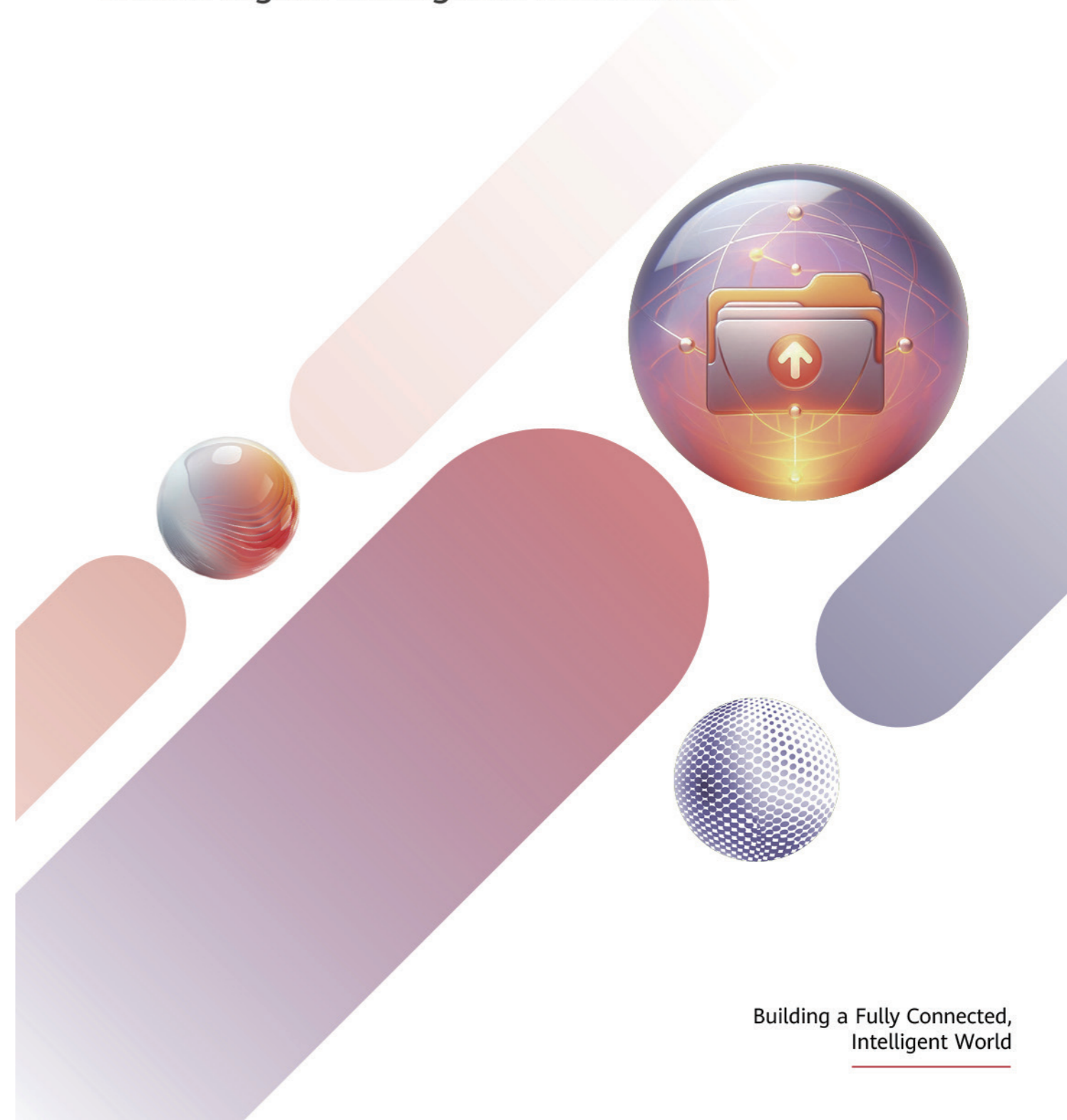




Striding Towards the Intelligent World White Paper 2024

# ICT Services and Software

Enable Digital Intelligence Acceleration



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Building a Fully Connected,  
Intelligent World

## Abstract

In the future, the trends will undoubtedly continue to be digitalization, intelligence, and low carbonization. AI will be the biggest opportunity in the next decade. Large models are a technological revolution in AI development. AI-powered digital transformation across industries — including digital government, smart finance, smart manufacturing, smart port, and smart mining — will be ramped up. Huawei's latest Intelligent World 2030 report predicts a 500-fold increase in global AI computing power by 2030 compared to 2020, with the number of connections expected to reach 200 billion.

Intelligent changes will bring qualitative changes, resulting in a significant boost in industries' digital productivity, which will become the main theme of the intelligent era. This poses new challenges and requirements on ICT services and software. To embrace the AI era and seize the opportunities of digital and intelligent transformation across industries, all industries need to work together to get prepared for the following six key fields:

1

**In the intelligent era, ICT infrastructure will evolve toward computing-network convergence, cloud-network convergence, and intelligence-network convergence.** To achieve the strongest computing, transmission, and storage power, we need to jointly define a new target architecture, and implement it by providing professional services like target network planning, cross-domain design and integration, and coordinated optimization and O&M of networks and services. In addition, we need to build a simplified, secure, resilient, green, efficient, and sustainable architecture. At HUAWEI CONNECT 2024, Huawei ICT Services & Software will partner with Analysys Mason to jointly release the Cyber Resilience White Paper oriented to the intelligent era.

2

**Build new professional service capabilities based on large models and generalize large models to the ICT service field to achieve inclusive AI.** Artificial intelligence-generated content (AIGC), made popular by ChatGPT, has shown its vast potential. Huawei ICT Services & Software are keeping pace with the latest industry trends, making bold explorations, and leveraging AI to further enable its digital and intelligent transformation as well as creatively solve industry challenges. Huawei ICT Services & Software also work with service partners to provide customers with industry-leading ICT service and software solutions. These include predictive and preventive maintenance for networks and devices, precise risk control for mobile financial services, and intelligent dialog for customer service centers. In the intelligent customer service field, the accuracy has reached 95% based on the intent understanding of natural language models.

3

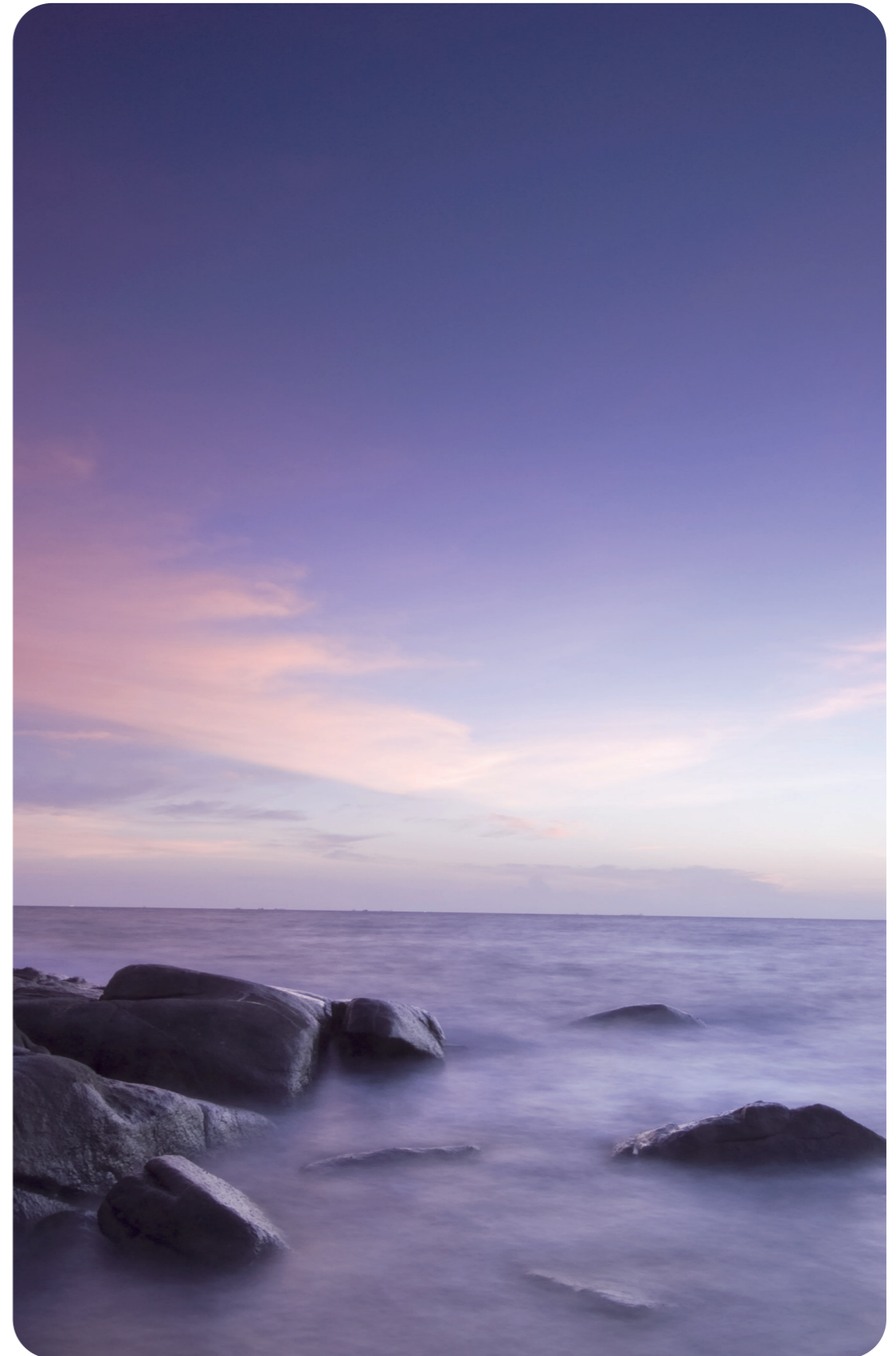
**Provide networks that ensure deterministic Service Level Agreement (SLA) experience so that ICT can penetrate the OT production network.** Based on service practices, experience, and algorithms, knowledge graphs and fault trees are used to accurately model device faults, network performance, and user experience. In this way, faults can be predicted and prevented, performance can be simulated and optimized, and experience can be measured and managed. ICT can penetrate enterprise production environments to boost digital productivity. For example, ICT can be applied to unmanned driving in ports and mines, remote control of excavators for coal mining, unmanned inspection of power grids, and machine vision in manufacturing factories. These scenarios require professional services to ensure network performance, which is measured by indicators like throughput, latency, and jitter in different networking scenarios.

4

**Integrate intelligence into digital services to deliver new experience and create new opportunities.** Technologies like natural language recognition, video, and knowledge graph can upgrade traditional call centers into intelligent contact centers. This can greatly improve user experience, expand the service scope, and open up a new blue ocean. For another example, big data analytics and precise risk control modeling can be applied to mobile financial services to improve the bad debt prediction accuracy from 70% to 90%. This greatly reduces losses incurred by bad debts while expanding the credit scale.

5

**Train and develop new digitally skilled talent to drive digital and intelligent transformation across industries.** Talent is the foundation of transformation. To boost future-proof digital and intelligent transformation, we must continuously improve the digital leadership and professional skills of enterprise personnel, including managers and junior-level personnel. Huawei Training & Certification provides a range of scenario-specific practice environments and learning platforms, and collaborates with partners to help organizations achieve talent development and skill reserve.



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1

## Trend 1

**Green Transformation and Intelligent Upgrade Drive Low-Carbon New ICT Infrastructure Construction**

Digitalization and low-carbon development are two engines that drive green development, and ICT is key to both. The major concerns across industries include network reconstruction and upgrade, efficient resource utilization, energy saving and emission reduction, and implementation of green development strategies. We need to center on the concerns to continuously promote ICT innovation, build green ICT infrastructure, and shift the focus from energy consumption to energy efficiency. As AI continuously develops, data and computing power have become indispensable production factors and key productivity during the digital and intelligent transformation of industries. The construction of digital and intelligent infrastructure — such as all-optical backbone networks, computing networks, supercomputing centers, and intelligent computing centers — is accelerating. Green, reliable, and intelligent ICT infrastructure is needed to meet the sustainable development requirements of services in diverse scenarios and enable the acceleration of digital and intelligent transformation across industries.



## ▶ 1.1 Accelerating Green Network Development

The constantly evolving intelligence is further accelerating industry innovation and development. Traditional ICT equipment rooms are faced with challenges like numerous outdated devices, high energy consumption, insufficient space, and difficulty in maintenance. Their reconstruction and upgrade involve all kinds of issues, including long process, low efficiency, and difficulty in supporting sustainable service innovation and development. As the foundation of digitalization and intelligence, ICT network infrastructure must undergo green transformation to support sustainable service development. To this end, systematic design and deployment should be carried out from the aspects of green management framework design, green standard evaluation system, and green operations platforms.

