

SUSTAINABILITY
REPORT
2021



UNDERTAKE NEW MISSIONS
DEVISE NEW STRATEGIES
CONTRIBUTE TO THE NEW ERA



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MESSAGE FROM CHAIRMAN



The year 2021 had milestone significance in the history of the CPC and the country, and was also an important year for China Unicom to determine a new strategy and embark on a new journey. With the impact of an epidemic and the accelerated evolution of changes unseen in a century, the external environment has become more complicated, tough and uncertain. Under the strong leadership of the CPC Central Committee with Comrade Xi Jinping at its core, we resolutely implemented the decisions and deployments of the CPC Central Committee and the State Council, and solidly carried out Party history learning and education campaigns; we stood out to undertake due political, economic, social and technological innovation responsibilities, and embarked on a new journey toward high-quality development with new positioning, strategy and paradigm; we undertook new missions in supporting the implementation of major national strategies, the public needs of high-quality life and the transformation of various industries, and demonstrated new achievements in the first year in implementing the 14th Five-Year Plan.

Always maintaining original political aspirations by learning Party history and in devising strategies. China Unicom adheres to the Party's leadership with political building and conscientiously implements the spirit of the 19th CPC National Congress and all plenary sessions of the 19th CPC Central Committee. It has consciously supported the "Two positions to establish" and firmly implemented the "Two positions to secure", providing strong ideological guarantee for and confidence in reform and development. It drew upon the Party's century-honored experience in endeavoring to carry forward the great spirit in the founding of the CPC and made Party history learning a compulsory and regular routine for its CPC members. It leveraged digital tools to empower Party spirit education by building a "Party History Learning and Education" bookstore online and 60 Party Culture Education Bases, 3 of which were named by SASAC the first batch of 100 SOE-funded Patriotic Education Bases, to pass on the spirits and tradition of revolution. In practice, it launched the "Practical commitments for the people" campaign to ensure that the learning and education of the Party history can be solidly rooted and flourishing. Starting from the big picture of the Party and the country, it closely followed the trends of the new round of technological revolution and industrial transformation and devised the Company's positioning and development direction in a scientific manner that accurately adapted to the "time" and "trends". It formulated the "1+8+2" strategic planning system, proposed a new strategy to "Strengthen and solidify, Preserve and innovate, and Integrating and open", focused on five main responsibilities and businesses of "Big Connectivity, Big Computing, Big Data, Big Application and Big Security", and was committed to building itself into a "national team in the operation and service of digital information infrastructure, key force in the establishment of Cyber Leadership, Digital China and Smart Society, and frontline troop in the integration and innovation of digital technologies".

Bearing in mind what's important to the country with efforts to solidify fundamental capabilities and nurture growth dynamics. Undertaking the missions to enable technology and cyberspace leaderships, Digital China and smart society, China Unicom accelerated the development of intelligent and comprehensive digital information infrastructure featuring high-speed, ubiquitous access, space-ground integration, cloud-network convergence, intelligence, agility, greenness, low-carbon, security and controllability. The Company provided high-quality communications support to central government leaders in 192 "cloud diplomacy" meetings and 31 major events including the 100th anniversary of the founding of the CPC, and empowered Smart Winter Olympics against high standards, polishing its golden name as "the top communications service provide for major events". It comprehensively advanced the deployment of "dual Gigabit" networks and built the world's fastest 5G SA network. Its gigabit broadband network covered 110 million households, with the broadband speed ranking the first among operators in the northern China market; its mobile coverage in townships was 100%, helping narrow the digital divide to connect the ICT "artery" for socio-economic development. It actively implemented the "IDC in the East and Computing in the West" program to

build a computing power network with advanced architecture, security, reliability and service excellence, as well as a new “5+4+31+X” IDC pattern; it re-designed and upgraded its cloud service brand and enabled collaborative development of digitalization, connectivity, cloud computing and edge computing to provide strong computing power to boost high-quality economic and social development. It gave full play to the integration advantages in cloud, big data, IoT, smart intelligence, blockchain and security to mine the value of data elements, serve national macroeconomic monitoring and collaborative governance, and provide in-depth support to local data governance and data security services; it supported various industries to transform and upgrade with “cloud migration and digital intelligence” and implemented the “5G Applications Set-Sail” Action Plan, winning 94 awards of various types in the MIIT “Blooming Cup” Contest. Led by independent innovation, it adhered to the “Four orientations” and focused resources on the core technology “bottlenecks”, with the R&D investment intensity exceeding 4%. It was approved as the National Engineering Research Center, with over 200 self-developed applications and products, including a batch of star products such as government big data platform, industrial Internet platform and smart city base; it set up the Western China Innovation Research Institute, the Chongqing 5G Convergence Innovation Center and other facilities to create an innovation consortium linking the industry, academia, research institutions and end-users, significantly enhancing its innovation capability in digital technology convergence. It made new breakthroughs in digital and intelligent operation, with the establishment of a world-leading, ultra-large intensive IT system, and also built “five middle-office” for individual customers, governments and businesses, data, network and management, and officially launched the Smart Brain to efficiently empower industries in differentiated scenarios.

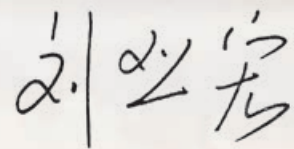
Basing corporate actions on commitments for public wellbeing and boosting synergy for public good. China Unicom has always adhered to people-centered approaches so everyone can be benefited from the convenience brought by the development of digital technologies, and had a sense of gain, happiness and security. At every critical moment, be it the flood rescue in Henan or disaster relief in Shanxi, China Unicom was always the first to come forward and completed its tasks as expected, building its image as an Iron Army forging ahead against all difficulties; its big data platform supported over 4 billion “Health Code” queries, providing effective tools for the CPC Central Committee, the State Council and 24 national ministries and commissions to analyze and judge the situation of epidemic prevention and control as well as the resumption of work and production, and becoming a reliable force the country could rely on. It consolidated and expanded what had been achieved in poverty alleviation and continued to strive for comprehensive rural revitalization, providing 153,000 administrative villages with digital village platform services for 14.363 million permanent rural residents. With digital live broadcasting technology, it helped nurture a group of well-known, high-quality and differentiated rural e-commerce product brands. It implemented the overall national security concept by building strong cyber security protection, decreasing the number of fraudulent calls by 49% year-on-year with industry-leading capability to combat telecom fraud. It provided heart-warming and intelligent services, with special focus on “the old and the young” through trustworthy, worry-free, reliable, warm and convenient services, and built agile and intelligent service capabilities with the establishment of 2,100 intelligent elderly service centers nationwide, improving overall customer satisfaction. It adhered to the harmonious coexistence of human and nature with vigorous promotion of the R&D and application of new energy-saving technologies, saving more than 17.5 billion kWh of electricity per year through 4G/5G co-building and sharing and reducing carbon emissions by more than 6 million tons. It enabled green production and lifestyle to help achieve carbon peaks and carbon neutrality. It accelerated the development of a digital ecosystem featuring “multi-party synergy,

complementarity, mutual support, cross-border convergence, and co-existence of competition and cooperation”, and created a new ecosystem that runs through the innovation chain, industrial chain and value chain, building a “joint fleet” with all partners; it deepened co-building and sharing in an all-round manner and drove rapid development of the industrial chain to help stabilize the macro-economy with the sustainable development of the industry.

Acting in a pioneering spirit with enhanced reforms for excellence. China Unicom has been always reforming internally as a critical approach to building a new development paradigm. It strengthened reforms in system integration to connect the “unconnected dots” that restricted productivity and used reforms to overcome difficulties, seize opportunities and open up new prospects. It vigorously developed corporate culture as a way to prospering the Company, established the management concept of creating value for customers, and consciously practiced customer-oriented, employees-based and service-first actions with a commitment to innovation and a pride to endeavor, cultivating the spirit of perseverance and hard work, which is key to China Unicom. It took the arduous task in a three-year SOE reform action, accomplishing 93% of all 130 reform tasks; it deepened the market-oriented reform of subsidiaries, of which 100% set up the board of directors with a majority of external directors, and comprehensively promoted the tenure-based and contract-based systems among management teams; it stimulated the vitality of grass-roots units and initially formed a customer-oriented, frontline-targeted operation system to continuously improve the ability to empower front-end operations with policies suitable for front-end scenarios. It implemented talent-based corporate development strategy by training and introducing talents in an all-round manner and put them in positions they’re most suitable for; the total number of innovative talents exceeded 9,000 and more than 40 industry experts were introduced, constantly optimizing the talent structure. It continued to enhance its competitiveness and capabilities in innovation, control, influence and risk prevention, effectively preempting and defusing major risks, and continued to strengthen, expand and increase the returns on state capital, taking solid steps towards building a world-class enterprise with global competitiveness.

The year 2022 is the starting year for China Unicom to fully implement the new strategic plan. We should unite more closely around the CPC Central Committee with Comrade Xi Jinping as its core, with “two big pictures” and “what’s important for the country” in mind. We should follow the strategic planning in our work, with a focus on the five main responsibilities and businesses. We should leverage the market and innovation as two driving forces to stabilize growth, optimize networks, enhance reforms, improve capabilities, strengthen collaboration and guard against risks. As always, we will follow the spirit of hard work and aim for new heights with confidence; we will embark on the new journey toward the digital economy, set sail for the new future of China Unicom and get ready for the successful convening of the 20th CPC National Congress with excellent results.

Secretary of the Party Leadership Group & Chairman
China United Network Communications Group Co., Ltd.



March 2022

WELCOME TO CHINA UNICOM

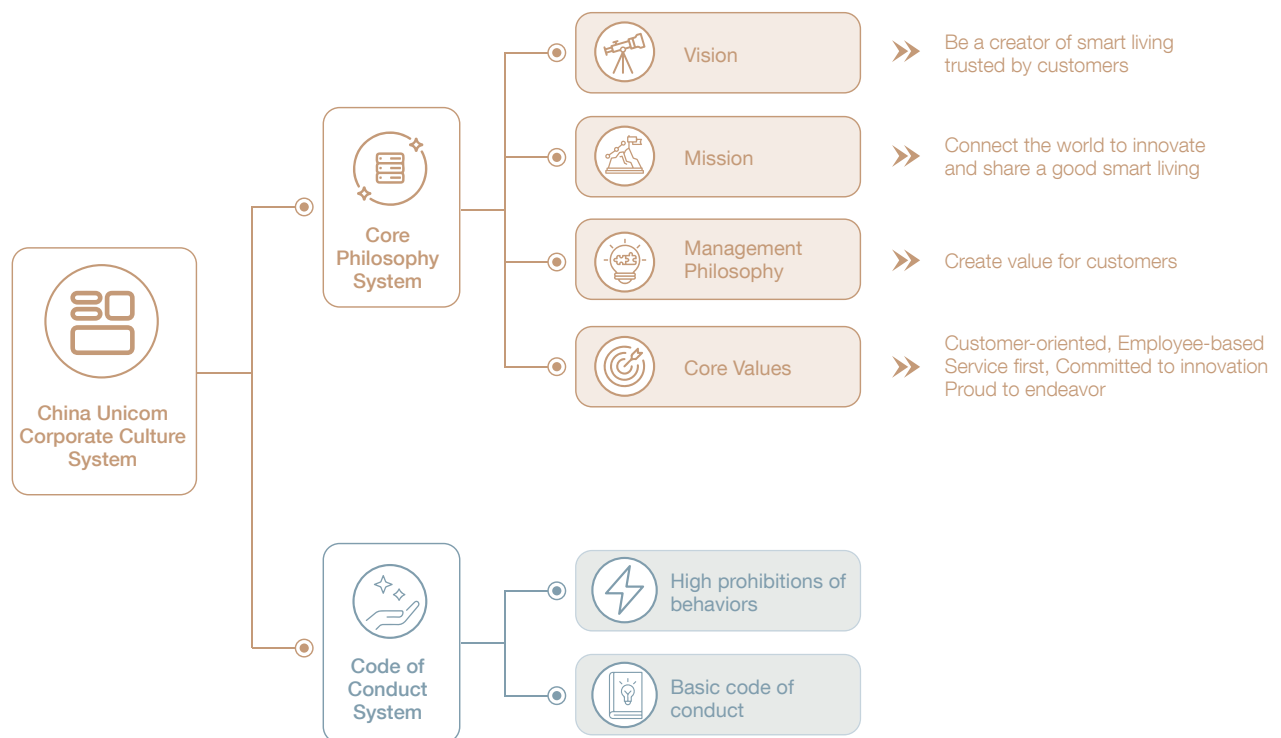
Company Profile

China United Network Communications Group Co., Ltd. ("China Unicom") was established on January 6, 2009 based on the merger between the original China Netcom and China Unicom. It has operations in 31 provinces (autonomous regions and municipalities) across China and many other countries and regions around the world. The Company has been shortlisted into the Fortune Global 500 for thirteen consecutive years and ranked 260th in 2021. It is co-listed in Hong Kong and Shanghai.

China Unicom has been making a full endeavor on the track toward the digital economy, with "Big Connectivity, Big Computing, Big Data, Big Application, Big Security" as its main responsibilities and businesses to create new room for development and integrate into the new development pattern.

Cultural Philosophy

China Unicom has actively practiced its responsibility and mission as a flag-bearer to gather the people to act with unity, nurture new talents, revitalize corporate culture and demonstrate its image as a responsible company. It upheld the motion that culture is critical in prospering and strengthening the corporate and continuously strengthened the development of corporate culture. It leveled up its soft power through corporate culture and built its corporate culture system that consists of a core philosophy system and a code of conduct system.



China Unicom Corporate Culture System

Senior Management



Liu Liehong

Secretary of the Party Leadership Group
Chairman



Chen Zhongyue

Deputy Secretary of the Party Leadership Group
President
Director



Wang Junzhi

Deputy Secretary of the Party Leadership Group
Director



Mai Yanzhou

Member of the Party Leadership Group
Vice President



Liang Baojun

Member of the Party Leadership Group
Vice President



Dong Qun

Member of the Party Leadership Group
Head of Discipline Inspection & Supervisory Team



He Biao

Member of the Party Leadership Group
Vice President



Tang Yongbo

Member of the Party Leadership Group
Vice President



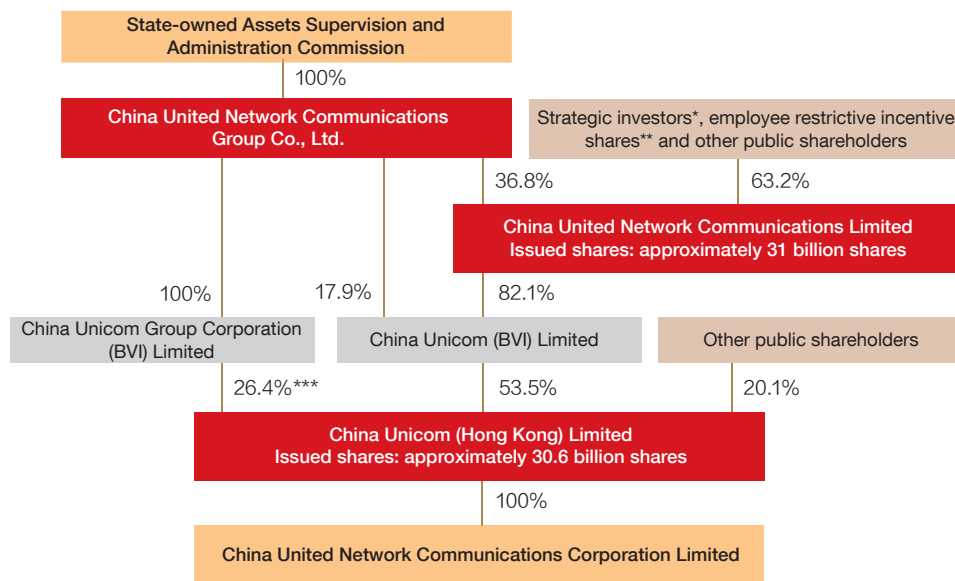
Li Yuzhuo

Member of the Party Leadership Group
Chief Accountant

Note: Changes of the Board of Directors and management.

Liu Liehong (appointed in August 2021); Wang Xiaochu (retired in August 2021); Chen Zhongyue (appointed in February 2021); Wang Junzhi (appointed in October 2021); Li Fushen (resigned for other occupation in May 2021); Zhu Kebing (resigned for other occupation in June 2021); Fan Yunjun (resigned for other occupation in April 2021); Tang Yongbo (appointed in November 2021); Li Yuzhuo (appointed in December 2021).

Shareholding Structure



Shareholding Structure of China Unicom

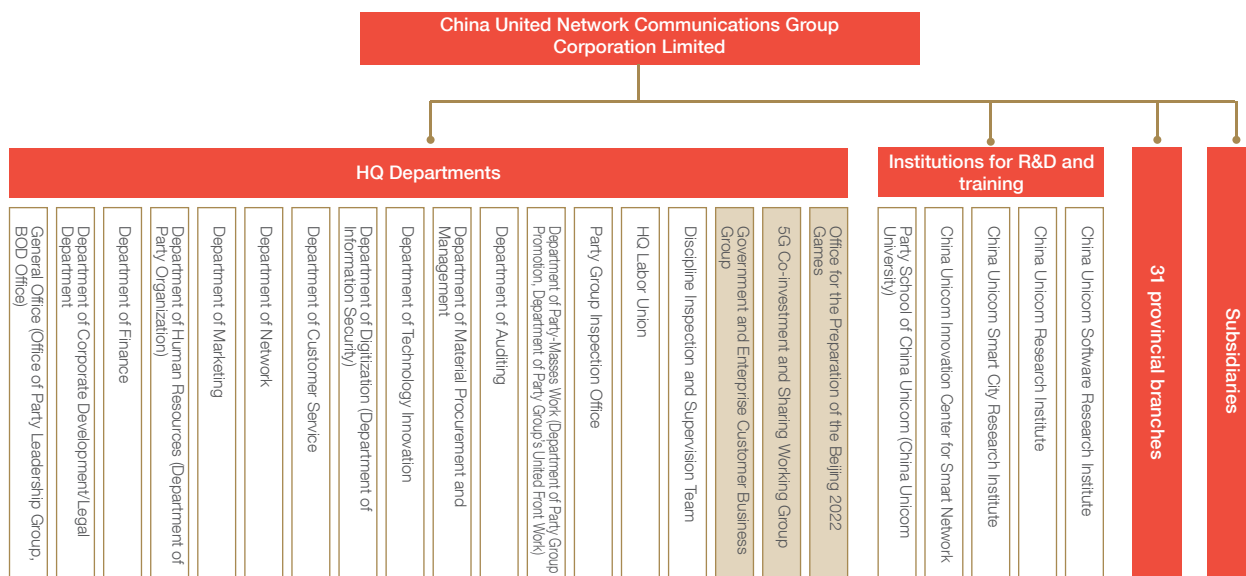
Notes: all data as at 31 December 2021.

In 2017, approximately 10.9 billion shares of China United Network Communications Limited were acquired by the strategic investors introduced by the mixed-ownership reform through non public share issuance and transfer of existing shares. These shares were no longer restricted from sale in November 2020.

** Pursuant to the initial grant of restrictive share incentive scheme, China United Network Communications Limited granted approximately 800 million restricted shares to the core employees, of which, approximately 500 million shares were unlocked in April 2020.

*** Excluded the interest regarding the pre-emptive right owned by China Unicom Group Corporation (BVI) Limited in 225,722,791 shares of China Unicom (Hong Kong) Limited.

Organization Structure



China Unicom Organization Structure

FEATURE 1

DRAWING UPON THE CENTURY-OLD HERITAGE OF TIRELESS ENDEAVOR

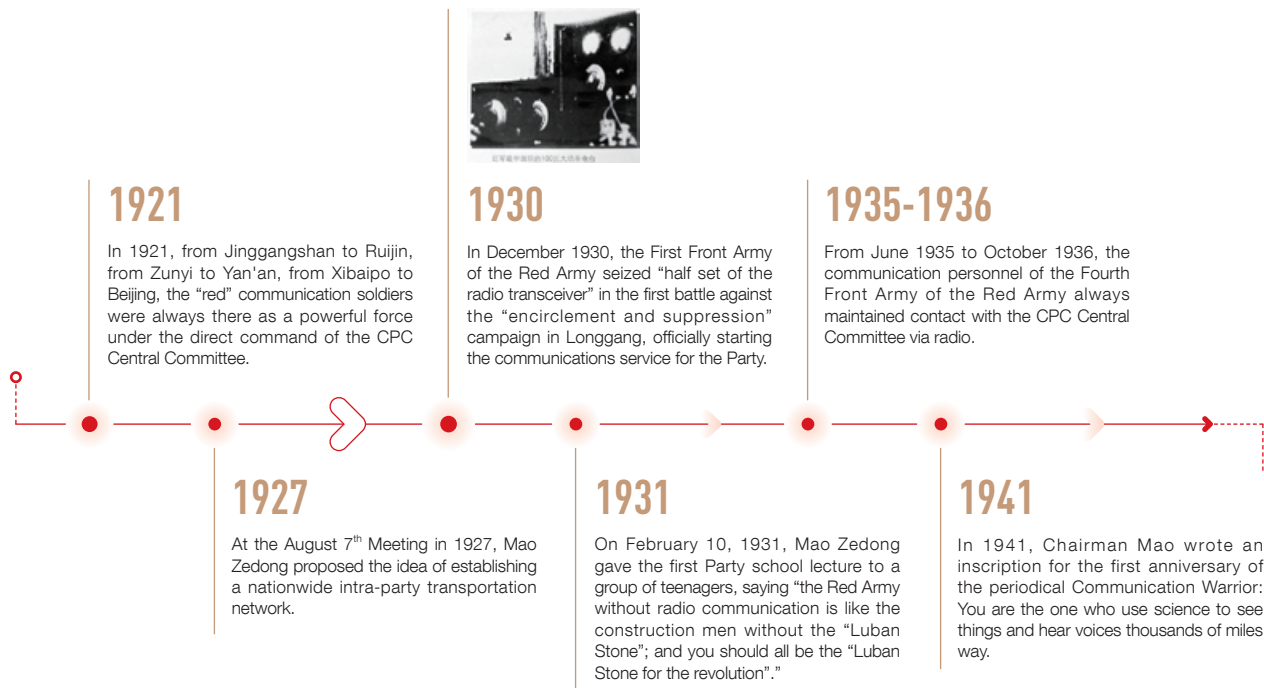
The 100-year journey has been turbulent yet magnificent, and the mission of enabling cyberspace leadership has never changed. The red color bears enormous implications to China Unicom. Starting with “half set of radio transceiver” for communication during the days of revolutionary and now growing into a high-quality development engine, China Unicom has always been there at every critical moment and on every important occasion.

Committed to great contribution to the country, we're honored with a century-old heritage behind. Standing at the historical intersection with the “two centenary goals” and based on a new stage in implementing the 14th Five-Year Plan, China Unicom will surely pass on the spirit and tradition of revolution while keep in mind the original aspiration to forge ahead and contribute to the comprehensive establishment of a modern socialist country as the national team in the operation and service of digital information infrastructure, the key force in the establishment of cyberspace leadership, Digital China and smart society, and the frontline troop in the integration and innovation of digital technologies.

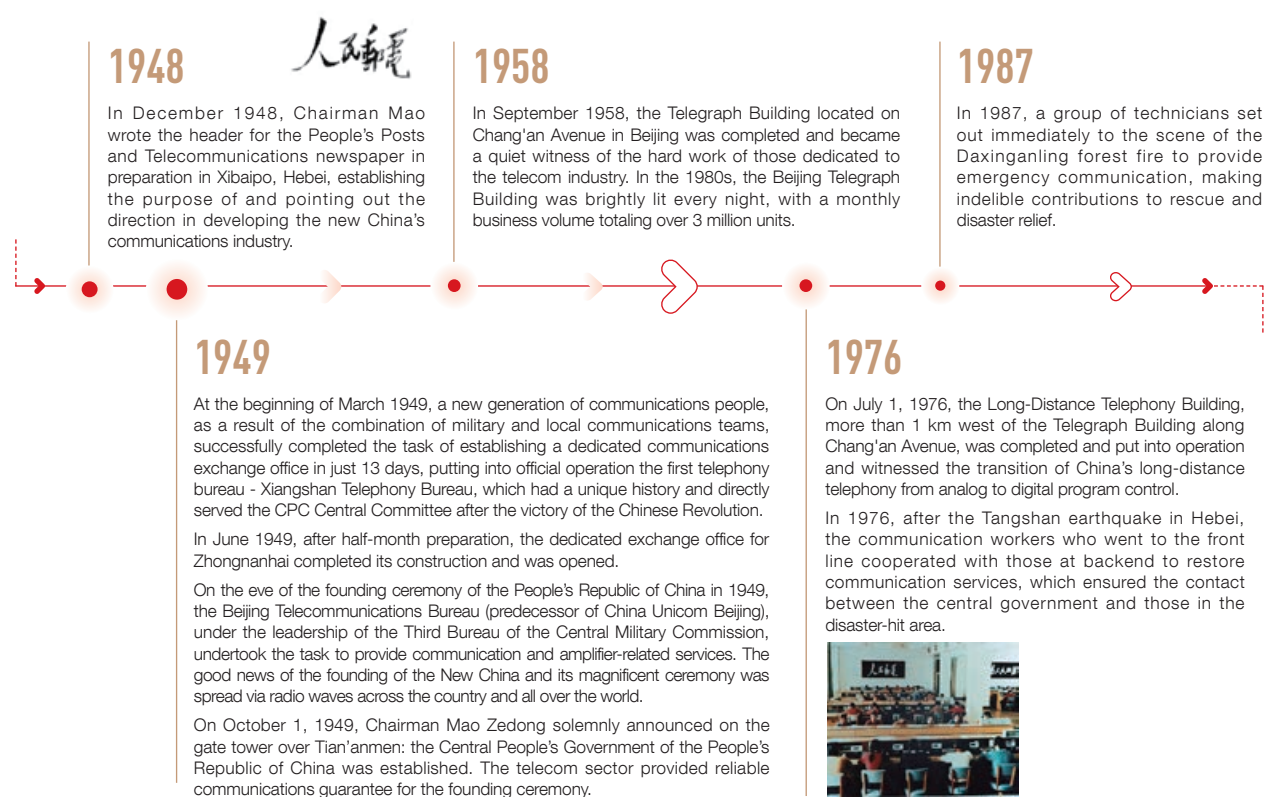


Be the “Luban Stone” for the Revolution

From 1921 to 2021, “red” communication played a very important role in the history of the Party to overcome difficulties on its journey toward success. Generation after generation, people in the communications industry passed on the tradition of revolution and worked hard to develop China's ICT sector for the realization of the “Chinese Dream”. From the hard times with only “half set of radio transceiver” to the mission of acting as a “Luban Stone”, China Unicom innovated and developed based on its great tradition, which was always passed on within this organization that bravely shouldered its mission whatsoever.



Hard Start with Milestone Achievements



📡 A New Chapter of Leapfrog Development

Since the mid-1980s, China's economic development has entered a fast track, with its comprehensive communication capability rapidly enhanced and the communication sector beginning to take off.

In the 1990s, the tide of global informatization was surging. Chinese telcos continued to carry forward the fine tradition of hard work, and launched a campaign to build "eight vertical and eight horizontal" communication trunks on a land of 9.6 million square kilometers in China.

1994

On May 12, 1994, the Ninth Five-Year Plan for China's Posts and Telecommunications Industry was officially released, putting forward the goal to build "eight vertical and eight horizontal" optical transmission backbone networks to cover provincial capital cities and key areas across the country and connect to the world.



The South Coast Optical Cable is the starting point in the development of China's optical trunk line communication networks. The constructors laid the optical cables with a length of more than 2,800 kilometers in only 28 days, a miracle in the history of world communication network construction.

The Lanzhou-Xining-Lahsa optical cable is a communication project with record-high altitude in the world. The workers overcame the lack of oxygen on the mountains, ultraviolet burns and many other unimaginable difficulties, and managed to complete the laying of 2,754 kilometers of fiber-optic cables and most of the connection lines in just 68 days, finishing the most challenging project so far in the history of communication network construction at home and abroad.

📡 Lay the Foundation to Build Cyberspace Leadership



1994

In July 1994, China United Communications Limited (the former China Unicom) was approved by the State Council to set up and had since embarked on a difficult, winding yet glorious journey to break monopoly and promote competition in the telecom sector.

1998

In 1998, the Ministry of Information Industry was inaugurated, unveiling the reform of the telecommunications system in China. Government functions were separated from business operation, the postal and telecom sectors were divided, and the mobile business was separated from China Telecom, giving birth to China Mobile.

2008

In October 2008, a third reform was carried out in China's telecom industry and China United Network Communications Co., Ltd. was formally established by the merging and reorganization of the former China Netcom and the former China Unicom. With such a background, China Unicom is endowed with a 100-year history of communication service provision, the tradition of "red communication", the original aspiration to support the development of social informatization, and the determination to bravely shoulder the mission tasked by the times and act as the "Luban Stone" in building national cyber strength.

1995

At the end of 1995, the original China Unicom's GSM mobile network was opened to provide service in Beijing, Shanghai, Guangzhou, Shenzhen and other cities, and gradually grew into an emerging telecom company.

2002

In 2002, the telecommunications industry underwent a new round of restructuring, forming China Telecom Group Limited and China Network Communications Group (formerly China Netcom).

2014

In 2014, with the "Broadband China" strategy, China Unicom accelerated the upgrading of fixed networks to fiber-optic networks.

2016

By the end of 2016, all 10 provinces, autonomous regions and municipalities in northern China had realized the "all-fiber networks" one year ahead of schedule, with 100Mbps access in urban areas and fiber-to-the-village in administrative villages in rural areas.

2018

In 2018, China Unicom proposed to transform itself with new governance, new genes, new operation, new dynamics and new ecosystem, striving to build a new, socialist central SOE with Chinese characteristics for a new era.

2015

In 2015, the Suggestions from the 13th Five-Year Plan was endorsed by the Fifth Plenary Session of the 18th CPC Central Committee and clearly proposed the implementation of the strategy to build national cyber strength. Later on September 22, Shandong became China Unicom's first "all-fiber" province.

2017

In August 2017, China Unicom introduced 14 strategic investors and became the first central SOE to adopt group-wide "mixed-ownership reform" pilot. In December, China Unicom announced as the official telecommunication service partner of the Beijing 2022 Olympic and Paralympic Winter Games.

2019

In 2019, China Unicom obtained the 5G commercial license and released a new 5G brand logo "5Gn" with the tagline "Unleash the future".

2020

In 2020, China Unicom's Big Data Company won the honorary title of National Outstanding Group in Fighting Covid-19.



