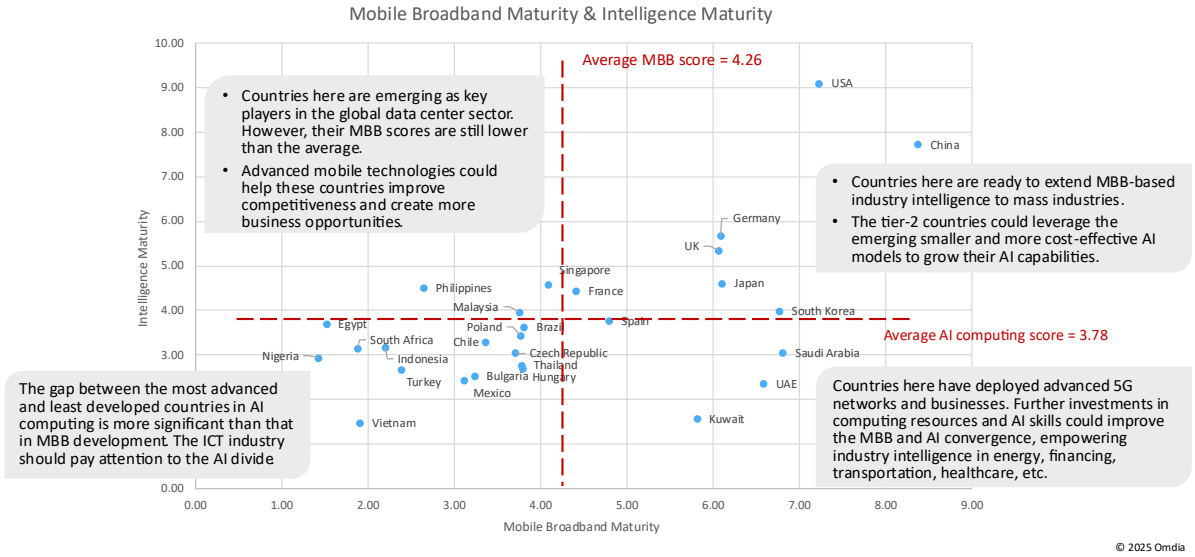
Table 2: Country categorization based on MI³ score

Group	Countries	Score range	Readiness of converging MBB and AI computing
Super power	China, US	> 70	Fully ready to accelerate the massive convergence of MBB and AI computing for an intelligent society.
Leaders	Germany, UK, Japan, South Korea	30 ~ 50	Ready to accelerate the massive convergence of MBB and AI computing for an intelligent society.
Followers	Saudi Arabia, France, Singapore, Spain, UAE, Malaysia, Brazil, Poland, Philippines, Thailand, Czech Republic, Chile	15 ~ 30	Ready to kick off the converged deployment.
Immatures	Kuwait, Hungary, Mexico, Indonesia, Bulgaria, Turkey, South Africa, Egypt, Vietnam, Nigeria	< 15	Immature to promote MBB-based AI intelligence.

Source: Omdia and GTI

In addition to the overall scores, the breakdown scores can provide more details about each country's readiness and maturity for converging mobile broadband and AI computing to develop an intelligent society. The chart below illustrates each country's position in the two dimensions, providing insights into each country's advantages, weaknesses, opportunities, and challenges in converging mobile broadband and AI computing to develop an intelligent society.

Figure 6: Mobile broadband vs. AI computing in MI³



Source: Omdia and GTI

Case studies

The MI³ benchmark can help a country's industry and authorities understand its mobile broadband and AI computing development status and decide on strategies and policies to promote an intelligent society through converging MBB and AI. Four countries' cases will be analyzed here to illustrate how the MI³ can help.

China

China gains the second place MI³ score among the 28 benchmarked countries, just behind the US by a very narrow margin. The table below gives China's breakdown of MI³ scores.