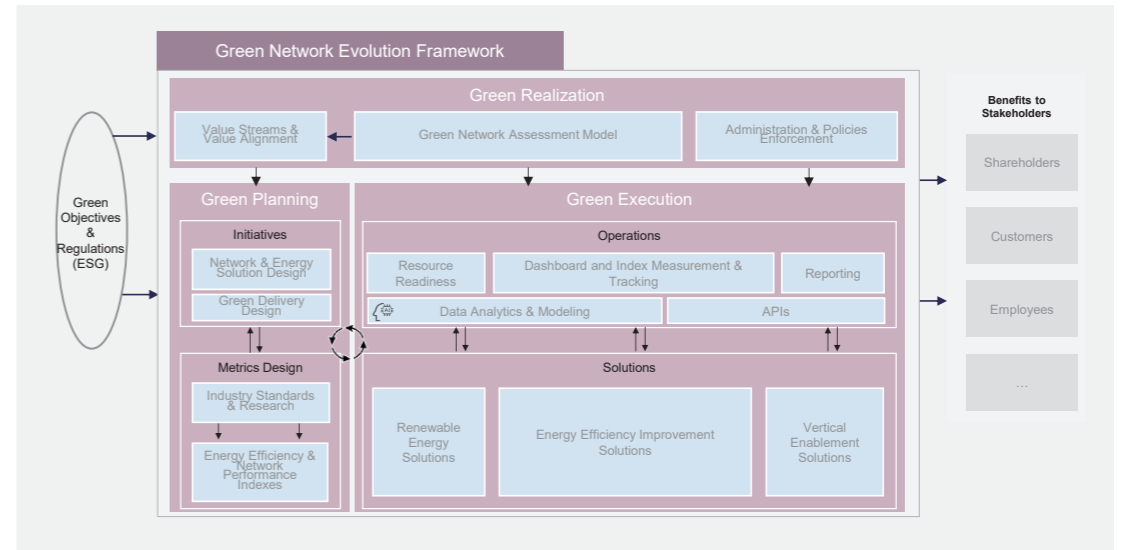


Figure 1: Green network management framework for ICT infrastructure

### Design of Green Management Framework

Green transformation is a long-term process. The top-level design and objective planning of the management framework must be carried out to construct continuously leading ICT network infrastructure. A three-layer management framework consisting of green administration, green planning, and green execution needs to be established to guide the implementation of green transformation strategies.

The green management framework offers a holistic approach to promoting environmental sustainability within the ICT industry. It aims to boost sustainability practices across the green ecosystem. Green administration refers to the formulation of policies, guidelines, and decision-making procedures in the field of information and communications to promote and ensure environmental sustainability. It involves establishing a responsible environment management framework and considering green energy in the overall strategy and operations of the company. Green planning means developing green evolution solutions and green evaluation systems, and strategically integrating them into ICT network infrastructure development planning. Green execution means implementing green energy initiatives and continuously managing sustainability practices in the ICT sector. It focuses on converting strategic plans into concrete green evolution solutions, and continuously optimizing the solutions during ICT network O&M.

### Green Standard Evaluation System

A comprehensive green network evaluation indicator system needs to be established based on four-layer indicators and baselines. These indicators include network carbon intensity energy (NCIe), network energy efficiency (NEE), site energy efficiency (SEE), power usage effectiveness (PUE), and telecom energy efficiency (TEE).

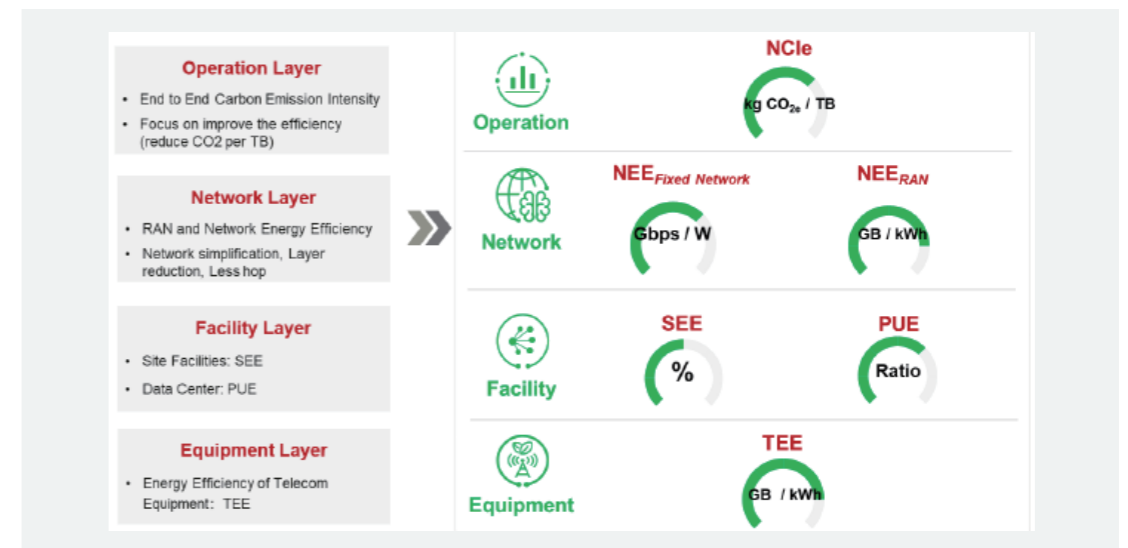


Figure 2: Four-layer indicator system for green management of ICT infrastructure

The preceding figure shows the indicators for measuring the environmental impact of a typical telecommunications network, which involves hierarchical indicators regarding the network, infrastructure, and operations. The first layer is the device layer, where the TEE is used to measure the energy efficiency of a single network device. The second layer is the site layer, where the SEE and PUE are used to measure the energy efficiency of sites and data centers. The third layer is the network layer, where the NEE is used to measure the overall energy efficiency of the entire network. The fourth layer is the operations layer, where the NCI is used to measure the carbon intensity of data transmitted across networks. In general, this hierarchical system can effectively evaluate the energy efficiency and carbon emission intensity of ICT network infrastructure. It can also facilitate the implementation of ICT network green transformation solutions and the enablement of carbon emission reduction for other vertical industries.

### Green Operations Platform

Operations is an indispensable part of the sustainable development of green network infrastructure. A digital and intelligent green operations platform is the basis for refined operations of green strategies, measurement, and solutions.

A green operations platform needs to be developed to implement refined governance, such as green strategy implementation, carbon emission intensity monitoring, and green evolution solution development, through digital and intelligent means. It needs to enable carriers' green operations organizations to monitor, coordinate, and optimize green transformation and carbon emission reduction work in terms of visibility, manageability, and optimization. The platform should be able to collect key data from various ICT infrastructure devices, including traffic, performance, energy consumption, temperature, and humidity data. Based on the collected data and evaluation indicators, the platform provides targeted solution development and ROI analysis. This enables communication service providers (CSPs) to improve network operations efficiency and investment effectiveness from a global perspective. In addition, the platform can connect with carbon regulators, transaction institutions, and other vertical industries to meet regulatory requirements and support digital transformation and carbon emission reduction in more industries and the whole society.

### Construction of Green Target Networks

Through systematic planning and design of ICT network green transformation, as well as network integration and deployment, CSPs can gradually improve network energy efficiency and reduce carbon emissions. In terms of systematic planning and design, we should aim for global optimum. That is, we should implement collaborative planning of the green target network architecture from aspects of integrated services, network capabilities, security, and energy efficiency. In terms of network integration and deployment, the core lies in implementing secure evolution. This means implementing smooth evolution of diverse services, professions, technologies, and vendors in all scenarios. Innovations and practices should be made in green architecture design, green site reconstruction, and green equipment room reconstruction to support the planning and construction of CSPs' green target networks.

**1. Green architecture design:** The construction of a green target network must focus on the architecture planning throughout the lifecycle of sites, equipment rooms, and networks, including network planning, design, reconstruction, and O&M. The green architecture design must ensure that CSP services grow and their network capabilities do not deteriorate. The architecture of networks and infrastructures like sites, equipment rooms, and optical cable networks needs to be properly optimized. Diverse clean energies and multi-energy synergy solutions should be leveraged to improve energy and resource efficiency. The operational expenditure (OPEX) and operational results should be optimized from a mid- and long-term perspective.

**2. Green site reconstruction:** The energy consumption of wireless sites accounts for more than 70% of the total energy consumption of carrier networks. In certain areas, the sustainability of communication is severely affected due to unstable mains supply and frequent site disconnections. By introducing green power, simplifying site architectures, and intelligently optimizing energy, green site reconstruction helps carriers save energy, reduce carbon emissions, lower OPEX, enhance network robustness, and boost business growth. In 2023, China Mobile implemented simplified reconstruction for 23,000 sites, saving 290 million kWh of electricity annually and CNY350 million in electricity, rental, and maintenance fees. In addition, the reconstruction has facilitated its 5G Ready, ToB, and ToH service development. Due to the electricity crisis, the site availability rate of MTN South Africa was lower than 80%. Through the reconstruction solution involving PV deployment, hybrid power supply, and intelligent optimization, its site power availability (PAV) has been improved to 99.6%, with a 50% increase in network traffic and more than 10% lower fuel consumption.

## ▶ 1.2 Green and Low-Carbon Development of Data Centers

KPMG released the Inclusive and Intelligent Computing Power Ushers in a New Computing Era report at World Artificial Intelligence Conference 2023. According to the report, the training computing power demand for world-leading AI models has increased exponentially since 2012, doubling every three to four months. This equates to a 10-fold average annual growth in computing power. The manufacturing industry will become the largest potential market for inclusive computing power. In addition, ICT, automobile, finance, healthcare, and education are also among the leading industries in computing power.

The explosive growth of computing power leads to an increase in power density. According to the Development Research Report on China's Green Computing Power (2023), as the number of applications related to AI model training and inference increase in the future, diversified computing power collaboration will become the norm. In addition, the mainstream power density of a single cabinet will increase to 12–15 kW, and that of supercomputing and intelligent computing centers will increase to over 40 kW. This invariably results in a surge in energy consumption. According to the Electricity 2024 report released by the International Energy Agency, the electricity demand for global data centers and AI will increase from 460 TWh in 2022 to 620–1015 TWh in 2026, with a compound annual growth rate (CAGR) of 9.6% to 22.9%.

Additionally, as China implements its carbon peaking and carbon neutrality strategy, the government imposes higher requirements on energy saving indicators, for example, the PUE of existing data centers. According to the Data Center PUE Evaluation and Acceptance Specifications formulated by the MIIT entrusted by the National Audit Office in 2023, the PUE of new large and ultra-large data centers must be less than 1.3, and that of reconstructed core equipment rooms must be less than 1.5 by 2025.

All these pose great challenges to the construction of data centers. As such, new indicators, new scopes, and new measures need to be coordinated to build next-generation green and low-carbon data centers and enable three changes.

### New Indicators: Shift the Focus of Energy Saving Indicators from Purely PUE to XUE That Features Sustainable Development, Comprehensive Indicators, and All-round Carbon Control

The PUE is the ratio of a data center's total energy consumption to that of its IT equipment, and is widely used to measure the energy efficiency of data centers. As the data center scale keeps expanding in the intelligent computing era, issues arise such as increasing carbon emissions caused by increased energy consumption as well as water shortages caused by a large amount of water consumption by cooling systems. Energy saving indicators of advanced data centers become diverse, shifting from PUE only to comprehensive indicators that feature sustainable development, including water usage effectiveness (WUE), carbon usage effectiveness (CUE), and grid usage effectiveness (GUE).