2021

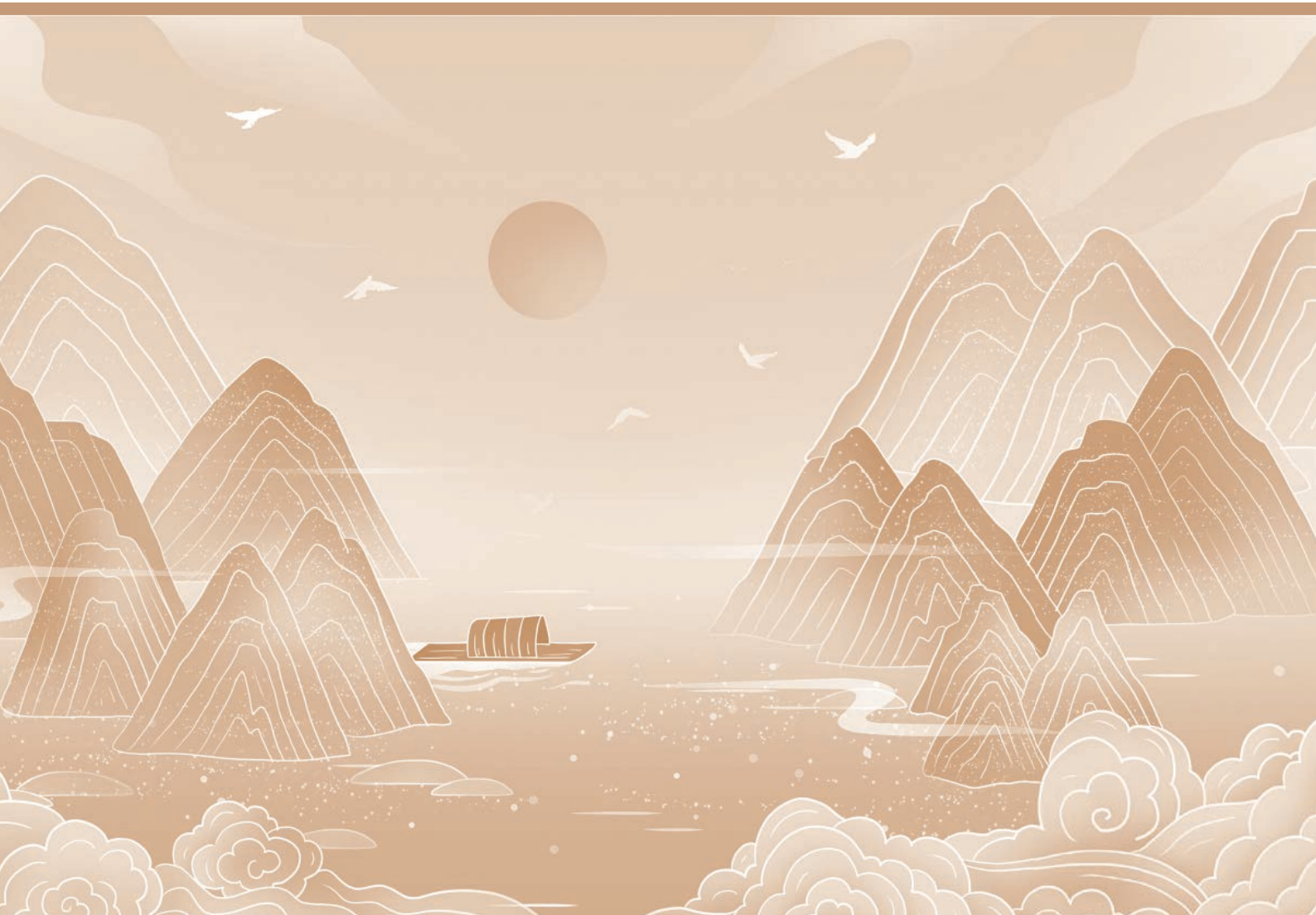
In 2021, adapting to the development trends of digitalization, network connectivity and smart intelligence, China Unicom took the initiative to conduct all-round integration, innovation and transformation in terms of mindset, network, business, mechanism and system, and proposed new positioning, strategy and paradigm. It acted as "the national team in the operation and service of digital information infrastructure, the key force in the establishment of Cyber Leadership, Digital China and Smart Society, and the frontline troop in the integration and innovation of digital technologies", to promote the development of the digital economy, digital life and digital governance, and constantly satisfy the people's aspiration for a better information life.

After a hundred years against all odds, we have prepared ourselves well for a new era. Looking back, China's communications industry and the New China have grown up together in despite of difficulties and challenges. Moving forward, the people of China Unicom are building new glory under the call of its new mission! Since the establishment of "red communication service", countless people with lofty ideals had braved against challenging tasks regardless of personal sacrifice and built up information rainbows with their loyalty and wisdom. Today, the people of China Unicom who silently practice their mission in the new era in ordinary positions will surely pass down the red gene and the fine tradition, uphold the great spirit of endeavoring, and contribute the wisdom and strength of China Unicom in the historical process of the great rejuvenation of the Chinese nation.

FEATURE 2

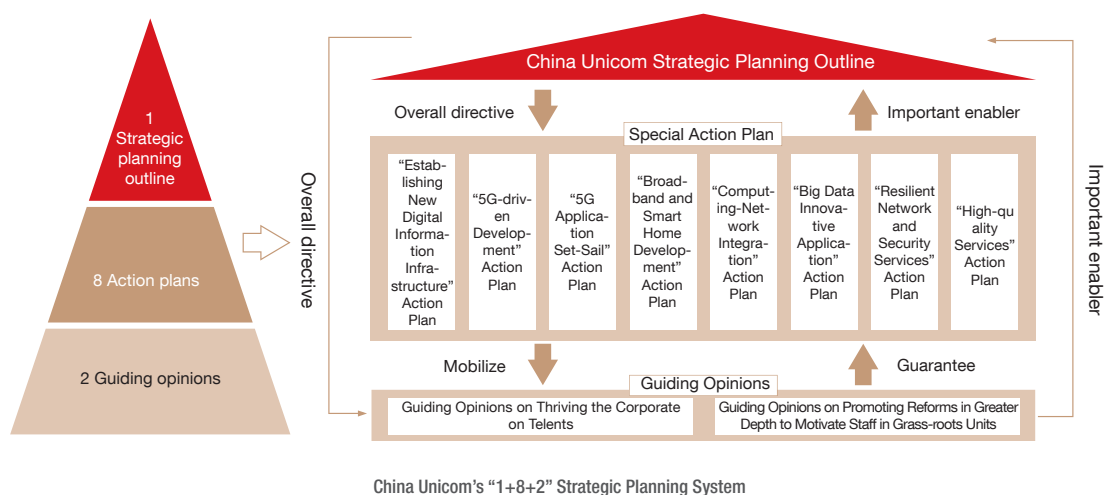
BRAVELY SHOULDERING THE MISSION AND DEVISE DEVELOPMENT STRATEGY

General Secretary Xi Jinping pointed out that there would be great chance in the cause of the Party and the people if the strategic judgment was accurately made, the strategic plan was scientifically devised, and initiatives were taken in strategic terms. Bearing in mind the “two big pictures” and “what’s important for the country”, China Unicom earnestly implemented the spirit of General Secretary Xi Jinping’s important instructions and the decisions and deployments of the CPC Central Committee and the State Council. It fully undertook the new mission entrusted by the new era, leveraged its own resource advantages, adapted to technology and market development rules, and closely followed the trend of a new round of technological revolution and the industrial transformation. It identified the new positioning, strategy, deployment and tasks for its development and was determined to strengthen, expand and increase the returns on state capital while transforming toward a globally competitive, world-class enterprise.



Systematic Establishment of “1+8+2” Strategic Planning

With higher political positioning, broader landscape and a stronger mission, the Company scientifically devised its strategic planning consisting of “1 strategic planning outline + 8 action plans + 2 guiding opinions” to comprehensive, systematic and high-quality fulfillment of its political, economic, social and technological innovation responsibilities.

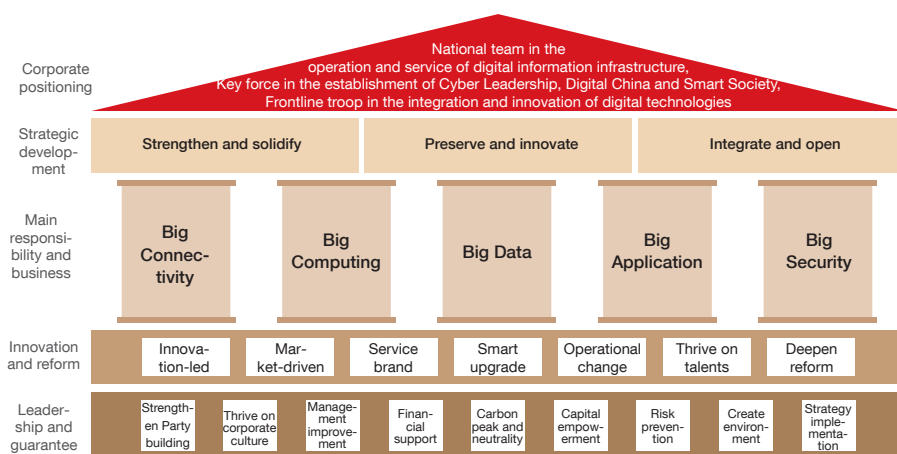


The “1+8+2” system is an organic whole to provide joint guidance for China Unicom to forge ahead and set sail on the main track of the digital economy.

- **1 strategic planning outline:** this is the “beacon light” leading the way as well as the general outline and strategy for China Unicom to manage itself and thrive in the new era, playing the role of overall directive and orientation.
- **8 action plans:** these are the “navigation charts” indicating the path, the important link in the strategic planning and the supply-side structural reform of China Unicom. They further decodes and refines the planning outline, with more emphasis on practicable and implementable instructions to promote the structural optimization of deployments, improve resource allocation efficiency and raise development quality.
- **2 guiding opinions:** these are the “propeller” to speed up actions and the important enablers to promote the implementation of corporate strategy. They embodies the organic combination of market-driven and innovation-driven approaches and focuses on addressing lacks of innovative talents and efficient incentives to boost energy in the organization and its employees and inject more vitality into the high-quality development of the Company.

Systematic Determination of the “13579” Strategic Layout

Identifying “1 new strategic trunk line, 3 new orientations, 5 main responsibilities and main businesses, innovative and reform measures in 7 areas, and 9 leading and guarantee measures in 9 aspects”, the Strategic Planning Outline of China Unicom fully manifests the mission of the Company as a backbone player, designs the blueprint and roadmap for the new journey in a scientific manner, and clarifies the ambition for high-quality development.



China Unicom's “13579” strategic system

Undertaking Due Mission and Identifying New Positioning and Strategy

New positioning

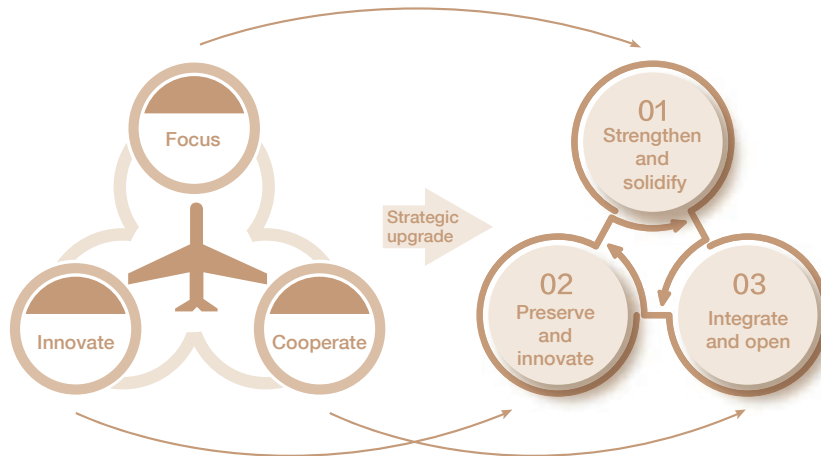
Embarking on the new journey, the Company actively supported and integrated itself into the national strategy and resolutely shouldered the mission and responsibility to enable national cyber leadership, Digital China, smart society, and technological innovation, with the positioning of becoming the “national team in the operation and service of digital information infrastructure, key force in the establishment of Cyber Leadership, Digital China and Smart Society, and frontline troop in the integration and innovation of digital technologies”.

- **The national team in the operation and service of digital information infrastructure:** resolutely implement the national mission, and make comprehensive efforts to build industry-leading intelligent and comprehensive digital information infrastructure in greater breadth and depth featuring “high-speed, ubiquitous access, space-ground integration, cloud-network convergence, intelligence, agility, greenness, low-carbon, security and controllability”, which helps establish unblocked information “artery” and serves as a new digital base for economic and social development.

- **The key force in the establishment of Cyber Leadership, Digital China and Smart Society:** resolutely implement the strategy of building national cyber strength and serving the development of Digital China and smart society. Efforts should be geared toward digitized, networked and intelligence-based development to empower various industries to “migrate to the cloud and apply digital intelligence” with technologically advanced, highly integrated digital services featuring “full coverage, 100% online access, 100% cloud accessibility, greenness and one-stop-shop offering”, in order to promote new development of digital production, digital life and digital governance.

- **The frontline troop in the integration and innovation of digital technologies:** resolutely implement innovation-driven approaches, with focuses on core technologies and key applications while making converged and innovative efforts to build China Unicom into a technologically innovative enterprise with high-level of self-reliance and self-improvement of digital technologies, and make the Company an integral part in the national strategic and technological strength.

New strategy



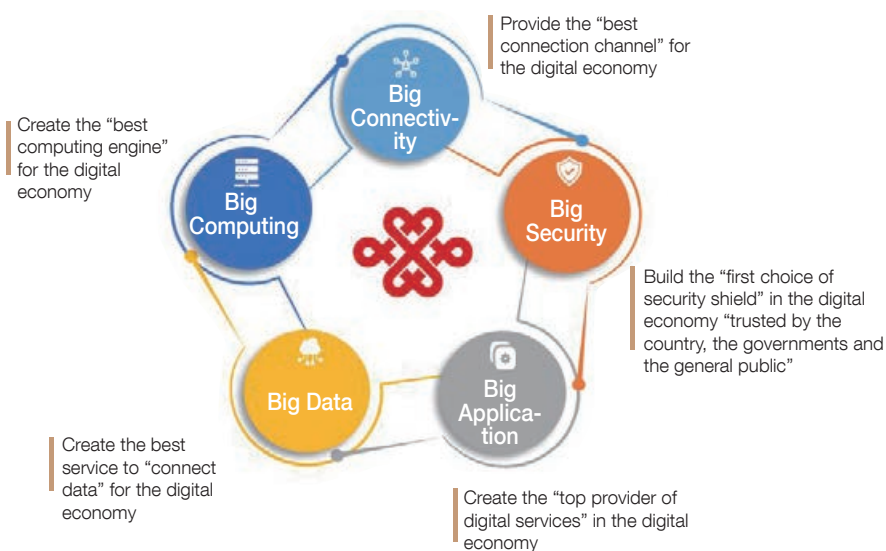
With an aim to pass on traditions, making up for shortcomings and giving full play to advantages, the Company upgraded its strategy to “strengthen & solidify, preserve & innovate, and integrate & open”. The new strategy is a complete system adhering to systematic concepts. It focuses on the present while taking long-term perspectives, it targets the market while emphasizing innovation, it solidifies corporate foundation while daring to try different approaches, and it gives full play to advantages while staying open to cooperation, giving answers to a series of important questions, e.g., the basis, dynamics, methods and paths of China Unicom’s development in the new era, in a comprehensive and systematic manner.

- **Strengthen and solidify:** more emphasis on strengthening the network and solidifying service-related efforts as the underlying foundation.
- **Preserve and innovate:** more emphasis on preserving network-based advantages complemented by innovation toward digitalized intelligence.
- **Integrate and open:** more emphasis on integrating resources and factors while opening markets to prosper hand in hand with partner players.

Gearing toward Greater Market with Deployment in Five Main Responsibilities and Businesses

Facing new opportunities brought by the wave of digitalization as well as new demands from various industries for digitalized, networked and intelligent transformation and upgrading, the Company had an understanding of the characteristics of the ICT industry in the new era and closely followed its corporate positioning. It strengthened innovation-driven approaches so as to shift from traditional business competition to digital innovation and development, from simple price competition to digital value creation, from competition for incumbent markets to expansion

of incremental digital markets. It identified five main responsibilities and businesses, namely “Big connectivity”, “Big Computing”, “Big Data”, “Big Application” and “Big Security”, and enhanced its capability to use digital technologies to empower various industries with smart intelligence and value creation, allowing people to have greater sense of gain, happiness and security in the digitalized, networked and intelligent development.



China Unicom's five main responsibilities and businesses

🏆 Innovation and Reform to Lead and Secure Sustainable Development

· China Unicom gave full play to the critical role of innovation and reform in fostering a new development pattern, by combining market-driven and innovation-driven approaches. It clarified priorities in 7 aspects with deep integration and efficient joint actions in further unleashing and developing productive forces and remove impediments to productivity, so as to overcome difficulties, seize opportunities and set the new stage.

· China Unicom adhered to high-quality Party building to lead and secure quality development, and put forward specific guarantee measures in 9 areas around service service development strategy, main responsibilities and businesses layout, innovation, reform and development to ensure high-quality development.

FEATURE 3

FORGING AHEAD WITH GREATER RESOLVE TO SUPPORT SMART WINTER GAMES

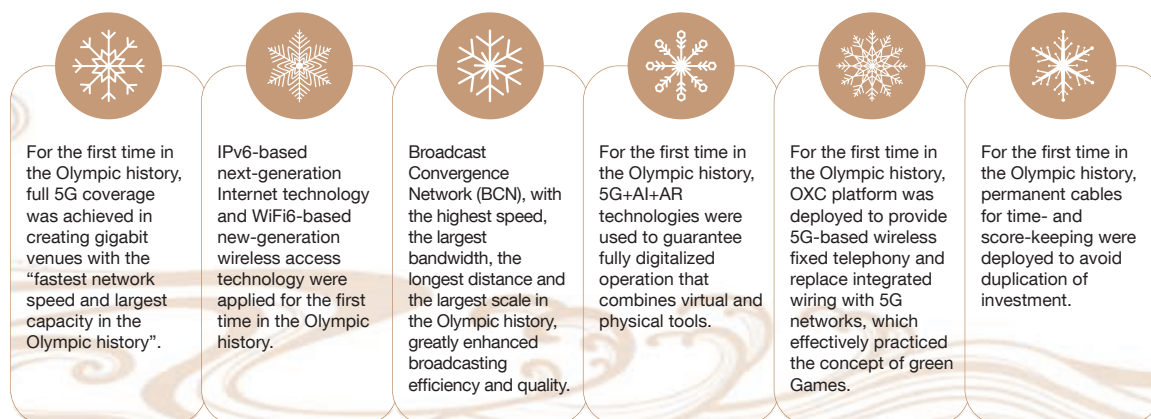
2021 was a decisive year to secure the victory in preparing for the Winter Games. As the only official telecommunication service partner of the Beijing 2022 Olympic and Paralympic Winter Games, China Unicom followed the philosophy to hold “green, shared, open and clean” Games and focused on requirements to make the Games “streamlined, safe and splendid”. It made all-out efforts to guarantee the communications service for the Games and managed to realize zero network failure, zero complaints in Games services, zero infection among communication guarantee personnel and zero negative public opinion related to the Games, contributing China Unicom’s wisdom and strength to the magnificent Beijing 2022 Games which attracted worldwide attention.



Smart Networks and Superb Data Rate to Support the Games

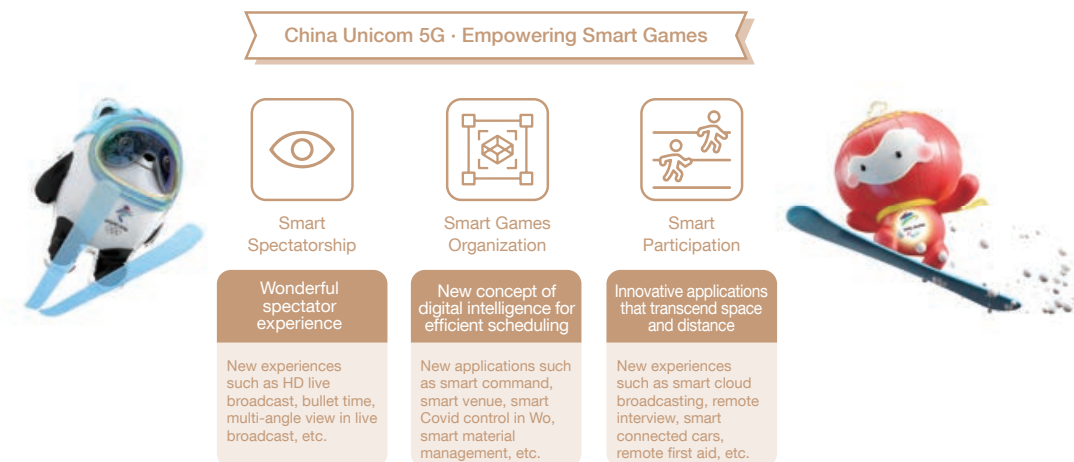
China Unicom strove to build excellent, future-oriented networks with reasonable architecture, comprehensive functions, advanced technology, security and reliability, in order to cover competition venues, non-competition venues, service facilities, transport trunk lines and all other scenarios, using 5G, "IPv6+", WiFi6 and other new technologies to build a state-of-the-art digital base for the Technology-driven Games.

- Telecommunication guarantee for the "Experience Beijing" testing series was completed successfully, with communication system tested "to the greatest extent possible", which was highly recognized by the organizing committees of all test events.
- World-leading, intelligent and comprehensive digital information infrastructure was built for 87 venues in both the Beijing and Zhangjiakou competition zones, functioning as the information "artery" of the Beijing 2022 Games.



Smart Applications and Diversified Products for the Game

China Unicom made full use of 5G, "IPv6+", cloud computing, big data, artificial intelligence and other next-generation ICTs to perfectly integrate technologies into sports, and enabled the Beijing 2022 Games to achieve many "world's firsts" and "historical breakthroughs" in terms of "smart Games organization, smart spectatorship and smart participation".



· On the Beijing-Zhangjiakou high-speed train, the world's first with continuous 5G coverage with 200MHz bandwidth, joint efforts were made for the first time to create a "5G+4K+ high-speed train" UHD live broadcast studio, allowing the audience to experience the 5G+4K Games viewing on the high-speed train.

· 5G cloud broadcast was used for the first time in the Olympic history, with extensive application of new technologies such as "free viewing angles" and "bullet time", allowing the audience to choose viewing angles freely and freeze wonderful moments in any competition.

· 5G backhaul for video broadcasting signals was adopted for the first time in the Olympic history to help the Olympic Broadcasting Services (OBS) realize the first-ever 5G-based event broadcast.

· For the first time in the Olympic history, the INFO-AV system realized all cloud-based production, editing and processing, allowing registered media reporters from around the world to watch the live broadcast of press conferences, play on-demand and play back.

· The "big data+AI+computing" platform for digitalized, automatic processing was first used in large scale.

- For the first time in the Olympic history, remote interview technologies was adopted, which not only secured real-time transmission, guaranteed the quality of interviews, but also met the requirements of epidemic prevention and control.
- For the first time in the Games, the push-to-talk running on 5G public network was used across different regions, realizing the public network-based commanding between and among all Olympic venues in Beijing and Zhangjiakou competition zones, improving the efficiency of command and dispatch.
- For the first time in the Games, 5G smart healthcare was applied for timely rescue of skiers, winning golden time for patient treatment.
- For the first time in the Games, L4-level unmanned shuttles, 5G-based unmanned vehicles for torch relay and other intelligent connected vehicle services were provided, offering high-quality, smart mobility experience for the Beijing 2022 Games.
- 5G-based smart epidemic prevention was realized for the first time during the Games, together with “smart Covid control in WO” - independently developed handheld device for intelligent epidemic prevention, to improve the efficiency of event operation and management during the epidemic.



China Unicom built a 5G-based intelligent connected vehicle system that covered an area of over 1 million square meters in Shougang Park. With the help of cutting-edge technologies such as 5G, MEC and Beidou, it demonstrated operations under intelligent scenarios including unmanned retail, unmanned shuttle and precision-based delivery. These vehicles ran smoothly within the Park and were able to realize timely collision avoidance in changing road conditions. In the Beijing Winter Olympic Village, the three core “green technologies” – “5G+sensing+positioning” - empowered innovative business of unmanned cleaning to help build a 5G+smart Winter Olympic Village.

Smart Technologies and Professional Teams to Guarantee Smooth Games Operation

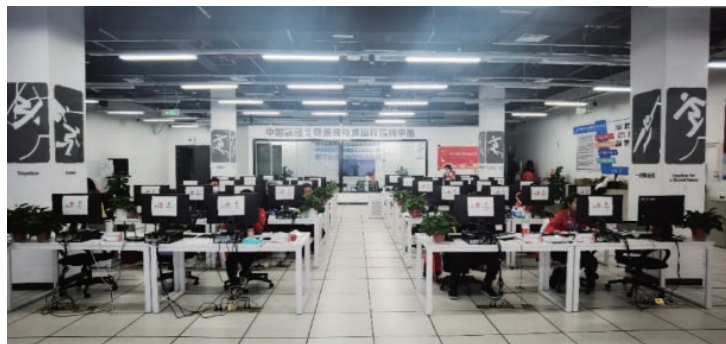
In the face of harsh natural environments including extreme cold, high altitudes and strong winds, China Unicom carried on with perseverance, thanks to network-wide interaction to overcome difficulties. All units involved, - the headquarters, China Unicom Beijing, China Unicom Hebei, the five provinces neighboring Beijing, as well as branch offices at provincial level where the international exchange office and satellite stations were located – collaborated to make the most out of their high-quality network service capabilities to establish the digital network operation guarantee system for the Games and the “1+5+N” Games-time command system, providing system-wide integrated guarantee for the opening and closing ceremonies and various events during the Games.

- During the Games, communication support personnel and vehicles were dispatched for 257,000 and 113,000 times respectively, guaranteeing communication for a total of 427 events. Among them, over 1,500 people worked within the “red line” in different venues, more than 5,000 people directly participated in the guarantee major events and more than 30,000 people were involved in network communication, network security, digitalization and other guarantee services.

- China Unicom built a “Digital Great Wall” of network and information security, providing reliable digital support to “Safe Winter Games”. Relying on network security situation perception, big data-based risk control and monitoring, AI-based analysis, automatic blocking and other frontier technologies, and using efficient and comprehensive command and dispatch systems, China Unicom ensured the safe operation of all Games-related networks and systems.

- 87 venue-specific contingency plans were formulated and a total of 49 large-scale drills were carried out. All Games-related areas were equipped with “dual routes, dual nodes and dual power supply”.

- Enhanced and highly reliable network services were provided, allowing users to experience ultimate network speed on-site, with an upload rate at 500Mbps and a download rate at 1.5Gbps during the Games.



China Unicom Telecommunication Technology Operation Center (TTOC), the smart brain for the Beijing 2022 Games

On February 4, 2022, the Beijing 2022 Games unveiled its grand opening in the Bird's Nest. China Unicom supported 5G+4K/8K UHD live broadcast to bring this spectacular event to all audiences while satisfying network use by 40,000 spectators, actors and actresses in the stadium. In addition to full-scenario mobile live streaming, IPv6+ technology was applied for the first time to the Winter Games, providing sound accessibility for media staff with one-click activation, plug-and-play and other functions. With 5G network slicing, the Xinhua News Agency and other media were able to enjoy real-time backhaul connection for live photos and videos during the opening ceremony.



Reliable communications guarantee for the opening ceremony of the Beijing 2022 Games



Highlights backhauled on 5G high-definition video transmission when athletes marched into the Bird's Nest

China Unicom went all out in the preparation and service guarantee for the Games against the highest standards, under the most considerable organization and with the most practical measures, the best services and the best results, which was recognized by the central leadership. Mr. Bach, President of the International Olympic Committee, paid a special visit to China Unicom telecom guarantee team to express gratitude and affirmation, saying that "China Unicom team is a vigorous and dynamic team", and recognizing that "the Beijing 2022 Games have made breakthroughs in many fields, especially in broadcasting and communication technologies". Yiannis Exarchos, CEO of Olympic Broadcasting Services, mentioned that "this is probably the best-quality broadcasting infrastructure in my Games experience". Athletes, media reporters and staff from various countries also spoke highly of the Games.

Rise Public Passion for Ice and Snow Activities with Smart Intelligence

China Unicom implemented the national strategy for ice and snow sports development to "expanding ice and snow activities from northern cities to southern, western and eastern regions in China", and supported to achieve the goal of "involving 300 million people in ice and snow activities" with concrete actions. The selection of "Winter Dream Ambassador", the "Smart Winter Games Tour in China", the management plan for Winter Games merchandizes and other series of activities all helped to tell well the story of the Winter Games, promote the Olympic spirit and gather great strength to get ready for the best Games ever held. Focusing on publicity themes such as "China Unicom 5G to demonstrate national strength", "China Unicom 5G to empower smart Winter Games" and "China Unicom strength trusted by the Winter Games", the Company demonstrated its political responsibility to support national major efforts as a central SOE and promoted the hard power of central SOEs in technological innovation.

- During the Games period, China Unicom appeared three times on the CCTV "19:00 News Broadcast" program, covered by the CCTV for 27 times, in addition to coverage by several professional media, provincial/municipal/local media, and social media.

- China Unicom's 4-year selection of "Winter Dream Ambassador" was successfully concluded, recruiting a total of 2,022 "Winter Dream Ambassadors" from more than 2,000 universities in 30 provinces and receiving over 2 million pieces of creative works. This campaign created 17.4 billion threads and nearly 300 million times of interaction online, forming extensive social influence.

- The "Smart Winter Games Tour in China" series of activities were launched, which brought the Olympic culture and ice and snow sports experience to 16 cities including Beijing, Zhangjiakou, Shenyang, Taiyuan, Guangzhou and Haikou, so that the general public could feel the passion and charm of ice and snow activities.

- With online and offline channels throughout the country, China Unicom launched the sales of Games merchandizes in its hundreds of business outlets in over 300 cities in 31 provinces. No matter where you are, be it Daxing'anling in Heilongjiang in the north, Sanya in Hainan in the south, or Ali in Tibet in the west, you can always buy the lovely Bing Dwen Dwen or Shuey Rhon Rhon in China Unicom outlets to understand, experience and get closer to the Winter Games.



China Unicom "Winter Dream Ambassador" on Campus program



China Unicom "Smart Winter Games Tour in China" program

BEARING IN MIND

***“WHAT’S
NEEDED BY THE
COUNTRY”***

AND BE DETER-
MINED TO SHOUL-
DER POLITICAL RE-
SPONSIBILITY



Guided by Xi Jinping's discourse on building the country's strength in cyberspace, China Unicom stayed true to the people-centered values and fundamental logic. It accelerated the development of intelligent and comprehensive digital information infrastructure featuring high-speed, ubiquitous access, space-ground integration, cloud-network convergence, intelligence, agility, greenness, low-carbon, security and controllability, promoted coordinated regional development and guaranteed network and information security, bolstering national strength in cyberspace and the development of Digital China.



Measures adopted in 2021

- Promoted the in-depth integration of Party building into production and operation, carried out Party history learning and education and adhered to honest operation, achieving remarkable anti-corruption results.
- The cumulative scale of 5G base stations reached 690,000 and over 60% population was covered by 5G, with the total number of broadband ports at 239 million and the number of IoT connections exceeding 300 million.
- The network-wide computing power reached 350PFLOPS, and efforts were made to fully upgrade the low-latency, high-quality computing power carrying network.
- Provided communication guarantee for major national conferences and events including the 100-year anniversary of the founding of the CPC, "cloud diplomacy" and the Beijing 2022 Games, while contributing routine epidemic prevention and control with digital intelligence.
- Continued to build fiber-optic information channels to support the Belt and Road initiative.