Table 3: China's MI³ score breakdown

	Score	Rank
MI³	74.54	2
Mobile	8.37	1
Intelligence	7.73	2
Mobile intelligence integration	9.82	1

Source: Omdia and GTI

China is the leading 5G market in the world. By the end of 2024, Chinese operators had gained over one billion 5G subscribers, accounting for 56.7% of total mobile subscriptions in China, and deployed 4.25 million 5G base stations, covering around 96% of the Chinese population.

For 5G industrial applications, Chinese operators have collaborated with various vertical sectors, deploying more than 18,500 "5G+ Industrial Internet" projects nationwide, including 700 excellence 5G factories. According to China's telecom and industry regulator, MIIT, 5G applications have been integrated into 80 of the 97 major national economic categories, with a total number of cases exceeding 138,000.

Chinese operators are rolling out 5G-Advanced technologies to enhance network capabilities to meet growing market demands. In the industry intelligence aspect, 5G-Advanced enhanced uplink bandwidth and shortened latency can better support industrial AI applications. Chinese operators also add intelligent computing capability to their 5G base stations to enable proximate AI computing for enterprise customers, providing affordable and low-latency inference computing services.

The Chinese government is striving for the “AI+” action plan to promote the convergence of AI technologies with vertical industries. According to MIIT, more than 30,000 smart factories, including over 1,200 advanced-level and 230 excellent-level smart factories, have been built nationwide. More than 80% of categories in the manufacturing industry have introduced AI capabilities to enhance productivity. The rise of innovative startups like DeepSeek means Chinese clients will have more access to the latest GenAI capabilities, propelling the growth of the domestic GenAI industry and creating new opportunities for Chinese enterprises to benefit from GenAI capabilities.

To support AI development, the Chinese industry is actively investing in data center deployment, particularly AI data centers. Omdia’s database and the MI^3 benchmarking indicate that China is the second-largest data center market in terms of data center capacity and server installed base. However, the advanced semiconductor supply still constrains the deployment of AI data centers and the development of AI capabilities. The AI talent pool must also be extended further to support China’s ambition of leading global AI development.

With increasing investments in AI-related R&D and education as well as the growing maturity of the domestic semiconductor supply chain, we expect China’s MI^3 score, especially the AI computing score, to increase further.

Germany

Germany is third among the 28 benchmarked countries, following China and the US. The table below gives Germany's breakdown of MI^3 scores.

Table 4: Germany’s MI^3 score breakdown

	Score	Rank
MI^3	41.82	3
Mobile	6.09	7
Intelligence	5.68	3
Mobile intelligence integration	7.23	6

Source: Omdia and GTI

German operators started 5G rollouts in late 2019. Some 92% of Germany has received 5G coverage provided by at least one network operator. The proportion with 5G standalone (SA) network coverage already stood at 90% (as of April 2024), according to BNetzA, the German telecom

regulator. Omdia predicts that 5G subscriptions will account for around 40% of total German mobile subscriptions, including IoT connections, in 2025.

The German regulator also opens spectrum bands in 3.7-3.8 GHz and 26 GHz regional 5G licenses, also known as "campus networks" or "local networks," allowing companies to operate private 5G networks for specific purposes, like Industry 4.0 applications, within a defined area. By April 2025, 465 and 24 regional 5G licenses have been allocated for 3.7-3.8 GHz and 26 GHz bands, respectively.

Advanced 5G technologies integrated with AI capabilities empower German industries' “Industry 4.0” program. For instance, Deutsche Telekom has tested a 26 GHz band private 5G solution with metal process manufacturing company Ger4tech Metall & Mechatronik for several Industry 4.0 use cases, including autonomous guided vehicles (AGVs) and autonomous mobile robots (AMRs), as well as “other challenges in industrial manufacturing.” The mmWave 5G solution can provide low latency times of three to four milliseconds RTT (round-trip time) and a data rate of over 4 gigabits per second in download and 2 gigabits in upload, meeting the demand of data-intensive AI applications.