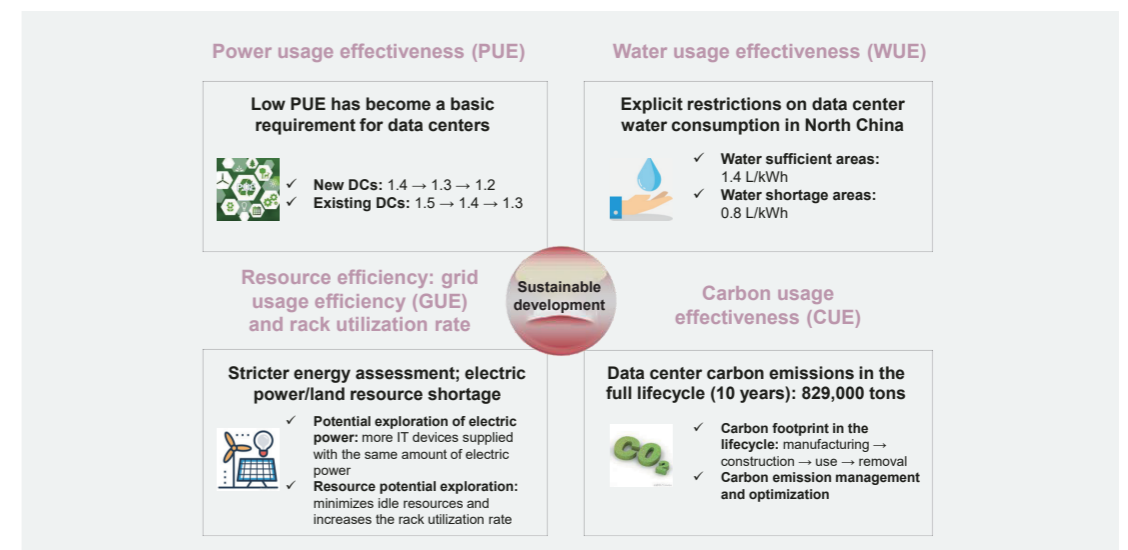


Figure 3: Energy efficiency indicators of data centers

### New Scope: Change the Energy Saving Mode from L1+L2 Coordinated Energy Saving to Intelligent Adjustment

The traditional energy saving mode focuses on reducing L1 energy consumption. In the intelligent computing era, water-liquid hybrid solutions transform the energy saving mode. L1 and L2 affect each other. For example, increasing the supply coolant temperature of the liquid cooling source coolant distribution unit (CDU) can reduce the PUE, but increases the power consumption of IT chips. Increasing the temperature of the air cooling source can reduce the PUE, but increases the power consumption of server fans. As such, a lower PUE is no longer equal to lower total energy consumption. L1+L2 collaborative optimization becomes the key.



First, we need to obtain the L2 server load, chip temperature, fan speed, and training status, as well as the L1 supply and return water temperatures for liquid cooling, ambient temperature, and cold source working conditions. Second, we need to establish the cooling source energy consumption optimization model, full-stack energy consumption optimization model, cross-layer collaborative optimization model, and service load scheduling model. Third, we need to find the water temperature control point resources that achieve the optimal energy efficiency. All these efforts can help optimize the L1+L2 overall energy consumption. In addition, the service load needs to be balanced based on the scheduling plan; idle chips not used for training need to be identified; and the active/standby power of the power supply and the chip hibernation modes need to be properly selected to minimize energy consumption of services. In this way, it is possible to achieve multi-objective optimization, including PUE fulfillment, optimal IT performance, and minimum overall infrastructure energy consumption.

L1+L2 collaborative optimization optimizes the energy efficiency of full-stack computing power, reduces the overall energy consumption, and leads the new standard for evaluating energy consumption in the intelligent computing era.

#### **New Measures: Transform from a Single Energy Saving Measure to Measures Oriented to Various Scenarios**

As the computing power requirements of different industries become increasingly complex and varied, data centers must be able to meet diverse computing power requirements. The traditional chilled water solution saves energy by increasing the temperature, improving the air flow, and optimizing the device efficiency. The energy saving measures are limited, and there is not much more room for further improvement. Given this, energy saving measures oriented to various scenarios are urgently needed.

1. Ultimate free cooling of chilled water improves the system heat exchange efficiency and the utilization of free cooling sources by increasing the water temperature and enlarging the temperature difference. This provides a new approach for further optimizing the PUE.

2. Through water-liquid convergence, shared cooling sources, and phased device deployment, an elastic cooling architecture is built to adapt to computing power evolution. In addition, L1+L2 collaborative optimization is implemented to transform from PUE-only optimization to full-stack energy efficiency optimization.



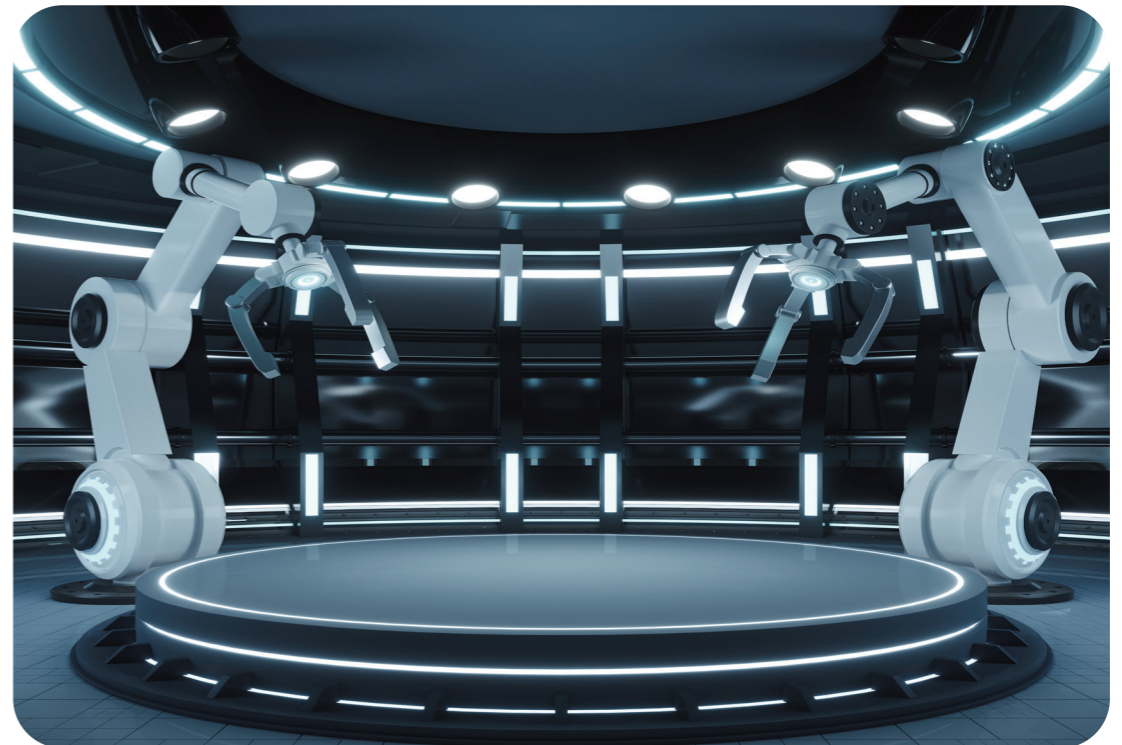


As large AI models are applied across industries and evolve from natural language processing (NLP) models to multimodal models, the data volume and data processing complexity increase exponentially. In model training, the data scale and quality are key factors that determine the model's capability. The entire service process of large AI models involves multi-protocol access, read, write, save, loading, transfer, recovery, tiered storage, and on-demand capacity expansion of massive amounts of unstructured data. New AI service scenarios bring great challenges to data-centric fast storage, efficient transfer, and information security.

# 2

## Trend 2

**Sufficient Storage, Free Mobility, and Full Utilization of Data Is the Basis of Intelligence**



## ▶ 2.1 Data Determines the Development of AI, and Data Storage Becomes the Critical Infrastructure for Developing Large AI Models

To meet the new service requirements of large AI models, the computing and storage architectures of traditional data centers evolve from CPU-centric to data-centric. In addition, the upstream and downstream ecosystems are gradually reconstructed. AI computing clusters use an architecture with decoupled storage and compute to integrate PB-level storage and TB-level bandwidth. They continuously improve data access efficiency to meet the high throughput requirements in scenarios with massive amounts of data. To match customer service development with new technologies, professional analysts need to comprehensively evaluate the entire IT infrastructure, provide best practices and architecture planning, and build a secure and reliable data foundation through data storage integration.

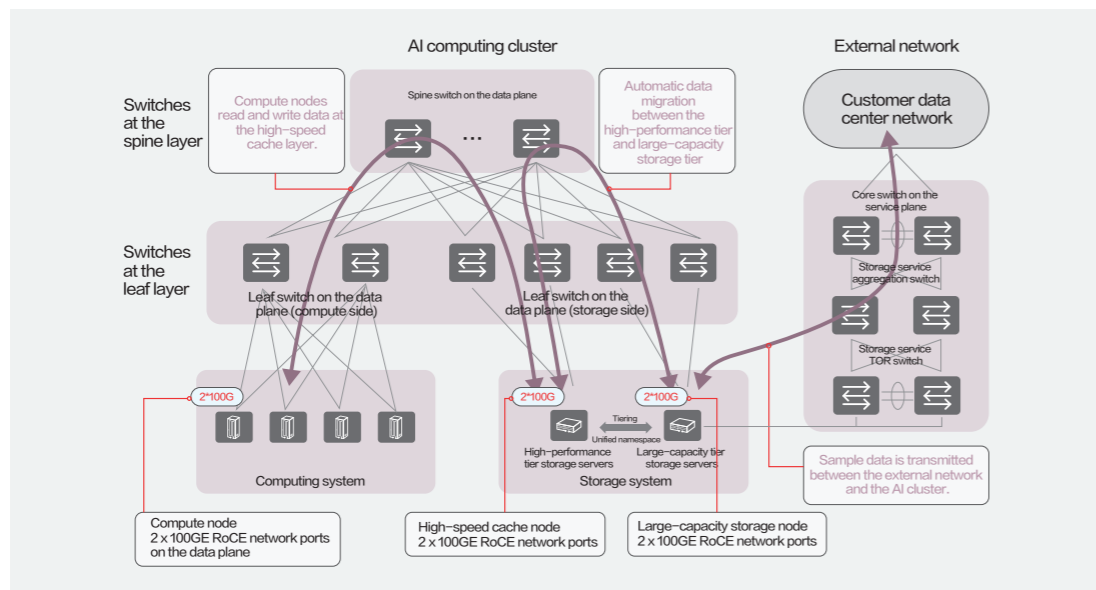


Figure 4: Framework of AI computing clusters

## ▶ 2.2 Fast Integration Enables Smooth Service Rollout and Secure Data Flow

As customer services develop, data is becoming the core asset of customers. In China, to meet the regulatory and Multi-Level Protection Scheme (MLPS) requirements of national policies and prevent core service system interruption or data losses caused by power failures or system breakdowns, professional data protection solutions are provided based on different RPO/RTO requirements. Professional disaster recovery (DR) tools and platforms help quickly detect service issues, restore the E2E topology, and shorten the fault location time. Intelligent, systematic evaluation provides reports on service impacts and switchover risks to assist customers in decision-making. Digital orchestration is performed for DR switchover so that key services can be quickly restored based on full-process visualization. Regular DR drills can be conducted for customers to safeguard customer services.

Professional migration tools and platforms support online migration of mainstream storage devices, hosts, databases, and virtualization devices in various scenarios. They also ensure zero service interruption and data loss. One-click information collection and migration enable secure data flow.

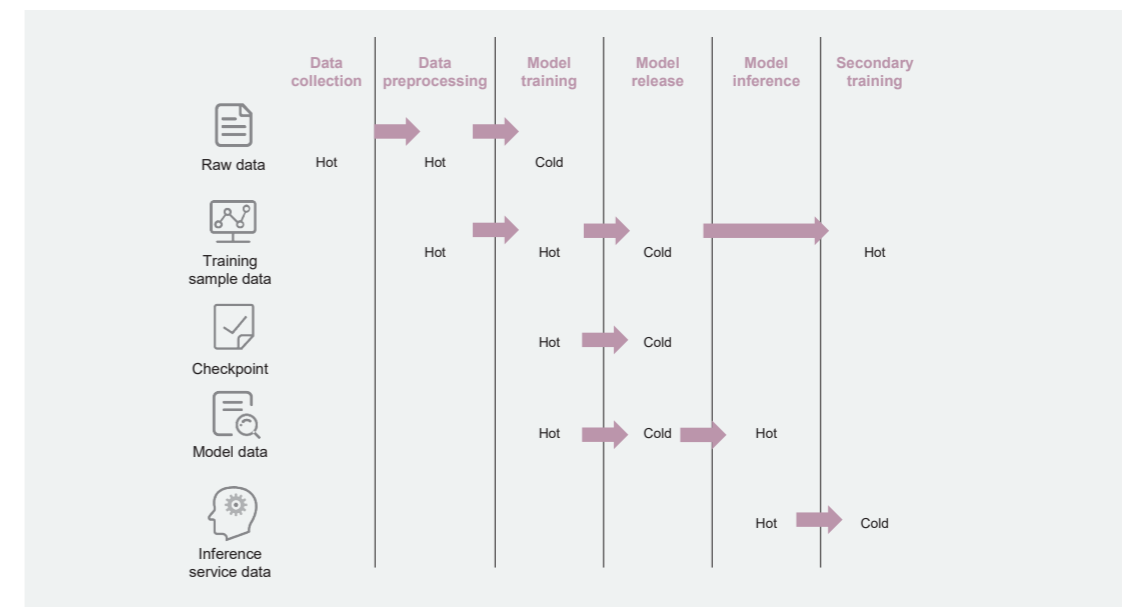


Figure 5: Model training and inference

## ► 2.3 Intelligent Data Improves Operations Efficiency and Facilitates Continuous Innovation and Development of Customer Services

With the surge of new services, technologies, product features, and product complexity, customers are faced with the challenge of insufficient consumption capabilities. Increasingly complex IT products make it difficult for customers to fully utilize and unleash the value of purchased products, as they do not have the time, skills, or manpower required to do so. As customers have paid for products, the failure in promptly using products prolongs the return on investment (ROI) period, and results in severely unbalanced risks and returns. Customers are eager to find a new path to realize business value with strategic partners. To better monetize business value, customers need partners to participate in their business success, face the same risks and returns with them, improve their experience, and maximize the potential value of products.