Actions to be taken in 2022

- To lead high-quality development with high-quality Party building, deepen the rule of law, and continuously nurture a favorable political environment.
- To improve wireless network coverage in greater breadth and depth, speed up the deployment of 10G PON and expand pre-installed coverage in commercial buildings, so as to ensure leading experience.
- To accelerate the development of green, intensive, secure and reliable computing infrastructure, and promote the development of intelligent operation support system.
- To provide high-quality communication guarantee services, create a secure and harmonious network environment, and help epidemic control in a technology-driven and intelligent manner.
- To improve the service capabilities of an intelligent network that covers all global customers, and empower the development of various industries worldwide with "cloud migration and digital intelligence".

Staying True to Political Building as Overall Guidance

Staying true to political building as its overall guidance, China Unicom conscientiously summarized lessons learned from the Party's history and consolidated what had been achieved in Party history learning to push forward its overall operation to a higher level through Party building. Meanwhile, it adhered to honest operation and regulatory compliance, and continued to exercise full and strict Party self-governance, with remarkable results in improving Party conduct, building a clean government and fighting corruption.

Party building for enhanced development

Under the guidance of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, China Unicom continued to strengthen the Party's political, ideological, organizational and institutional building for better conduct and self-discipline, promoting high-quality development of the Company through high-quality Party building.

Study and implementation of the spirit of the CPC Central Committee

We studied, promoted and implemented Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era as our primary political task with close follow-up through continued study, and thoroughly learned and implemented the spirit in General Secretary Xi Jinping's important speech on "July 1" and the sixth plenary session of the 19th CPC Central Committee.

- Senior officials made themselves an example to ensure publicity covered the greatest extent possible. Members of the Central Publicity Team were invited to give lectures while members of the Party Leadership Group at CU HQ also went out for many times to give lectures at the grass-roots operations, on the site of Winter Games communications guarantee, facilities for rural revitalization and contact units for Party building.

• What had been learned should be put into full implementation. Guided by the spirit of the sixth plenary session of the 19th CPC Central Committee, China Unicom transformed what was learned in Party building into concrete corporate governance strategies and measures.

Carrying out activities to study the history of the CPC

We studied the history of the CPC to act in a sensible manner, build trust, honor morality, be practical and be better mobilized to shoulder our due political responsibility. In doing so, we were better politically equipped with loyalty to the Party, better able to undertake the major national missions, more committed to serving the people, more intellectually capable in business endeavors and more confident with the spirit of self-revolution, achieved the goal of learning Party history to brainstorm, do practical things and start a new stage.

- Vigorous efforts were made to promote the study of Party history in an orderly manner, with active participation of all 9,298 Party organizations, 115,400 CPC members and the majority of employees.
- Innovated cooperation with other sectors in organizing a large-scale Party class under the theme of “The Pillar Player of a Great Country Always Follows the Party - The Eternal Wave for China Unicom”, an innovative, situation-based “quality class” for Party history learning.
- Centering on the theme of “Studying the Party’s history to inspire and set good examples”, we held 246 activities to report on the deeds of model workers and awarded 2,117 outstanding groups and 7,782 individuals at all levels, in order to advocate on the spirit of diligence, model workers and craftsmanship.



Live performance of the “Song for the August 1 Uprising”

In order to celebrate the 100th anniversary of the founding of the Communist Party of China, China Unicom Jiangxi branch used 5G, AR, VR and other advanced digital technologies, together with local resources, to innovative activities including the “Immersive Class of Party History Education at the August 1 Uprising Memorial Hall”, “5G Broadcast at the New Fourth Army Memorial Hall” and “5G+VR for Smart Party Building to Celebrate 100th Anniversary of the Founding of the Party”. The citizens echoed with revolutionary culture in these immersive experience, which won unanimous praise from the general public.

Party building integrated into work priorities

China Unicom continued to deepen the integration of Party building into production and operation, through the “six ones” working mechanism - establishing one sound management teams, clarifying one list, focusing on one batch of tasks, strengthening one education topic, making good use of one set of instruments, and implementing one evaluation scheme. Focusing closely on key tasks such as the three-year SOE reform action plan, comprehensive digital transformation, motivating the vitality of grass-roots staff, and epidemic prevention and control, it guided grass-roots Party organizations to use specific work scenarios as the “main battlefield” where they were expected to play a role.

• The Intensive Customer Service Operation Center of China Unicom Heilongjiang branch was awarded “National May 1st Women’s Model Post”.

• In the 20th National Youth Civility Awards, 6 groups including China Unicom Beijing branch, Shandong Ji’nan branch and Guangdong Guangzhou branch won honorary titles.



Promote honesty and integrity to prevent misconduct

China Unicom stayed true to political building as its overall guidance and gave full play to the leading role of full and strict Party self-governance as a guarantee, to unswervingly combat misconduct and corruption so officials dare not to be corrupt, were not able to be corrupt and did not want to be corrupt. By doing so, we were able to create clean and honest governance.

• Highlighted political supervision, explored the establishment of a “4+5+N” political supervision system, and promoted the effective fulfillment of political, economic and social responsibilities by Party organizations at all levels.

• Improved the corporate supervision system, by establishing sound system and mechanism targeting key personnel, areas and links around “top officials”, management teams, young officials, grass-roots governance and Party officials to oversee their behavior “beyond the eight working hours”. We built smart discipline inspection and supervision platform to strengthen active, accurate and real-time supervision of the entire process in executing powers.

• Carried out in-depth anti-corruption training, conducted regular interviews with officials, took multiple measures for discipline-related education, and reported on cases such as non-restraint, non-stop misconduct since the 18th CPC National Congress, “shadow companies”, “shadow shareholders”, and violations of discipline and law beyond working hours. Regular warning was done with routine education program that covered more than 495,000 times of attendance, with 100% employees receiving anti-corruption education.

Anti-corruption training
attended by

495,000 times

Employees receiving anti-
corruption education

100%

- Prevented external corruption risks, revised the Measures of China Unicom in Supplier Blacklist Management, optimized the identification procedures of blacklisted suppliers, and began the identification of the fourth batch of “blacklisted” suppliers.

- Organized the evaluation and inspection of the professional discipline for corruption risk prevention and control, and implemented preventative measures targeting 65 risk items related to 42 business matters in 8 key areas including investment and construction, material procurement, marketing, and personnel selection and recruitment. Promoted corrective efforts with identified cases, rectified “corruption from within the corporate”, and conducted special inspection campaigns on opening up businesses in violation of regulations, so as to continuously improve the ability to prevent and control integrity risks.

- Persevered to rectify the “Four Malfeasances”, vigorously carried forward the fine tradition and conduct of the Party and implemented the spirit of the eight-point decision made by the central leadership together with related implementation rules. Routine supervision and inspection were carried out to combat the “Four Malfeasances”, which also checked on Party member officials’ “social circles” “life circles” and “entertainment circles”. Typical cases were reported and disclosed on important occasions and actions were taken to reduce the burden on grassroots operations and avoid unnecessary meetings and redundant paperwork, so as to continue to enhance corporate conduct.

- Deepened inspection and supervision, completed a new round of inspections that covered all operations, carried out special inspections on personnel recruitment, economic accountability auditing and financial compliance, improved the quality and efficiency of supervision, and urged concrete rectification.

- In 2021, the number of petitions and reported cases received group-wide decreased by 11.3% year-on-year, with “decline in four consecutive years”. Strategic results were consolidated in anti-corruption to ensure sound political ecosystem.

Improving the level of operational compliance

China Unicom implemented Xi Jinping’s Thought on Rule of Law in full and further promoted its development by the rule of law to enable sound governance, operational compliance, standardized management, legal compliance and integrity. Risk prevention and control were strengthened, and continuous efforts made to cement the Company’s foundation for high-quality development.

Operation with legal compliance

China Unicom established a sound, comprehensive compliance management system featuring “compliance among all employees, across all regions and in all aspects”. It issued the revised China Unicom Measures on Compliance Management (v2.0), and formulated the eighth five-year plan (2021-2025) of China Unicom for awareness campaigns on the rule of law to further enhance its legal compliance. It advanced the digitalized management and intensive operation of legal awareness activities; actively facilitated the transformation toward digital contract management to secure corporate integrity.

The number of employees studying law online exceeded

76,000

The number of students attending the “Law and Compliance Class on the Cloud” exceeded

73,000

The percentage of the Company’s economic contracts with legal review was

100%

Risk prevention and control

China Unicom pursued the goal to “strengthen internal control, prevent risks and enhance compliance” and further advanced the development of risk management and internal control management systems. It circulated the revised Administrative Measures of China United Network Communications Group Co., Ltd. for Accountability on Non-compliant Operation and Investment, and kept improving digitalized risk prevention and control to effectively preempt and defuse major systemic risks.

- Improved the risk management and internal control management systems, which was under the responsibility of the board of directors and included the Internal Control and Risk Management Committee, the general administration department and functional management departments of relevant disciplines.

- Using risk evaluation as fundamental, an internal control framework issued by COSO was adopted to establish a sound internal control and management system leveraging such fundamental components as control environment, risk evaluation, control activities, information and communication, and monitoring activities.

- Deepened full-coverage auditing, established a mechanism for transferring clues and feedbacks, and completed special supervision on accountability of non-compliant operation and investment through “Take a look back”, “Practical commitments for the people” and other programs, recovering a total loss worth over RMB 52 million.

- Fully leveraged the coordinating role of comprehensive budget management in resource allocation, established a performance dialogue mechanism and strengthened dynamic management, to further forestall and resolve operational risks.

- Improved the work mechanism for overseas risk prevention and control, formulated the Four-tiered Catalogue of Overseas Compliance Risks of China Unicom Global (Trial Version), and conducted special inspections on overseas risks on a regular basis to form closed-loop risk management. Focused on risks in key areas such as the United States, Australia and Europe and closely followed latest developments, to make best effort to ensure compliance in overseas operation.

The number of compliance training

8,010 times

The number of people attending compliance trainings

243,000

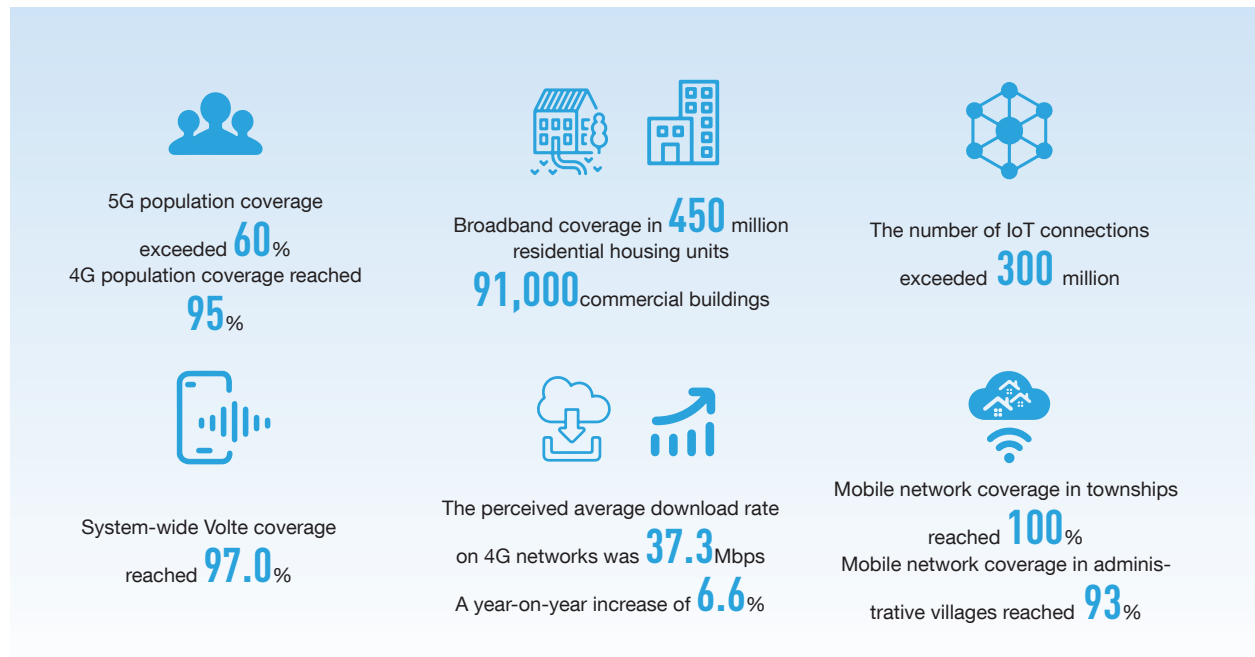
- The case of digital transformation of auditing was selected by China Institute of Internal Audit as a typical example of “Internal Audit for Organizations to Implement Major Policy Measures of the CPC Central Committee and the Country”
- China Unicom Digital Technology Company was certified as AAA integrity by Beijing Security and Protection Industry Association

Building Unblocked Information Artery for the Society

Under the guidance of China Unicom is guided by Xi Jinping's discourse on building the country's strength in cyberspace while facing new demands from various industries for digitalized, networked and intelligent transformation and upgrading, China Unicom equipped itself with an accurate understanding of the characteristics of the ICT industry in a new era and built new digital infrastructure to guarantee network and information security, thus laying a solid foundation for smooth information connection for the rapid development of the digital economy.

Building solid digital base

With a deep understanding of the decisions and plans of the CPC Central Committee on "accelerating the progress in developing 5G networks, data centers and other new infrastructure", China Unicom formulated the Outline by the China Unicom Party Leadership Group on Deepening the Implementation of the Strategy to Build National Strength in Cyberspace. It made concerted efforts in building premium-quality 5G network, promoted the evolution and upgrade of 5G IoT technologies, and coordinated the development of 5G and 4G networks. It also deployed gigabit fiber-optic networks, improved end-to-end connectivity of IPv6 and strengthened basic connection with enhanced efficiency.



Strengthening high-speed, ubiquitous basic connection

China Unicom promoted high-quality network development to connect households, buildings, parks, enterprises and factories under differentiated scenarios, creating novel experience of digital work and life for customers while building solid digital base for high-quality economic and social development.

- Built premium-quality 5G network with effective coverage, satisfying experience, first-class capability and excellent performance and made breakthroughs in the co-building and sharing of 5G networks, with an cumulative number of 690,000 5G base stations. 5G indoor distribution systems were further deployed to increase 5G coverage continuously. China Unicom and China Telecom jointly won the 2021 GSMA Outstanding Contribution to the Asia Mobile Industry Award.
- Built quality gigabit broadband network connecting thousands of households, with 16.84 million broadband ports, adding up the total number of ports to 239 million, and the average access rate of 252Mbps, an increase of 40% over 2020.
- Built high-quality, intelligent and secure networks for government and enterprise customers. Leapfrog development was achieved in terms of network, industry and service on the 5G industry-specific private network system 2.0 (5G private network PLUS). The "China Unicom Fundamental Network with All-fiber Trunk Line" project jointly carried out with Huawei won the "ICT China Innovation Award for Best Solutions" during the ICT China High-level Forum 2021.
- Built ubiquitous, intelligent IoT network with collaboration at high and low speed and independently developed the Yanfei · Zhilian connection management platform and the Yanfei · Gewu device management platform. It also enhanced core capabilities in integrated 5G+AIoT with software-based networks, software-embedded hardware and intelligent hardware, recognized by Communications World Weekly as top ten chip/module companies in the China 5G Power List in 2021.
- Continued to enhance technologically-advanced network and expedited the development of SDN networks, cloud migration and network virtualization, with SDN network leading the industry. Actions were taken to deploy IPv6-based next-generation Internet with over 34.57% IPv6 traffic on the mobile network and to promote Beidou applications to pursue excellent performance of innovation products.



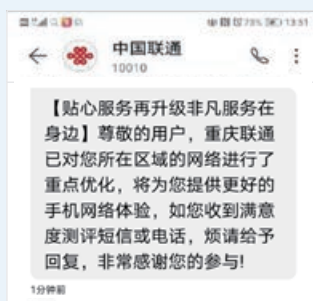
Users experiencing 5G network at North Railway Station in Dalian

China Unicom Liaoning branch continued to improve network coverage. By 2021, continuous 5G coverage was realized in urban areas and town centers. In developed townships in key cities, the needs for 5G hotspots were met. Transportation hubs such as airports, subways, and high-speed rail stations enjoyed 5G access indoor while university campuses, hospitals, industrial parks, government organizations, enterprises and other important units were provided with high-speed 5G services.

Enhancing intelligent and precision-based network experience

Adapting to user perception, China Unicom further optimized its network, improved the capability of the operation platform and strengthened the delivery system to enable significant improvement in network quality and maintain industry leadership with low-latency network.

- Relied on network AI, digital operation of wireless and broadband networks and other platform capabilities, China Unicom implemented digital transformation of broadband network covering all scenarios from “planning, construction, maintenance, optimization to operation”, realizing automatic and intelligent improvement of network operation quality, with world-class maturity of network AI platform and breakthroughs in smart network diagnostics through intelligent O&M as well as in intelligent operation.
- Strengthened the development of 5G delivery and operation system, provided end-to-end automatic activation and management capabilities in B2B network slicing products, and achieved 100% online intensive production of 5GC, improving inter-province collaboration and the efficiency of regional operation.
- Enhanced the independence of network-related disciplines, through various independent network operation measures such as “self-operation, self-building, self-maintenance, self-optimization and self-repair”, and improved training systems, with more than 66% certified intelligent network engineers, and introduced expert-level system architects and other talents.
- Improved network quality and carried out the “Practical commitments for the people” and the “Difficulties tackled in 100 days” programs, gaining highest satisfaction rate for fixed-line network according to MIIT, the industry's first place in installation and maintenance services, and an increase in timeliness of broadband installation and maintenance to 99.62%.
- The proportion of users accessing 5G network continued to rise. In 2021, a total of 1,645 complaints-driven development tasks were initiated, of which 1,623 were completed, or a completion rate of 98.7%. The number of customer complaints in construction areas dropped by 98%.
- Built low-latency networks and optimized the China169 backbone network in key directions with an industry-leading average latency below 29ms.



China Unicom Chongqing branch drove network value creation with customer satisfaction. Using deep neural network algorithm, it set up a network healthiness model to assist in qualitative network problem analysis, raising the efficiency of network complaint handling by 30%. At the same time, it leveraged this model to target demanding customers with brand image building approaches, increasing customer perception by 0.19 points.

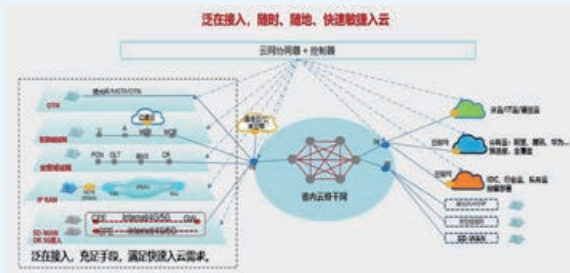
Enhancing intelligent computing power engine

Following the national strategy of “IDC in the East and Computing in the West”, we built green, intensive, secure and reliable computing infrastructure and accelerated the deployment of national hub nodes to build an integrated, agile and intelligent computing network. We established the China Unicom Cloud featuring cloud-network integration, security, reliability, exclusive customization and multi-cloud collaboration to provide customer-oriented innovative services and empower the development of the digital economy.

- Shaped a new “5+4+31+X” IDC pattern that integrated the cloud, the network and edge computing, with a total computing power at 350PFLOPS, equaling a computing scale of 11.38-million-core vCPU. The total storage capacity was 959PB, with about 300 shared MEC nodes, giving an initial shape of one-stop delivery of cloud-network resources.
- Comprehensively upgraded the low-latency, high-quality computing power carrier network, and built premium-quality public Internet, multi-cloud high-quality industrial Internet, intelligent MAN and other service-oriented computing power networks based on a design of computing-network convergence. We were incorporated into the 2020 Data Intelligence Industry “Computing Power 20” List by Computing Power Think Tank and awarded as the Cool Vendor for the capacity in scenario implementation.
- Built unified technology base and PaaS platform for China Unicom Cloud, and implemented PaaS integration and interconnection project to support rapid and standardized access to multiple types of PaaS services such as database, security components, AI atomic capabilities and blockchain.
- Nurtured a multi-cloud cooperation ecosystem with Alibaba, Huawei, H3C, Vmware, China Unicom Cloud, OS-Easy and Tencent to grow

the number of heterogeneous cloud providers and create a “multi-cloud management + China Unicom Cloud + X” hybrid multi-cloud solution.

- Based on the dual-engine core base of cloud computing, we created an integrated and digitally competitive scenario cloud product to upgrade the performance of general-purpose cloud products in terms of computing, storage and network with a diversified portfolio.
- Constructed an open, intelligent scheduling system for integrated cloud-network-edge capabilities and continued to deepen the development of cloud computing support system. More than 30 software copyright and patents were obtained and was recognized as outstanding in the first batch of comprehensive cloud-network integration capability evaluation by CAICT.



Cloud-Network Integrated Digital Infrastructure of China Unicom Guangdong Branch

China Unicom Guangdong branch comprehensively promoted cloud-network integration and launched nine key measures in four areas: ubiquitous connection capability, differentiated service capability, online service capability and security capability. It enabled the 10-millisecond latency loop in Guangdong Province and the 4-millisecond latency loop in the Greater Bay Area. Compared with traditional network solutions, the latency in users' cloud access was reduced by up to 10ms, which provided strong support to cloud deployment and further digital transformation in healthcare and other industries.

Building cyber security defense

We pursued a holistic approach to national security with thorough implementation of the Cyber Security Law, Data Security Law, the Personal Information Protection Law, the Critical Information Infrastructure Security Protection Regulations and other laws and regulations, with an aim to cement cyber security and data security protection system for the data age and build our capacity as the “first choice of security shield” of the digital economy “trusted by the country, the governments and the general public”.

Improving cyber security capabilities

China Unicom regarded network and information security as an important mission in abiding by our duties, and built a network security guarantee system with complete functions and advance capabilities. Security enhancement was applied in every aspect and stage of corporate development to enhance security protection capability.

- Furthered the improvement of cybersecurity threat management capabilities on public Internet. The monitoring and handling capacity of 5G SA core network was increased by 9.12Tbps, and the broadband Internet monitoring and handling capacity expanded to 29.88Tbps, effectively reducing attacks and impacts of botnets, Trojans and malicious programs.
- Guaranteed IoT security and continued to improve the basic risk model for accurate judgment on suspected risk cards. No case involving terrorism or fraud was identified throughout the year.
- Improved active security early-warning capability with DDoS protection capability above 8T, and built network security situation awareness platform, asset security management platform and other platforms to reduce security threats.
- Successfully completed various cyber security guarantee tasks during the celebration of the 100th anniversary of the founding of the Communist Party of China, which was commended by the Ministry of Industry and Information Technology.

Combating telecom fraud with severe punishment

China Unicom took firm measures in implementing national requirements for cracking down on telecom fraud to maintain normal communication order, protect personal data and privacy, and safeguard the legitimate rights and interests of users, with no major information security incident identified throughout the year.

- Deepened control over fraudulent and nuisance calls, as well as spam text messages, with intensified efforts targeting the sources of such problems. We carried out the “SIM Off Operation” 2.0 and further fights against telecom fraud, assisting the public security departments in arresting 2,767 criminal suspects and seizing 2,691 GoIP devices and other equipment, which was highly spoken of by the Ministry of Industry and Information Technology.
- Strengthened data security control and personal information protection, carried out special actions against infringement of users' rights and interests via APPs, and improved data security assurance, capable of identifying 80.54% sensitive data.
- Revised the China Unicom User Privacy Policy, China Unicom Customer Network Access Service Agreement and other rules and regulations, formulated the China Unicom Children's Personal Information Protection Policy and Guardian Instruction, strictly regulated real-ID registration, secured users' information and protected children's personal information.
- Enhanced public awareness of information security through various channels, provided alert services on calls from overseas, sent 565 million pieces of alert SMS and 843 million pieces of group SMS with security alerts throughout the year, which was recognized by users.



Unwanted Information Governance Platform of China Unicom Tianjin Branch

China Unicom Tianjin brand classified all fraudulent and nuisance calls and spam text messages as “unwanted information”, and built a governance platform with intensively control on suspected numbers. In 2021, it optimized the platform to redefine 11 high-risk areas, 51 high-risk base stations and 9 abnormal TAC codes for GoIP and other suspected equipment; it assisted the public security department in destroying 3 sites using GoIP to organize telecom fraud, during which 8 criminal suspects were arrested and 4 fraud-related devices were seized. Such activities supported the fight against unwanted information from its root cause and were praised by MIIT in a special issue of publication against telecom fraud.

China Unicom Anhui branch established a big data system to prevent nuisance calls and frauds with automatic detection and disposal of numbers making fraudulent and nuisance calls. The system detected 150-200 numbers every day and was capable of using GOIP data in police-enterprises joint actions to provide accurate clues on potential fraud. In 2021, it helped destroy 17 fraud-organizing groups, arrest 73 suspects and seize more than 3,000 telephone cards, which was well recognized by the Anhui Provincial Public Security Department and the Anhui Provincial Communications Administration.

Innovating security products and services

We strengthened the supply of security products and services centering around network security, cloud security, application security and data security, created China Unicom Cloud Shield, encryption, situation awareness, Security Island Chain and other products, established China Unicom security operation service platform, and optimized the network information security ecosystem, in order to build a strong shield for network and information security to serve various industries.

- 9 self-developed cryptographic products passed commercial encryption review, 3 of which were included in the catalogue of innovative ICT applications, and partnership was established with SASAC Information Center to create the “State-backed CA” service brand to translate typical cases into practical implementation.
- Situation awareness products were put into commercialization and was award the “Outstanding Organization” by the Ministry of Public Security.
- In the MIIT “Blooming Cup” 5G Application Contest, our 5G security products and solutions won the first prize and several awards.
- Trustworthy Corporate Creditability Information Service Platform, privacy computing, data security and other products and services won multiple awards under the “Galaxy Award” from the CAICT Big Data Technology Standard Promotion Committee.

Building Brand Image as Top Communications Service Provide for Major Events

China Unicom always put protecting people's lives above everything else. We contributed digital intelligence to epidemic prevention and control, provided communication guarantee during major events, devoted ourselves to rescue and disaster relief, and fulfilled our mission with concrete actions.

Going all out to fight the epidemic

Epidemic control in 2021 continued to face severe and complex challenges, with confirmed and asymptomatic cases arising in many places, suggesting the need for continued prevention and control. China Unicom collaborated closely with Covid control authorities at different levels and leveraged its strength in communication to support smart epidemic control with ICT empowerment, providing solid guarantee for routine epidemic prevention and control.

Cementing efforts for smart epidemic control

China Unicom continued to leverage its advantages in big data, artificial intelligence, 5G and other ICT services, and developed innovative digital applications including the travel history inquiry system, cloud-based video conferencing, China Unicom smart community and cloud-based reporting to fully support targeted prevention and control measures.

- Utilizing its unique technology big data advantages with multi-source massive data, extensive accessibility and high level of integration, China Unicom optimized the system architecture for travel history inquiry service, supporting 4.2 billion inquiries on “health code” from all over the country with a total of over 8 billion times of service, efficiently supporting epidemic prevention and control as well as analytics and judgment of the resumption of work and production.
- Developed the ID-based travel history inquiry system for highway checkpoints immediately outside Beijing, shortening the wait time from 3 minutes to 20 seconds, bringing a successful solution to the long queues of vehicles waiting to enter Beijing.
- In order to address difficulties in holding meetings during the epidemic period, we conducted an in-depth investigation of the needs of central government agencies and SMEs at all levels. With China Unicom video cloud, we provided teleconference support for over 24,000 meetings throughout the year, including 38 major events with the participation of central government agencies.

- In community-based epidemic prevention and control, we developed China Unicom Smart Community, cloud-based reporting and other products suitable for the needs of communities in visitor registration, nucleic acid testing and population flow monitoring, providing 41.4 million times of services in 59 cities in 18 provinces.

Guaranteeing smooth communication services

With confirmed cases emerging in Liaoning, Anhui, Guangdong, Guangxi, Shaanxi, Tianjin and other places, China Unicom made full use of its network advantages and united efforts at all levels in mobilizing and organizing its branches and subsidiaries to engage in local communication guarantee, providing solid support to local efforts in epidemic prevention and control.



In the cold winter of 2021, facing a new round of Covid outbreak in Xi'an, Shaanxi Province, China Unicom Xi'an branch responded quickly and rose to the challenge. The communication support team was on 7/24 standby to strengthen communication guarantee in 901 key areas including hospitals and nucleic acid testing sites. It enabled smart epidemic prevention with technology-enabled products. More than 4 million pieces of public-interest text messages were sent to citizens while ring-back tone alerts, pop-up alerts, 5G-based video ring-back tones and other solutions were developed to raise public awareness. A large number of anti-epidemic materials were mobilized to ensure the health and safety of employees in business environment, in order to help win the fight against the epidemic in a scientific manner.



China Unicom Tianjin branch supported rapid nucleic acid testing with 5G network slicing

In January 2022, with a new round of Covid outbreak in Tianjin, nucleic acid testing for nearly 14 million people was completed within 24 hours. Citizens generally reported that the testing speed was getting faster. China Unicom Tianjin branch applied 5G network slicing technology to enable the QoS function on the work phones of epidemic control staff, with separate wireless network resources for communications guarantee. At the same time, thanks to the rapid R&D of nucleic acid sampling and testing platform, stable and efficient operation of massive data was ensured, impressing the front-line epidemic control staff with better experience of the integration of computing power into networks while securing successful epidemic control and the resumption of work and production in Tianjin with technology-driven approaches.

Duty-bound in communication guarantee

Under the philosophy of providing communication guarantee in a "considerable, focused, reliable, excellent and intelligent" manner, China Unicom took actions against the highest standards, under the most considerable organization and with the most practical measures, the best services and the best results. In 2021, it provided communication guarantee for national conferences and major events including the Two Sessions, the activities in celebration of the 100th anniversary of the founding of CPC, and the "cloud diplomacy". Its superb performance with "zero mistake, zero failure and zero complaint" was highly recognized by the CPC Central Committee and other high-level authorities, enhancing its brand image as "top communications service provider for major events".

Communication guarantee for "Cloud Diplomacy"

In the context of epidemic prevention and control on an ongoing basis, "cloud diplomacy" has become the main channel for the central leadership to communicate with leaders of other countries and international organizations. In 2021, communication guarantee was provided for 192 "cloud diplomacy" activities attended by the central leadership and for 31 major events including the 100th anniversary of the founding of the CPC, during which China Unicom Cloud Shield, anti-DDOS data cleansing, domain name resolution monitoring system and other products were applied for network security. In doing so, it made remarkable contribution to "telling China's stories well and spreading China's voices" under complex circumstances, and to composing great chapters in major-country diplomacy in the new era.



Communication guarantee in celebrating the centenary of the founding of CPC

Committed to great contribution to the country, we're honored with a century-old heritage behind. On July 1, 2021, the celebration of the 100th anniversary of the founding of the Communist Party of China was held at the Tian'anmen Square, Beijing. With high standards, strict organization and excellent service, China Unicom provided foolproof communication guarantee against high standards, under well-designed organization and with optimum services to ensure network stability and security. A total of 33,000 staff were dispatched, together with around 10,000 vehicles. Its service with "zero failure, zero complaint and zero security incident" was highly appraised by the commanding teams in the celebration activities, MIIT, SASAC, and other agencies, living up to the expectations of the Party and the people.

Dedication to rescue and disaster relief

There is always perseverance in the wind and rain, and peaceful life is support with someone dedicating themselves for others. At every critical and challenging moment, China Unicom was always at the front line to secure communication and build solid network defense.