Germany launched its national Artificial Intelligence Strategy in 2018 and has considerably increased its spending on AI consequently. The updated AI Strategy was launched in December 2020 and focuses on new developments and needs. The priorities include strengthening AI research, expanding AI infrastructure, advancing the campaign for AI skills, pushing the transfer of AI into real-world value creation and economic opportunities, etc.

However, the MI^3 score shows that Germany’s AI computing capability lags the leading country further than its mobile broadband system. Germany’s gap to the leading country is -2.28 and -3.42 in MBB and AI computing aspects, respectively, indicating that the Tier 2 countries such as Germany should more actively invest in the AI computing area to narrow the gap with superpowers and accelerate the development of an intelligent society. As Deutsche Telekom CEO Tim Hoettges pointed out, "more computing power is a must-have for the future growth of our economy, and it is a must for Europe's sovereignty that it needs in the digital age.”

In February 2025, the European Union announced an initiative to mobilize €200 billion for investment in AI, including a new European fund of €20 billion for AI gigafactories, developing trustworthy AI, and allowing every company, not only the biggest players, to access large-scale computing power to build the future. The initiative is expected to boost investments in AI computing and help Germany narrow the gap to the superpowers.

Saudi Arabia

Saudi Arabia is seventh among the 28 benchmarked countries and the leading country in the “follower” group. The table below gives Saudi Arabia's breakdown of MI^3 scores.

Table 5: Saudi Arabia’s MI^3 score breakdown

	Score	Rank
MI^3	27.36	7
Mobile	6.81	3
Intelligence	3.05	18
Mobile intelligence integration	6.60	9 (tie)

Source: Omdia and GTI

In 2016, Saudi Arabia launched the Saudi Vision 2030 initiative to decrease its dependence on oil resources and increase economic, social, and cultural diversification. Led by these goals, the Saudi government and ICT industry have maintained their focus on expanding the digital infrastructure and enhancing connectivity across rural and urban areas.

Saudi Arabia has become the largest 5G mobile market in the Middle East & Africa and the 10th globally, with 22.96 million subscriptions by 3Q24. Omdia forecasts that 5G mobile subscriptions will be up to 33.69 million, over 63% of total mobile subscriptions, by the end of 2025. This increasing 5G adoption will drive major growth in cellular data traffic in Saudi Arabia. Omdia's data show that cellular data traffic attributed to 5G will reach 7.79 million terabytes by 2024, accounting for 62.1% of total cellular data traffic in the country. By 2029, 5G is forecasted to represent 98.3% of cellular data traffic.

Saudi Arabia is actively deploying private 5G networks across various industries to drive digital transformation and achieve the goals of Vision 2030. Key use cases include smart cities, industrial automation, logistics, healthcare, and smart agriculture, with applications like remote asset control, logistics automation with AGVs and AMRs, facility surveillance, and data-driven decision-making.

Saudi Arabian operators have also started 5G-Advanced rollout, aiming to provide a gigabit experience in both indoor and outdoor scenarios. These 5G-related progresses make Saudi Arabia the third-place country in the MI^3 model's MBB benchmarking, only behind the two superpower countries.

However, even if data center investments started surging in Saudi Arabia recently, the established capacity and installed server base are still relatively low. Meanwhile, enterprises' AI activities and AI talent pool are also far behind those of leading countries. These make Saudi Arabia only 18th in the AI computing benchmark and drag the country's overall MI^3 score to seventh place. Further investments in computing resources and AI skills are expected to improve Saudi Arabia's capabilities of converging MBB and AI computing, empowering the country's Vision 2030 initiative.

Indonesia

Indonesia is 22nd among the 28 benchmarked countries. The table below gives Indonesia's breakdown of MI^3 scores.

Table 6: Indonesia's MI^3 score breakdown

	Score	Rank
MI^3	11.72	22
Mobile	2.20	24
Intelligence	3.17	16
Mobile intelligence integration	4.75	19

Source: Omdia and GTI

4G remains the main network in Indonesia. Indonesian mobile operators recognize the importance of 5G; however, progress and 5G subscription growth remain tepid, mainly because of spectrum challenges, the low penetration rate of 5G-compatible devices, and the limited use cases for both consumers and enterprises.