Partners need to meet these needs by providing business operations support services. First, partners designate experienced experts to promptly provide adaptation solutions based on best practices accumulated over years to help quickly roll out services. Second, professional tools and platforms are used to improve service experience through unified management of numerous devices, AI-based prediction, automatic resource provisioning, application service association analysis, and large-screen display. Third, the industry-leading GREAT evaluation model helps customers accurately analyze IT service systems, as well as provide guidance on sustainable architecture evolution and strategies. Partners assist customers in full-lifecycle data management, and help them achieve business success.



# 3

## Trend 3

The O&M Mode Is Transformed from Network-centric to Service-centric

Since Autonomous Network (AN) was proposed in 2019, more than 10 world-leading carriers have released the strategic goal of achieving L4 by 2025–2027. The large-scale deployment of 5G by carriers and the implementation of new technologies like generative AI (GenAI) systematically promote the evolution of networks toward automation and intelligence. New functions like network as a service (NaaS) further unleash the potential of networks to enable carriers to take the lead in the digital economy. The development of the market and technologies requires the operations mode to be automated and intelligent to support enterprises' strategic and business development. The traditional network-centric operations mode is insufficiently automated, and needs to be transformed to a new, intelligent operations mode.

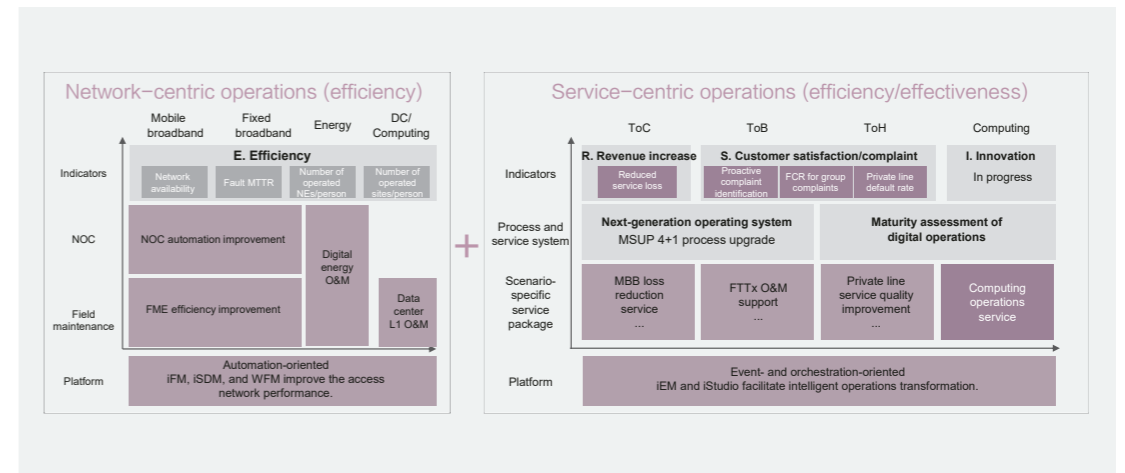


Figure 6: Business value of the new service-centric operations mode

### ▶ 3.1 Rapid AN Development and New Service-centric Operations Mode Bring New Business Value Based on the R.I.S.E Model

After nearly five years of development, 91% of carriers have incorporated AN into their strategies and entered the stage of substantial deployment and rapid development. However, most carriers use the traditional network-centric operations mode. Limited automation results in data silos, process isolation, and high dependency on manual cross-domain collaboration, which in turn hinder carriers from supporting customers' business strategies and objectives.

The next-generation service-centric operations mode drives digital transformation and autonomous operations with intelligence and value. The new operations mode features data-driven processes, automatic cross-domain collaboration, in-depth integration of data platforms and applications, new AI models, and carrier-class algorithms. It provides customers with a cross-domain, cross-layer, and full-process view, allowing customers to evaluate all operations processes in an E2E manner. In addition, it creates new business value by shifting the focus from efficiency (E) only to revenue, innovation, satisfaction, and efficiency (R.I.S.E).

### ▶ 3.2 GenAI Accelerates Transformation of Service-centric Operations, and Injects Automation Technologies and Scenarios into the Basic O&M Field

Since its emergence, GenAI has quickly become the technical frontier and strategic center of global carriers. It drives AI applications in the O&M field to transform from passive optimization to proactive support, and from exception detection and root cause identification to enhanced customer service and fault prediction. In addition, it accelerates the digital operations transformation of enterprises.

Take Hong Kong Telecom (HKT) as an example. To fully unleash the value of AI and transform from a CSP into a digital service provider (DSP), HKT attaches great importance to shifting the focus of its ISOC from 'machines assisting humans' to 'humans assisting machines'. In terms of fault management, the useCet for fault and performance management is built based on GenAI and DTN to implement intelligent service monitoring. The time required for root cause analysis and fault rectification is shortened from hours or days to minutes. AI is also applied to the resolution of customer experience and complaint issues, enterprise customer service security, and network troubleshooting transformation.

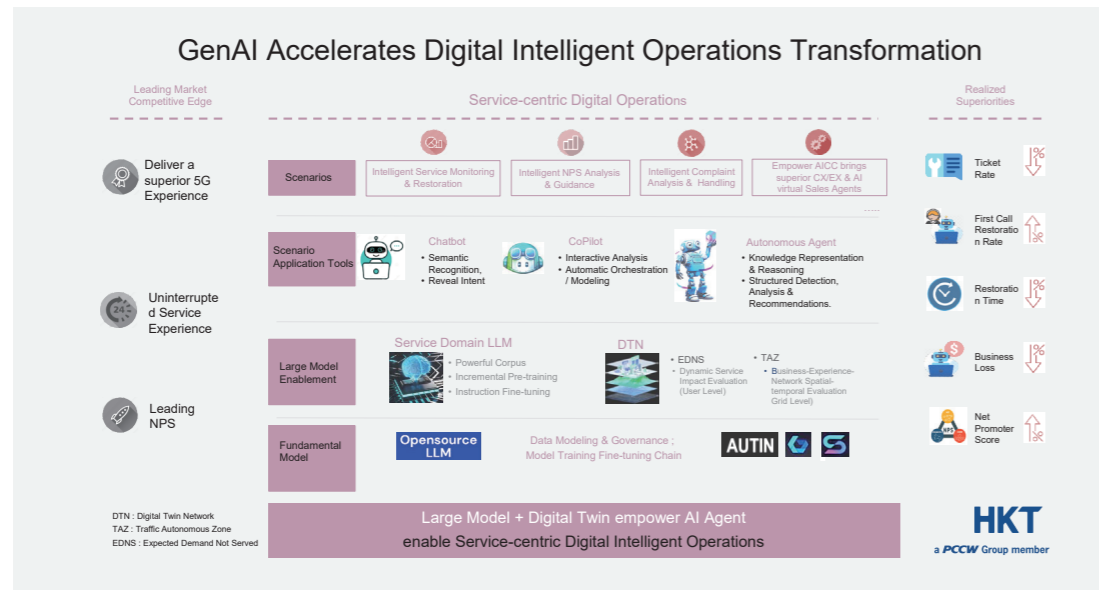


Figure 7: GenAI accelerates digital and intelligent operations transformation of HKT

In the basic O&M field, automation technologies and application scenarios are continuously deepened, and basic O&M work is standardized and process-based. This helps enterprises reduce costs and improve efficiency, accelerate service innovation and development, maintain a leading position in the market, and achieve sustainable development.

However, in the process of using GenAI to assist operations transformation, enterprises face many challenges, the biggest being data security and privacy. In the implementation of GenAI, it remains a challenge to integrate sensitive customer data with data of public large language models (LLMs) and measure the workload required for model optimization.

**The Systematic Evolution of the New O&M Mode Requires 6-Dimensional Capabilities and 3 Core Technological Features**

The evolution from network-centric operations to service-centric operations faces many challenges. They include a sharp increase in the network and service complexity, a growing demand for model algorithms and knowledge, scenario-based development to support agile services, and heterogeneous IT and network environments. The evolution is a systematic project that requires continuous iteration in terms of technology, solution, and operations mode. The future O&M system must be equipped with 6-dimensional evolution capabilities and three core technological features, as shown in the following figure.

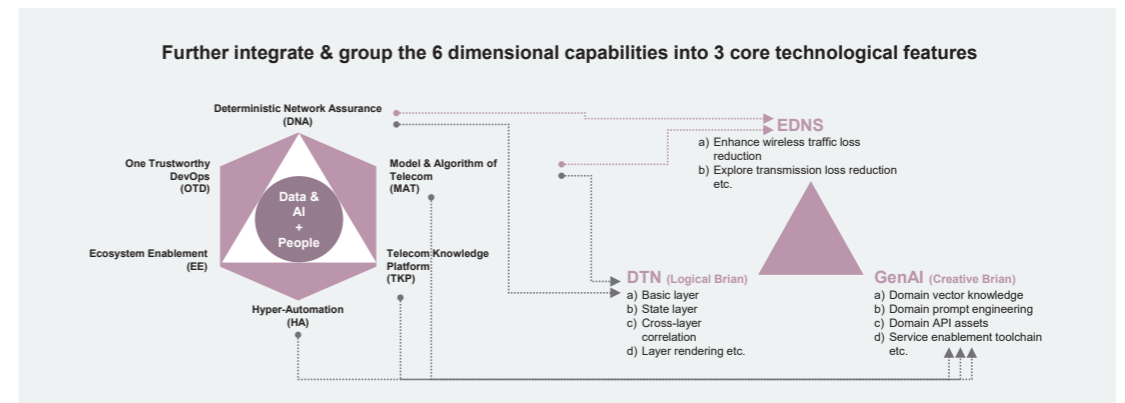


Figure 8: O&M capabilities and technologies

**New Operation Mode Drives Carriers to Innovate Services and Increase Revenue in the ToB, ToC, and ToH Fields**

**ToC Service Assurance: Agile Service Recovery Is Provided in Addition to Event Management to Minimize Service Loss**

To implement service-centric operations, carriers must enhance the keepalive capability of agile services, visualize service impacts, and restore services within minutes in the case of network accidents to reduce traffic loss. For example, if a wireless NE is faulty, based on existing network coverage and a radio access network mechanism, the antenna coverage and power of neighboring base stations can be adjusted to quickly restore and compensate certain affected user services. In this case, the mobile user characteristics, service impact, and work order efficiency jointly determine the work order priority, which helps achieve the optimal operations efficiency.

FME Work Order No	Parent Alarm	Alarm Severity	Affected Traffic (GB)	Affected Users	Domain
CM-6829XXXX-0001	gNodeB out-of-service	Critical	20.1	199	RAN-5G
CM-6829XXXX-0005	AC mains fault	Major	14.5	148	RAN-5G
CM-6829XXXX-0002	NodeB unavailable	Critical	10.5	110	Wireless-3G
CM-6829XXXX-0004	Battery discharge	Major	7.4	80	RAN-5G
CM-6829XXXX-0006	CSL fault	Major	4.1	54	Wireless-2G
CM-6829XXXX-0003	Cell unavailable	Critical	2.8	35	RAN-4G

Figure 9: Determining the priorities of FME work orders based on user and traffic impact analysis data

### **ToH Service Assurance: Manageable and Visualized FTTx Services and Networks; One Fault, One Work Order**

As FTTx services grow rapidly, the number of passive devices increases sharply. Optical line terminations (OLTs) and optical network terminals (ONTs) are dumb resources, and the accuracy of network topology is low. Additionally, CSPs are faced with high complaint rates, as well as a large number of invalid and repetitive work orders. Especially in mass fault scenarios, a work order may be assigned for each complaint or NE fault.

Based on DTN, CSPs can collect network-wide ONT optical power data for trend analysis, correct resource data errors, make up for deficiencies, improve the accuracy of topology restoration, and implement visualized and manageable FTTx service paths. In addition, the topology information can be combined with spatiotemporal clustering algorithms to associate and identify a massive number of FTTx faults. All invalid work orders in a mass fault can be combined into one work order with accurate root cause information. This reduces the number of invalid work orders and improves operations efficiency.

### **ToB Service Assurance: Service-Level Quality Visualization and Private Line Connection Assurance Services**

Service quality monitoring has become a mandatory requirement for high-SLA private line services provided for finance and government customers.