Establishing sound guarantee for flood control

In response to flood disasters, China Unicom made early preparations, revised emergency communication support plans, and established a sound mechanism for emergency response based on cloud-network collaboration adaptive to region-wide action, platform-based and intensive approaches, and cloud resource development, to improve communication guarantee capabilities and emergency response efficiency. It carried out investigations on hidden danger in advance, and organized 1,372 times of drills throughout the year to ensure reliable operation.

- Carried out the “Travel with Ingenuity-based Network” program, a 4,000-kilometer trip in 38 days, in which the communication fleet embodied China Unicom’s mission to be “always on duty in every important moment” and represented the highest level of communication guarantee for major events.

Courage in emergencies, difficulties, dangerous challenges and demanding tasks

In every flood control and emergency rescue, China Unicom was never absent in securing communication against all odds. In 2021, in the face of severe flood disasters in Shanxi, Shaanxi, Henan and Shandong, as well as earthquakes in Sichuan and Qinghai, China Unicom stepped out and rose to difficulties and danger with multiple approaches to well-organized flood control and disaster relief. A total of 695 times of emergency communication services were provided throughout the year; during the flood season, 134,000 disaster relief personnel were dispatched, with 47,000 emergency vehicles and 10,000 pieces of emergency equipment, and 370 million pieces of emergency text messages were sent.

Disaster relief staff

134,000 times of dispatch



China Unicom Hebi branch in Henan Province united as one to secure communication

In July 2021, after the “July 20” torrential rain in Henan, China Unicom Henan branch was called upon and braved against the wind and rain. Countless moving stories were told in this fight against natural disaster: staff standing in flooding waters to repair the Beijing-Hankou-Guangzhou fiber-optic cable, retired soldiers offering to come to the front line despite of illnesses and dragging boats with their bodies for ten days and ten nights, to name just a few. In this test of flood control, China Unicom gathered its strength and mobilized rescue teams from 15 provinces to Henan, making contributions to flood control and disaster relief. Upon leaving the province, it was surrounded by community residents who were grateful for the assistance provided, and received over 100 letters of thanks from the Henan Provincial Party Committee and the Henan Provincial Government as well as their lower-level agencies in cities and counties.



On May 22, 2021, an earthquake with a magnitude of 7.4 hit Maduo County in Guoluo Prefecture, Qinghai. China Unicom Qinghai branch organized an emergency team overnight to come to rescue in affected areas in spite of high altitudes, hypoxia, continuous aftershocks and other difficulties. A hotline was put in service for contact with family members and Tibetan-speaking seats were added to the 10010 hotline. During the earthquake relief, a total of 14 commandos consisting of 81 people were dispatched, 28 vehicles were called out in 98 shifts, and more than 100,000 pieces of text messages for earthquake and disaster prevention were sent to users in Goluo Prefecture.

Supporting Coordinated Regional Development

We promoted positive interplay between domestic circulation and international circulation and implemented the national strategy for coordinated regional development. We accelerated the establishment of pilot demonstration areas for digitalization, promoted collaborative efforts for domestic and overseas development and responded to the Belt and Road initiative in fulfilling the responsibility as a global corporate citizen.

Promoting region-specific development policies

We facilitated favorable domestic circulation by implementing major regional strategies and strategies for coordinated regional development and optimizing regional resource allocation and capital layout, so as to integrate ourselves into coordinated regional development. We made efforts to promote the coordinated development of Beijing, Tianjin and Hebei through integrated networks and the sharing of IDCs and other resources. We facilitated the integrated development of the Yangtze River Delta with enhanced collaborative innovation by the industrial ecosystem. We supported the development of the Guangdong-Hong Kong-Macao Greater Bay Area with accelerated application innovation in the fields of smart healthcare, smart transportation and smart energy for sound industrial development. We helped advance the high-quality development of the Yangtze River Economic Belt and the Yellow River Basin for inclusive services to improve people’s livelihood. We accelerated the development of the three northeastern provinces with greater balance. We strengthened measures for the Hainan Free Trade Port and the Chengdu-Chongqing region with more efficient use of resources to help build Beautiful China.

Serving the Belt and Road initiative

With accurate understanding of the new development paradigm, with “domestic circulation as the mainstay and domestic and international circulations reinforcing each other”, China Unicom was able to identify new changes, new room and new opportunities. It strove to strengthen global cloud-network integration and cloud-based service capabilities and took solid actions in implementing the Belt and Road initiative, thus advancing the innovative development of the Digital Silk Road through cooperative development and digital transformation.

Building the Digital Silk Road

China Unicom deepened the implementation of the Belt and Road initiative and firmly promoted the development of the Digital Silk Road along the Belt and Road; it was determined to leverage innovation-driven approaches to providing quality digital information services for customers along the Belt and Road and the general public; it was committed to cooperative development with synergies built for resource aggregation and agile delivery.

- Continued to build fiber-optic information channels, with 5 international network operation centers built overseas, more than 130 overseas PoPs to cover over 80 countries and regions, and 4.85T of international Internet extranet bandwidth. The cumulative investment in the BRI region exceeded RMB 2.8 billion, enabling an additional submarine cable capacity of 26.9T and cross-border land cable capacity of 20.1T. In 2021, three new BRI nodes were built.

- Set up 30 operations worldwide, half of which were along the Belt and Road, to provide quality digital services for “going global” enterprises. For such key industries as industrial manufacturing, finance, government media, transportation and logistics, energy, commercial retail and TMT, 23 international BRI high-speed connections were built, SD-WAN light-traffic products achieved global coverage, and connected cloud services covered 40 resource pools of 10 cloud providers to offer customers with scenario-based solutions.

- Provided preferential products and services for BRI countries, with tariffs in 95 countries and regions reduced to low-price category.

- Continuously strengthened the BRI core “circle of friends”, with active ecosystem cooperation including multi-cloud platform, network and information security, supply chain, system integration and smart city and equity-based partnerships. 5G NSA was enabled for outbound traffic to 21 countries and inbound traffic from 31 countries. Long-term partnership was established with more than 300 international operators, together with more than 120 global ICT partners.

- Made positive contributions to China-Africa economic and trade exchanges and South Africa's epidemic prevention and control, through support to China-Africa ministerial dialogue via video conferencing, increased investment in South Africa, and participation in conferences for epidemic prevention and control organized by the Economic and Commercial Affairs Office of the South African Embassy.

Sincere cross-border services

Relying on CUG, China Unicom was committed to becoming an “international digital service value creator trusted by customers”. It established global customer service system to provide efficient and reliable end-to-end comprehensive information services in addition to international voice and data services.

- To meet individualized customer needs, a total of 55 high-speed connections were launched for rapid delivery. In Hong Kong, multi-member data sharing, smart home and other product series were provided to meet household demands. As for business customers, one-stop communication solutions would satisfy. For customers requiring smaller bandwidth, they were provided with AS4837 IPT products for Hong Kong node. In terms of the financial industry, we provided security products and services such as China Unicom Cloud Shield.

- During the epidemic, users could enjoy more data traffic in their current package while roaming in 126 popular destinations. Data tariff was reduced in 35 directions and packages with less data were provided in 23 directions. Tariffs on outbound data in international roaming in 2021 decreased by 11.26% year-on-year, with data roaming enabled in 249 countries and regions, including 23 on 5G networks.

- Provided services during the Tokyo Olympics to support China Sports and other media platform in live coverage, ensuring high-quality broadcasting.

- Officially launched 5G services in Hong Kong for epidemic prevent and control. We cooperated with local government to promote the “safe travel” convenience services, for which we worked with Xiaomi to offer ultra-low-cost mobile phones to the elderly people for them to be better prepared for quarantine-free travel between the Chinese mainland and Hong Kong. The one-SIM-two-numbers service was provided for free, together with the development of other convenient applications such as Hong Kong health code and cross-border service handling.



2021 Carrier Community Global Awards in multiple categories: Asia Regional Operator of the Year, The Best ‘Cloud’ Innovative Operator and Best Mobile Operator of the Year



Seamless network connection when a train passing through tunnels on the China-Laos railway

Operation with compliance and integrity

China Unicom relied on China Unicom Global to operate overseas business in compliance with applicable laws and regulations. It established sound corporate governance structure, strictly abided by local laws and regulatory requirements and submitted external audit reports and paid taxes in a timely manner, winning international awards for operational integrity.

- Continued to improve the overseas compliance management system, with rolling updates of compliance manuals for overseas business operation. Organized multiple risk investigations and 13 compliance trainings, with more than 3,000 participants, raising the awareness of risk prevention among employees.

- In 2021, no conduct involving dishonesty, violation of laws and regulations, or competition disorder was identified, nor was incidents involving infringement of indigenous people's rights or commercial bribery.

Responsible local operation

Under the principle of "one institution, one system and one scheme", we continued to optimize the agile and intelligent supply chain, recruited local applicants, strictly abided by local market order, business rules, social customs and cultural habits, doing our best to build a community of mutually beneficial development for win-win results.

- Integrated the supply chain for "globally integration", carried out local partnership management by division and type, conducted strict review of procurement plans, and enhanced scenario-based procurement, to ensure that the equipment provided by suppliers was energy-saving, environmentally friendly, hazard-free and safe, with procurement localization (including in Hong Kong and overseas) reaching 94.59%.

- Continued to develop green communication infrastructure, with further energy conservation and carbon reduction, while guarding against negative impacts on local environment during project implementation, winning the 2022 HKAAEE Hong Kong Awards for Environmental Excellence.

- Prioritized the introduction of local talents. In 2021, we made active efforts in recruiting local graduates in Hong Kong and started an intern training program with the Henley Business School of the University of Reading in UK, which was well received by local teachers and students. By end of 2021, the total number of employees in China Unicom Global was 896, including 761 overseas employees and 289 overseas female employees. There was no local employee holding senior management positions.

- Strictly followed local laws in safeguarding the legitimate rights and interests of local employees, respected local traditions in formulating remuneration and welfare programs, developed differentiated currency-based subsidy schemes, and actively organized sports activities and publicity on welfare design. These practices in fulfilling social responsibility to care for local employees won us the World Green Organization labeling as "Green Office" and "Eco-Healthy Workplace", as well as the MPFA "Good MPF Employer" Award.

- Paid attention to the needs of female employees with full support to the "Say yes To Breastfeeding" campaign and was certified as a "Breastfeeding-Friendly Workplace" by UNICEF HK.

- Actively participated in activities organized by local associations, improved the overseas news and public opinion monitoring system, and maintained sound communication with local communities and Chinese-funded enterprises. As the Chair (Chinese side) of the Digital Economy Working Group of the BRICS Business Council, China Unicom deepened researches, exchanges and cooperation related to the digital economy, and facilitated practical cooperation among members of the working group.

Fulfilling overseas responsibilities for public welfare

China Unicom actively participated in charitable activities overseas, promoted the spirit of mutual assistance, mutual care and community care, and carried out activities on food saving, environmental protection and caring for disadvantaged groups, to pay back the society in fulfilling overseas responsibilities for public welfare.



During the Dragon Boat Festival in 2021, China Unicom Global participated activities organized by the Hong Kong Chinese Enterprises Association to visit the elderly people living alone in Sha Tin, New Territories, bringing gifts to show care for the elderly.



China Unicom Global participated in the "A Day with Food Angle" activity held by Food Angle, in which it worked together with other volunteers to sort out and process 30 boxes of edible surplus food, totaling 490kg, to be re-prepared as ingredients for making hot meals and take-away packages for those in need.

We engaged in charitable activities to help disadvantaged groups. China Unicom Global participated in the "HKFHY Cookies • Gift for Love" charity sale organized by the Hong Kong Federation of Handicapped Youth for many years to offered its help to the Hong Kong Federation of Handicapped Youth, the Parent's Associations of Pre-school Handicapped Children and other disadvantaged groups.



2020 HKAAEE Hong Kong Awards for Environmental Excellence



FULFILLING
***“CORPORATE
RESPONSIBILI-
TY”***
IN STABILIZING
ECONOMIC DEVEL-
OPMENT



The development of digital information infrastructure and the iterative innovation in digital technologies impressed the general public with greater sense of gain, happiness and security. China Unicom supported the development of the digital economy, by empowering industries with digital intelligence, diversifying communication products and services, improving network quality and customer experience and providing high-quality communication services to satisfy customers. As a pioneer in the mixed-ownership reform among central SOEs, we leveraged market-oriented allocation of production factors as the driving force to deepen the restructuring of systems and mechanisms and accelerate the establishment of sound mechanisms to stimulate the vitality of micro-players, so that production relations could be more suitable for the development of productivity and the efficiency of business operation could be leveled up. China Unicom regarded employees as its most valuable resources. It attached great importance to employees and helped them to make achievements by providing extensive opportunities for comprehensive development, forming favorable atmosphere to the harmonious relationship between employees and the enterprise.



Measures adopted in 2021

- Built core capabilities in cloud computing, big data, IoT, smart intelligence, blockchain and security, developing industrial Internet applications and products in some of the key industries.
- Took special action to make breakthroughs in services for better customer perception.
- Deepened the three-year SOE reform action plan to build itself into a process-based organization.
- Established harmonious labor relationship, with solid measures to safeguard the legitimate rights and interests of employees and care for their physical and mental health, to improve the sense of gain among employees.



Actions to be taken in 2022

- To promote the “5G Application Set-Sail” Action Plan and the commercialization of security products in full, with focus on key regions and industries, to build China Unicom into the “first choice of digital service provider” for the digital economy.
- To build the “1+N+1” service system as the overall objective to create high-quality services.
- To form a long-term reform mechanism to promote the transformation toward a digitalized, intelligent, ecosystem-based and platform-based enterprise.
- To deepen the reform in talent development systems and mechanisms, to allow employees to share the fruits of reform and development and grow together with the enterprise.

Supporting the Development of Digital Economy

As an outstanding provider of ICT technologies and services, China Unicom fully leveraged digital technologies to amplify and enhance economic development. It nurtured a certain scale of digital applications and services for vertical industries, governments, public welfare and other fields, and developed applications and products in the field of industrial convergence. It targeted the main track of the digital economy and empowered the transformation and upgrading of industries in various fields, growing itself into the “first choice of digital service provider” in the digital economy.

Accelerating industrial convergence

China Unicom was committed to accelerating industry convergence, by expanding innovative applications of the industrial Internet and 5G+industrial Internet, deepening “smart transportation” and other innovative applications in key verticals, and realizing standardized product replication with scaled expansion.

Industrial Internet

The China Unicom Industrial Internet produced 8 industry solutions including “5G+smart mining”, “5G+smart iron and steel industry”, “5G+smart household appliance”, “5G+smart grid” and “5G+smart vehicle”, covering over 10 industrial categories with more than 2,000 benchmark projects under the model of champion enterprises + industrial clusters with large-scale development.

- Built the Yundee industrial Internet platform targeting key industries, industrial clusters and enterprises, and supported local government with this platform for visualized, predictable and intelligently management of the industrial economy, acting as a support to government decision-making.
- Provided local enterprises with massive resources for industrial Internet application, and facilitated their migration to “the cloud and the platform”, comprehensively improving the adoption of digital technology; enabled the “CU Powered – Plant with Full 5G Connectivity” for interconnection of all production factors in manufacturing companies with higher level of production management; established middle-end for production data to process data and standardize data management, harmonizing data interfaces and data formats while providing efficient data services for better data mining.

With industrial Internet for intelligent manufacturing as its work priority, China Unicom Jiangxi branch took into account the leading role of textile and apparel industries in the Qingshanhu District of Nanchang to develop the innovative benchmark project - the Huaxing Dress 5G+Smart Factory. The textile and apparel industry was empowered with 5G+industrial Internet and reduced the labor intensity to show humanistic care, improving the production efficiency and market competitiveness while driving the development of local modern textile industry clusters.

Relying on its Shanxi branch, the Industrial Internet Company and other organizations, China Unicom completed the construction 170 5G networks with enabling applications in Datang Tashan and Majialiang mining sites; it also established several joint laboratories with Datong Coal Mine Group and universities to develop 5G-based smart mining applications. In 2021, the Tashan Intelligent Command Center was built, and 5G technology researches and applications, experiments of the intelligent video recognition platform and wireless sensor testing were completed, realizing full coverage of 5G signals both on the ground and underground and building a new mode of smart mining.

China Unicom Jilin branch cooperated with Changchun FAW Group in a pilot of 5G-enabled smart automotive factory, providing 5G private network technologies, equipment, services and other support to the FAW Hongqi Fanrong Plant; it also worked with partners to verify 5G applications in monitoring of fast-moving overhead cranes, C2C control, machine vision-based AI inspection and other production processes, providing support to digitalized, intelligent and flexible manufacturing in the factory area.

Smart transportation

With focuses on ICT infrastructure construction, industry-specific operation supervision, public mobility services and other business areas, China Unicom developed 22 industry solutions including smart highway, smart ports, smart logistics and smart airports, with the implementation of 2 benchmark cases including the Sanya Yazhou Bay Smart Transportation EPC project, providing services to 80+ customers in the transportation and logistics industry across the country and continuing to empower digital transformation.

China Unicom (Tianjin) Industrial Internet Research Institute focused on V2I technology for vehicle-road collaboration and vigorously promoted the implementation of smart transportation applications. It successfully created an application scenario of unmanned bus in Tianjin Haihe Education Park, and established the Demonstration Base for “5G+Internet of Vehicles” Applications as a benchmark for cooperation among “governments, businesses, universities, research institutions and end-users”, bolstering rapid development of intelligent, connected vehicle industry.

Digital village

China Unicom took the digital village as its main leverage to empower rural infrastructure development, innovation in rural governance models, upgrade of production methods and improvement in lifestyles with its advantages in digital technology to build “digital village models” based on local conditions. Its rural digital applications became the “new farming tool” for rural revitalization and a “helping hand” to improve the quality of life of villagers.

The number of administrative villages supported by China Unicom's digital village platform exceed

153,000

In June 2021, China Unicom held a Digital Village Promotion Campaign with an official launch of its cloud platform and brand for digital village, as well as the release of China Unicom White Paper on Digital Village and the Digital Village Product Manual, providing comprehensive support to rural economic and social development.

China Unicom focused on rural governance, industrial upgrading and improvement of people's livelihood, prioritizing projects to provide new digital application services featuring "integration of cloud, network, edge, terminal and industry", establish new patterns of ICT adoption to support the development of modern agriculture and urban-rural integration, contribute digital power and wisdom to a new stage in rural revitalization, and benefit rural residents with digital dividends.

- **Implemented new infrastructure project for Gigabit connection.** We developed "a single cloud", "gigabit networks" and "extensive connection", upgraded "gigabit networks", promoted "smart big screens" and built "unmanned farms" to promote the development of next-generation rural ICT infrastructure and bridge the urban-rural digital divide. By the end of December, China Unicom Digital Village program had covered 153,000 administrative villages, providing services to 14.363 million rural residents.

- **Implemented new platform project for rural governance.** Focusing on the last-mile challenge in rural ICT adopting, we relied on the digital village service cloud platform to identify a large number of successful solutions and services such as smart Party building, village organization, government service online, safe village and village administration. In doing so, we managed to inject "smart genes" in grassroots-level governance and service to improve the level of intelligent, refined and professional rural governance. By the end of December, the platform served more than 153,000 administrative villages.

- **Implemented new service projects for digital applications.** We provided solutions to digital governance service, industrial service, public wellbeing-related service and localized service, and acted as an expert in digital technology services close to farmers by designating digital village liaison stations and counselors.

- **Implemented new cooperation ecosystem projects for "rural areas, agriculture and farmers".** We worked with outstanding partners to provide smart terminals and smart big screens to rural residents, financial subsidies, old-for-new services, direct supply and purchase of specialty agricultural products, special training for new farmers, etc., to accelerate the digitalization and intelligent transformation of agriculture, rural areas and farmers.

China Unicom made vigorous efforts in building demonstration models for digital village in areas with designated assistance, with an aim to create a batch of effective, influential, replicable demonstration projects suitable for promotion. Up till now, 388 model sites had been built.

Drawing upon the characteristics of Baerhu Town, a demonstration model of rural revitalization in the province, which thrived on beautiful lake sceneries, China Unicom Sichuan branch created digital twins for 8 administrative villages around the 20-square-kilometers of Baer Lake with two-way mapping, dynamic interaction and real-time connection. The digital twins technology served more than 20,000 villagers and about 7,000 tourists per day, enabling a digital village model with the characteristics of Baer Lake.



The Baerhu Town reimaged with digital technology

China Unicom Guizhou branch achieved practical results in serving rural revitalization. It made an analysis on the 17,000 administrative villages in the province and selected 1,757 as the first batch to provide rural ICT service, focusing on building 4 national digital village demonstration pilots in Xifeng (Guiyang), Yuqing (Zunyi), Qianxi (Bijie) and Jinsha (Bijie), as well as 3 provincial-level demonstration pilots in Huamao (Zunyi), Shimen (Anshun) and Liupanshui Grassland. Centering on key townships and scenarios, it carried out four major actions, namely "digital townships", "hundred towns and thousands of villages", "joint construction and operation" and "assistance to spring farming", and ensured that all villages were covered with marketing teams and service outlets, upgrading and expanding rural development model in an innovative manner.



Chairman Liu Liehong in a field visit to Liuchang Township, Qingzhen City, where local staff was demonstrating the digital village platform



Signing ceremony of the digital village workstation



Digital Village project in Qianfeng Village, Shitong Town, Xifeng County



China Unicom Qingyang branch in Gansu worked with Zhaijiage Town to build the city's first digital township platform, allowing people to inquire about policy information and apply for various services online without leaving home.

Deepening applications related to people's livelihood

China Unicom was committed to deepening applications related to people's livelihood, innovating high-quality life services, and diversifying innovative applications including "smart culture and tourism, smart education, and smart healthcare". It facilitated inclusive services for people's livelihood, developed 5G messaging and other products, and promoted the upgrading of new types of information consumption.

Smart culture and tourism

Fully leveraging its capabilities in big data, blockchain and AI with focuses on key areas such as industrial supervision, scenic spot services and smart culture and museums, China Unicom developed 11 solutions for tourism, smart scenic spots, and smart culture and museums, serving over 170 tourism administrations, over 200 scenic spots and over 50 cultural facilities and museums, to boost the digital transformation and upgrading in culture and tourism management, services and marketing.



Overview

Taking into account local conditions, China Unicom Hunan branch created an innovative command center platform for the Hunan Provincial Department of Culture and Tourism to support the administration's efforts digital upgrading. This would further demonstrate the culture and tourism industry environment and innovative development model with Hunan characteristics, and consolidate industry supervision as an approach to intelligent empowerment for post-epidemic market recovery.

Smart education

China Unicom focused on such key areas as general education, higher and vocational education and regional education management, and developed 22 industry solutions including China Unicom 5G for Future Campus and China Unicom Smart Campus for Primary and Secondary Schools with the implementation of 3 benchmark projects including the "ICT Adoption for the Experimental School of the Open University of China" project, serving 150+ education industry customers.

China Unicom iCloud Wisdom developed a virtual experiment teaching system, which combined cutting-edge technologies such as AI, 3D and VR, to integrate modern ICTs into the teaching and learning of theoretical knowledge in physics, chemistry, biology, science and other disciplines as well as in experiment operation and exams.

Smart healthcare

China Unicom focused on key areas such as smart hospitals, smart health and smart medical insurance, and developed 6 healthcare industry solutions including China Unicom Smart Hospital, China Unicom 5G-based Smart Ward, and China Unicom 5G for Smart First Aid with the implementation of benchmark projects such as 5G-based smart community healthcare in Hainan and 5G-based smart first aid in Ruijin Hospital, serving 100+ healthcare industry customers for continued empowerment in the reform of the healthcare system, promote the development of Healthy China.

China Unicom Hainan branch promoted the development of a 5G+AI primary healthcare information platform covering more than 3,000 primary healthcare providers in the province. It innovated a new model of 5G-enable primary healthcare to improve the capability of primary healthcare providers in diagnose and treatment. In 2021, 5G-enabled primary healthcare services were provided to over 250,000 people at grassroots level.

5G messaging

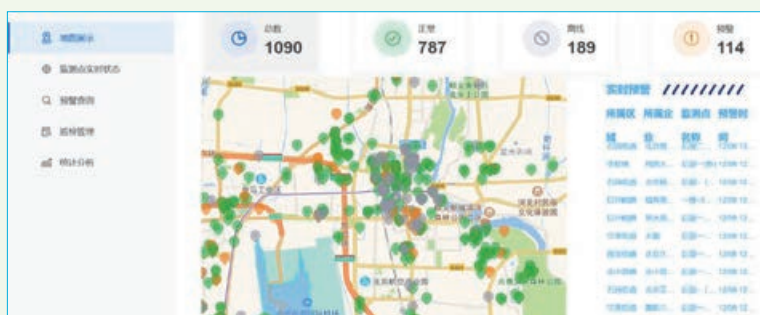
China Unicom completed the commercial trial of 5G messaging and developed 5G messaging application for the Beijing 2022 Winter Games. Currently, more than 100,000 users activated the 5G messaging service, whose commercial trials were launched nationwide with a total of 53 customers and 109 CSPs; the "Intelligent Future" 5G Messaging Forum was successfully held and the 5G Messaging Ecosystem Consortium was established.

Strengthening government applications

China Unicom focused on strengthening government applications, deepened high-efficiency governance services, engaged itself in building digital governments, smart city, smart ecology, etc., and developed innovative applications and products such as “all-in-one service application platform and one-stop-shop management platform” to help modernize the country's governance capacity and system.

Digital government

China Unicom focused on the key businesses of emergency response, public security and Internet+governance services, and developed 6 industry solutions for emergency management, production safety, smart fire protection, urban security, smart public security and all-in-one service application platform, serving more than 200 governments including the Ministry of Emergency Management and the Ministry of Public Security.



China Unicom Beijing branch's Cloud Platform for Smart Pollutant Monitoring

Taking into account the needs in digitalization of local regulators, China Unicom Beijing branch built the smart pollutant monitoring platform featuring “integration in four aspects” for Shunyi District in Beijing and made it a benchmark for smart ecological monitoring projects across the country, which was recognized by local government departments.

Smart City

China Unicom built the “Smart Brain - City NEXT” system to enable smart city capability, with the launch of 10 solutions including comprehensive solution to new smart cities, smart campus and city brain, with more than 660 smart cities programs implemented in 31 provinces.

Through the integration of technology and resources, China Unicom Shenzhen branch realized intelligent online response to hot issues and improved the hotline service capability. With big data-enabled accurate analysis of government information and public opinion monitoring, the Shenzhen branch improved the timeliness and effectiveness of governments in handling emergencies, and promoted the overall improvement of service capabilities of the Shenzhen government service hotline platform, thus contributing to Shenzhen's smart city program.

Smart ecology

Focusing on the fields of comprehensive ecological supervision and ecological big data, China Unicom developed such solutions as the “China Unicom Ecological Big Data Platform” and “Classification of Domestic Waste in Urban Areas”. The integrated management system for ecological environment inspection, the “one-stop-shop management platform” for ecological environment and other projects were implemented in Xiong'an, Shandong, Zhejiang, Shanghai and other provinces and cities, realizing ecological data sharing across different departments, levels and regions within the province while helping to enable digitized, convenient and targeted management.

Providing Warm, Intelligent Services

“Customer trust” is fundamental to the survival and development of enterprises. China Unicom is committed to continuous improvement in the quality of products and services to meet customer needs, create high-value smart brands and demonstrate care for groups with special needs, to build high level of trust among its customers.

Creating excellent customer service

Adhering to the business philosophy of “creating value for customers”, China Unicom promoted high-quality service projects, developed closed-loop mechanism for trouble shooting, continuously diversified the connotation of service brands, refined customer services and improved service quality, delivering better, more efficient and more convenient service experience through diversified services.



Improving customer experience and perception

Guided by customer perception, China Unicom took actions to address service challenges with active response to customer complaints.

- Comprehensively sorted out customer complaints from four major channels, and established a full-scale operation scheme to address system-wide problems based on “two networks and two businesses”. It strengthened pre-authorization and closed-loop operation targeting system-wide problems, ensured smooth complaint channels, increased service authorization and remedy scenarios, and initiated post-service survey among complaint-reporting customers to continuously improve customer perception.
- Innovated in the establishment of China Unicom complaint platform, and enabled complaint reporting via the online websites, WeChat mini program and China Unicom APP in 31 provinces, creating ultimate customer experience with wide access, transparent process, convenience and efficiency to raise customer perception.
- Deepened the “Special Campaign to Improve Customer Satisfaction”, focusing on 23 issues in ten categories that affected customer experience, to continue to tackle service deficiencies and effectively solve urgent problems and service headaches for the general public.
- Strengthened service assessment with three-dimensional matrix-based management and control of complaints targeting “provincial branches, professional departments and subsidiaries”. Monthly analysis and notification, return visits to customers and supervision were adopted to facilitate problem solving, which could be applied to address similar problems.
- Ensure the smooth operation of number portability service, while relying on the centralized system to launch services for customers to “apply for number portability online across different regions” and “claim account balance in different areas”. Attentions were paid to ensure the implementation of all applicable policies and rectify “barriers to number portability and limitations from service bundling without notification”, creating warm and considerate service experience.



Innovating digital life experience

China Unicom provided users with more intelligent lifestyle experience through product innovation. In 2021, the total number of mobile users reached 317 million, 5G users reached 150 million and fixed-line broadband users reached 95.046 million.

- Built a cooperative and shared ecosystem for China Unicom smart home solution. We independently developed culink, the standardized protocol for ecosystem interworking, and provided users with innovative experience of smarter, and happier lifestyle services through six converged systems built upon digital operation platform, namely, converged gigabit network, converged secondary SIM, converged fixed-telephony, converged application, converged video and converged finance.
- Built platform-based product innovation system and unleashed greater innovation dynamics based on the ultimate 5G experience to meet the needs of users for digital and intelligent lifestyle through innovative products such as video ring-back tone, CU Assistant and CU Cloud Storage. The number of registered video ring-back tone users reached 200 million, and the number of registered CU Assistant users reached 181 million.



Enabling agile service operation

China Unicom gave full play to its advantages in smart operation with strengthened empowerment to continuously improve service operation capabilities for the integration of online and offline channels and service marketing.

- Deepened seamless online/offline services to solve customer problems in one-stop. By connecting hotline services with offline service, channel-wide collaboration was enhanced to effectively improve customer perception; with seamless marketing, we were able to identify customer demands and adapt service policies accordingly to delivery invisible smart services in an all-round manner.
- Leveraged the advantage in intelligent operation to improve the one-stop solution to customer concerns. The rate of problems solved in first contact increased by 1.9PP to 88.9%, with the proportion of intelligent services up by 56.8PP to 84.03%.



Building unblocked service channels

Expanded the 10010 hotline, China Unicom APP and other service channels to extend service outreach and improve service quality and efficiency.

- The 10010 hotline service adopted intensive operation model with cross-domain centralized scheduling and duty overlay, increasing the rate of successfully connection in 15 seconds to 92.5%; an agile and intelligent call center was built with nationwide cross-domain direct dialing, to accurately adapt service methods on demand. Intelligent prediction and response were realized across the entire network to allow insights into customer behaviors and customer needs. In 2021, the number of hotline service volume reached 1.38 billion times, and the 10010 satisfaction rate was increased by 2.3PP to 97.5%.
- The China Unicom APP aimed at leading experience to deliver accurate inquiry, fast response, smooth process and comprehensive services, becoming the preferred one-stop service channel for users. As of 2021, the number of China Unicom APP users was 62.98 million, an increase of over 80%; self-service accounted for 80.5%, with a service satisfaction of 9.1 points, up by 25%.