Although 5G subscriptions have nearly doubled since 2Q23, from 3.4 million to 6.2 million in 2Q24, the expansion of 5G networks is still limited to key urban areas with more economic and monetization opportunities. Omdia predicts that, by the end of 2025, Indonesia's 5G subscription share in its total mobile subscriptions will be 8.2%, and by 2029, it is expected to grow to 37.5%.

The slow 5G progress makes Indonesia one of the least developed countries in the MBB aspect among the 28 benchmarked countries. However, the country's booming manufacturing, mining, and logistics sectors have raised demands for infrastructure that can support real-time applications like robot control, remote monitoring, and data analysis.

Thus, Indonesia has attracted billion-dollar investments from top hyperscalers for computing infrastructures. For instance, in April 2024, Microsoft announced that it will invest $1.7 billion over the next four years in new cloud and AI infrastructure in Indonesia, as well as AI skilling opportunities for 840,000 people. Google expanded the strategic alliance with Indosat Ooredoo Hutchison in June 2024 to offer enterprise-grade AI and generative AI solutions for businesses across Indonesia.

Chinese industry giants are also actively expanding their businesses into the Indonesian market. In July 2024, China Mobile announced a partnership with Sinar Mas Group to establish ASIX, Indonesia's leading AI accelerator, to make AI technology more accessible and affordable for everyone by leveraging China Mobile's "Jiutian" AI model and its core technologies. Tencent announced in November 2024 that it will invest $500 million by 2030 to deliver cloud and AI services in Indonesia.

These AI and computing services naturally require advanced network connectivity. The Indonesian industry is exploring 5G industrial solutions. For example, Telkomsel has provided a 5G private network solution for PT Freeport Indonesia to operate mining vehicles remotely, enhancing safety and operational efficiency. It has also offered smart port solutions at Benoa Port Bali, AI- and 5G-Powered Smart Factory in Batam, etc.

Even if Indonesia is among the immature countries in the MI^3 benchmarking, the country's intelligent development can be gradually improved with continuous investments in digital infrastructures and an expanded talent pool in advanced digital technologies.

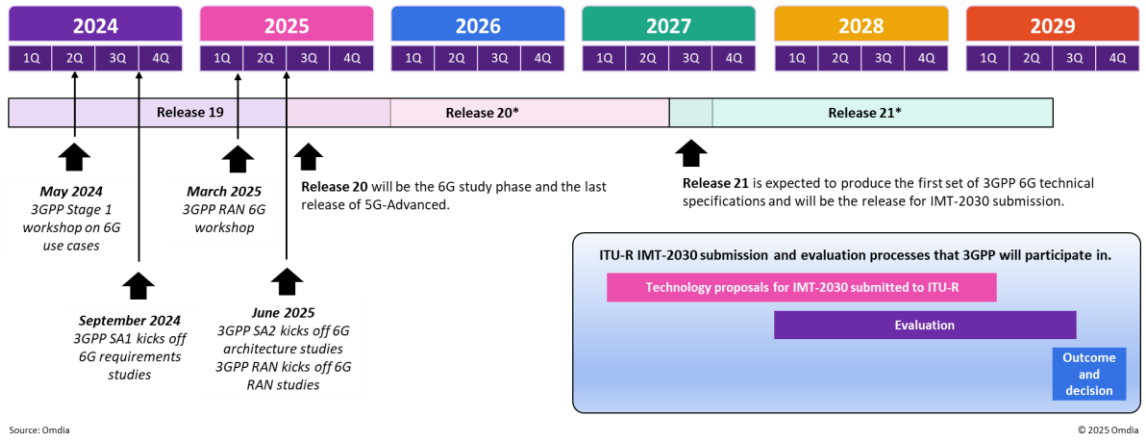
Converging MBB and AI to explore new growth streams

The developments of MBB and AI technologies are pushing the convergence of MBB and AI into a new stage. AI will play an increasingly crucial role in the evolution of mobile broadband technology, while mobile broadband infrastructure is evolving into a multi-purpose platform that can offer edge computing for AI tasks. This development can create further opportunities for telecom operators to address emerging scenarios and empower an intelligent society.