In new operations mode, service-level quality visualization and enterprise-level proactive assurance can be implemented. For example, DTN can add performance indicators like latency and congestion to the service topology to implement E2E visualization of the service topology and active/standby path status. Various types of fault diagnosis trees are combined to quickly identify accidents and automatically associate them with existing user complaints to ensure service experience of private line customers. Requirements of different QoS classes are matched to implement differentiated SLA management. Based on service status visualization, the health status of single nodes, blinking, and optical networks can be proactively evaluated. This helps identify potential risks and hidden faults, reduce user complaints, and implement proactive SLA assurance.



# 4

## **Trend 4**

**Convergence of 5G-A and Business Scenarios Gives Rise the Demand for Deterministic SLA Experience Assurance and Promotes New Value Creation**

The global mobile penetration rate has reached 69% by the end of 2023, as reported by the GSMA in The Mobile Economy 2023. This rate is forecast to rise to 74% by 2030. However, considering population growth and other factors, the compound annual growth rate (CAGR) is only 1.7%. This rate is even lower in densely populated urban areas and economically developed regions. This indicates that the era of population dividend for global carriers has ended, making it essential for them to focus on enhancing the value of existing customers for sustainable business growth. The integration of AI technologies with mobile networks is driving the intelligence evolution of mobile networks, unlocking their full business potential.

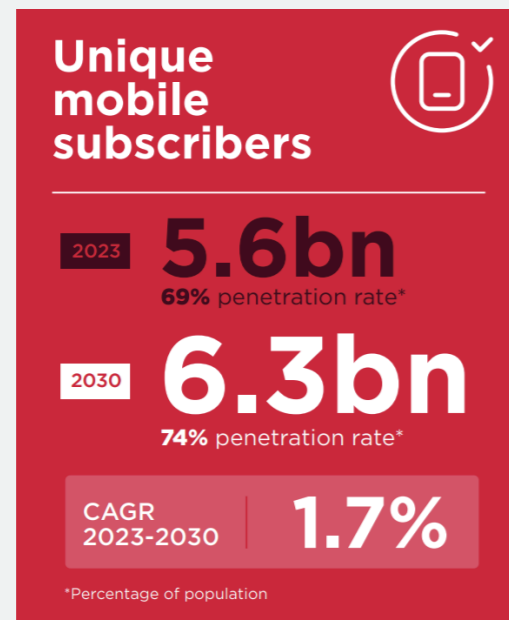


Figure 10: The Mobile Economy 2023 released by GSMA

With the official release of 3GPP Rel-18, the first standard version of 5G-A in Shanghai on June 18, 2024, global telecom carriers have announced their plans for 5G-A commercial deployment. This signals the emergence of 5G-A, and the potential for new business growth.

## ► 4.1 Network Optimization Aligns with Business Needs and Unleashes Network Values

Telecom carriers are adopting a more diversified experience operations model to meet growing consumer demands, shifting away from a single traffic operations model. In Europe, 31 operators have introduced rate-based charging packages. China Unicom Guangdong launched a 5G live streaming package in 2022, while China Mobile Shanghai released the "Magic Speed Plan" in June 2024, promoting several 5G-A packages for commercial use focusing on business travel, live streaming, and gaming. The Middle East has also seen multiple carriers launch FWA rate-based packages. As service become more diverse and personalized, network optimization must be more refined and differentiated. Specifically, network optimization can be classified into three types:

**Type 1, large-scale general routine optimization.** This type of optimization focuses on improving the basic experience for most users, including voice and traffic users. It involves the largest number of users and network elements, and has well-established technical methods. The main goals are to reduce costs and increase efficiency. Integrating AI technologies, routine optimization is rapidly evolving toward automation.

**Type 2, scenario-based and differentiated experience-based optimization.** This type of optimization is used to ensure experience-based operations, that is, to deliver high-quality network experience to high-value users, meeting their subscription expectations and supporting network value investment. This type of optimization usually delivers personalized experience to high-value users through customer experience management (CEM) tools, and provides customized topic optimization or special optimization services.

**Type 3, optimization oriented to satisfaction and net promoter score (NPS).** This is the ultimate optimization. The core objectives are to improve customer loyalty, extend the customer service lifecycle, and improve the comprehensive value of the customer service lifecycle. This process involves long-term tracking, in-depth analysis, and continuous optimization of customer experience. With so many telecom network users and business types, users with different business may experience different outcomes in different scenarios and at different times. This is why optimizing the network is crucial. Many top carriers now use customer satisfaction or NPS as a key performance indicator for their CEOs.



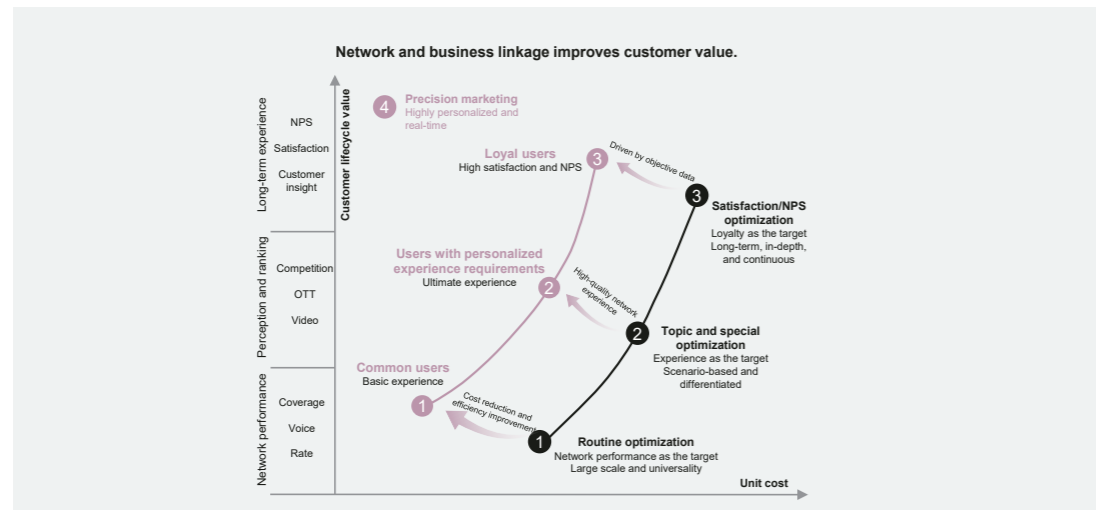


Figure 11: Network and business linkage improves customer value

To maximize resource efficiency, strategies oriented to automation, intelligence, specialization, proactiveness, and refinement must be applied to each type.

**Type 1: Rapidly evolve to advanced AN.** The wireless optimization foundation model will be developed to gradually achieve highly automated network optimization. This model transforms sub-scenarios with mature processing policies like top N optimization, coverage optimization, and capacity management into network optimization using AI agents. It provides real-time closed-loop management, proactive predictions, maximum effectiveness, and high automation. Driven by the characteristics of 5G and 5G-A networks, beam-level optimization is a crucial part of the wireless optimization foundation model. To achieve high model accuracy, high-quality routine optimization data for all scenarios must be input.

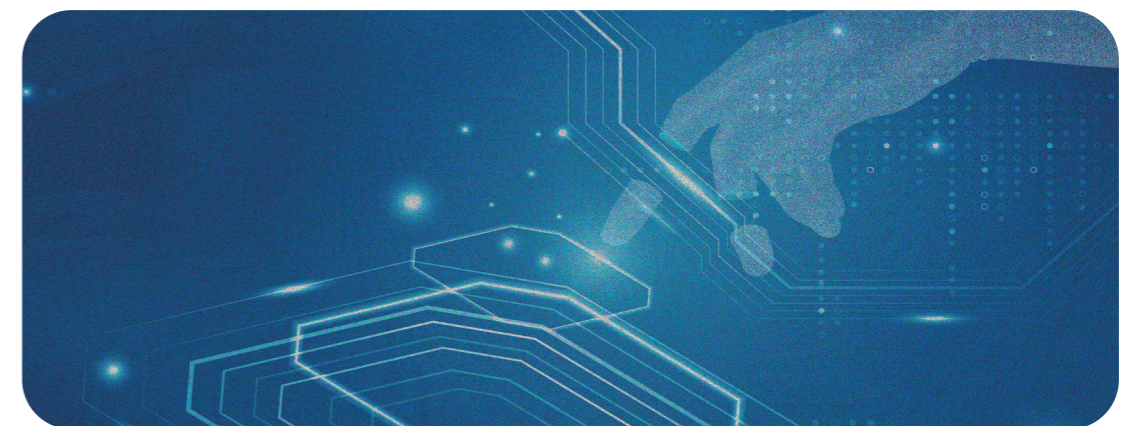
**Type 2: Work with appropriate partners to perform special optimization.** In this scenario, cost is no longer the primary concern for network optimization. Instead, the focus is on integrating business needs and implementing network optimization strategies that align with business goals. To implement this strategy, we need specialized skills, tools, and a deep understanding of the carrier's business needs. Take experience assurance for Facebook as an example. Experience modeling is required to quickly identify Facebook experience issues based on KPI/KQI changes. When an issue occurs, it must be broken down into specific domains (wireless network, core network, server, etc.) and NEs. Accurate and fast optimization is then performed based on different requirements, such as rate optimization, video freeze rate optimization, or delay optimization. This process relies heavily on support from professional vendors, particularly the original device vendors.

**Type 3: Provide proactive management and precise optimization.** Traditionally, customer satisfaction and NPS management rely on surveys, which have several drawbacks, including small sample sizes, high randomness, difficulty in tracing root causes, and delayed feedback. During optimization, we can only make the best of what we have, and it is challenging to accurately predict the outcome. However, with the rapid development of AI and digital twins, an optimization mode driven by objective data and AI is now emerging. The method uses spatiotemporal digital twin technology and carriers to restore the exact time and location of a user experience event, ensuring consistent satisfaction and NPS management. It will become a fundamental and rigid requirement.

## ► 4.2 Marketing Systems with Personalized Big Data Insights are Key to Developing High-value Customers

Network usage habits imply customer requirements, and network data is essential for gaining accurate customer insights. To succeed, businesses must develop personalized insights and marketing capabilities that are applied in daily operations.

The key to successful experience monetization is to identify customers willing to pay extra for premium experiences and offer them attractive products through suitable channels. Telecom carriers' marketing systems must have key capabilities including personalized insight, real-time intelligent decision-making, marketing planning, and multi-touch marketing execution. The integration of these capabilities enables seamless linking of marketing and networks, creating a closed-loop business process.



### ► 4.3 Large AI Models Need to Be Deeply Integrated with Telecom Knowledge to Implement Refined Business Operations

The telecom industry is increasingly relying on AI as its core foundation, using it to create value, boost efficiency, and cut costs. While AI is powerful, it still requires high-quality data and domain expertise to be effective.

Large models are driving rapid iterative updates of AI technologies. Significant investments in infrastructure and AI generation capabilities are empowering IT and cloud vendors. However, pure IT and cloud vendors have yet to fully integrate their expertise with that of the telecom industry. As a result, carriers still need to exercise caution when making decisions, recognizing the critical importance of data and domain expertise. By 2025, at least 30% of GenAI projects will fail after the proof of concept phase, according to Gartner. This is due to several factors, including poor data quality, insufficient risk control measures, rising costs, and unclear business benefits. The root cause, however, lies in the insufficient integration of large models and domain knowledge, which prevents high-quality, multi-dimensional decision-making.

### ► 4.4 5G-A Brings New Growth Opportunities to Telecom Carriers and Demands for Deterministic SLA Experience Assurance

5G-A offers ultra-rate, low latency, and integrated sensing and communications, making new business scenarios possible. Leading carriers are now working with upstream and downstream partners in the vertical industry to explore and accelerate these new business scenarios. To ensure high-quality network experience, network optimization with deterministic SLAs is becoming basic requirements.

#### **5G-A Enables Telecom Carriers to Create New Business and Explore Revenue Growth Opportunities**

New consumer-oriented rate and latency assurance packages: Based on the ultra-high rate and low latency of 5G-A, meet the requirements for rate and latency of applications such as naked-eye 3D videos, cloud gaming, FWA high-experience package, ultra-HD live broadcast, XR/VR, telemedicine, and remote education.

IoV and autonomous driving services oriented to intelligent vehicles (such as remote vehicle monitoring, autonomous driving service, and intelligent traffic management): The pilot project of "vehicle-road-cloud integration" led by the Ministry of Industry and Information Technology (MIIT) and other four departments has been carried out in 20 cities, opening up an investment space of CNY100 billion.

Low-altitude economy services oriented to drones (such as deterministic SLA assurance): 5G-A enables applications in new scenarios, including drone-based logistics delivery, urban management, low-altitude tourism, and networking, by integrating sensing and communications capabilities.



### Telecom Carriers Need to Reserve or Plan Deterministic SLA Experience Assurance Capabilities

These new business scenarios pose high requirements for experience assurance: from non-real-time single-domain to real-time integrated awareness, from KPIs/KQIs to SLAs, and from offline optimization to dynamic fine-tuning. To provide better experience assurance for these new business scenarios, telecom carriers now require a shift from "best-effort" to "real-time management with deterministic SLAs".