In April 2021, China Unicom mobile business hall APP was officially renamed to “China Unicom APP”, with comprehensive upgrade in terms of service, lifestyle, entertainment, wealth management, etc., committed to providing customers with warmer and smarter experience and to creating more convenient, individualized lifestyle.



Video calls could be initiated by a simply QR code scan

“沃在线”客户端采用轻量化的 H5 设计，用户不需下载 App，扫码或点击链接即可发起视频连线请求。业务办理过程中坐席会推送圈注过重点内容的免填单至用户手机端进行确认，充分保障用户的知情权，消除诱导订购、计费争议，让用户轻松办理，明白消费。



建立体验监测体系

坚持“以人民为中心”，建立全客户、全业务、全生命周期端到端客户体验监测体系。

- 构建端到端感知监测体系，实时采集、分析，并推动感知洼地解决。聚焦四大专业、301 个重点场景，构建客户全场景图谱，“事前洞察预防、事中运营监测、事后评价管理”，推动问题根源解决。
- 立足全程全网大服务理念，重构中国联通服务标准规范体系，覆盖四大专业，与客户侧体验评价相校验、一体化运营，并依托数字化手段实时监测预警、快速解决问题，实现网业服全方位客户体验提升。



内塑文化外塑口碑

中国联通全力打造高品质服务影响力，对外立足服务视角，围绕热点、痛点及经营重点，强化知识传播，传递差异化服务优势，将服务口碑植入人心；对内以党建带动服务文化建设与贯通，推动思想意识、行为规范、流程制度深刻变革，实现服务文化入脑、入心。

- 以主题党日为牵引，开展“我为群众办实事——‘三个一切’再行动”服务文化季活动，以党建引领锻造服务新文化。
- 推出“服务体验再升级”客户口碑活动，整合公司内外部宣传资源，合力打造中国联通落实推进高品质服务的官方声量。
- 全年发布异地同享、联通 APP 服务焕新、我为群众办实事等六个话题，累



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计宣传总曝光量超 30.1 亿次；服务口碑知晓率达 50.14%；中国联通客服抖音、B 站规模央企第一，快手行业第一；“秒懂联通”通信知识专家打造，推出视频知识 560 条，直播 168 场，总浏览量 2.1 亿次，以清晰、易懂的形式向社会大众普及通信知识和使用技巧，建立良好客户沟通与互动。

2021 年工信部综合满意度全年呈改善趋势

工信部满意度

81.68 分

其中网络满意度同比提升

0.94 分

服务质量同比提升

2.58 分

NPS 持续提升

移网年度自改善提升

16.8 分

宽带提升

9.9 分

5G 专项满意度保持

行业领先

塑造一流品牌形象

中国联通在数字经济大格局之下，焕新升级品牌战略，优化品牌定位、构建品牌战略模型，完善品牌管理体系。在新战略指引下，打造高价值智慧品牌，实现数字经济时代的品牌引领。

持续提升品牌美誉度

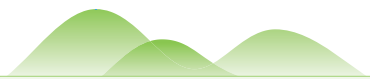
借 5G 和冬奥时机，充分协同内部媒体矩阵，打造“有温度”差异化的智慧品牌形象，内外兼修塑，提升整体品牌价值。

- 对内承接品牌焕新品牌内化“5+N”工程，通过品牌联盟平台、品牌课程培训、品牌形象工程、品牌大使评选及宣传等活动方式，持续深化品牌内涵，提升员工对品牌的认知度和认同感，激发践行品牌承诺的积极性。

- 对外借势热点时点，多维度打造品牌智慧体验，通过畅听王卡、建党百年大合唱、智慧文旅、敬老助老银龄、行业展会、合作伙伴大会等，表达联通为客户、为社会、为行业创造价值的鲜明态度，体现联通投身数字经济，助力高质量发展的社会责任。

- 紧抓建党百年、东京奥运会等热点时点，与抖音、B 站、新浪等优势媒体共同策划“N 城打卡”、点亮“城市奥运地标”、“兆这样生活”、“家庭网络检测为民服务行”、“花式体育运动大赏”等线上线下互动体验活动，通过场景化演绎，突出产品特点。

- 与北京卫视、团中央、新华网、北京卫视等上级单位、央媒党媒及行业垂直媒体，共同策划打造《冬梦之约》、《硬核少年冰雪季》等栏目内容，以“小切口大故事”的形式，联动标杆企业和专家，差异化凸显联通产品业务优势，强化联通行业解决实力，提升品牌好感度。



中国联通携手新华网共同推出《5G 领航，扬帆未来》系列节目，节目呈现了用户、大众对于联通 5G 的真实应用体验，展现出联通 5G 技术实力，并通过案例专访栏目详细解说重点项目，塑造联通品牌智慧形象。



借助 517 世界电信日和 520 全球无障碍宣传日契机，以特殊视角打造三条真实故事改编的温情短片，讲述联通科技智慧为特殊人群的生活带来的改变，体现联通的社会责任感、富有深厚人文精神的科技感、饱含人情味的品牌温度。

该视频创意在 2021 年中国国际广告节中斩获了互动创意奖的影音游戏媒体类短视频创意广告金奖、公益广告奖类人文关怀工艺广告金奖、品牌想象公益广告铜奖、工艺创新营销铜奖四项大奖，并获得第十四届金投赏商业创意奖提名奖。



规范品牌经营管理

贯彻公司品牌发展战略，修订完善《中国联通品牌及广告宣传管理办法》，使品牌管理科学化、规范化、高效化、透明化，增强公司全体员工的品牌观念，完善品牌管理体系。

国资委品牌建设能力

央企第七，行业第一

2021-2022 品牌竞争力

品牌第一提及率

行业第二

2021-2022 品牌竞争力

品牌美誉度位居

行业第二

2021-2022 品牌竞争力

攻坚改革增强动力

中国联通一以贯之持续推动改革创新，加强系统集成，切实推动公司各项改革与公司战略一体协同、迭代深化，切实形成改革长效机制，引领公司高质量发展。

推进国企改革三年行动

提高政治站位，深入贯彻落实国企改革三年行动，中国联通将国企改革三年行动与全面数字化转型、对标世界一流管理提升行动三位一体有机结合，确定 10 个方面 130 项改革任务，上下协同、系统推进，截至 2021 年底，改革任务推进进度达到 93%。

持续完善现代企业制度

中国联通持续推动党的领导更加深入有效融入公司治理，集团及所属子公司党建工作要求全部进章程，同时修订完善党委（党组）前置研究讨论事项清单；应建董事会子公司 100% 建立董事会，100% 实现外部董事占多数。

深化市场化经营机制

中国联通全面实施领导人员任期制和契约化管理，迭代推进激发基层责任单元活力改革，智家工程师 100% 入格管理，强化网龄数字化赋能。

推进布局优化和结构调整

基于专业线运营体系改革基础上，深入开展大市场、网络线、科创线等运营体系变革复盘，持续优化改革方案；圆满完成两非两资清理和法人压减工作任务。

深化子公司市场化改革

2021 年中国联通推动价值链关键业务重组整合，组建联通数字科技有限公司，是主动适应数字经济“跨域整合”新生产力的变化，重构“融合创新”新生产关系的重大战略布局；与此同时，成立联通资产运营公司，加强房产和土地存量资源统一规划运营。

2021 年 2 月 7 日，联通数字科技有限公司揭牌仪式在京举行。在“十四五”新开局，大力整合“云、大、物、智、链、安”等能力，组建联通数科公司，既是主动适应数字经济“跨域整合”新生产力的变化，重构“融合创新”的新生产关系，也是紧跟数字经济需求侧的新变化推动的供给侧结构性改革，是中国联通打造独特创新竞争优势、实现创新赛道差异化突围的重大战略布局。

中国联通凭借“转型改革一体化”管理模式，即通过全面数字化转型铸就独一无二的数字生产力，通过央企整体混合所有制改革试点构建独一无二的新型生产关系，成功荣获国资委十大标杆管理模式之一，充分发挥国企管理标杆示范引领作用，为企业核心竞争力赋能，打造新时代国有企业转型升级的新样板。

深化三项制度改革

深化劳动、人事、分配制度改革，是提升企业活力、效率的关键环节。中国联通持续深化三项制度改革，全面激活人力资源核心要素，实现公司管理人员能上能下、员工能进能出、收入能增能减，增强公司活力和竞争力。

- 注重全面指导，制定《中国联通深化三项制度改革的指导意见》，清晰改革任务、清晰改革要求。
- 注重结构优化，网络线持续加强支撑自主运营交付的智网工程师队伍建设，公众线推进人员向线上运营团队、中台生产运营等转型关键岗位流动，政企线推进重点客户营销、产品管理、解决方案、技术研发队伍建设。
- 注重评估牵引，建立三项制度改革评估体系，聚焦改革成效指标，重点关注“能上能下、能进能出、能多能少”三个方面机制运行指标，闭环评价改革成效，强化评估结果应用。

加强内部流程治理

聚焦价值创造，秉承“客户优先”、“业务优先”和“一线优先”的原则，把以管理控制为中心的低效率、高成本的传统流程转变为以客户为中心的高效率、低成本的数字化流程，打造流程型组织，推动向数字化、智能化、生态化的平台型企业转型。

- 围绕流程框架，搭建流程管理体系和流程建设运营体系，以流程管理平台为基础，实现流程全视图可视可管可控。
- 简化系统操作步骤，在 4G 融合转 5G 融合业务营业受理场景下，系统点击步骤由 88 步减少至 68 步，受理时长由 15 分钟缩短至 10 分钟以内，打造简捷高效的流程。
- 压缩流程环节，政企双线业务缩减建设立项环节，实现有资源交付由最长 15 天缩短至 3/5/7 日通，交付开通平均时长缩短 50%，提升业务交付效率。
- 建立集约化运营服务，推进政企账务和发票省级集约，实现支撑人员减少 10%、销账周期缩短 20%、发票打印周期缩短 50%，平均效率提升 30% 以上，人工成本降低 45%。

探索运营混改模式

深化云南公司改革。为保证云南联通持续健康发展，中国联通研究印发《关于进一步深化云南联通“双百行动”综合改革的通知》，联通集团增资为单一大股东，股权占比由 5% 提升至 40%，确保国有资本在改革中的主导权；完成党组织融合、双主体融合，实现统一运营。

推进广西公司改革。广西联通在 7 个地市实施社会化合作运营改革，2021 年进入首个合作期。7 个地市运营公司已建立市场化运营体系和以利润、现金流为核心的财务管控体系。自治区公司对改革和非改革区域实行一体化运营管理。

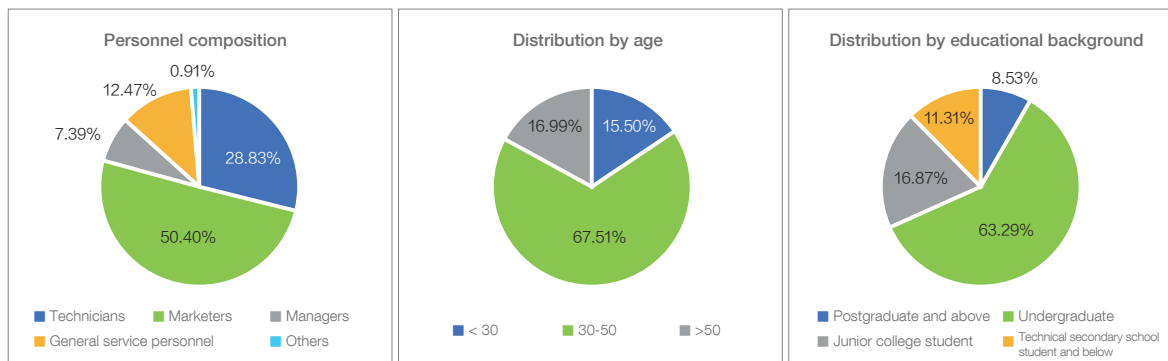
智网科技积极筹备上市。智网科技公司完善公司治理体系，完成公司股份制改造，完成经营班子市场化选聘，由总经理、副总经理、CFO 组成全新的经营团队。改革以来，公司估值由成立时的 1 亿元提升至投前 10.39 亿元、投后 15 亿元，有效实现了国有资产保值增值。通过与车厂类、行业生态类战投的有机融合，实现价值创造能力快速提升，保持前装市场份额 70% 以上，稳固市场主导地位。

Building a Highland of Innovative Talents

China Unicom places talents at a strategic position to lead development. We have deepened the reform of talent development system and mechanism, further implemented the talent strategy to make the Company strong, and try to develop talent comparative and competitive advantages. We exert efforts to train, introduce and make good use of talents thoroughly, and promote fundamental change of the talent structure. At the same time, we practically safeguard the legitimate rights and interests of employees, give full play to their enthusiasm and creativity, share the fruits of reform and development with wide employees, and help them grow together with the enterprise.

Optimizing talent structure

China Unicom believes talents are key to its growth and development. We improve the talent management system and mechanism, and optimize and adjust the talent structure based on strategic requirements. The grass-roots front line and the practices of dealing with major events are two channels we use to find outstanding young management talents. Through continuous improvement of the whole chain mechanism of cultivation, selection, management and use, the age structure of the cadre team has been younger and more proper. We have built a level 4 professional talent echelon of 19,000 people, including 950 leading and expert talents, 6,100 backbone talents and 12,200 young talents. The level 4 professionals have all been covered by digital training and certification through the “Digital Elite” program.



Total employees (person)	Employees from Chinese mainland (person)		Employees from HK, Macau & Taiwan		Overseas employees
243,380	243,329		46		5
Employees newly recruited (person)	Gender distribution (Male: Female)	Proportion of ethnic minority employees (%)	Separated employees (person)	Temporary workers in Chinese mainland (person)	
13,038	1.62:1	6.8	4,093	12,607	

The level 4 talent echelon

19,000 people

Exit rate of the level 4 talents

12.8%

Industrial experts imported in the technological innovation field

40+

Protecting employees' rights and interests

China Unicom regards the employees as its root. It carries forward the spirit of struggle and pioneer, respects labor, knowledge, talents and creation, protects the legitimate rights and interests of employees, and wholeheartedly cares for and serves them. It promotes the common growth of employees and the Company for win-win development through market-oriented reform of human resources, and constantly improves the employees' sense of happiness and gain.

Insisting on fair employment

- China Unicom stringently enforces provisions specified in the Labor Law and the Employment Contract Law, and signs contracts with 100% of its employees. The policy of dismissing employees is implemented in accordance with relevant requirements of the state.
- We have formulated a Manual on Risk Prevention and Control in the field of Human Resources, and adopted strict review and control procedures in recruitment and promotion. It is strictly forbidden to discriminate against employees in terms of age, gender, etc., and it is strictly forbidden to use child labor. We abide by the Rules on the Prohibition of Child Labor, and provide training to main contractors providing human resources or services in this aspect. No discrimination, or child labor or employee abuse incident occurred in 2021.
- Implementing the national work plan of "stabilizing posts and expanding employment", we expanded the recruitment scope to unemployed students who have graduated for two years. We promoted employment assistance and provided 396 targeted recruitment positions in Xinjiang, Tibet and Qinghai, and have recruited 39 Tibetan graduates in total.

Safeguarding democratic rights

- We implement the relevant national rules on working hours management, strictly implement the declaration system of special working hours, and protect the right of employees to rest and leave. No forced labor incident happened.
- We implement the paid leave system, and 100% retain the work opportunities for female employees after their maternity leave. We support and actively implement the parental leave and one-child care leave. We also implement a paid accompanying leave system for employees whose children will take the senior high school or college entrance examination, and have provided guidance services to 3,700 employees' children for filling the intention for university.
- Information about the staff team is reported to the workers' congress. The formulation and implementation of human resource policies are disclosed, and the channels of information communication are unblocked.



China Unicom AI Training Course



China Unicom "Digital Elite" training for the level 4 professionals

Innovative talent incentives

- We optimized the management method of total wages, and continuously released mixed ownership reform dividends. We improved the allocation rules of labor cost of provincial subsidiary companies, optimized the incremental revenue sharing mechanism for coordinated growth between labor cost and revenue, with labor cost up by 7.6% year on year. In order to get rid of the hardening of stock, the average adjustment proportion of labor cost stock of each unit is up to 10%.
- We improved the framework of long-term incentive system, and optimized the flexible welfare system, to meet employees' diversified needs.
- The promotion of employee rank and salary scale has been carried out in a normal way. In 2021, the promotion rate of rank and salary scale of the whole Group was 14.3% and 38.4%.

Helping employees grow

China Unicom adheres to the people-oriented principle, cherishes the value of each employee, and attaches importance to their ability building and career development. Focusing on improving the digital ability of all employees, we continue to promote the development of the education and training system, to help each employee develop his/her career and promote their communication and growth.

Restructuring the training system

We keep improving the training management system and mechanism, deepen the restructuring of the education and training system, strengthen the organization support to training and the allocation of training resources, and promote the implementation of the education and training system in all units.

- Developed training plans for key groups and set up a standard system of professional competences. Based on the training objectives, development paths and ability requirements of different groups, a digital ability standards and curriculum system has been built for digital empowerment.
- Advanced the construction of the certification system for professional lines, and promoted the transformation of ability with post certification. The ability standards of 63 professional directions have been updated and iterated, and 93,056 professionals have passed the certification.
- Develop technical courses in digital empowerment, smart network operation, network information security, independent delivery of intelligent network, and technological innovation. A total of 223 courses with 360 class hours were developed throughout the year.
- Made full use of all kinds of online education platform resources to hold a series of training, such as "Unicom Lectures", "Smart Talk" and "Wo Share", with a total of 1.26 million people participating in the study. 33 live broadcast training sessions were held, watched by 53,000 people. A special zone of online college was set up, and more than 9.97 million people studied online.
- Provided IT/DT technical ability training to all staff, and 19,000 people received online training. Implemented "Digital Navigator" and "Digital Elite" programs, fully covering the level 2 managers, level 3 managers and level 4 professionals. Implemented a "mentoring and apprenticeship" for level 4 talents to promote the digital ability of other professionals.

Subject	Training content
Cadres and staff of the whole Group	Organized 11,402 sessions of study on Xi Jinping Thought on Socialism with Chinese characteristics in a new era, participated by over 897,000 people.
Managers	Continued to carry out training on improving political quality and professional ability. 340 people participated in the rotation training for the Group's Party group management personnel, 47 general managers of municipal branches participated in the transformation training demonstration class, and 16,761 people participated in the education and training to study and implement the spirit of the Fifth Plenary Session of the 19 th CPC Central Committee. Selected 26 managers to participate in the training organized by the Organization Department of the Central Committee of the CPC.
Outstanding young cadres	Organized "Class for Advanced Studies for Young and Middle-aged Cadres", and 122 outstanding young management talents participated in theoretical study and ability training.
Professionals	Focused on key tasks, and carried out the transformation and empowerment training to level-4 talents and professional sequence employees in a normalized and multi-level manner. Organized Group-level demonstration classes to continuously empower the teams of various professional lines. The whole Group has conducted 84,000 sessions of professional skill training for personnel under professional sequence, with 5.16 million participants.
Front-line employees	For front-line employees engaged in business operation, voice call service, installation and maintenance, we built a digital ability standards and curriculum system, and carried out more than 58,000 sessions of training and certification throughout the year, with more than 2.29 million participants.

Staff training investment
RMB

340.99 million

Training covered

5.39 million people

Training time per capita

94 hours



At the opening ceremony of the training class for young and middle-aged cadres and the demonstration class for young management talents, Mr. Liu Liehong, Secretary of the Party Leadership Group and Chairman of the Group Company, presented flags to the two classes.

Training rate of top management

100 %

Average training time

203 hours

Training rate of middle-level management

100 %

Average training time

104 hours

Training rate of general staff

99 %

Average training time

94 hours

Building training platforms

In order to build a digital transformation talent team, China Unicom has actively organized various skills competitions in innovative 5G applications, big data innovation, solutions, and smart Winter Olympics, and selected cases from real production scenarios, real customers and real cases, so as to achieve good effects by replacing training with competition, promoting learning with competition and empowering abilities with competition, to constantly improve the technical capability of employees.

• In 2021, we held 502 labor and skill competitions, covering the fields of segment marketing, customer operation, financial rights and interests, network AI, Winter Olympic network support, network security and so on, and 233 participants won the title of “China Unicom Technical Experts”. The year 2021 is exceptional as the number of competitions held, the number of participants, and the participation rate all reached the highest in history.

• Working with China National Defense Posts and Telecommunications Labor Union, and China Telecom, we respectively held a practical skill competition on digital operation services for government and enterprises, and a labor competition on network co-building and sharing.

Group-level Class I & II labor and skills competitions organized in 2021

16

Group-level Class III skills competitions organized

30



China Unicom New Highland Labor Competition on Innovative Products



China Unicom Innovation Skills Competition on New Operation Engineering

Improving democratic management

China Unicom improves the democratic management system that takes workers' congress as the basic form, comprehensively promotes the trinity work of “workers' congress, corporate affairs transparency, and employees' suggestions” in the democratic management of the enterprise, to effectively protect employees' right to know, right to participate, right to be heard, and right to oversee, and encourages them to contribute wisdom to the development of the Company.

• Nearly 500 sessions of workers' congress were held in the whole Group throughout the year. More than 1,700 items were reviewed at the provincial company level, more than 10,000 items were reviewed by subsidiary companies and municipal companies, and more than 3,000 proposals were submitted.

• Established opinion collection channels, such as the “three everything” discussion and Party Leadership Group Direct Train platform, the whole committee online, employee satisfaction survey, and lower-level survey, and held special activities for staff participating in management, such as process governance, delegation and decentralization, China Unicom APP user experience, and working style improvement. In 2021, the Party Leadership Group Direct Train platform received 13,400 work orders from employees on their complaints and demands, with a problem-solving rate of 97.61%.

• Launched the “I do practical things for the masses” – “Party Leadership Group Direct Train” in service culture season, to collect the experience feedback in contact service, product business, network experience and other aspects, and collected 26,668 questions and suggestions in total.

• Unblocked the submission channels of rational suggestions by organizing “General Manager Online” and other activities to ensure that employees can submit their demands and receive feedback. In the whole year, we have held more than 150 sessions of “General Manager Online”, conducted two sessions of excellent proposal selection from employee representatives, and collected 85 proposals of all kinds.



Listen to the voice of employees and absorb the advice of grass-roots units. China Unicom has held “General Manager Online” activities, and employees at all levels have actively participated in providing suggestions for the development of the Company.

Caring about employees' lives

Adhering to the philosophy of serving employees, China Unicom tries to fully understand what employees think and need, constantly innovate various measures to serve employees, help employees balance work and life, create an efficient, relaxed and caring working atmosphere for them, and enhance their sense of belonging, security and mission to the Company.

Strengthening pandemic prevention & control

As the pandemic prevention and control has been normalized, the labor unions at all levels have continued to optimize and implement measures to care for employees and better serve the Company and staff during this special period while exerting efforts to do a good job in COVID prevention and control.

- Established a pandemic prevention mechanism, and required labor unions at all levels to strengthen pandemic prevention awareness, organize pandemic response activities according to local conditions, reasonably reserve pandemic prevention supplies, formulate emergency response measures, and promote pandemic prevention & control and the operation and development of the Company in a coordinated manner.
- Called for employees to stay local for the Spring Festival during the special period, and sent regards to the families of employees working overseas. The Company provided various forms of care for employees staying local during the Spring Festival. For employees working overseas and unable to return home as the pandemic situation was severe, the labor union took measures to relieve their worries by sending regards to them and their families, and distributing gifts and funds to their families.

Ensuring work safety

The Company strictly abides by the Law of the People's Republic of China on Work Safety and other relevant laws and regulations, has further fulfilled the responsibility of work safety, and improved the basic systems such as the "Measures for the Supervision and Management of Work Safety" and the "Fire Safety Regulations", to enhance the safety supervision mechanism, strengthen personnel protection, and fully implement work safety.

- Improved the quality of all staff on work safety by organizing theme activities such as work safety month, fire safety day, and work safety law publicity week, holding theoretical training on fire protection, and organizing drills on firefighting, emergency evacuation and response.
- In 2021, no work safety accident above the general level happened in the whole system, and there was no fire accident in the workplace. The accident mortality rate per 1,000 people was 0%, and there was no loss of working days due to occupational injury. The employees' sense of safety has improved significantly.
- Promoted the development of the employee health management system, and provided employee health examination, health lectures, critical illness insurance and other services.
- Protected the mental health of employees through a series of activities such as "Mental health of employees" and "Grass-roots mass sports", as well as pilot promotion of "Psychological Station". The Company also took the initiative to offer psychological care to staff during special periods such as when COVID was severe in Hebei and overseas and when Henan was hit by heavy rain and sever flood. In 2021, China Unicom was awarded as a "Healthy Enterprise" by health.people.cn.

Work safety training held

119 times

Work safety training coverage

100%



In order to conscientiously implement the China Unicom Three-year Action Plan for Special Rectification of Work Safety, popularize fire safety knowledge among headquarters personnel, improve their fire safety awareness, and enhance safety knowledge and necessary skills, the Administrative Service Center of the Group invited Tian Siyu, officer of the Fire Rescue Detachment of Financial Street, Xicheng District, to give a training lecture on fire safety in office.

Caring for female employees

In order to protect the rights and interests of female employees and provide accurate and considerate services to them, the Company signed special collective contracts for female employees, improved the construction of "nursing room" and held "March 8 Festival" series of activities. In 2021, we selected 120 Group-level "Women's Civilized Posts" and 125 "Meritorious Female Models", to stimulate the working vitality of female staff.

Diversified entertainment activities

In earnestly implementing the national strategy of healthy China and national fitness, China Unicom has actively held various forms of cultural and sports activities, and participated in various competitions organized by the national defense posts and telecommunications system and the Communications Sports Association of China. In 2021, labor unions at all levels organized nearly 6,000 cultural and sports activities with 600,000 participants. China Unicom Shandong branch was commended as a national advanced unit of mass sports by the General Administration of Sports, and Hu Mingrui of the Guangdong branch and Qu Fengxia of the Hebei branch won the commendation of the national advanced individual of mass sports.



Held flower art and handicraft themed activities for female employees on the occasion of International Women's Day



China Unicom organized a series of employee sports activities themed on “Welcoming the Winter Olympics and Writing a New Chapter”, including badminton and gas volleyball games. Chairman Liu Liehong came to the competition site to watch the game, and encouraged employees to actively participate in various cultural and sports activities of the Company.



2021 China Unicom Employees' Table Tennis Competition

Assistance to employees in difficulties

China Unicom has established a mutually complemented assistance mechanism consisting of archives of employees with difficulties, critical illness insurance assistance, and mutual assistance funds of employees, and formed a “trinity” assistance system of critical illness insurance, mutual aid fund and supplementary medical care, to help employees solve difficulties. In 2021, the Company paid more than RMB70 million to needy workers, compensated 2,273 people with critical illness insurance, and helped 3,700 people with mutual aid funds. After the catastrophic flood disaster in Henan, the labor union of the Group rushed to the scene immediately to comfort the front-line rescue workers and raised RMB1 million to support post-disaster reconstruction.

China Unicom has set up a special fund for the construction of “five types of facilities”. In 2021, we raised RMB6.685 million to improve the working and living environment for 100 grass-roots units in old revolutionary base areas, support the post-disaster reconstruction of grass-roots units in Henan, Shanxi and Sichuan, and improve the working and living environment for cadres and employees working away from home due to poverty alleviation and stability maintenance missions.

China Unicom Inner Mongolia Hohhot branch combines home building with the building of staff team and staff culture. It fully considered the needs of employees when the office building was relocated, and has built a “small reading corner” and a “small fitness corner” for employees. It has improved employees' happiness and sense of gain, as well as their sense of identity and belonging to the enterprise through the building of “Home of Staff”.



We carried out the activity of “I do practical things for the masses”, and the “Sending a piece of care” activity for heroes, families of martyrs and national labor models. Labor unions at all levels have sent regards to 2,306 people and paid RMB2.57 million of solicitude funds.

Funds paid to help employees with difficulties
RMB

70.22 million

Solicitude funds paid
RMB

42.10 million

Caring for employees' children

In order to overcome the difficulties caused by the pandemic, we continued to organize childcare classes for employees' children during vacations in an innovative form. In particular, the childcare class set up by the Fujian branch was rated as a “National Love Child Care Class” by the All-China Federation of Labor Unions.

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The nation is composed of people, and people are all that matter to the nation. China Unicom has always adhered to the people-centered development idea, and taken improving people's well-being and promoting people's all-round development as the purpose and target of digital development. We effectively link the consolidation and expansion of key achievements in poverty alleviation with rural revitalization, actively conduct public benefit activities, promote common prosperity of society, and continuously enhance people's sense of gain, happiness and security. At the same time, we actively implement the national requirements on carbon peaking and carbon neutrality, to help build a beautiful China. We also gather the strengths of all parties to play a good "team game", form an integrated, open and cooperative ecosystem, and drive the common development of the industrial chain.



Measures adopted in 2021

- Consolidated and expanded the achievements in poverty alleviation, and took follow-up efforts for comprehensive revitalization of rural areas, by investing 217 million yuan in assistance.
- Enhanced green management, green production and operation, and green industry empowerment, and arrange a special fund of 130 million yuan for energy conservation reform.
- Gathered the strengths of industry competitors, equipment and terminal suppliers, channel partners, strategic investors, and other parties to play a "team game".
- Conducted public benefit donations, deepened inclusive services, and devoted in voluntary services to give back to the society.



Actions to be taken in 2022

- To vigorously promote network development for rural revitalization and give play to the driving role of industry.
- To further implement carbon peaking and carbon neutrality, and promote the research, testing and application of new green energy-saving technologies, equipment and solutions.
- To deepen cooperation with strategic investors and leading companies in the industry, and achieve win-win cooperation in terms of business, product and capital.
- To promote systematic organization and management of voluntary service for public goods, standardized team building and normalized activities.

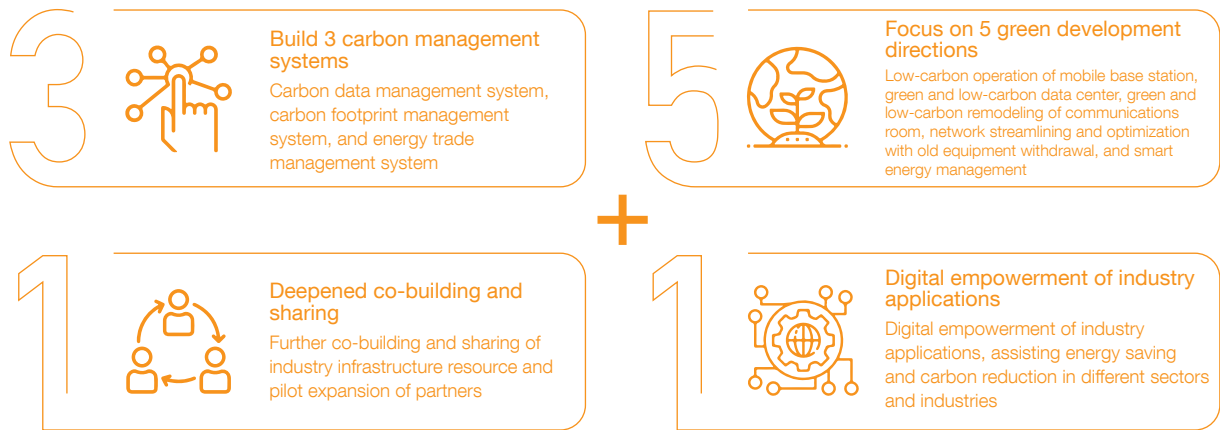
Contributing to the Building of a Beautiful China

If we humanity do not fail Nature, Nature will not fail us. China Unicom has thoroughly studied and applied Xi Jinping Thought on Ecological Civilization, followed the concept of green development, and made overall planning for green management, network construction, and operation. We have strictly controlled energy consumption in a reasonable range, further promoted green industry empowerment, and facilitated the formation of green and low-carbon ways of production and living, to contribute to carbon peaking and carbon neutrality, and make ecology benefit people, and serve people.