AI plays a critical role in the mobile system evolution toward 6G

The mobile broadband system is evolving to a new generation. 3GPP recently kicked off the 6G standardization and targets to complete the first 6G standard release before 2030.

Figure 7: 6G standardization timeline



Source: Omdia

The first commercial launches of 6G are expected in 2029, but as with previous technology generations, the initial phases will be slow. Omdia expects that, by 2035, approximately 22.3% of subscriptions worldwide will be using 6G, a bit lower than the 5G adoption curve, which shows 26.6% of SIMs using 5G at the equivalent stage, while subscription growth will accelerate throughout the forecast period. By 2035, over 150 countries are expected to have commercial 6G services. Asia will lead global growth, accounting for more than 70% of global 6G subscriptions throughout the period.

Meanwhile, substantial 6G RAN investment will begin in 2030, when the market for 6G RAN hardware and software is projected to reach about $4bn. This is expected to rise dramatically to $25bn by 2035 when 6G RAN investments align more closely with overall mobile capex.

AI has been introduced into the radio access network (RAN) standard since the 5G-Advanced phase and will become one of the technology pillars of 6G. Through transitioning from traditional measurement-centered to predictive capabilities-centered mechanisms, RAN operation efficiency and user experience can be significantly improved by AI algorithms, for example, to increase energy efficiency in the radio network with no degradation in network KPIs or to balance the traffic loads between component carriers and sectors to ensure high downlink throughput for all subscribers during peak traffic hours.

As the conventional approach is reaching performance limits and an AI-based approach may provide further improvement, the global mobile industry has broadly agreed that an extensible AI/ML framework, with native support for AI/ML lifecycle management, should be built for 6G. Therefore, 6G is expected to be the first AI-native air interface (AI-AI).

AI-AI use cases could include channel estimation, reference signal overhead reduction, uplink performance enhancement via AI-enabled receivers, etc. Leading companies in the industry will further explore new AI-AI use cases in the 6G standardization phase.

Leading operators have tested and demonstrated the AI-native air interface features. For example, NTT, NTT DOCOMO, and SK Telecom, through collaboration with vendors, conducted an indoor test with radio waves in the 4.8 GHz band of 6G wireless technology using AI-based baseband transmission and reception processing. The prototype, which had a GPU server and AI algorithms for channel estimation and other processing blocks, achieved up to 18% data rate improvement. Softbank also demonstrated AI-based channel interpolation by applying super-resolution technology in image analysis AI to restore degraded radio signals in complex environments. In a simulation environment, Softbank confirmed an improvement of about 30% in throughput compared to conventional signal processing technology.

Mobile infrastructure transforms to a multi-purpose digital platform to support AI growth