Take the Cost Measurement Specifications for Video and Image Services of Drone Government Applications as an example. The specifications were released by the Digital Government Association of Guangdong Province and set requirements for real-time video backhaul by drones: video resolution must be at least 4K; video stability error must be 3% or less; video interruption rate must be below 0.1%; and coverage rate of reserved routes and mission areas must reach 99% or higher. Network mechanism modeling technologies are required to cover these strict requirements into deterministic network SLAs. Professional low-altitude solutions are also required to implement network planning and optimization measures.

Telecom carriers need to reserve or plan capabilities in advance to ensure a good user experience and promote new services.

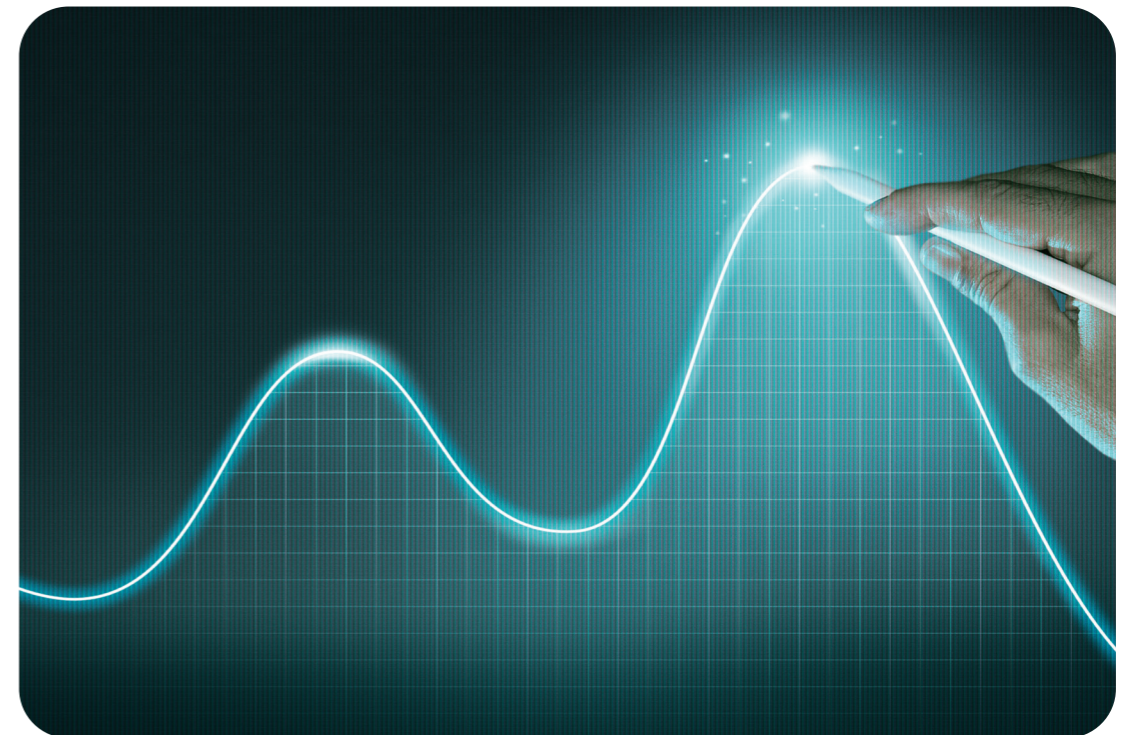


### Telecom Carriers Needs to Develop New 5G-A Business Scenarios and Create Viable Business Models, Capitalizing Growth Opportunities

**E2E verification and pilot:** Cooperate with vertical industry partners, equipment suppliers, terminal device vendors, and software developers to quickly carry out technical verification pilots, verify the feasibility and business value of 5G-A technologies through actual projects, and quickly promote 5G-A technologies by establishing benchmark projects.

**Long-term ecosystem cooperation system:** Cooperate with upstream and downstream enterprises in the business domain chain, including vertical industry partners, equipment suppliers, terminal vendors, and software developers, to jointly promote the long-term development and application of 5G-A technologies. Promote close cooperation between the upstream and downstream of the business domain chain through resource sharing and interconnection, and promote the prosperity of the 5G-A industry ecosystem.

**Scenario-based network requirement standard system:** During the cooperation, establish standard systems for different scenarios and continuously refine them to support precise network construction and continuous optimization. Explore effective investment strategies while ensuring a good network experience in each scenario.





# 5

## Trend 5

**Mobile Finance Digitalization Accelerates the Conversion of High-Value Users, Reduces Transaction Risks, and Expands the Payment Ecosystem, Driving High-Quality Development**

The mobile money service industry continues to grow, according to the State of Industry Report on Mobile Money 2024 by GSMA. In 2023, 1.75 billion mobile payment accounts were registered worldwide, a 12% increase from 2022. Mobile payment transactions reached US\$1.4 trillion, or US\$2.7 million per minute, a 14% year-on-year increase. International transfers reached US\$29 billion, a 33% year-on-year increase. Credit services have become the most popular financial services of mobile money providers (MMPs). The number of credit products they offer increases by 73% year-on-year. Mobile money has improved financial inclusion and access to other digitally enabled services. It contributes to the achievements of 15 out of the 17 goals listed in the United Nations Sustainable Development Goals (SDGs), an increase from 13 in 2019. Mobile money has achieved significant economic and social benefits.

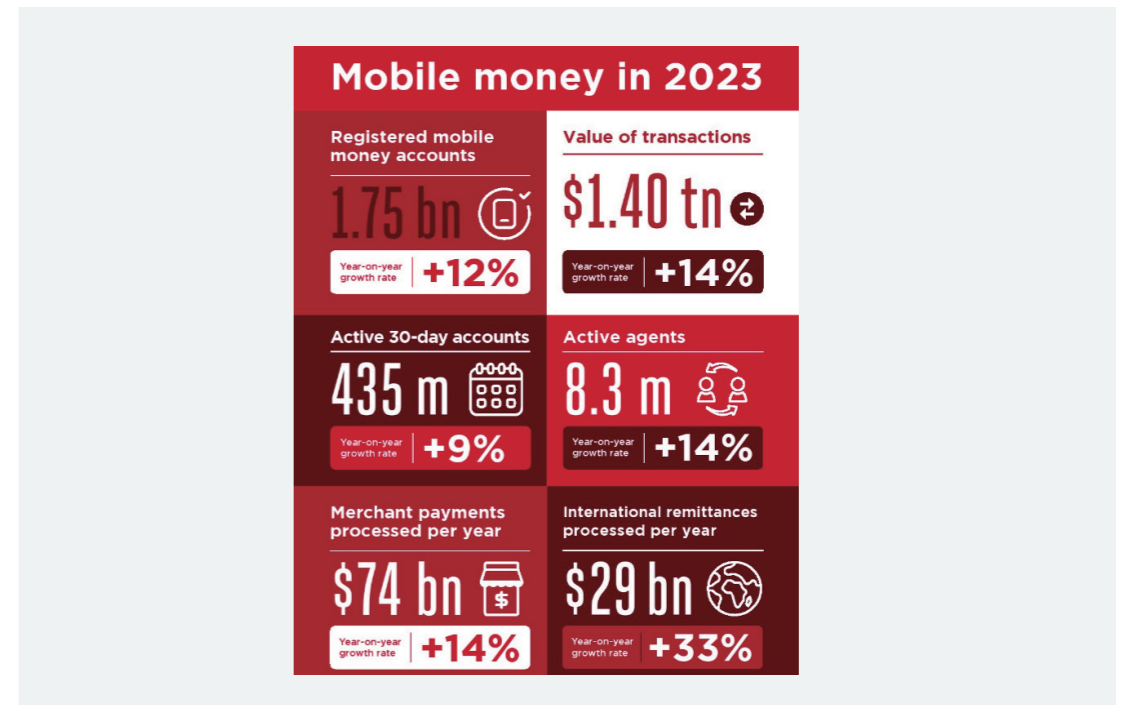


Figure 12: State of Industry Report on Mobile Money

The report also highlights several challenges facing the mobile money industry. First, there is a lower growth rate of the number of registered accounts and activated accounts than the 12% seen in 2023, 15% seen in 2022, and 19% seen in 2021. By the end of 2023, the number of accounts activated within 30 days was 435 million, with an annual growth rate of 13% in 2022 compared to 15% in 2021 and further reduced to 9% in 2023. Second, the number of active 30-day accounts make up only 24.8% of all registered accounts. This indicates that over three-quarters of users are hesitant to use mobile money services frequently due to concerns about transaction risks and limited payment options. Cash deposits and withdrawals, as well as remittance transfers, are the most common mobile money services. Merchant payment amount makes up only 5% of the total transaction amount, showing that the mobile money ecosystem is still fragile and needs more platforms and channels for merchant-customer transactions. MMPs must now leverage AI and digital financial innovation to boost user conversion, reduce transaction risks, and expand the payment ecosystem.

## ► 5.1 AI-powered Digital Marketing Improves Activeness of Target User Groups

Mobile money services traditionally adopt extensive marketing methods including TV, newspaper, and outdoor ads, but these efforts are costly, often met with user complaints and yield low user conversion rates. We can boost mobile money account group engagement by combining AI with digital marketing strategies in the following terms:

1. Data analysis: The use of AI-assisted user data analysis allows for further insights into users consumption habits, behavior characteristics, providing more accurate data support for marketing strategies.
2. Personalized recommendation: AI analyzes users' historical consumption records and behavior data to recommend products and services tailored to their interests and preferences, increasing purchase willingness and loyalty.
3. Marketing automation: AI automatically executes a range of marketing activities, including sending coupons and consumption reminders, which boosts efficiency and accuracy.
4. Intelligent customer service: AI uses natural language processing technologies to implement intelligent customer service, helping users resolve issues and access services, which boosts user satisfaction and loyalty.

## ► 5.2 AI-powered Risk Control Model Safeguards Mobile Money Transaction Security

Mobile payment fraud is a widespread issue. A hacker can steal a user's funds by forging their identity or creating a fake transaction. They can also obtain benefits, such as a service provider's coupon, by manipulating transactions. Hackers can exploit service vulnerabilities to commit credit fraud. The AI-powered risk control model can detect and prevent fraudulent transactions by analyzing patterns of fraudulent behavior.

A large amount of transaction data will be collected using big data and machine learning, including transaction amounts, times, and locations. This data is then analyzed by machine learning algorithms to identify rules and patterns, and to score users' creditworthiness. When a new transaction occurs, the risk control model identifies anomalies by comparing the transaction data with the previous data. When an anomaly is detected, the risk control model informs risk management personnel to investigate further. The risk control model performs real-time risk assessments on transactions through continuous monitoring. If the model detects a risk in a transaction, it takes immediate action to prevent it, safeguarding the user's funds.



### ► 5.3 AI-powered Scenario-based Payment Reshapes Mobile Money Ecosystem

Mobile money services are increasingly needed in various scenarios. Traditional point-to-point integration is inefficient and costly, and cannot meet the needs of various industries. AI-powered scenario-based payment can be adopted to build integration and development tools for mobile money services, reshaping the ecosystem.

AI technologies help merchants to register with the payment platform in a more agile and efficient manner. For example, AI semantics can be used to quickly generate applet components/scripts, enabling one-click conversion of existing e-commerce web applications to applets for merchants.

AI technologies can help make scenario-based payment more intelligent and personalized. For example, AI can recommend a suitable payment method and discounts by analyzing users' consumption habits and historical data. AI can use biometric recognition technologies, such as fingerprint or facial recognition, to provide a more convenient payment experience.



# 6

## Trend 6

**Large AI Models Boost Call Center Upgrades from Cost Center to Experience and Revenue Center**

The industry suffers from common issues including value scenario consensus, data privacy and security, and cost-effectiveness. Generative AI is expected to significantly impact two key areas: Chatbots and call centers, as highlighted in the 2023 Omdia report. Leading carriers in Asia Pacific are investing in scenario-specific large models and AI computing networks to enhance customer interaction through digital assistants and chatbots. It is preferred to integrating GenAI into existing service processes and activities to enhance their effectiveness. Mainstream vendors of the industry focus on applying GenAI to assistant and operations, aiming to improve work and operations efficiency. Carriers are now focusing on chatbot and personalized marketing, driven by the need to reduce cost and increase revenue. The top reasons for companies to switch call center suppliers are poor agent experience and user experience, as found in a European survey by a leading call center outsourcing company.