Improving green management system

Abiding by the Environmental Protection Law of the People's Republic of China, the Energy Conservation Law of the People's Republic of China and other laws and regulations related to environmental protection, China Unicom actively responded to the adjustment caused by national climate change, and established a Carbon Peaking and Carbon Neutrality Management Committee, to guide the establishment and improvement of the company's management system on carbon peaking and carbon neutrality, and decide on relevant work of significance. Under the management committee, there is a Carbon Peaking and Carbon Neutrality Management office, which is responsible for following up relevant policy research, establishing and improving relevant systems, organizing the R&D, testing and promotion of energy-saving and carbon reduction technologies, organizing relevant training, publicity and exchange, and striving to reduce carbon footprint.

We developed and released the Action Plan for Carbon Peaking and Carbon Neutrality during the 14th Five-year Plan Period, and started the "3 + 5 + 1 + 1" action plan, to comprehensively, systematically and deeply promote energy conservation and carbon reduction with a goal of green and low-carbon circular development. We continuously improved the greening of communications network infrastructure to help the industry achieve green, low-carbon and high-quality development, and contribute to the increase of non-fossil energy consumption to about 25% by 2030, and the decrease of carbon dioxide emissions per unit of GDP by more than 65% compared with that of 2005.



"3+5+1+1" action plan for carbon peaking & carbon neutrality

Enhancing green production & operation

Promoting green and low-carbon production

China Unicom has actively promoted intelligent transformation, energy-saving innovation and green upgrading of communications infrastructure to improve the comprehensive utilization efficiency of energy. The Company applied strict control from the source of equipment procurement, implemented energy-saving responsibilities, put forward energy-saving index requirements, and allocated a special fund of RMB130 million for energy-saving transformation.

- **Promoted 5G energy-saving technologies.** We made in-depth study of the critical technologies for 5G energy saving, installed small and energy-saving air conditioning equipment such as central ventilation system, and made full use of clean energy, moderate hibernation, time-division shutdown and other measures to reduce high energy consumption of 5G. We built a "4G/5G collaborative intelligent energy-saving management platform" based on the concept of environmental protection, which has achieved intelligent collaboration of multi-standard networks and differentiated energy-saving scheduling with "one station one policy", to promote green, efficient, and intelligent communications networks for sustainable development.
- **Built green IDCs.** For the newly-built communications rooms (including IDCs), we strictly implemented the requirements of the national and local competent authorities on environmental impact evaluation and environmental protection acceptance, introduced high-voltage DC and municipal direct power supply technology, simplified the power supply system, optimized the air distribution of the communications room, made full use of natural cold source, air conditioning atomized spray, closed cold and hot channels and other means to reduce power supply loss and improve refrigeration efficiency.
- **Drove optimization and upgrading of production capacity.** 114 sets of MGW equipment were withdrawn from the core network; 40 sets of PSTN equipment and 27 sets of NGN equipment were withdrawn from the integrated access network; about 45,000 units of old MSTP/SDH equipment and about 897 units of old wavelength division equipment were withdrawn from the transmission network, with a completion rate of 187%; and 62 units of DCN backbone equipment were withdrawn from the data network. We continued to promote the withdrawal of old equipment that was supporting infrastructure from the network, and saved about RMB23.95 million in electricity charges throughout the year.
- **Strengthened the management of electromagnetic radiation (EMR).** We strengthened the management of the EMR of mobile communications base stations during their construction, to ensure that the EMR of base stations meets the requirements of national standards. After the completion of base stations, EMR test will be conducted against these base stations, and the test data will be made public on the website for public supervision.

Coverage rate of energy-saving technology for base stations

75%

Coverage rate of energy-saving technology for core computer rooms (IDCs included)

85%

China Unicom Guangdong branch closely focused on how to meet the requirements of carbon peaking and carbon neutrality. Throughout the year, it saved energy consumption costs by RMB41.44 million and reduced carbon emissions by 5,100 tons of standard coal by simplifying the network, eliminating backward production capacity, carrying out technology-based energy conservation, electricity price reduction, and remodeling computer rooms for greenness and low carbon.



Greenness and low carbon-oriented remodeling of computer rooms

In May 2021, the “4G/5G Collaborative Intelligent Energy-Saving Management” project of China Unicom Research Institute won the Champion Award of ITU WSIS ICT E-Environment.



Award certificate of the “4G/5G Collaborative Intelligent Energy-Saving Management” project

Unicom Digital Technology Co., Ltd. engaged in building low-carbon IDCs. With energy-saving technologies and operation means, such as natural cold source, equipment frequency conversion regulation and control, and UPS operation mode, it saved about 9.974 million kWh of electricity and reduced 9,943.7 tons of carbon dioxide emissions.

A special chapter on energy-saving solutions was prepared in each feasibility study scheme of IDC construction project. We tried the introduction of renewable energy to solve the energy consumption of ancillary offices, and increased the proportion of green electricity through market-oriented transactions. The IDCs in Langfang and Hohhot have been rated as “Advanced Units in Energy Conservation and Emission Reduction” for five consecutive years, and Gui'an and Hohhot IDCs have been selected into the national green IDC list.



Gui'an IDC was selected into the national green IDC list

Promoting green and low-carbon operation

China Unicom has actively carried out green office, green product design and business services, created a green supply chain system and deepened the recycling of resources.

- **Pursued green office.** We have unswervingly implemented the concept of “green office” and pursued resource-saving and environment-friendly office buildings by adopting efficient, energy-saving and environment-friendly products for office and living scenarios such as office air conditioning, building elevator, office lighting and staff canteen. Special measures to save fuel and reduce consumption of vehicles were developed, and vehicles that had reached the retirement age, failed to meet environmental protection standards, and consumed high fuel and material maintenance were scrapped in time. We continued to promote digital operation of the business hall, and guided users to deal with services online for digitized operation and paperless acceptance.

- **Rational use of water resources.** We strictly abide by relevant provisions of the Water Law of the People's Republic of China and the Law of the People's Republic of China on the Prevention and Control of Water Pollution, strengthen daily water-saving management, and enhance the reuse of water resources. For example, the left boiled water and tea were used for cleaning, dedusting or watering flowers after cooling down; collected rainwater for outdoor grassy area irrigation; and intensified equipment maintenance and patrol inspection to avoid leakage. The water for the Company's daily office, production and operation mainly comes from the unified municipal water supply, and there is no risk of water pollution.

- **Built a green supply chain.** A Notice on China Unicom Strengthening Independent Control of the Supply Chain and Encouraging Green and Low-carbon Procurement was issued. In the centralized procurement of 5G and other network equipment, green and low-carbon requirements were set separately, and the evaluation weight of energy-saving indicator has been improved. The products provided by the supplier should meet the requirements of green packaging that use recyclable, degradable or harmless packaging materials instead of toxic or harmful substances, and avoid excessive packaging.

- **Strengthened recycling use.** An internal mechanism to efficiently use idle materials was established based on market fair value, which has revitalized materials valued at RMB78 million. Scrapped assets such as batteries and cables were disposed through online public auction, with a bidding transaction amount of RMB456 million, including RMB122 million for scrapped batteries and RMB334 million for other scrapped assets.

- **Carried out publicity activities on greenness.** Taking advantage of the National Energy Conservation Publicity Week, the National Low-carbon Day and other activities, the Company organized energy conservation publicity activities in a hybrid way of online and offline campaigns, to educate and guide employees to pursue a new way of green consumption and low-carbon life, raise their awareness of energy conservation, emission reduction and environmental protection, and create a new fashion of green and low-carbon life.

China Unicom innovated a working mode of “Party building + voluntary revitalization” and set up relevant voluntary teams to revitalize and allocate the idle terminals in good status to economically backward areas and disaster-stricken areas, to help improve the office terminals of front-line workers. In 2021, a total of 1,202 terminals including printers, scanners, servers, switches and 905 computers were revitalized, which were valued at RMB20.11 million.

China Unicom Beijing branch formulated energy-saving plans, measures and implementation plans for water, heating and electricity use in office places. It detailed the accounts of energy consumption such as water, heating and electricity, implemented green network operation, and carried out publicity on energy conservation and consumption reduction in office space. According to the Green Logistics Action Plan of China Unicom Beijing Branch, it actively promoted the open market application of the Group's logistics express, and assisted relevant units to sell more than 300 pieces of idle assets and materials such as available tables and chairs in secondhand stores.

Strengthening green industry empowerment

Giving full play to its technical advantages in such as 5G, cloud computing, big data, Internet of Things and AI, and focusing on key scenarios such as emission and carbon reduction, smart water conservancy and environment monitoring, China Unicom has developed green intelligent application products, and launched information-based green solutions, to enable green transformation and upgrading of thousands of industries.

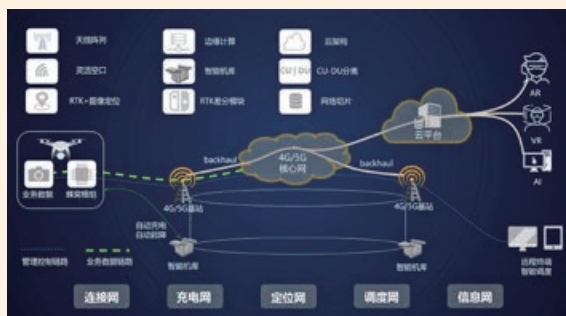
Developed intelligent cloud products for “double carbon”. A “double carbon” big data platform has been built, providing a base for common capability. Development of carbon emission management software has been strengthened for functions of carbon emission quantification, analysis, management and reporting. An application center has been established to support the access to various “double carbon” applications, closely integrating with power, industry, construction, steel, transportation and other industries, and improve low-carbon management. In addition, we have created a unified “double carbon” data resource system, innovated the modes of the “double carbon” management, decision-making, and service, and improved the “double carbon” index system and evaluation system.



The “zero carbon” energy Internet model for the Asian Games

China Unicom Zhejiang branch has built a 5G virtual private network for the State Grid Hangzhou Power Supply Company, enabling it to build a “zero carbon” energy Internet model for the Asian Games. The investment in communications optical cables has been reduced by RMB60 million, the annual average outage time has been reduced by 42%, and the annual carbon dioxide emission was expected to be 550,000 tons less.

Innovated water conservancy solutions in a smart way. Focusing on the development and utilization of water resources, flood and drought disaster prevention, rural water conservancy, water ecology, water environment and other key areas, we promoted the modernization of water governance system and water governance capacity, to create smart water conservancy with thorough perception, comprehensive interconnection, in-depth mining, intelligent application and ubiquitous service, and achieve the whole process intelligent control of water related events perception, supervision and decision-making.



Technical architecture of 5G + UAV river patrol

China Unicom Fujian branch seriously implemented the new positioning of the Ministry of Water Resources for the national water conservancy work deployment, innovated the river/lake chief system and created a demonstration benchmark for smart water conservancy work, integrate resources, improve work efficiency and reduce social management costs, and was highly praised by all sectors of society. The river/lake chief system platform has served more than 20,000 river chiefs, river chief office staff, administrators and the general public, supported more than 2.4 million times of river patrol services, and handled more than 200,000 river/lake events every year.

Launched the “one network for unified management” environmental monitoring scheme. Focusing on the fields of comprehensive supervision and big data of ecological environment, we provided solutions such as “China Unicom Big Data Platform for Ecological Environment” and “Classification of Urban Household Waste”, and implemented the comprehensive management system for ecological environment monitoring and the project of “one network for unified management” of ecological environment in Xiongan, Shandong, Zhejiang, Shanghai and other provinces and cities, realizing ecological environment data sharing across departments, levels and regions of the province, and digital, convenient and accurate management.



Demonstration of the smart ecological environment monitoring system in Xiongan New Area

Relying on its independent innovation and technological capability, China Unicom has integrated 5G application, remote sensing monitoring, ecological data standardization, data governance, IoT for environment monitoring, edge cloud and other capabilities, and developed a smart ecological environment platform, which realized full-scenario 5G coverage for smart monitoring of ecological environment in Xiongan New Area, built an "air-land-lake" integrated smart ecological environment monitoring system, and improved the ecological environment monitoring, forecast and early warning level, as well as the information capability and guarantee level.

Promoting Overall Rural Revitalization

The year 2021 was the first year when China had achieved overall victory in poverty alleviation and successfully shifted to rural revitalization strategy, which is a holistic and historic task that matters to the comprehensive construction of a socialist modern country, and a general means to promote the work on "agriculture, rural areas and farmers" in the new era. General Secretary Xi has stressed for several times that to rejuvenate the nation, the rural areas should be revived. China Unicom has resolutely implemented the requirements of the "four no shaking off", and enhanced its understanding of mission and responsibility in helping rural revitalization, so as to ensure that the work intensity, capital investment, policy support and assistance force will not be reduced. The Company has taken multiple measures in parallel to continue to strive for comprehensively promoting rural revitalization and consolidating and expanding the achievements in poverty alleviation.

Standing higher to be a better joint for rural revitalization work

China Unicom further optimized and sorted out the three major systems formed by the Group Company in the process of poverty alleviation, namely, the Comprehensive Poverty Alleviation Work System, the Responsibility Division System for Paired-up Assistance in Poverty Alleviation, and the Assistance Work System with Industrial Development as the Core, which continue to be the basic systems and work requirements for rural revitalization.

Assistance fund
invested by the Group
RMB

2.17 million

Number of cadres, first secretary
and staff taking temporary positions
in lower units

1493

On February 25, 2021, the National Poverty Alleviation Summary and Commendation Conference was grandly held at the Great Hall of the People. General Secretary Xi presented awards to the honorary title of national poverty alleviation model and delivered an important speech. The office of China Unicom leading group for poverty alleviation and partner assistance to Tibet was awarded the "National Advanced Collective for Poverty Alleviation" by the Party Central Committee and the State Council.



Awarded the title of "National Advanced Collective for Poverty Alleviation" for the paired-up assistance work in poverty alleviation

We provided all-round guarantee to drive rural revitalization work to go deeper, be pragmatic and effective by doing a good job in six aspects, including policy, system, personnel, project, organization and assessment. We gave play to the guiding role of models, strengthened promotion, and created a good atmosphere to lead more cadres and workers to pay attention to, participate in and help rural revitalization.



Six aspects of work for rural revitalization

We organized two sessions of "digital village" on-site training for national assistance cadres and relevant personnel of the Rural Revitalization Office, and uploaded the training courses to China Unicom Online College. More than 5,000 assistance cadres received the training online and offline.

Universal service building an information highway for villages

What the people need is what we pursue. China Unicom overcame difficulties such as tough construction environment, poor construction conditions and long distance, and set up an information highway for rural and remote areas to benefit the people with information.

- Network construction for rural revitalization, and construction of the seventh and eighth batches of universal service pilot projects in rural areas as well as China Unicom special network project for poverty alleviation were advanced. 327,000 administrative villages have been covered by broadband, including 244,000 administrative villages in 10 northern provinces, with a coverage rate of 98%.

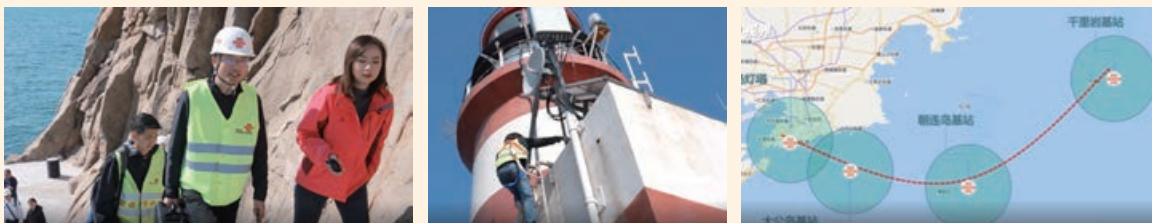
- Strengthened the construction of network channels in remote and poor areas to make services closer to rural life. There are nearly 230,000 channels in rural and remote and poor areas.



Base station construction in poor and remote mountainous areas in Wulong

With the aim to solve the problem of no network signal coverage in poor and remote mountainous areas in Wulong District all year round, China Unicom Chongqing branch has actively pursued universal telecommunications service and devoted itself to the construction of base stations in mountainous areas. "Although there is no driveway, we may transport facilities manually; although the mountain is high and the road is steep, we may form a team to move forward hand in hand; and although it is rainy and the road is slippery, we may stay at the construction site to catch up with the progress." Now, 27 base stations have been fully completed and in operation, providing full coverage of 4G network. CU Chongqing branch paved an unblocked information road for local people with the original aspiration of posts and telecommunications people.

Qianliyan Island is the farthest island from the mainland in the Yellow Sea of Shandong Province. Its natural environment is harsh. There was no mobile network signal, and even the necessities of life are extremely scarce. The Qianliyan Lighthouse on the island has been in operation for 77 years, and the only entertainment way for tower watchers was to watch satellite TV. In order to solve "the last kilometer" communications problem of Qianliyan Island, 12 construction workers of CU Qingdao branch stayed on the island and worked for 18 days regardless of difficulties and dangers, and finally made 4G network and voice call cover 30 kilometers of the surrounding sea area. Unicom people realized the dream of "let the century old channel lighthouse embrace modern communications technology" with their hands. The isolated island is no longer isolated and the family relationship is no longer disconnected.



Base station construction on Qianliyan Island

Broadening the income channel for farmers through industrial development

The key to agricultural and rural work is to increase farmers' income. Industrial revitalization is the material foundation of rural revitalization. Previously, we have explored the way of poverty alleviation through industrial development, and finding the right path is critical to further promoting rural revitalization as well.

Building an advantage of characteristic agricultural products

China Unicom continued to carry out paired-up assistance, and went deep into the front line to help farmers further expand income channels by taking into account regional reality and cultivating new industries and new business forms.



Glutinous Banana Plantation in Ceheng County

China Unicom Guizhou branch continued rural revitalization, and provided paired-up assistance to 1 county (Ceheng) and 20 villages by sending 23 assistance cadres and investing RMB46.1282 million for rural revitalization. It developed a "14" Five-year plan of industrial assistance to Ceheng, with a planned assistance fund of RMB168 million to provide financial guarantee for further consolidating and expanding the achievements of poverty alleviation. In November 2021, the National Rural Revitalization Administration published a special report of "China Unicom Helping Ceheng County to Build a Pattern of Whole Industrial Chain Development of Glutinous Bananas", which introduced the Company's good experience and practices, and promoted them to central units with paired-up assistance missions and relevant local departments.



A technician is guiding villagers of Dongjiu in Xiangxi Prefecture on how to pick tea-leaves

To help the residents in Dongjiu Village, Xiangxi Prefecture, Hunan Province live a better life, after taking into consideration local soil characteristics and suitable crop varieties, CU Hunan branch invested RMB2.48 million to build a Gold Tea industrial park with an area nearly 800 mu. After tea trees grow up, each mu can produce more than 50kg of fresh tea.



Helping farmers grow crops

Zhang Zehui, an employee of CU Heilongjiang Hegang branch who serves as the First Secretary in a village, encouraged and drove the villagers to carry out online sales and picking activities of agricultural products. Through the process of placing orders online, direct supply from the place of origin, and delivery to customers, the growers increased their income by RMB10,000 per year. He coordinated with the Disabled Persons' Federation of the county for several times to invest RMB60,000 in the village to build six smart greenhouses, and mobilized poor households with disabilities to plant *Lepista Sordida*. With his coordination and help, the village has developed a number of poverty alleviation industries. The villagers have lived a richer life and more smiles can be seen on their faces!

Innovative promotion of agricultural products

China Unicom vigorously carried out activities such as revolution education in smart villages, cultural and tourism promotion of beautiful villages, and live streaming of agricultural product traceability. Combined with digital rural construction and digital live streaming technology, the Company has built a Unicom channel for agricultural products to "touch the Internet" and "go upward", and accelerated the cultivation and formation of a number of rural e-commerce product brands with good reputation, high quality and distinctive characteristics.



Live streaming site of CU Tianjin branch for agricultural products

China Unicom Tianjin branch carried out live streaming activities to help rural revitalization, and innovatively created a brand of "Tianjin Rural Harvest Festival Live Streaming Competition" to upgrade the digitalization of agriculture. The "Unicom Red" live streaming room diversified the sales channel of agricultural products, fostered teams of "social media influencers" in the field of rural live streaming, made the agricultural brand popular, improved people's quality of life, and was highly praised by all sectors of society.

Building an Integrated and Open Ecosystem

Opening-up and cooperation is a historical trend, and mutual benefit and win-win results are the aspiration of people. Following the cooperation philosophy of "consultation, co-building, sharing, joint innovation, integration and win-win", China Unicom pursues greater, wider and deeper opening-up and cooperation, a brand new ecosystem running through the innovation chain, industrial chain and value chain, and a "joint fleet" built with partners, so as to complement and empower each other with respective advantages, accelerate the integration of factor resources, and meet people's increasing demand for a beautiful digital life.

Launching a new initiative on ecosystem cooperation

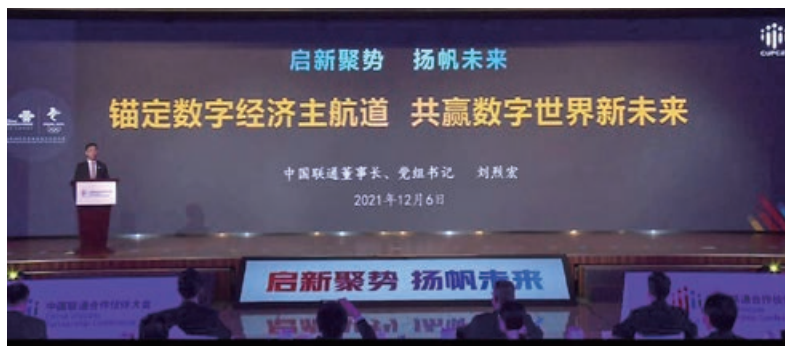
The 2021 China Unicom Partnership Conference was held on December 6. Themed on "Inspiring New Ideas with Cohesion, Sailing to the Future", the conference aimed to comprehensively show the digital achievements of China Unicom and global partners, and jointly draw a blueprint for the development of digital economy. Chairman Liu Liehong delivered a keynote speech entitled "Sticking to the Main Channel of Digital Economy to Achieve a New Win-win Future of Digital Economy" and announced the new strategy of China Unicom.

For the purpose of speeding up the building of a digital ecosystem featuring "multi-party synergy, complementarity, mutual support, cross-border convergence, and co-existence of competition and cooperation", China Unicom has joined hands with friends from all walks of life to create a new paradigm of industrial cooperation and jointly write a new chapter of digital economy with the deepest sincerity, the most open mind and the most pragmatic actions. Three new initiatives were launched:

- Deepen cooperation in the innovation chain and strengthen the force of national strategic technology. We shall bear in mind the principle of "opening the door for innovation and win-win results", and work with all parties to make further collaborative innovation. A "Technological Innovation Cooperation Plan" has been issued.

- Deepen industrial chain cooperation and work together to expand new space for digital development. We shall join hands with all parties in the industry for win-win results and share, fully open the capacity, fully meet the needs, and conduct efficient cooperation in planning development, business matching, procurement settlement, and model innovation.

- Deepen cooperation in the value chain, to better serve and integrate into the new development pattern. We shall strengthen collaboration with industry partners and investors, enhance factor allocation and guarantee ability, and improve the value chain.



Working with industry competitors for new development

China Unicom has seriously implemented the new infrastructure deployment of the CPC Central Committee, and deepened network co-building and sharing to integrate digital information infrastructure resources, maintain the industry value, promote sustainable development of the industry, and create a solid digital base for enhancing national strength in cyberspace, the development of digital China and smart society.

Promoting co-building and sharing in an all-round way

The Company continued to promote the co-building and sharing of 5G, 4G and basic network resources with China Telecom, and continuously expanded the breadth, depth and thickness of the network.

- Achieved equivalent scale and coverage of 5G network to that of the industry. The two sides have jointly built 690,000 5G base stations, covering all urban areas of cities and counties and areas above developed townships in China.

- We actively carried out joint construction and sharing of 4G networks, opened 1.4 million new 4G sharing cells, which contributed to a cumulative sharing scale of more than 2 million cells.

- Expanded the cooperation scope of infrastructure co-construction, sharing and co-maintenance. The co-construction and sharing length of trunk lines, optical cables, pole roads and pipelines has exceeded 400,000 kilometers, saving investment of more than RMB4 billion and maintenance cost of RMB200 million/year. We also further promoted cooperation in cloud-network convergence, communications room, international submarine cable and emergency support, to give play to the potential of synergy.

- Prohibited broadband monopoly in residential areas and commercial buildings, to ensure right of way and fair access in telecommunications infrastructure construction.

Investment saved for the country by co-building & sharing throughout the year
RMB

210 billion

Operation cost saved
> RMB

20 billion/year

Pollutant discharge reduced

6 million tons



5G Joint Construction System of CU Heilongjiang branch and CT Heilongjiang branch

China Unicom Heilongjiang branch and China Telecom Heilongjiang branch jointly developed a 5G joint construction system, which relies on ultra-high-precision map simulation and big data platform resources, and has realized whole-process automatic planning, value network construction, efficient operation and maintenance and intelligent optimization, promoting the formation of a new 5G development pattern with faster construction speed, higher resource efficiency, better service quality and better co-opetition order.

While conducting co-building and sharing with China Telecom, we also pursued strategic cooperation with other industries and reached consensus with State Grid, city construction, investment and management companies, and communications groups on tower, optical cable and station resource sharing.



Maintenance of 5G base station

China Unicom Henan branch has promoted the co-building and sharing of 5G network with China Telecom across the province, and has opened more than 42,500 5G base stations, covering all cities, counties and towns. Joining hands with partners, it built a series of typical 5G applications, including the first commercialized automatic bus line, the first 5G + MEC intelligent application of UHV substation, and the first 5G ubiquitous low-altitude test center in China, providing new impetus for serving the high-quality economic and social development of Henan.

Standing firm to maintain sustainable development of the industry

The Company has steadfastly implemented the rectification requirements of the central inspection team, and resolutely corrected vicious competition that was at the expense of customer interests and industry value, to promote the whole industry to form a good situation of co-opetition, continue to release development dividends, and facilitate the healthy and sustainable development of the industry. During this process, the Company gave full play to its role as a “stabilizer and ballast” of the national economy, and effectively promoted national strength enhancement in cyberspace, and digital China and smart society building.

Propelling in-depth cooperation in the industrial chain

China Unicom has actively worked with all parties to build a safe, innovative, smooth and efficient industrial chain and supply chain, create value for customers with digital technology, and drive the integration, innovation and coordinated development of the industrial chain.

Deepening cooperation with equipment suppliers

We strengthened the normative management of material procurement, and built a digital supply chain platform, to promote equipment suppliers to actively fulfill their social responsibilities.

- **Strengthened normative management.** Projects that must be tendered according to the law shall be selected in strict accordance with the requirements of national laws and regulations, and by means of public bidding; for projects that bidding is not a mandatory requirement, we followed the SASAC's open procurement idea, innovated tools such as open comparison and open direct purchase, and selected qualified suppliers through the supply chain platform. The entry threshold for suppliers has been lowered, and a qualification system has been widely adopted for products and technologies, allowing small-scale suppliers to participate in procurement activities fairly. We reviewed corporate credit in bidding and procurement activities, and prohibited companies violating rules and with poor credit to participate in bidding activities. The centralized procurement amount was about RMB128.38 billion.

- **Built a digital supply chain.** We improved the e-bidding platform, promoted an online remote bid evaluation model during the COVID-19 pandemic, and realized intensive sunshine procurement. We embedded and configured risk rules and data models into the system for automatic risk identification, early warning and control of the entire supply chain process. We improved the capabilities of the e-mall to provide multiple and convenient procurement support services for the grassroots network. We established a unified supplier information database, and created “suppliers portraits”, providing support for procurement review and supplier evaluation.

Total number of suppliers
of the e-mall

71,000

Number of newly increased
suppliers in the year

14,000

Indicator	2019	2020	2021
Centralized procurement rate (%)	90.6	91.4	96.7
Proportion of local suppliers (%)	>99	>99	>99
E-procurement rate (%)	68	88	96

Enhancing cooperation with terminal suppliers

The Company strives to build a new pan-terminal ecosystem with Unicom characteristics. It strengthened the empowerment and guidance of terminal suppliers, expanded operation boundaries, enriched product categories, and intensified integrated operation for common development.

- **Empowered partners with intelligence.** Relying on the terminal partner service portal, we provided partners with one-stop services such as technical specifications, access guidance, performance testing, and product display. In 2021, more than 100 terminal suppliers, and 15 service partners, privilege partners and financial service providers were introduced, with more than 300 cooperative brands, and the cumulative sales of pan-intelligent terminals reached 25.95 million units.

- **Guided terminal suppliers to fulfill their responsibilities.** We beefed up the governance of mobile malware, and terminal suppliers have promised not to install malware on terminal products. We also communicated with terminal suppliers timely and dynamically to understand their prevention mechanism for terminal software. Partners are required to meet the national 3C (China Compulsory Certification) and SRRC (State Radio Regulation Committee) certification for terminal products. For terminal supplier with negative news, we communicated with the supplier actively and set up a special team to quickly accept customer complaints, verify information, and comfort customers, so as to reduce negative social impact and maintain corporate image and reputation.



At the Channel Terminal Ecosystem Cooperation Forum, which was themed on "Concerted Efforts for Ecological Win-win Results", under the 2021 China Unicom Partnership Conference, Mr. He Biao, Vice President, proposed that in the future, the Company would cooperate with all parties in the industrial chain to jointly build a new ecosystem of channel cooperation, a new ecosystem of terminal collaboration, and a new ecosystem of pan terminal technology sharing, to together develop a new space for digital development.

Jointly building a new ecosystem of digital channel cooperation: giving full play to the advantages of flat and agile operation, marketing service delivery capability and large Internet connection, we are committed to jointly building a new ecosystem of digital channels featuring "consistent product, integrated data, and smooth marketing" with the industry chain.

Jointly building a new model of smart terminal operation: with accurate insight that hundreds of millions of stock users have mobile phone replacement needs, and giving full play to the advantage of precise end-network business matching between 5G and broadband, we work with partners to expand the development scale of "5G terminal integration, smart home pan terminal integration and industrial application-intelligent terminal integration".

Jointly creating a new future for the prosperity and development of three gigabit smart terminals: giving full play to the advantages of cloud-network convergence, computing-network integration and smart brain, we carry out in-depth cooperation with partners to develop standards for terminals and pan terminals, improve the weak links of terminal chips, and build a modern digital supply chain.



Joint Laboratory on Pan Terminal Technology Ecosystem Innovation launched

China Unicom has set up a Joint Laboratory on Pan Terminal Technology Ecosystem Innovation, and 21 enterprises including Huawei, QUECTEL and UNISOC have become its first batch of signed partners. The lab will focus on technology and standards, testing methods and capabilities, business and application, and core technology research, and promote the new ecosystem of pan terminal with technology.

Developing cooperation with channel vendors

Upholding the philosophy of coordinated development, open cooperation, and mutual benefit through mutual consultation, China Unicom contributes to the digital transformation and development of cooperation channels, and promotes a win-win situation for operators, cooperation channels and users by employing a model of online and offline joint innovation and mutual empowerment for value enhancement.