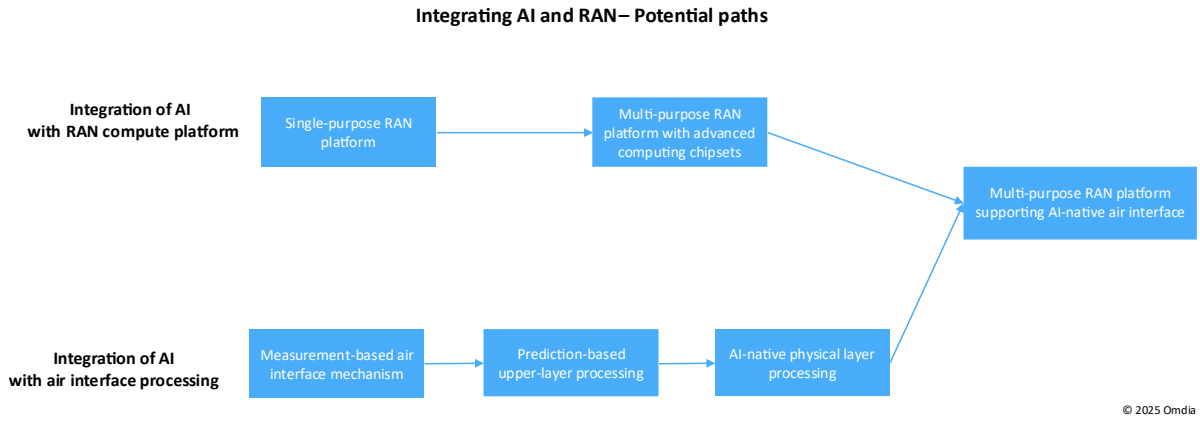
Integrating AI models and algorithms into RAN operation and air interface requires an increasing computing capacity in the RAN platform. Thus, some operators and vendors start integrating high-performance computing chipsets into base stations, potentially transforming the traditional connectivity infrastructure into a multi-purpose platform. On the multi-purpose platform, computing resources can be shared between communication tasks and AI workloads to improve infrastructure utilization efficiency and profitability, then increase telecom infrastructure value and discover new business models.

Leading operators are actively exploring the potential. China Mobile has introduced intelligent computing cards into its base stations since 2024 to enable RAN intelligent operation and provide edge computing capability to enterprise customers, especially small and medium enterprises (SMEs). Based on the intelligent base station and upgraded core network element, China Mobile can provide customers with precise differentiated service to further reduce energy costs and carbon emissions, greatly improve user experience, and thus increase revenue.

SK Telecom plans to introduce xPU (CPU, GPU, NPU, RAN accelerator, etc.) to the virtualized base station platform to implement edge AI. The computing resource of xPUs can be shared between RAN processing tasks and AI workloads from external partners. Thus, the nationwide RAN infrastructure can become an edge AI platform to narrow the gap between AI data centers and AI applications on user devices.

The edge AI initiative is one of the three pillars of SK Telecom's "AI Infrastructure Superhighway" strategy that the operator announced in November 2024. As pointed out by Ryu Young-sang, CEO of SK Telecom, "so far, the competition in telecommunications infrastructure has been all about connectivity, namely speed and capacity, but now the paradigm of network evolution should be changed. … The upcoming 6G will evolve into a next-generation AI infrastructure where communication and AI are integrated."