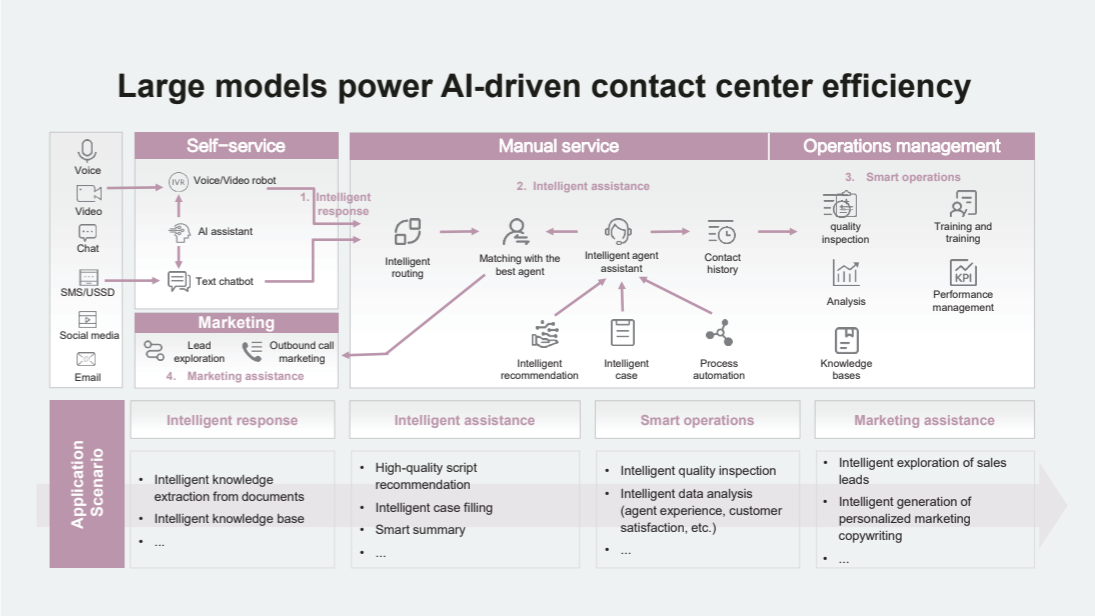


Figure 13: Intelligence for all call center scenarios

► **6.1 Achieving a Comprehensive Customer Experience Improvement for End Users, Agents, and Operations Managers**

Traditional call centers prioritize the experience of end users, often neglecting the needs of their agents. This leads to a heavy workload for agents and inefficient system operations, resulting in high costs for the call center. The next-generation call center, while focusing on end user experience, help agents reduce workload and improve operation efficiency in an intelligent mode. From self-service and manual service to operations management and then to intelligent marketing, the next-generation call center implements intelligence for all scenarios covering the entire process. This reduces the average call duration by 30% and boosts the first call completion rate by 30%. The AICC integrates Pangu models and enables seamless connections with third-party models, ensuring robust data protection and security while maximizing AI value through flexible deployment and tailored service scenarios.

► **6.2 Highlighting Cost Reduction and Revenue Increasing Needs of Carriers and BPO Customers**

Traditional call centers are typically self-used platforms of carriers, which can be costly for them. The AICC enables platform openness and multi-level multi-tenancy, allowing enterprises to reduce call center TTM by 50%. Partners can rapidly develop services based on the AICC, and enterprise customers can quickly provision services based on it. In addition, intelligent outbound call marketing, lead exploration, and call center service resale can help customers reduce costs and increase revenue.





## 7

**Trend 7**

**B2B Billing and Intelligent Packages  
Explore Possibilities for Carriers' Refined  
Operations and Value Monetization**

5G-A networks will boost carriers' B2B capabilities, enabling ultra-broadband, integrated sensing and communication, and immersive experiences. This brings new opportunities for carriers to meet the diverse needs of application scenarios across various industries, and posts new challenges on carriers' billing systems.





## ▶ 7.1 TM Forum Research: Leading Carrier's Revenue Growth Is Driven by New B2B Business

Carriers are shifting from traditional connection and traffic services to digital services and industry solutions. This shift makes B2B billing a crucial step in generating revenue. Huawei's next-generation billing system allows for flexible combinations of over 1,000 billing dimensions, focusing on the customer's consumption journey. It enables new B2B growth through interface openness, and easy configuration, auditing, correction, and tracing, streamlining the billing process and doubling efficiency.

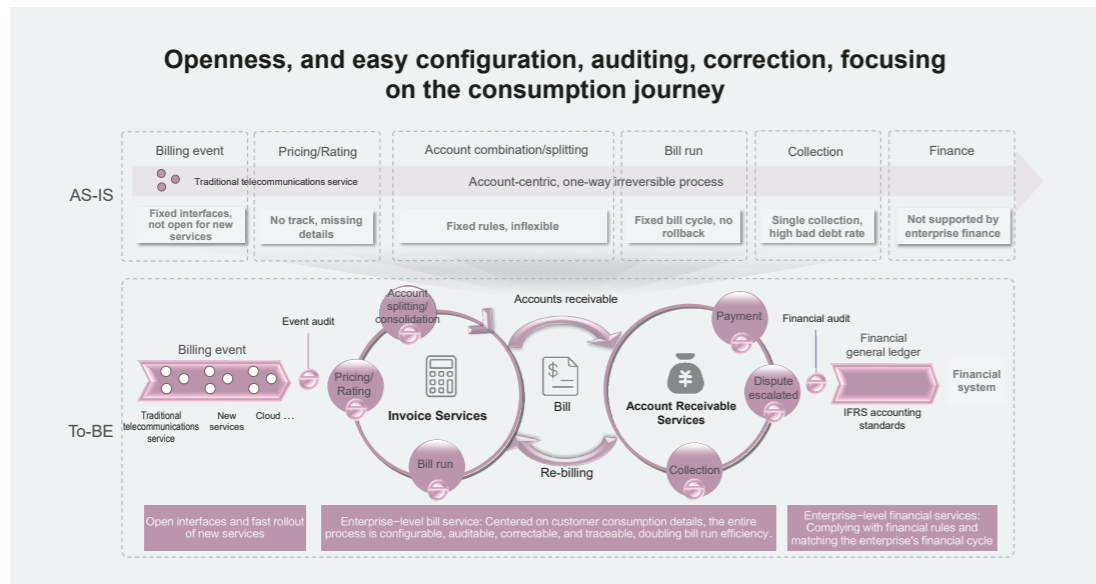


Figure 14: Mobile communications consumption journey

## ▶ 7.2 Intelligence Is Key for Carriers to Achieve Refined Operations, Lower Costs, Higher Efficiency, and Better Experience

Tier-1 carriers like DT, VDF, and Orange now consider AI capabilities a strategic necessity. The intelligent Idea to Cash solution of CBS uses AI to design, configure, and operate packages, reducing the time to revenue from 5–6 months to 3–4 weeks.

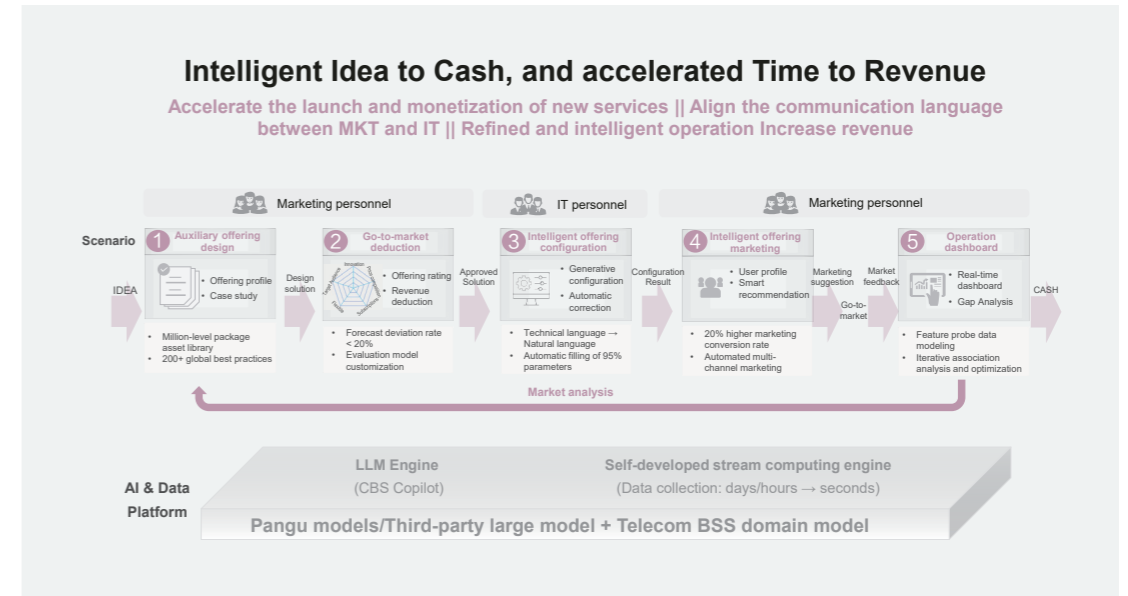


Figure 15: CBS intelligent operations





Thanks to the rapid development of AI-powered technologies, intelligent computing large models are leading industry upgrades. They serve people's livelihood assurance and improve governance efficiency. Major breakthroughs in science and technology paradigms rely heavily on advanced talent to drive innovation and industry growth. However, a significant shortage exists in professionals who can harness intelligent computing models to drive industry innovation and transformation. The business domain urgently needs them. Organizations are in urgent need of transformation.

# 8

## Trend 8

**Integrating Industry Perception, Digitally- and AI-enabled Intelligent Computing Talent Can Keep Pace with the Era of Intelligence**



## ▶ 8.1 In-depth Integration of AI and Business Calls for Up-to-date Talent Cultivation and Professionals with Industry Perception

Intelligent computing affects work and tasks in two main ways: substitution effect and absorption effect. Intelligent computing changes the way we work through its substitution effect. It supports human brainwork and replaces manual labor through technological innovation. It also transforms work modes, benefiting those closely involved in intelligent computing. For instance, there is a shortage and large market demand of professionals with large-scale cluster construction skills. Besides, traditional data centers need talent with transformed capabilities more urgently.

Intelligent computing creates job opportunities through its absorption effect. It generates new jobs. As global enterprises rapidly adopt intelligent computing models, more jobs related to this field are being created. Gartner predicts that by 2026, over 80% of enterprises will use generative AI APIs or models, or deploy applications that integrate with generative AI in production environments. New careers and positions, including prompt engineers and AI trainers, are emerging rapidly.

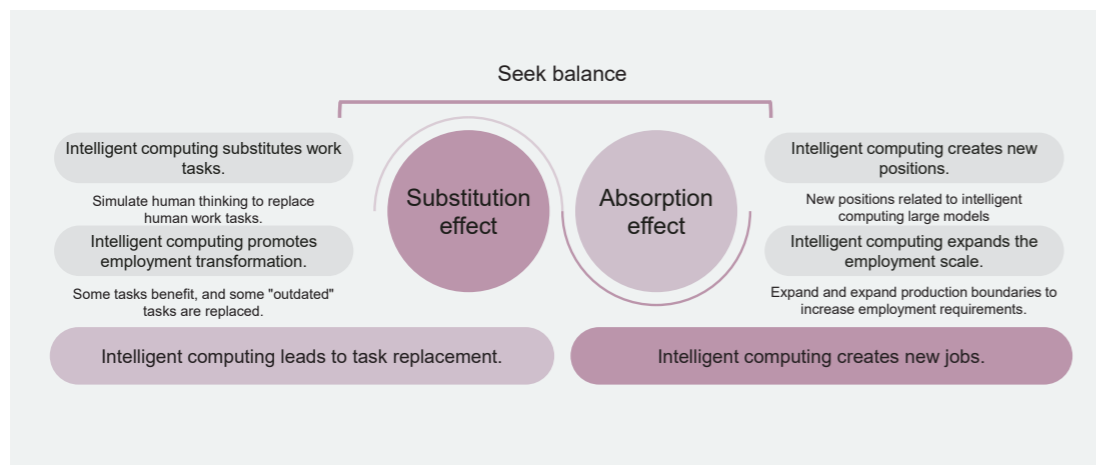


Figure 16: Substitution and absorption effects

In the intelligent era, industry-aware talent remains a valuable asset for digital transformation. Existing network professionals, for instance, can leverage large AI models to enhance their skills in planning, construction, maintenance, optimization, and marketing in the carrier domain. By combining these new technologies with knowledge management and engineering, they can solve long-term business problems, drive positive business value, and accelerate the intelligent process.