- Took advantage of complementary strengths of channels. We promoted large-scale development of 5G by seizing the 5G mobile phone replacement window period, and integrating products and services into the manufacturer channel without being noticed. We helped the transformation of cooperation channels by applying financial installment, e-vouchers, supply chain finance and other capabilities in a comprehensive way. We kept improving the digitization ability of IT system, and promoted the use of "Zhang Wo Tong" app in all channels, for quick introduction of cooperation, quick acceptance and handling of services and quick sharing of revenue, so as to facilitate partners to improve efficiency and increase benefits.

- Promoted channel partners to fulfill their responsibilities. We strictly implemented the business regulation of the real name registration system to curb risks at the source of account opening, eliminate potential risks, and build the "first defense line" for telephone card security protection. We improved the prevention and control ability of the sales tools of Zhang Wo Tong, and fully applied the portrait comparison technology and ID card verification equipment, to further strengthen the risk process management while providing convenient services to users, and help channel partners carry out production and business activities in accordance with laws and regulations.

Number of cooperative channels by the end of 2021

200,000

China Unicom and partner representatives, including Xiaomi, D.Phone, Davao, and JD.com, jointly launched the "Channel Ecosystem Cooperation Alliance", aiming to keep iterating the channel ecosystem model and promote sustainable development of the channel by pooling strength and wisdom of channel partners.



The Channel Ecosystem Cooperation Alliance officially launched

Achieving prosperity of the new ecosystem of digital cooperation

Facing the vast blue ocean of digital economy, China Unicom continues to deepen cooperation with strategic investors and industry-leading companies, to jointly build a large application ecosystem featuring integration, openness and win-win cooperation, and serve digital transformation, intelligent upgrading and integrated innovation in all fields of economy and society.

Expanding cooperation in new information consumption

The company provided customers with high-quality products and services by giving play to the advantages of its strategic investment partners in intelligent terminals, AI, big data, content and other fields.

- Sold 867,000 Du Smart Speakers and 190,000 WiFi6 routers through cooperation with Baidu. Launched the portal of AI-based smart customer service agent in 31 provinces, with an intelligent level of 80.2% and a national end-to-end recognition rate of 94%.
- Launched Jiasubao, a speedup product to reduce users' jamming, delay and packet loss during games together with Tencent, to improve user experience.
- Cooperated with Alibaba in financial installment product, and created a digital person as China Unicom assistant through Aliyun, to upgrade product functions.

At the same time, we enhanced cooperation with ecosystem partners to create strategic and innovative basic products.

- Cooperated with partners such as Xinhuanet and the National Early Warning Information Distribution Center to promote the trial commercial use of 5G messages.
- Cooperated with iQIYI, Bilibili, Mango TV, ByteDance and other partners to manage the value of targeted traffic for videos.
- Cooperated with CCTV Yunting, Ximalaya, Mango Hearing, China Literature, iFLYTEK and other partners to roll out online audio and digital reading products.
- Launched SIM-CTID, a SIM-based digital identity authentication product, with ANICERT and other partners.

Deepening cooperation in industry transformation and upgrading

The company gave full play to the amplification, superposition and multiplication effect of digital technology on economic development, and worked with all parties in the industry for win-win results and share by fully opening up the ability and fully meeting their needs, to jointly serve the transformation and upgrading demands of thousands of industries in cloudification, digitalization, and intelligence empowerment.

- Accelerated commercialization of 5G application, built an open platform for 5G ecosystem based on 5G Application Innovation Alliance, and worked together with partners to play a "team game".
- Made a plan to build China Unicom 5G open laboratory together with subsidiaries of Huawei and UNISOC to create a standardized process of 5G terminal R&D, testing and application.
- Teamed up with partners to enrich the supply of security products and security operation services, and promoted the complementary and coordinated development of the network information security industry.
- Conducted large-scale promotion of main projects such as cooperative public cloud and jointly-operated cloud.

Building an ecosystem of capital cooperation

The Company expanded and optimized its capital layout, and tried to build a bridge of ecosystem cooperation between industry and capital around serving the national strategy and the Company's strategic business. We worked with strategic investors and leading companies in the industry to build a capital ecosystem, and strove to empower the industry and drive its coordinated development by enhancing collaboration, innovation and value, and making investment to make up and strengthen the industry chain.

- The product and service capabilities of the seven joint ventures, Yunli, Yunjing, iCloudShield, Yundee, iCloud Wisdom, Cloud Broadcasting, and Smart Footprint, continued to improve.
- Continued to deepen cooperation with investors to give full play to their respective advantages, and enhanced capability and product promotion in cloud computing, big data, AI, Internet touch points and other fields, to expand strategic synergies.
- Further intensified capital operation, and promoted rapid breakthroughs in key areas such as Beijing-Tianjin-Hebei, Yangtze River Delta, Guangdong-Hong Kong-Macao Greater Bay Area, and Sichuan-Shaanxi-Chongqing, as well as key business areas such as industrial Internet, Internet of vehicles (IoV), smart city, smart healthcare, smart education, smart family, integrated communications, edge computing and information security by focusing on the five main responsibilities and businesses, and comprehensively using diversified methods such as investment, M&A, equity participation and fund, to amplify the function of state-owned capital.
- Set up a 10 billion scale 5G master fund on 5G industrial ecosystem and related application fields, and gave play to the resource advantage of the Company as a basic telecom operator, together with government policies, to leverage social industry capital and accelerate the development of 5G innovative business.
- Promoted market-oriented reform of professional subsidiaries in the fields of IoV and industrial Internet, drove mixed reform and listing of professional companies with high degree of marketization, strong business independence, good development prospect and high premium ability, and attempted to foster a batch of specialized, fined, peculiar and innovative companies with innovation ability and competitive strength.

Commitment to Public Welfare Undertakings

With the purpose of cultivating and practicing the core socialist values and meeting people's growing demand for social services, China Unicom takes active actions in aid to Tibet and Xinjiang, culture and sports, education, health care, environmental protection and public welfare, continuously spreads love and warmth in the society, and serves the mission of improving people's livelihood.

Charitable donations

The Company kept improving the management system governing its charitable donations, proactively undertook and fulfilled social responsibility based on the principles of voluntary services free of charge, acting within its capacity, clear accountability, and honesty and trustworthiness, and endeavored to give back to the society and promote the sustainable development of public welfare undertakings.

Cause of donations	Amount of donation (RMB10,000)
Assistance fund invested	21,679.31
Aid to border areas (Tibet, Xinjiang)	35.78
Donations for other purposes (culture and sports, education, health care, public welfare, environmental protection, etc.)	1,186.14
Total	22,901.23

External donations in 2021 amounted to RMB

229 million

China Unicom has devoted more efforts in supporting Tibet in the new era. We prepared and completed the "China Unicom Plan on Paired Assistance to Tibet in the 14th Five-year Plan Period", increased assistance in promoting industrial development, improving infrastructure construction, enhancing medical and educational capacity, and strengthening ethnic exchanges, arranged 8 Tibet assistance projects, and allocated RMB31.5791 million of Tibet assistance funds throughout the year. We continued paired assistance to Xinjiang, and explored a new path for central enterprises to assist Xinjiang by sending stationed cadres and carrying out assistance activities with smart technology and services.



Infrastructure improvement



A cadre aiding Xinjiang is visiting a company



CU Jiangsu branch organized an activity to aid Xinjiang with smart technology and services



Campus recruitment in Tibet University

Unicom (Sichuan) Industrial Internet Co., Ltd. has built a medical information system for Ganzi Tibetan Hospital, involving outpatient management, inpatient management, comprehensive management, integrated platform, medical technology system, and evidence-based system of traditional Chinese medicine. It also supports the switching and display of Chinese and Tibetan, enabling the people of ethnic minority in Tibet to enjoy the convenience brought by medical information to their lives.

Deepening inclusive communications services

Helping the elderly and the disabled is a livelihood project that the Party and the state attach great importance to. China Unicom continues to advance the implementation of various favorable policies and service measures for helping the elderly and the disabled, strives to create a good information environment for the life and work of special groups, and does practical things for them.

Helping the elderly with smart services

We developed warm services, “filial” products, and convenient terminals to the elderly, kept in mind the original aspiration of doing practical things for the masses, and continued to carry out publicity and optimization work.

- Developed warm services for the elderly by providing love channels for the elderly in the business hall, a care version of China Unicom APP, and direct manual service of 10010 hotline. At present, 2,100 smart service centers for the elderly have been set up in the business halls nationwide. The 10010 hotline has provided services for the elderly for more than 14 million times. And 42,000 offline activities for the elderly have been held, with 380,000 participants, helping the elderly to cross the digital divide.

- Developed “filial” communications products for the elderly, such as silver age card, filial piety card, “Wo Eye” and other products based on the actual needs of the elderly. In 2021, over 2.02 million users benefited from these products, and received more than RMB35.72 million of communications fee reduction and exemption in total.

- Developed various convenient terminals for the elderly. With ingenuity and originality, we developed “Little Assistant for the Elderly” and other easier-to-use intelligent communications terminal products for the elderly, which have applied for national network access certification.

CU Hainan branch and Hainan Library jointly organized a public welfare class activity “Silver Age and E Era” for the elderly on smart phones, taught the elderly on how to prevent phone scams, how to use WeChat, health code, payment and other commonly used APPs, and helped them build the ability, the courage and the willingness to use intelligent products.



“Silver Age and E Era” public welfare class activity for the elderly on smart phones

Based on the reading habits of the elderly, CU Hubei branch prepared an illustrated China Unicom Hubei Branch Service Manual for the Elderly with large fonts to help the elderly easily master the use of 10 WeChat operations such as adding WeChat friends, video chat and sending moments, and distributed the Manual to the elderly through offline activities such as information service into communities and nursing homes. This action has been widely praised.



Service manual for the elderly

Helping the disabled with warm service

China Unicom pays attention to the communications service needs of the disabled and has exerted efforts to solve the pain points of services to the disabled.

- Developed an innovative tech product, the first communications product accessible to the hearing impaired “Unicom Hearing King Card”, which can achieve real-time conversion of text and voice, and help the hearing impaired realize barrier free communication. In the APP of China Unicom, there is a special zone for Hearing King Card, where users of this card can enjoy special services from the online customer service agents, who have provided services for 22,000 times, with a satisfaction rate of 100%.

- In addition to the Hearing King Card and the Watching King Card launched jointly with the China Disabled Persons' Federation, China Association of the Deaf and the Hard of Hearing, and China Association of the Blind, the Group has launched a nationally unified care card with preferential packages for the disabled, in particular in data traffic. In 2021, we launched more than 80 packages exclusive to the disabled nationwide, benefiting about 553,800 disabled users, and reduced and exempted communication fees for more than RMB170 million.

- On May 17, China Unicom and China Association of the Deaf and the Hard of Hearing worked together and successfully made the first operator's live broadcast using sign language, covering 15 platforms and viewed by a total of 8.76 million people. Up to now, we have organized 7 sessions of sign language live broadcast for the disabled, and created 35 videos on communications knowledge to help solve the communications service problems of hearing-impaired people.

China Unicom Beijing branch organized a R&D project of accessible navigation, to promote the creation of accessible environment in Beijing and improve the quality of life and services for the disabled. More than 20 leaders and experts of China Disabled Persons' Federation and Beijing Disabled Persons' Federation spoke highly of the on-site experience and test effect of the accessible navigation.



On-site experience and test of the accessible navigation

Cooperating with Beijing Disabled Persons' Federation and Beijing Association of the Deaf and the Hard of Hearing, we held an activity of “I do practical things for the masses - hearing accessibility and love for the disabled”, donated communications products worth RMB6 million for the disabled on site, and created a WeChat “friends circle” for the hearing impaired. Besides, a special service zone for Hearing King Card has been set up in our own business hall, enabling the hearing-impaired friends to enjoy warm-hearted services anytime and anywhere.



“Hearing accessibility and love for the disabled” activity

December 3 of 2021 was the 30th International Day of Disabled Persons. China Unicom Ganzhou branch held a public welfare activity with the theme of “Caring for the disabled, you and me, and speak out love loudly” on that day. At the event site, CU Ganzhou branch sent daily necessities to the hearing-impaired, and explained and demonstrated the functions of the Hearing King Card on site. Nearly 50 hearing-impaired people participated in the activity.



China Unicom Ganzhou branch's assistance activity to the disabled

Dedication to voluntary activities

China Unicom has combined the volunteer spirit of “dedication, friendship, mutual assistance and progress” with the goal of corporate cadre and staff team building, and promotes systematic organization and management of public welfare volunteer service, standardized building of the public welfare volunteer service team, normalized organization of volunteer service activities, fulfillment of social responsibilities and establishment of a good corporate image in accordance with the working ideas of expanding the team, stimulating vitality, improving quality and advocating civilization, to contribute to the transformation and development of the Company and the construction of corporate culture, and drive the high-quality development of the enterprise.

Number of registered volunteers

57,550

Cumulative participants in volunteer service activities

68,735

Bit by bit, Wo credits turn into care and a bright future -- China Unicom builds a public welfare brand of credits for student assistance

With credits as the carrier, the public welfare project of credits for student assistance has linked 350 million Unicom customers and drives social forces to contribute to targeted poverty alleviation through this new model of pluralistic participation for public good. It is an active exploration effort of China Unicom to fulfill its social responsibility and manifest its brand influence. In 2021, nearly 40 service activities were carried out under the project, with the participation of more than 500,000 volunteers. It donated “Love Book Houses” to 132 primary schools in southern Xinjiang, provided grants to 8,000 poor children, and sent 3,015 sets of winter supplies to children in Tibet.



“Love Book House” donation ceremony of China Unicom Bayingol branch in Xinjiang



China Unicom Tacheng branch in Xinjiang launched an essay, calligraphy and painting competition among primary and secondary schools with the theme of “Winter Olympics in Love Book House”

On the basis of traditional credit donation, the Company developed more public welfare activities, such as “Reading together with Wo”, and “Double credits on Tencent 99 Giving Day”.



The Network Department of the Group and the Winter Olympic Games Office jointly carried out a series of volunteer service activities of “Love ignites hope, Unicom helps dreams come true”



Unicom Xiaoyan (swallow) providing door-to-door service – Xiaoyan volunteer service brand of China Unicom Jiangsu branch

“Move a city and warm a province. Being honest and dedicated, helping the elderly and the sick... Unicom Xiaoyan starts from the needs of users and provides innovation and wisdom step by step on this land we love.” In May 2021, Xiaoyan of China Unicom Jiangsu branch won the Service Innovation Award of “Touching China - Jiangsu Person of the Year”.

- Unicom Xiaoyan served in communities. During the COVID-19 pandemic, Unicom Xiaoyan provided door-to-door services to users, including mobile phones and SIM cards delivery, broadband, and networking service, and got an evaluation mean of 9.64 points (out of a full score of 10 points).

- Unicom Xiaoyan served in the frontline of the fight against COVID-19. When Nanjing and Yangzhou were plagued by the pandemic, Xiaoyan volunteers rushed to the frontline and the testing points. They bought drinking water and snacks urgently to help residents alleviate their hunger and thirst. They taught the people to be tested on how to scan the QR code, register and fill in information. They made every effort to ensure the efficient progress of nucleic acid testing.

- Unicom Xiaoyan volunteers also went to welfare institutes, sanitation centers, college entrance examination sites and other places to carry out public welfare activities such as “Xiaoyan sending coolness”, and “Caring for the elderly and moving Nanjing”, sending care to users and the masses with kind smiles and considerate services.



Xiaoyan service of CU Jiangsu branch into communities



Xiaoyan volunteers of CU Jiangsu branch in the frontline of the fight against COVID-19



CITC and the Online Company jointly organized a student assistance activity



The Communist Youth League Branch of the Asset Operation Company organized a winter clothes donation activity

***FORESEEING
THE GENERAL
TREND*** AND FUL-
FILLING RESPONSIBI-
LITY IN TECHNO-
LOGICAL INNOVA-
TION



Science and technology is the foundation for a country to be powerful and prosperous, and innovation is a decisive factor for a nation to make progress. China Unicom is committed to building itself into a national team in the operation and service of digital information infrastructure, key force in the building of national strength in cyberspace, Digital China and Smart Society, and frontline troop in the integration and innovation of digital technologies". With serving the national strategy, supporting and leading high-quality development as the main line, China Unicom takes development and security into consideration, strives to improve the abilities in driving original technology demand, source supply, resource allocation, transformation and application, build it into a world-class enterprise, and give better play to the role of a central state-owned enterprise in achieving technology independence, and building a modern industrial system.



Measures adopted in 2021

- Optimized the technological innovation system, increased investment in R&D, strengthened incentives for technological innovation, and released the "Torch Plan" for China Unicom's ecosystem cooperation.
- Accelerated the birthplace building of original technologies and promoted major technological breakthroughs.
- Upgraded the smart middle office to integrate and share the core business, core capabilities, core data, and core processes of the whole region and the whole country, and build the smart middle office into a core engine of comprehensive digital transformation.
- Continued to improve the industrial innovation planning, and the National Engineering Laboratory for the Application of Next-Generation Internet Broadband Services has been incorporated into the National Engineering Research Center under the new sequence management, creating an innovative consortium of industry, academia, research, and application.



Actions to be taken in 2022

- To actively build a technological innovation ecosystem, continuously improve the technological innovation mechanism, and stimulate the potential of technological innovation.
- To focus on the five main responsibilities and businesses of big connectivity, big computing, big data, big application and big security, promote the tackling of critical core technologies and achieve major technological breakthroughs.
- To continue to iteratively improve the five middle offices, four APPs and smart customer service, strengthen operation guarantee and improve user perception.
- Relying on the National Engineering Research Center, to actively participate in and support major national strategic tasks and main projects.

Deepening Reform of the Technological Innovation Mechanism

To promote self-dependent innovation, "the most urgent thing is to get rid of institutional obstacles and unleash the great potential of technology as the primary productive force to the utmost extent". China Unicom further deepened the reform of its technological mechanism, and improved the technological innovation system and organizational structure, to build an efficient research system, increase the efficiency of the innovation system, and stimulate the vitality of innovation.

Bettering the technological innovation system

China Unicom keeps improving its technological innovation system and optimizing its technological innovation organization. In 2021, a Technological Innovation Leading Group was established to coordinate technological innovation planning, strengthen basic management of technological innovation and increase R&D investment.

- China Unicom thoroughly implemented the requirements of SASAC on promoting central SOEs to increase investment in scientific and technological innovation, and invested more fund to R&D. By the end of 2021, the R&D investment had reached RMB13.227 billion, accounting for 4.02% of the revenue.
- We explored and implemented the open competition and "horse racing" mechanisms, and carried out 44 Group level technological research projects.
- We regulated activity management system, issued R&D project management measures, and positive and negative lists of R&D activities, and established a framework for technological innovation process system.
- We executed whole-process overall management of technological achievements, detailed the management rules for the registration and appraisal of technological achievements, and established a technological achievements specialist mechanism covering all branches and subsidiary companies.
- We strengthened the talent team building in technological innovation, established a standard certification system of technological innovation capability of the Group, and introduced overseas high-level scientists.

Enhancing motivation to technological innovation

China Unicom has further enhanced its technological innovation motivation system through extensive investigation and opinion solicitation. In 2021, the Group issued a total of RMB71.944 million of technological innovation bonus, which was twice as much as that of 2020, and the number tends to grow at a high speed, having greatly stimulated the vitality of the wide researchers.

- We enhanced support of strategic incentive resources, including the building of industrial chain chief and birthplace of original technologies, introduction of leading talents and innovation teams, commercialization of technological achievements, and development of technological innovation activities.
- Making good use of the medium and long-term incentive policies, we strengthened motivation through equity dividend distribution as a technology-based enterprise, applied medium- and long-term motivation by sharing the revenue from commercialization of technological achievements, and explored motivation methods suitable to our own characteristics.
- We strengthened the incentive-oriented technological innovation, implemented differentiated allocation of incentive resources, and increased the salary distribution to the backbone research personnel undertaking research projects.

Strengthening cooperation in technological innovation ecosystem building

Following the principle of open cooperation, China Unicom strengthens the joint innovation among industry, academia, research and application, released the "Torch Plan" of ecosystem cooperation, and put forward a "1 + 3 + 5 + N" technological innovation cooperation system, which revolves around 1 blueprint for technological innovation cooperation to establish 3 cooperation modes of joint R&D, strategic investment and platform cooperation, empowers 5 abilities through application demonstration, scale promotion, cooperative operation, research and procurement collaboration, and investment and industry collaboration, and takes N forms of activity to accelerate the implementation and operation, including industrial alliance, joint laboratory, industrial demonstration base, and capital support. We have established seven joint laboratories with industry-leading research institutions and universities, such as Peng Cheng Laboratory, Beijing Academy of Blockchain and Edge Computing, Beijing University of Posts and Telecommunications, Wuhan University, and China Eastern Airlines, and signed seven Group strategic agreements, to actively and effectively build a technological innovation ecosystem.



China Unicom released the Technological Innovation Cooperation Torch Plan

In December 2021, China Unicom officially launched the "Torch Plan for Technological Innovation Cooperation" at its 2021 Partnership Conference, to empower five main responsibilities and businesses and consolidate the foundation for cooperation and development. At the same time, the RIS Tech Alliance initiative and the Initiative for Advancing Smart Super Sensing were released.

Exerting More Efforts to Make Breakthroughs in Core Technologies

General Secretary Xi stressed that we should make breakthroughs in stranglehold technologies in important fields at a faster speed, effectively break through industrial bottlenecks and firmly grasp the initiative of innovation and development. Giving play to the role of the central SOE as a technological innovator, China Unicom tries to be the birthplace of original technology, delves into the untapped technological areas, speeds up the tackling of stranglehold technologies in key fields, and taps the potential of digital technology to promote secure, stable and controllable industry chain and supply chain.

Undertaking national major research projects

China Unicom takes the initiative to undertake major national research projects that meet the country's great needs.

Taking on national projects

In 2021, China Unicom undertook 7 national key R&D projects, all of which have passed the acceptance.

- In the key special project of "Multimodal Network and Communications", the Company took the lead in undertaking the research and application demonstration of industrial passive optical network architecture and system with ultra-low latency, ultra-large connection, security and trustworthiness, and multi-scale network slicing and intelligent adaptation technology.
- Undertook 8 special projects for industrial base reconstruction and high-quality development of manufacturing industry together with partners.
- The national major technological project "Industrial Manufacturing-oriented 5G Service R&D and Test" led by China Unicom achieved some results, and won the second prize of Scientific Progress Award of Chinese Institute of Electronics.

Leading national main projects

- The “Reliable 5G Communications and Advanced Network Demonstration Construction under Complex and Extreme Conditions”, a special project under the 2018 national major research and development program “Science and Technology Winter Olympics”, has achieved continuous 5G coverage of 87 Winter Olympic venues and important transportation links, including the Beijing-Zhangjiakou High-speed Railway, Beijing-Chongli Expressway, Zhangjiakou-Chengde Expressway (Chongli Section), in the three competition areas in Beijing and Zhangjiakou, and the project results has met the communications needs during the Beijing Winter Olympics.

- The “Winter Olympics-oriented Research and Demonstration of Efficient and Intelligent Internet of Vehicles Technology”, a special project under the 2019 national major R&D program “Science and Technology Winter Olympics”, developed the main system of the 5G intelligent IoV service platform to support people-vehicle-road-cloud collaboration, “5G+ Beidou” high-precision positioning, unmanned vehicle scheduling and other functions, and have completed service demonstration in ten scenarios such as unmanned shuttle, mobile sales, unmanned distribution, and assisted driving in the Beijing Winter Olympic venue - Shougang Park. The project achievements are expected to be officially applied during the Beijing Winter Olympics.

Making breakthroughs in critical core technologies

China Unicom organized and implemented critical core technology research, to improve its strengths in the fields of new generation network, 5G enhancement, big data, IoV, etc.

Core technology breakthrough in the new generation network

In the core technology research of the new generation network, China Unicom proposed its next generation network innovation architecture (CubeNet 3.0). The demonstration expert group represented by academicians Wu Hequan and Liu Yunjie believes that this outcome is technologically advanced, innovative, and forward-looking, and may help build a new generation of digital infrastructure that is ubiquitous, flexible, customizable, collaborative, intelligent and secure.

Following the evolution trend of forward-look technologies

China Unicom carried out pre-research on 6G scenario and moderately arranged quantum information and other forward-looking technologies in advance.

- Completed the conclusion work for three 6G standards and project approval work for 2 standards, continuing to input China Unicom 6G views and research results to ITU/IMT-2030/3GPP/CCSA and other organizations.
- Advanced the joint research and development on RIS prototype system, carried out a demonstration test of the end-to-end test system in Huairou outfield, and promoted the establishment of RIS Tech Alliance.
- Promoted research on the integration of low-cost, miniaturized and chip-based quantum communications equipment and traditional communications networks, the study on the security improvement scheme of blockchain-based quantum communications system, and completed the development of a quantum key cloud platform prototype.

Tackling stranglehold technologies

China Unicom analyzed risks of being hit in the throat of the existing network supply chain in the IT and CT fields, and identified 22 main risk points in the IT line and 18 in the CT line. Correspondingly, the Company put forward response plans for each risk point, formulated the idea of “tackling key problems to reduce risks”, and organized core technology researches to reduce the risk level. In 2021, revolving around the stranglehold risks, and focusing on the core difficulties of independence and control, the Company invested nearly RMB100 million in R&D, launched 15 core technology research projects in the field of localization replacement, and developed risk reduction solutions against stranglehold problems while undertaking the core technology research tasks of SASAC.

- Promoted intelligent transformation of networks, developed network-based AI test beds and MR-based Intelligent Construction & Maintenance Assistant System, and defined measurable classification of autonomous driving network.
- Constructed a prototype of the digital twin model of the broadband access network to achieve an integrated and Internet-oriented operating model of access network planning, construction, maintenance and operation.
- Designed and developed a proprietary IP network routing simulation system and designed an architecture prototype of the network digital twin system to build a digital twin system for the national new area (Xiongan).
- Held the 2020 AIIA Cup Artificial Intelligence and 5G Network Application Competition, and ITU AI/ML in 5G Challenge and Network AI Forum.
- Offered AI capabilities and applications, opened up the Company's capabilities in intelligent network, perception analysis, AI algorithm model, application services, etc. to reshape the smart city operating model. Created applications such as new effective urban governance, new convenient public services, new industry upgrade, and new livable and green ecology to reshape the experience of citizens.

Core technology breakthrough in IoV

The IoV core technology research focused on six key issues: 5G private network capability, edge collaborative computing, secure and trustworthy terminals, common capability aggregation, capability open service and ubiquitous scenario operation. We carried out top-level architecture design of the “intelligent vehicle-road collaboration system”, and produced products and solutions such as “1 intelligent integrated network, 1 common service platform, 2 vehicle-road intelligent terminals, and N types of collaborative service scenarios”. The achievements have been released at the Technology Innovation Summit Forum under the 2021 China Unicom Partnership Conference.

- Based on the achievements of the project, China Unicom joined the “Collaborative Innovation Platform for Digital Transformation of Central Automobile Enterprises” and was elected as a director unit.
- Relying on the application demonstration base of core research tasks - Tianjin Haihe Education Park demonstration base, the project of Industry Private Network-based 5GV2X Vehicle-Road Collaborative Pilot Application led and submitted by China Unicom won the first prize of Industry Virtual Private Network and the second prize of national finals in the Fourth “Blooming Cup” 5G Application Solicitation Competition in 2021 hosted by the Ministry of Industry and Information Technology.
- Cooperated with the National Intelligent Commercial Vehicle Quality Inspection and Testing Center to build the country's largest 5G/MEC vehicle-road collaborative test bed with the most complete infrastructure, and jointly established the “Joint Test and Research Center of 5G Vehicle-Road Collaboration”.

Strengthening research in basic software and hardware

China Unicom has devoted more efforts to enhance its weakness in the fields of independent control and basic software and hardware, improve its core technological capability in the terminal field, and solve the lack of independently developed and controlled chips, core technologies and core components. In 2021, we mainly focused on the independent control of CT and IT, as well as differentiated competitiveness innovation in 5G, optical network, cloud-network integration, digital innovation, Internet transformation, security and other fields.

- The research results are fruitful, such as the first MMW microcell with localized core components in China, the first lightweight IoT TLS transmission protocol based on the new public key certification technology with Chinese national cryptographic algorithms in the country, independently controllable white box routers based on self-developed OS, technical system and related standards of independently controllable communications cloud, and the first module-card integrated cellular network module without preset number in the industry.

Promoting research of basic generic technology

China Unicom attaches importance to the driving effect of innovation. We have increased investment to promote breakthroughs in basic generic technologies such as cloud computing, big data, IoT, AI, blockchain and security, consolidated the basic capability platforms of cloud computing, big data, IoT, AI, blockchain and security, and increased the supply of self-developed products in digital government, smart city, industrial Internet, public safety and emergency management, to develop professional comprehensive digital services, and achieve the independence of key core technologies.

- In the field of cloud computing, we supported commercialization of the virtualization and cloud native dual-engine computing power base, and achieved 100,000-level container scheduling capability.



Release of the brand-new "Unicom Cloud"

At the 2021 China Unicom Partnership Conference, Liang Baojun, Vice President of China Unicom, officially announced the comprehensive upgrading of Unicom Cloud and the renewal of the cloud computing service brand. The upgraded Unicom Cloud can provide more than 280 IaaS and PaaS products to meet customers' cloud needs in general scenarios. Based on the core base capabilities of Unicom Cloud 3.0 OS, China Unicom has built seven scenario-based cloud products: sensing IoT cloud, data storage cloud, smart video cloud, smart chain collaboration cloud, 5G edge cloud, self-control cloud and hybrid cloud, providing reliable assistance for the cloudification, digital use and intelligence empowerment of thousands of industries.

- In the field of big data, we innovated on the multi-source heterogeneous data acquisition and exchange technology and the super large-scale task distributed scheduling technology to support PB-level data.
- In the field of IoT, the self-developed IoT connection management platform - Yanfei Zhilian – has carried 160 million connections, surpassing Jasper as the main bearing platform for connection.
- In the field of blockchain, the Unicom Chain BaaS platform has enhanced its cross-cloud and cross-chain service capabilities, and supported integration services with multiple cloud computing platforms such as Unicom Wo Cloud, Aliyun, and Tencent Cloud, and various blockchain frameworks such as XuperChain and FISCO BCOS.
- In the field of security, we strengthened IoT security innovation, and has been able to support https protocol metadata and mirror traffic with efficient detection of large-scale encrypted attack traffic, and the average detection rate is higher than 85%.

In 2021, China Unicom signed a proposal with 27 organizations, including the State Grid, China Construction Bank, and Beijing Academy of Blockchain and Edge Computing, and established the "ChainMaker Ecosystem Alliance". The Company also joined the Chinese Society of Engineers as a director unit and the Quantum Information Network Industry Alliance as a vice president unit.

Participation in international and industrial standards development

China Unicom actively participates in international and domestic industry standard organizations and standard formulation, covering 5G, cloud computing, big data, IoT, AI, edge computing, blockchain, information security, etc. The Company successfully promoted the standardization of its cutting-edge research and development results, enhancing its influence in the industry and bargaining power in the international cyberspace.

- Paid attention to intellectual property protection, implemented the “Outline for Enhancing Strength of China in Intellectual Property (2021-2035)” and the “National Plan for the Protection and Application of Intellectual Property in the 14th Five-year Plan Period”, and revised patent management measures, to strengthen the protection of IP from the source and its high-quality creation.