Figure 8: Potential path of integrating AI and RAN



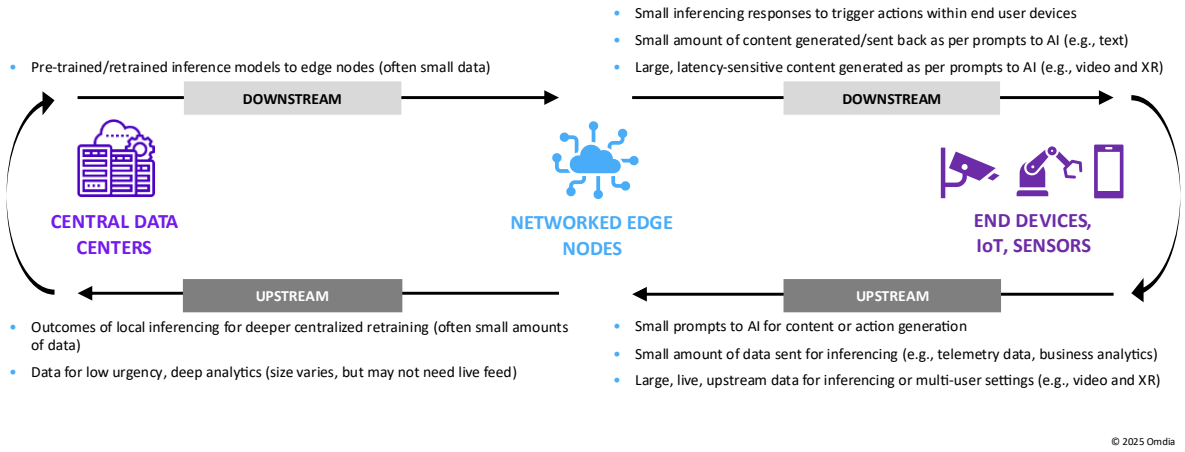
Source: Omdia

AI and MBB convergence address emerging scenarios and empower intelligent society

In December 2024, DeepSeek released DeepSeek-V3, a MoE architecture foundation model trained at a lesser cost than its global counterparts. The innovations pioneered by DeepSeek will further democratize generative AI (GenAI) and allow more companies to leverage GenAI for automation and augmentation, thanks to lower cost barriers. Smaller, cost-effective open models like DeepSeek will drive AI deployments, particularly AI inference on edge equipment.

AI deployments on edge equipment could create opportunities for telecom operators to monetize their network resources by connecting edge AI cloud and central data centers. Telecom operators can also leverage the network edge's converged connectivity and computing infrastructure to offer proximate AI computing services. With the multi-purpose infrastructure platform, telecom operators can further provide cross-domain orchestration to dynamically manage connectivity bandwidth and SLAs according to AI computing demands, improving service flexibility, affordability, and stickiness.

Figure 9: Network edge for AI computing



Source: Omdia

Considering the mass deployment of mobile base stations, RAN is a good starting point for telecom operators to explore the opportunity of proximate AI computing services, transforming traditional RAN into intelligent, adaptive, and revenue-generating platforms. For instance, Softbank has trialed its multi-purpose RAN platform in Japan to provide edge AI inferencing and dynamic resource allocation for emerging AI-native applications, such as:

- Autonomous Driving: Enable a traffic understanding multimodal AI solution to achieve unmanned driving operations
- Large Language Model (LLM) Robots: Enable real-time robot control with round-trip delay less than 0.1s.
- Retrieval-Augmented Generation (RAG) Chatbots for Customer Service and Network Support: Enable real-time data retrieval to offer accurate and context-aware responses.

In China, Chinese operators are actively trialing integrated sensing and communication (ISAC) functionalities to extend their infrastructure, not only carrying out data traffic but also monitoring vehicle traffic on the ground, on water, or over the air in low altitudes, or the distortion of key infrastructures such as dams or bridges. The ISAC feature is expected to help enterprises or authorities manage and regulate traffic and public infrastructures and create new revenue streams for telecom operators. For example, China Mobile tested the feature with Meituan's drone-based food delivery in Shenzhen.

AI capabilities at the network edge would be necessary in these ISAC use cases to accurately identify and track diverse, fast-moving objects. Cellular base stations would be good places to carry these AI workloads. AI-based ISAC service could become another use case of the multi-purpose RAN platform.

Outlook

Looking ahead to the 6G era, we believe 6G will be a natively and fully converged system of mobile and AI technologies, including the following perspectives.

- Technology convergence – AI will become a critical component in the radio transmission technology, protocol stack, and network operation of the 6G system. Enhanced mobile connectivity can also enable distributed AI computing between data centers and user devices, accelerating AI service proliferation.

- Architecture convergence – The 6G RAN could become a multi-purpose digital service platform, providing not only mobile connectivity but also proximate AI computing services. On the other hand, the embedded AI computing capabilities can significantly improve RAN's flexibility and agility.

Service convergence – Data is the lifeblood of AI applications. Either training or inference requires a large amount of data transmission. The mobile and AI convergence in the 6G system can enable mobile operators to develop innovative business models to converge data connectivity and AI computing offers.

Recommendations

Promote and accelerate the development of an intelligent society

Through the MI[3] benchmarking and analysis, we can see that some of the studied countries (superpowers, leaders, and followers) have been fully or partially ready to realize an intelligent society by converging mobile broadband and AI computing. These countries' telecom operators and relevant government authorities can promote and accelerate industry intelligence development from the following perspectives.