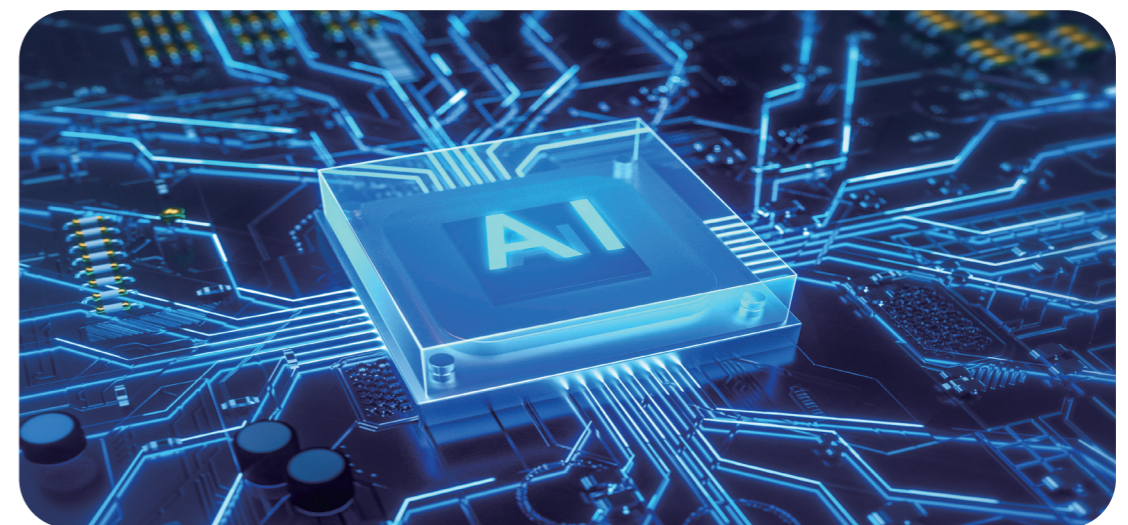
## ▶ 8.2 Cultivation of Intelligent Computing Large Model Talent Requires Integration of Research, Training, and Application

Intelligent computing large model talent refers to those who can integrate industry insights, data, and AI technologies to help enterprises achieve intelligent transformation and deliver business value. This includes strategic, technical, and business talent in the intelligent computing field.

**Strategic talent focuses on research directions.** They conduct in-depth research and innovation on intelligent computing from the perspectives of strategy and scientific research. In addition to CXO-level strategic management experts, it also includes technical experts and project research leaders.

**Technical talent focuses on training domains.** This includes organizing computing power and data resource to build or develop training architectures. Generally, two teams are involved: the AI and data team, comprising data analysts and AI engineers, who develop and train models using practical experience and data; and the computing power foundation team, responsible for implementing reliable and stable cluster operations and maximizing computing power utilization.

**Business talent focuses on application scenarios.** Business talent combines industry insights with AI technology to create new solutions, driving business value upgrade through innovative applications and valuable scenario development.



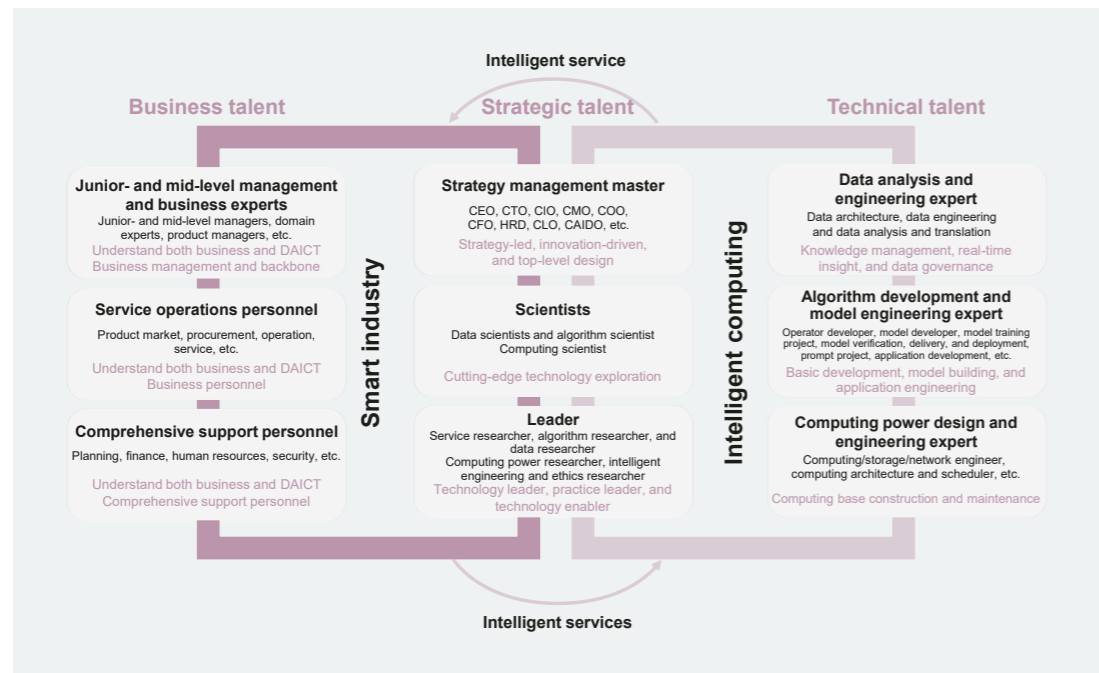


Figure 17: Industry digitally skilled talent

We will establish a collaborative framework of government-industry-research-university-application to promote industry-education integration, fostering high-quality AI talent for large models and guiding talent development. We will promote industry-education integration and build an ecosystem for intelligent computing talent through collaboration among the government, universities, industries, and enterprises. With institution and bases being the carriers, the government will provide policy and found support; colleges and universities will offer students and teacher resources to enable scientific research and innovation; enterprises will provide ecosystem support, technical enablement, and operations services; and industries will formulate standards, planning and design, and think tank. We collaborate to develop top talent that supports the intelligent computing business domain, driving business growth through innovation and enterprise incubation.

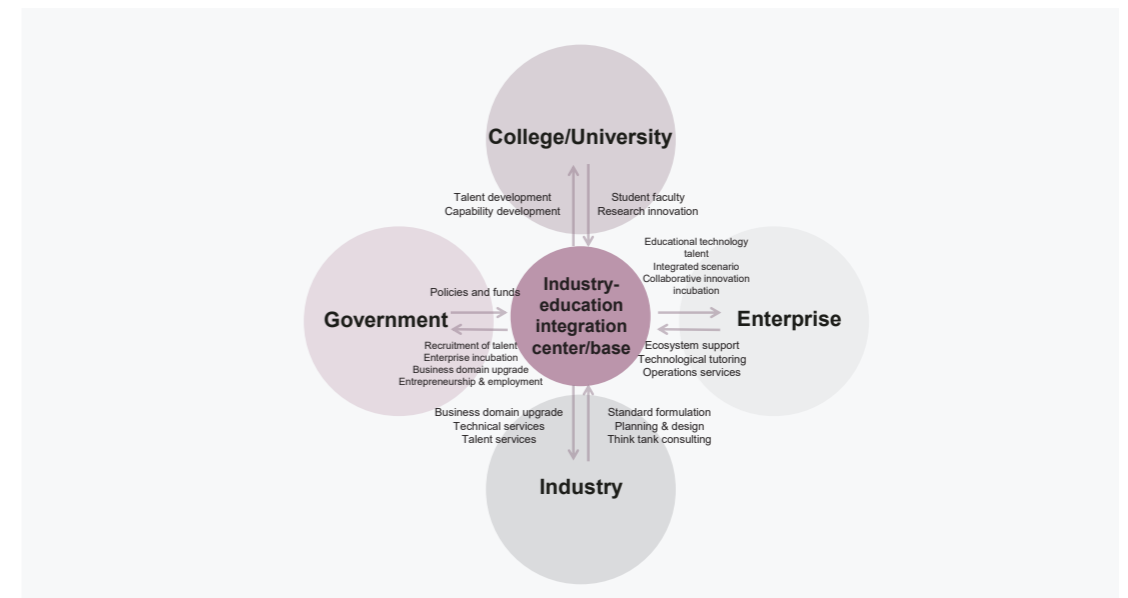


Figure 18: Industry-education integration

**Government: Connecting the Intelligent Computing Business Domain with Required Talent Through Dedicated Talent Policies**

The government develops policies and measures tailored to the local intelligent computing business domain, offering strong support for its growth. It also provides financial backing to establish industry-education integration centers that focus on local business domains. Centers/Bases use policy guidance to create an integrated system that attracts and keeps top talent, offers hands-on experience and training to develop resourceful intelligent computing talent, and encourages innovation and entrepreneurship with special benefits and subsidies. This helps local industries grow, driving technological innovation and business domain upgrading.

**Colleges and Universities: Restructuring Professionals to Meet Intelligent Computing Industry Needs and Developing Industry-Specific Talent**

Colleges and universities will revamp their course settings and teaching methods to better meet the talent requirements of the intelligent computing industry based on the integration of the knowledge of the industry and universities' curriculum system. They will create tailored cultivation plans, outline specific requirements for training objectives, graduation requirements, course systems, faculty teams, and support conditions. This will strengthen the intelligent computing majors and professional groups in colleges and universities. Meanwhile, to build capabilities, colleges and universities will leverage centers and bases to enhance faculty expertise and students' practical and innovative skills, ensuring they can meet the AI industry's demands.

**Industry: Connecting Universities and Enterprises to Evaluate Talent and Skills and Develop Intelligent Computing Talent Standards**

The industry should formulate forward-looking top-level plans to cultivate AI talent by assessing and predicting the current state of intelligent computing talent and skills. It should establish standards for talent development of the business domain, including systems of talent development, evaluation, and promotion. These standards will help drive AI talent cultivation and provide guidance for stakeholders. Centers/Bases train professionals of the business domain, supplying skilled talent to meet industry needs and driving comprehensive business domain upgrades.

**Enterprise: Building Business Domains, Fostering Innovation, and Ensuring Technical Integrity**

Enterprises should actively participate in building the intelligent computing joint innovation talent ecosystem, sharing resources with other companies and institutions, and jointly incubating innovations to drive upgrades of the business domain. Enterprises can drive independent innovation and support the intelligent computing industry through R&D investment, providing ecosystem support, technical enablement, and operational services. This investment also ensures the long-term operations of centers/bases with strong technical backing. Centers/Bases can collaborate with enterprises to achieve joint innovation, and foster the growth of the intelligent computing business domain through achievement incubation, showcasing an integrated education and technology model.



9

**Trend 9**

**Building a Knowledge Base in the Training Domain of Talent Operations with Large AI Models to Improve Learning Experience and Effectiveness**

In today's digital landscape, talent drives enterprise growth. With integrated large AI model and knowledge base in the training domain, we can design personalized learning paths tailored to each employee's needs and background. The integrated system enhances learning experience, accelerates knowledge transfer, and forecasts learning trends through data analysis, ultimately boosting training effectiveness and developing adaptable talent for future challenges.

## ► 9.1 Knowledge Base Drives Intelligent Talent Operations

The education and training industry is rapidly transforming with the development of AI technologies. AI integration boosts training efficiency and enables large-scale, personalized training. The Ministry of Education's Department of Higher Education released 18 cases in typical "AI and higher education" scenarios in April 2024, showcasing AI's integration and innovative practices in training. These cases show that AI is transforming education and training by enabling personalized education, intelligent coaching, and adaptive learning. It is driving the shift from traditional face-to-face teaching online, where students can access self-service platforms. Integration of AI is accelerating this shift, enabling more effective knowledge-based training and paving the way for a more intelligent and personalized education.

## ► 9.2 AI Enables More Precise Learning: Intelligent Recommendations and AI Profiles Drive Knowledge-to-People Matching

AI is transforming the training industry, particularly in personalized learning, at a rapid pace. AI-supported learning platforms use an intelligent recommendation engine to identify weak points in trainees' skills based on their job-specific assessments, then offer tailored training to create a personalized learning experience.

AI is not only used for personalized learning. It also plays an important role in knowledge graphs, intelligent knowledge recommendation, and other fields. AI technologies can analyze trainees' learning data and create personalized learning paths, driving the shift from people-to-knowledge match to knowledge-to-people match. This approach boosts learning efficiency, sparks trainees' interest, and fosters creativity.

As AI technologies advance, future training will be more intelligent and tailored to individual learners, offering customized learning paths.

## ► 9.3 AI Enables More Efficient Learning: Copilot Based on Domain-specific Models and Knowledge Bases, Focusing on Tailored Learning Journey

AI is revolutionizing the training industry by making it more efficient and personalized through powerful data processing and adaptive learning. Each trainee will have their own "super AI mentor" based on the training domain models and knowledge bases used by the copilot service. The increasing adoption of AI in training is driven by its diverse applications, such as designing personalized learning paths, providing real-time feedback and coaching, conducting intelligent evaluations, and recommending relevant resources.

As AI advances, especially with the growth of training domain knowledge bases, AI will be increasingly applied in training. The large models and knowledge bases learn from massive enterprise and individual data, enabling it to provide more accurate and personalized knowledge services and drive innovation in training. In the future, super AI mentors will become increasingly popular, offering personalized learning support and guidance to each trainee, thereby enhancing training efficiency and accuracy.