- Rethink business models
  - The development of an intelligent society will create new business opportunities for telecom operators, particularly considering the growing demand for edge AI services. By leveraging their edge infrastructure resources and local service networks, telecom operators can invest in the edge AI cloud and develop converged connectivity and computing services.
  - The national data residency and sovereignty requirements also bring opportunities to telecom operators. Incumbent operators can naturally leverage their trusted brands and long-term business and political relationships with the government to develop GPU-as-a-Service businesses to serve sovereign AI initiatives. Omdia forecasts that, by 2030, telcos globally will pull in $3.3bn in revenue from GPU as a service, or about 5% of the total GPU services market.
  - When telecom operators provide converged connectivity and computing services, the resources across multiple domains could be managed more efficiently, allowing customers to receive more flexible and affordable AI services with guaranteed service level agreements (SLAs).
- Rethink infrastructure strategies
  - With growing AI demands, telecom operators must consider AI traffic demand and patterns when they design and implement network infrastructures. The access network infrastructures are particularly critical, as they not only connect user devices and AI services but can also become a computing platform to support edge AI applications.
  - Telecom operators should work with vendor partners to further enhance the RAN capabilities, particularly for uplink bandwidth and latency, to meet AI applications' requirements. 5G-Advanced can be an essential evolutionary step between 5G and 6G to meet the growing demands and foster mobile AI ecosystem.
  - If a radio access network transforms into a multi-purpose digital infrastructure, the RAN computing platform should be upgraded accordingly. High-performance general-purpose processors, like GPUs, may become necessary. The increasing edge AI workloads may also impact

network traffic patterns, leading to a faster increase in East-West traffic than North-South traffic. All these could influence the architecture of RAN and relevant transport networks.

- Meanwhile, effective orchestration across connectivity and computing systems, central and edge nodes, and backbone and metro networks will become essential for a telecom operator to offer premium AI services. Planning the converged infrastructure will require a holistic view across multiple domains.

- Identify key AI applications and foster ecosystem

- To seize business opportunities from converging MBB and AI computing for an intelligent society, telecom operators should develop broad partnerships with AIapplication developers and promote the applications that can be hosted at the network edge or require guaranteed SLAs.

- Telecom operators can also collaborate with industrial partners to explore high-value industrial applications (for efficiency or cost savings) that generate significant traffic and require consistent, rigorous network quality.

- Invest in new competence

- Either deploying multi-purpose RAN platforms or developing AI businesses requires a deep understanding and expertise in both communication and computing subjects. Telecom operators should actively invest in in-house capabilities or build partnerships with industrial specialists to equip their technology and business development teams with professional competence.

Narrow advanced technology divide

The MI^3 benchmarking and analysis show that most immature countries significantly lag behind leading countries in mobile broadband and AI computing sectors. The gap between the most advanced and least developed countries in the AI computing area is even more significant than that in MBB development. After the digital divide, the AI divide is emerging. As the global economy increasingly shifts towards AI-driven production and innovation, less developed countries risk being left further behind, according to research jointly conducted by the United Nations and the International Labour Organization. The AI divide will impact global equity, fairness, and social justice and deepen existing inequalities.

Therefore, leading countries and industry players should join forces to help immature countries narrow the AI divide. Mobile broadband can connect enterprises and consumers in these countries to AI computing resources and enable AI skill development programs through online knowledge transfer, skill training, and experience sharing. Our MI^3 benchmarking indicates that AI skills are the most significant gap between superpowers and other countries. Thus, special attention should be paid to AI skill development.

The global telecom industry can leverage its experience in narrowing the digital divide to help the immature countries improve the intelligence of their economies and societies. Global industry organizations like GTI could become an important international collaboration platform, where leading countries and industry players help immature countries narrow the advanced technology divide.