- In 2021, it led the establishment of 33 new international standards and the release of 25 international standards.

- Recommended experts to run for the management positions in 3GPP and ITU-T, and successfully obtained three new seats. China Unicom had served for more than 100 positions in ITU-T, 3GPP, GSMA, Linux Foundation, OpenInfra and other major international standard organizations and open sources communities, including more than 20 key management positions.

- Ran the WeChat official account “China Unicom Standardization”, to build an academic exchange platform and popularize the latest research progress of standards research and open source communities at home and abroad.

- In the established and completed projects of 3GPP, ITU-T, GSMA, ETSI, BBF, O-RAN, TIP and other important international standards organizations, there are projects led by China Unicom.

- China Unicom-led project “Research and Practice of China Unicom Intelligent MAN Technology” won the first prize of China Institute of Communications.

Responsibility performance indicators	2021
Number of China Unicom-led international standards projects completed	25
Number of China Unicom-led industry standards projects completed	38
Number of patents applied (item)	2,224
Number of patents granted (item)	1,128

Digital Transformation Empowerment and Enablement

China Unicom promotes digital transformation in depth, to build smart middle office into the core engine of comprehensive digital transformation, stimulate data vitality, empower digital transformation and upgrading, and build itself into a new benchmark for digital transformation of central SOEs.

Consolidating strength in digital capability

In 2021, China Unicom stuck to intensive and independent research and development, and upgraded the smart middle office to integrate and share the core business, core capabilities, core data and core processes of the whole country, build the smart middle office into the core engine of comprehensive digital transformation, as well as promote digital business operation, smart network operation, digital operation management, and scenario-based data empowerment, so as to make a powerful smart brain of China Unicom.

Building unified digital base

China Unicom further consolidated its unified digital base to effectively support the Group's R&D, operation and maintenance and capacity sharing.

- It covers six data centers and 36,000 + nodes, has three architectures (X86/ARM/OpenPower), dual engines for container (Mesos/K8s), and virtual and bare dual computers for BMDOE global connectivity, and supports 1,043 applications simultaneously used in the cloud, 10,000 people's simultaneous R&D in the cloud, 250 million lines of cloud code, 1,500+ open capacity and 1.1 billion capacity calls per day.

Building five middle offices

China Unicom has completed the building of 48 centers, 6 platforms and 9 capacities, realizing real-time scheduling of orders, one-point release of products, network resource visualization and data storage in the cloud.

- Focusing on 16 core business scenarios in 8 categories, 31 provinces have completed the business integration test, ensuring end-to-end availability of the business. Pilot projects of intensive operation have been carried out in 15 provinces to integrate R&D, production and operation.



Architecture of China Unicom ecological environment data middle office

Based on the middle offices of data and business, with the improvement of ecological environment quality as the core, CU Shandong branch used cloud computing, big data, IoT, mobile Internet and other technical means in a scientific way to strengthen the environmental management of water, solid waste, environmental law enforcement, environment monitoring and other services, further enhance the comprehensive environmental supervision ability, improve the level of information disclosure and government services, and realize scientific comprehensive decision-making, accurate environmental supervision, convenient public services and IT-based business management. The big data construction in ecological environment has achieved initial success in Shandong Province.

Building a Smart Brain

China Unicom built a Unicom Smart Brain and launched it at the Partnership Conference, laying a solid foundation for smart operation.

- Realize 100% intensification of the core business system.
- Realize 100% intensification of the 10010 hotline.
- Realize 100% completion of the smart middle office.



Unicom Smart Brain launched

At the 2021 China Unicom Partnership Conference, Mr. He Biao, Vice President of China Unicom, officially released Unicom Smart Brain, a product committed to building a leading and industry-symbolic brain-inspired intelligent middle office and supercomputing-based cloud-network engine, as well as a scene-based, intelligent central nervous system characterized by high speed, ubiquitous existence, cloud-network convergence, computing-network integration, security and trustworthiness, intelligence and agility. The Unicom Smart Brain can connect thousands of smart operation scenarios internally, and empower the integration of thousands of industries externally.



Architecture of the smart operation system

CU Shanghai branch built a smart operation brain for networks, which has made disruptive changes to the traditional working mode, and greatly improved production efficiency. Taking resources and data as the digital twin foundation, it built the decision-making ability of the "network brain" through digital intelligence rules. Now, it has covered 1,397 scenarios and more than 30,000 rules. At the same time, it focuses on key businesses and key processes, and takes scenario transformation as the entry point, to reform the operation mode and fully empower the digital operation of networks. The automatic handling rate of network events has reached 99.625%.

Activating the value of data factors

Taking advantage of big data, and giving play to the value of data and technological factors, China Unicom perseveres in independent R&D to build data platforms and application products for urban governance, population, economy, employment and other fields, as well as key industries such as government affairs, emergency response, ecology, culture and tourism, transportation, agriculture, industry, housing and urban-rural development, and finance.

- Relying on the advantages of data governance, data security and data visualization, China Unicom has implemented a number of provincial-level data security projects in Zhejiang, Hainan, Anhui, etc. Among them, the “Hainan Government Affairs Big Data Security System Construction Project” was rated as one of the “2021 Top Ten Sample Projects for ‘Digital Government’”.

Optimizing Industry Innovation Plan

China Unicom makes an integrated plan for its innovation and R&D capabilities. It has actively applied for and participated in the construction of national laboratories, and explored an innovative model of industry, academia, research and application integration in key areas, to better its industrial innovation plan.

Establishing a national R&D center

Giving play to the role of a central SOE as an innovator, China Unicom has actively applied for and participated in the construction of national-level laboratories, and took the lead in organizing the application for a National Engineering Laboratory for the Application of Next-Generation Internet Broadband Service, which has been approved by the NDRC to be managed as a National Engineering Research Center under a new sequence. During the evaluation period, the National Engineering Laboratory for the Application of Next-Generation Internet Broadband Service seized the opportunity of industrial Internet development and broadband- and software-oriented transformation of networks, and made breakthroughs in new network architecture, critical technologies for mobile and fixed broadband, and high-definition video broadband applications. It actively participated in and supported major national strategic tasks and key projects, and made positive contributions to the implementation of major national strategies and projects such as enhancing China's cyber strength, building Digital China, smart Winter Olympics, and pandemic prevention and control. In the next step, it will further improve the organizational structure, strengthen self-construction, increase investment in R&D, and focus on new network architecture, next-generation Internet and broadband technologies, to make the Company stronger, better, and bigger by taking into account the Company's new strategies.

Building a consortium of industry, academia, research and application

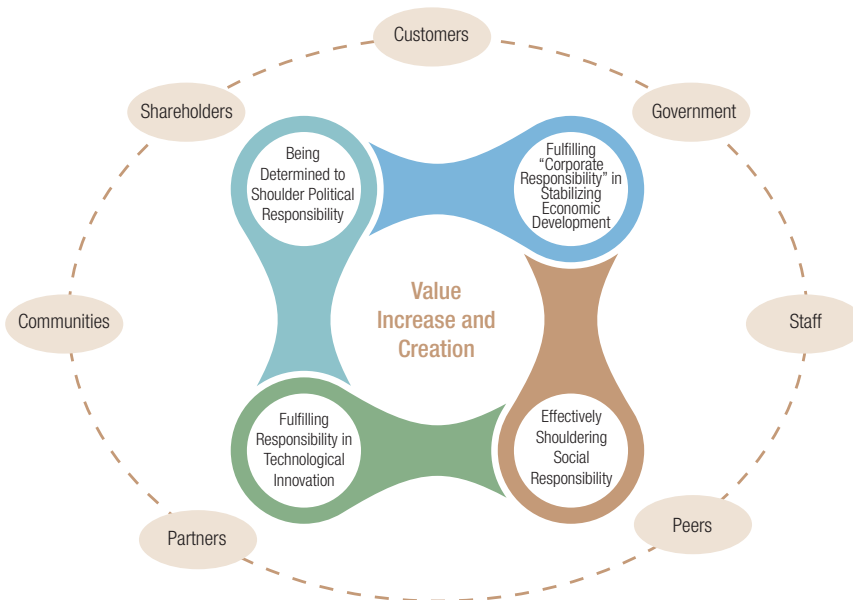
China Unicom tries to build regional technological innovation centers in key areas such as the Beijing-Tianjin-Hebei region, the Yangtze River Delta, the Guangdong-Hong Kong-Macao Greater Bay Area, and the Sichuan-Shaanxi-Chongqing area, to create an innovative consortium of industry, academia, research and application. In 2021, the Western China Innovation Research Institute and the Chongqing 5G Integration Innovation Center were respectively established in Xi'an and Chongqing to explore this innovative model.

In April 2021, China Unicom signed a strategic cooperation framework agreement with Shaanxi Provincial People's government, to make full use of the university resource in Shaanxi and establish a Western China Innovation Research Institute together with Xi'an Jiaotong University, Xidian University, and Xi'an University of Posts and Telecommunications. On September 6, 2021, China Unicom Western China Innovation Research Institute Co., Ltd. was officially established. It will strive to overcome the stranglehold key core technologies, make a plan for innovation chains such as basic research, technology development, achievement commercialization, talent cultivation and industry incubation around China Unicom's industry chain, and create a collaborative innovation platform for the concentration of factor resources (such as talents, technologies, products and businesses), innovation ecosystem, and pilot and demonstration of technological innovation.

RESPONSIBILITY MANAGEMENT

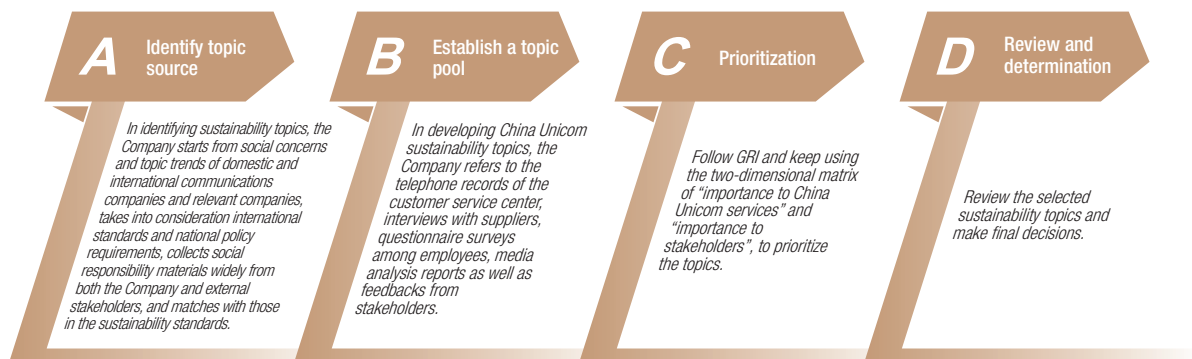
Strategy of Responsibility

China Unicom has always been committed to integrating self-development with wider social responsibilities, to harmonize and unite corporate interests and social goals. In 2021, the Company continued to take the new development philosophy of “innovation, coordination, greenness, openness, and sharing” as guidance, and took practical steps to implement national strategies such as enhancing national strength in cyberspace, Digital China, and the “Belt & Road”. A sustainability strategy system has been established, which shows the Company’s willingness and attitude in undertaking responsibilities for sustainable development.

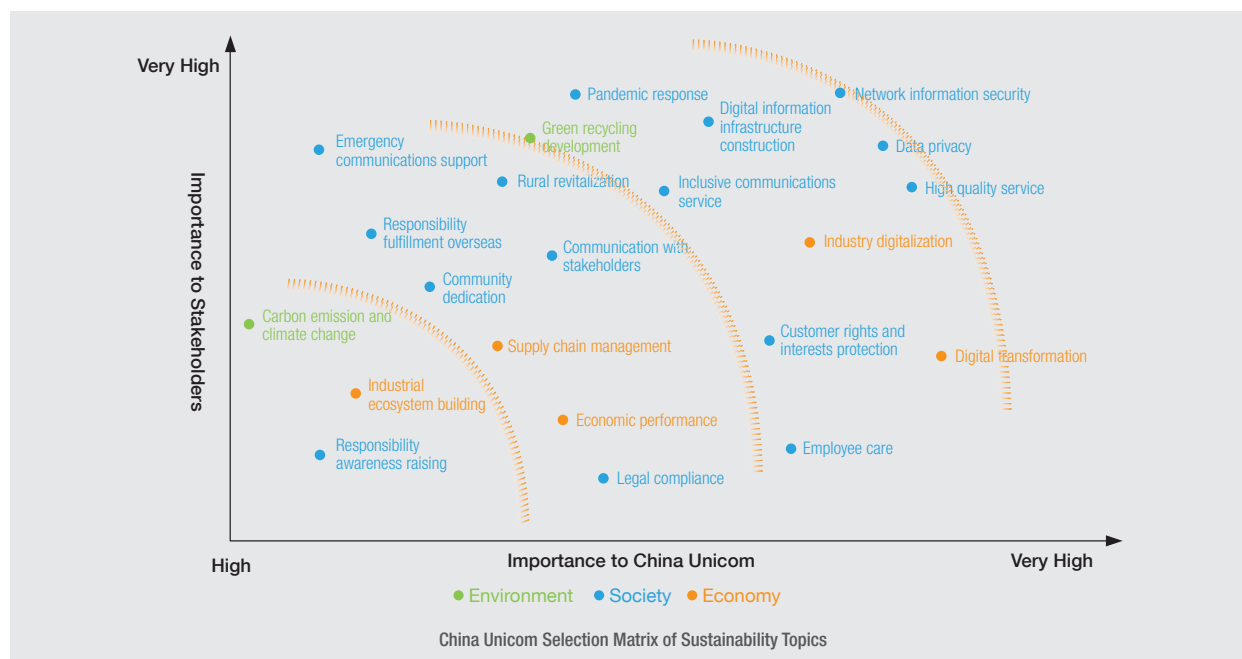


China Unicom Sustainability Strategy System

China Unicom has established a sustainability topic selection procedure under the principle of “closely following standards, regularly updating and continuously improving”, and keeps updating sustainability topics by closely following domestic and international changes and social hot issues, and taking advanced enterprises as the benchmark. In 2021, we selected four substantive topics to guide corporate responsibility practices in order to ensure the fulfillment of our responsibilities could meet the needs of people and society and respond to stakeholders’ concerns.



China Unicom Selection Matrix of Sustainability Topics

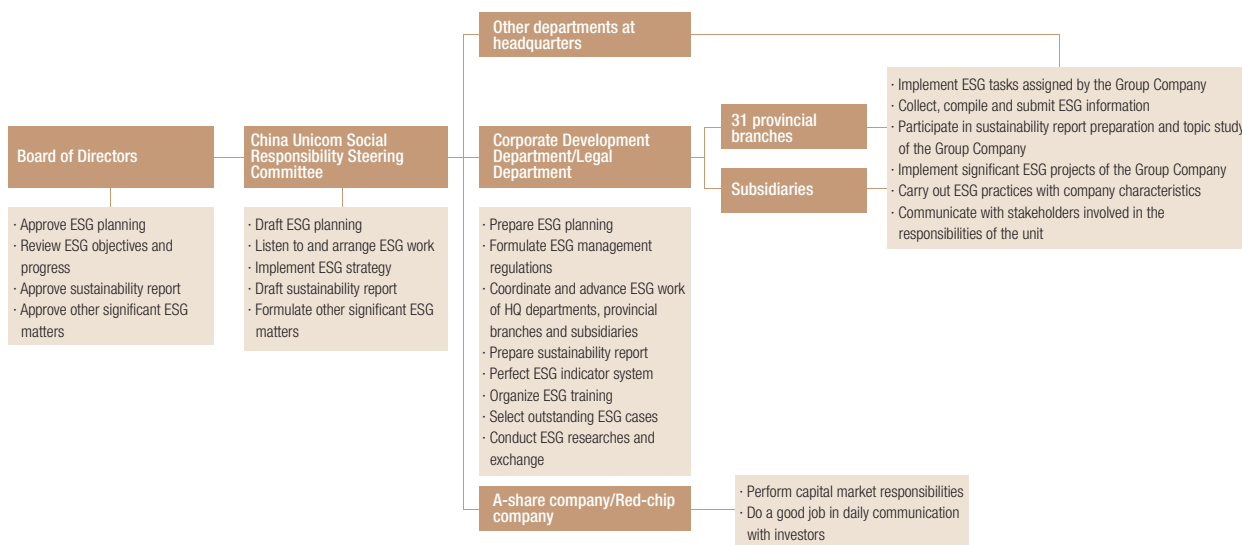


The four core topics of China Unicom in 2021 are determined through the analysis and selection of the topics collected according to the sustainability topic selection procedure and the topic selection matrix.



Organization of Responsibility

The Board of Directors of China Unicom is responsible for the ESG strategy and report, including the approval of sustainability planning, the review of objectives and progress of sustainability, the approval of sustainability reports and other significant matters. The Social Responsibility Steering Committee is responsible for the implementation of sustainability strategy and related operating matters, and regularly reports sustainability matters to the Board and offers suggestions. The specific daily work is undertaken by the Corporate Development Department/Legal Department, and other relevant departments of the Group, provincial branches and subsidiaries are responsible for the implementation of sustainability work in specialized fields.



China Unicom's Sustainability Working Organizations and Main Duties

System for Responsibility

China Unicom's Sustainability Management System consists of organizational support, planning and implementation, communication management, and performance evaluation. In practical work, we adhere to the principles of "management first, integrating into operation and top-down linkage", and make clear responsibility plans to drive the fulfillment of responsibilities and respond to concerns of all parties.

In accordance with international and domestic standards for sustainable development responsibility and focusing on the four substantial topics of the Company, we further optimized "China Unicom's Sustainability Indicator System", which consists of 145 indicators in 37 categories, to drive sustainable development responsibility to be effectively integrated into corporate production and operation.



China Unicom's Sustainability Indicator System

Capabilities on Fulfilling Responsibility

In 2021, China Unicom continued to strengthen the construction of its responsibility capability, and promoted the awareness of responsibility of all staff. We built two-level sustainability teams at both the Group Company and the subsidiaries, widely and deeply promoted the implementation of responsibility practices, encouraged the improvement of the whole Group's ability in responsibility fulfillment through case sharing, and many responsibility practices have won awards from all walks of life. We did a good job in information tracking and disclosure, effectively responded to the concerns of stakeholders, and our sustainability report has received positive evaluation. We actively participated in various exchange seminars and training organized by the sustainability community, at which we paid attention to responsibility development trend, learned from excellent enterprises, and contributed ideas and opinions, to help the continuous and in-depth development of responsibilities.

- Won the "Golden Bull Award for Social Responsibility" awarded by China Securities Journal in December 2021.
- Awarded "The Best of Asia - Icon on ESG" and "ESG Influencer" in the "16th Asian ESG Award 2021" held by Corporate Governance Asia.
- Accredited with the following corporate governance awards in the 11th Asian Excellence Award 2021 held by Corporate Governance Asia: Asia's Best CSR, Best Environmental Responsibility, Best Corporate Communications, and Best Investor Relations Company.
- Accredited with "Platinum Award - Excellence in Environmental, Social, and Governance" in "The Asset ESG Corporate Awards 2021".
- In the SASAC ESG rating of 440 centrally-controlled listed companies in 2021, China Unicom reached the leading level and was shortlisted in the "Central Enterprises · ESG Pioneer 50 Index" list.
- Three social responsibility practice cases were selected into the case set of the SASAC's Research Report on Corporate Social Responsibility of Central Enterprises/ESG Blue Book (2021).
- The report was rated AA level in the "1,000 Excellent Corporate Social Responsibility Reports" of MIIT.
- The technological innovation responsibility fulfillment case was selected into the "2021 Best Practices for Enterprises Achieving SDGs (technological innovation)" of the United Nations Global Compact Network China.

Communication of Responsibility

China Unicom has set up a sustainability communication mechanism to continuously carry out targeted communication according to the expectations of stakeholders and based on the substantial topics of sustainability.

Substantial Topics	Stakeholders	Communication Ways	Expectations for China Unicom
Being Determined to Shoulder Political Responsibility	Government	<ul style="list-style-type: none"> • Face-to-face communication • Meeting 	<ul style="list-style-type: none"> • Enhance Party organization building • Promote Party building to be integrated into work priorities • Improve legal compliance
	Shareholders	<ul style="list-style-type: none"> • Shareholders' meeting • Investors' communication meeting 	<ul style="list-style-type: none"> • Timely and transparent information acquisition • Long-term and stable investment returns • Corporate governance and risk control • Legal compliance and clean operations
Fulfilling "Corporate Responsibility" in Stabilizing Economic Development	Government	<ul style="list-style-type: none"> • Face-to-face communication • Meeting 	<ul style="list-style-type: none"> • Fair market competition order • Efficiency increase and costs reduction • Governance capability and system modernization
	Customers	<ul style="list-style-type: none"> • Meeting • Service hotline • Weibo and WeChat • NPS (net promoter score) survey 	<ul style="list-style-type: none"> • High-speed and smooth network • Innovative and smart network service • Favorable and transparent tariff policies • Convenient and efficient service guarantee • Protect network information
	The public and the media	<ul style="list-style-type: none"> • Phone call, forum • Internet communication ways 	<ul style="list-style-type: none"> • Timely learning about company information • Information interaction with the company
	Staff	<ul style="list-style-type: none"> • Staff forum • Workers' congress • Democratic life meeting • General Manager online 	<ul style="list-style-type: none"> • Protection of lawful rights and interests • Training and career development opportunities • Opportunities for participation in democratic management • Support in adversity • Safe and comfortable work environment
Effectively Shouldering Social Responsibility	Customers	<ul style="list-style-type: none"> • Interview, hotline 	<ul style="list-style-type: none"> • Promote partners to fulfill responsibilities • High-quality network in remote areas
	Peers	<ul style="list-style-type: none"> • Face-to-face communication • Meeting 	<ul style="list-style-type: none"> • Improve the complementary ability of resources • Save the cost and improve the efficiency
	Communities	<ul style="list-style-type: none"> • Meeting • Forum 	<ul style="list-style-type: none"> • Continuously valid donation • Fully promote rural revitalization • Carry out volunteer activities for public benefits
	Ecological environment	— —	<ul style="list-style-type: none"> • Green and environment-friendly corporation operation • Recycling use for less pollution
	Partners	<ul style="list-style-type: none"> • Partnership Conference • Meeting, interview • Self-service portals of partners 	<ul style="list-style-type: none"> • Wide cooperation areas • Fair and open cooperation opportunities • Rich and convenient supporting service
Fulfilling Responsibility in Technological Innovation	All stakeholders	<ul style="list-style-type: none"> • Meeting • Interview • Weibo and WeChat 	<ul style="list-style-type: none"> • Increase the proportion of high-tech talents • Increase R&D investment • Smart products improving life quality • Innovative and forward-looking communications technology • Internet-adaptive management system

APPENDIX

Key Performance

Type	Indicator	Unit	2019	2020	2021
Operations and development	Total assets	RMB100 million	6,023.6	6,158.2	6,283.2
	Operating income	RMB100 million	2919.6	3,048.8	3287.2
	Revenue from main services	RMB100 million	2628.9	2,735.3	2935.3
	Total profit	RMB100 million	101.9	119.8	137.4
	Mobile subscribers	10,000	31,847.5	30,581.1	31,711.5
	Fixed-line local access subscribers	10,000	5,421.5	4,733.9	4,719.3
	Fixed-line broadband subscribers	10,000	8,347.8	8,609.5	9,504.6
	Online 2I users	10,000	5,414	5,094	5,039
Network capability	Number of 4G base stations	10,000	140.7	150.3	156
	4G coverage of the population	%	93	94	95
	Number of cities covered by 5G network	-	50	348	348
	Number of fixed network broadband access ports	100 million	2.21	2.25	2.39
	Broadband coverage rate in administrative villages in ten northern provinces	%	95	96	98
	Coverage rate of broadband network at a speed \geq 100Mbps in urban areas	%	86.3	85.3	93.7
	Coverage rate of network at a speed \geq 20Mbps in urban areas	%	96	96	99
	Gigabit optical network coverage capacity	100 million households	/	/	1.08
	Coverage rate of network at a speed \geq 4Mbps in rural areas	%	100	100	100
	Coverage rate of mobile network in township	%	100	100	100
	Coverage rate of mobile network in administrative villages	%	90	91	93
	Number of administrative villages covered by broadband	10,000	29.9	30.6	32.7
	Co-construction rate of poles	%	91	95	95
	Sharing rate of poles	%	97	92	93
	Co-construction rate of pipelines	%	92	94	85
	Sharing rate of pipelines	%	93	97	92
	International interconnection bandwidth	G	2,460	2,460	3,260
	IoT connections	100 million	1.87	2.38	3.02
	Number of racks in IDCs	10,000	23.4	27.7	31.2
ommitment in emergency support	Total number of emergency communications support participated	Time	578	612	695
	Emergency communications vehicles called out	10,000 vehicle-time	15.2	15.3	15.5
	Emergency communications equipment input	10,000 set-time	11.9	18	17.2
	Personnel used	10,000 person-time	64.1	66	67

Type	Indicator	Unit	2019	2020	2021
Independent innovation	R&D investment	RMB100 million	102.6	119.9	132.3
	International standards completed under the leadership of CU	Item	24	23	25
	Industrial standards completed under the leadership of CU	Item	43	37	38
	Patents applied	Item	1,439	1,734	2,224
	Patents granted	Item	658	512	1,128
Customer service	Monthly average complaint rate in the year	Person-time/Million users	18.26	11.84	8.75
	Overall satisfaction rate	Point	81.11	81.32	81.68
	Including: Mobile service user satisfaction rate	Point	80.26	80.72	80.62
	Fixed line user satisfaction rate	Point	87.9	87.7	88.41
	Fixed broadband user satisfaction rate	Point	81.51	80.49	81.84
People-oriented	Gender ratio of staff	M:F	1.53:1	1.54:1	1.62:1
	Proportion of minority staff	%	7.33	6.72	6.8
	Proportion of females in senior management	%	11.9	12.5	12.4
	Input in staff training	RMB10,000	37,436	36,486	34,099
	Training length per capita on average	Hour	63	89	94
	Network college online learning person-time	10,000 person-time	1,808	5,100	4,200
	Network college total online learning hours	10,000 credit hours	916	2,178	2,373
	Proportion of contract workers in labor unions	%	100	100	100
	Input to help employees in difficulty	RMB10,000	7,900	7,880	7,022
	Solicitude fund input	RMB10,000	2,875	4,259	4,210
	Employee turnover rate	%	1.85	1.87	1.69
	New recruits in the year	Person	9,831	10,281	12,479
	Newly recruited male staff	Person	6,076	6,422	7,947
	Newly recruited female staff	Person	3,755	3,859	4,532
	Staff left voluntarily in the year	Person	4,521	4,692	3,939
	Male staff left voluntarily	Person	2,674	2,806	2,515
	Female staff left voluntarily	Person	1,847	1,886	1,424
	Staff dismissed in the year	Person	914	1,244	1,458
	Male staff dismissed	Person	560	797	927
	Female staff dismissed	Person	354	447	531
	Turnover rate below the age of 30 years old	%	6.84	7.07	6.23
	Turnover rate at the age of 30-50 years old	%	1.07	1.18	0.94
	Turnover rate above the age of 50 years old	%	0.14	0.13	0.10
	Male staff turnover rate in the year	%	1.78	1.88	1.67
	Female staff turnover rate in the year	%	1.95	2.02	1.53
	Work-related death	Person	0	0	0
	Work-related death rate	%	0	0	0

Type	Indicator	Unit	2019	2020	2021
Low-carbon development	Special investment in energy conservation and emission reduction	RMB100 million	1.04	1.23	1.3
	Unit information flow energy consumption	Kgce/TB	3.48	2.83	3.65
	Petrol consumption	10,000 tons	4.175	4.05	2.7
	Diesel consumption	10,000 tons	1.374	1.12	1.64
	Natural gas consumption	10,000 m ³	785.85	542.3	581
	Electricity consumption	100 million Kwh	158.1	172.2	204
	Water resource consumption	10,000 tons	1,809.5	1,499	1,698
	Water consumption density	Ton/RMB million	61.51	47.21	51.65
	Coal consumption	10,000 tons	9.4	2.3	4
	Energy saved	10,000 tce	17.28	24.5	7.7
	Greenhouse gas emission	Million tons	13.2	14.23	12.97
	Total direct GHG emissions (category 1)	Million tons	0.39	0.2	0.53
	Total indirect energy GHG emissions (category 2)	Million tons	12.81	14.03	12.44
	Carbon emission intensity	Ton/RMB million	45.40	46.6	39.5
	Sulfur dioxide emission	10,000 tons	0.004	0.001	0.002
	Recycling upon scrappage and disposal	RMB100 million	9.65	7.33	4.56
	Disposal of scrapped storage batteries	RMB100 million	1.02	1.13	1.22
	Disposal of general scrapped materials	RMB100 million	1.09	2.47	3.34
Compliance management	Legal compliance training organized	Time	2,514	4,580	8,010
	Legal compliance trainees	10,000 people	24.5	24.3	24.3
	Work safety training	Time	87	93	119
	Work safety training coverage	%	100	100	100
Community responsibility	Registered volunteers	Person	47,930	55,006	57,550
	Participants in volunteer activities	Person-time	55,004	58,095	68,735
	Credit rating ¹	Grade	AAA	AAA	AAA
	Total tax paid	RMB100 million	44.9	73.6	85.1
	Jobs created for	Person	10,296	10,981	13,038
	Total donation	RMB10,000	23,672	30,367.9	22,901.2

Note:

1. It is the credit rating given by United Credit Ratings Co., Ltd. and China Cheng Xin International Credit Rating Co., Ltd. to China United Network Communications Corporation Limited, a wholly-owned subsidiary of the Company.
2. The financial data of the year 2021 is express data and has not been audited.

Company Honors

- China Unicom ranked the 260th in “Fortune Global 500” for the year 2021.
- China Unicom has been rated “The Best Level (A level) in Information Disclosure” by Shanghai Stock Exchange for 4 consecutive years.
- China Unicom won the Tianma Award for Investor Relations of Chinese Listed Companies by Securities Times.
- China Unicom was voted six years in a row as “Asia’s No.1 Most Honored Telecom Company”, as well as “Asia’s Best ESG (Telecoms)”, and “Asia’s Best IR Team (Telecoms)” by Institutional Investor.
- China Unicom was awarded “Most Outstanding Company in China - Telecommunication Services Sector” in the “Asia’s Outstanding Companies Poll 2021” organized by Asiamoney.
- China Unicom was voted as “Asia’s No.1 Best Telecommunications Company”, “Best Managed Listed Company in China - 1st” and “Best Investor Relations in China - 1st” by FinanceAsia.
- China Unicom won the “2020-2021 Best Digital IR Award” at the Excellence IR Summit.
- China Unicom won the “2021 Outstanding Contribution to the Asia Mobile Industry” award at the GSMA Mobile World Congress.
- China Unicom got an excellent result in the evaluation of the Board of Directors in 2021, and ranked among the top ten central enterprises.
- China Unicom was shortlisted into the “Best Case in Performance Presentation” and “Best Practice Case in Board Office” by China Association for Public Companies.
- China Unicom won the “Outstanding IR Enterprise Award” and “Best New Media Operation Award” issued by Panorama Network.
- The official customer service account of China Unicom won the “2021 Top Ten Brands” award by Bilibili.
- At the China International Information and Communication Exhibition, China Unicom won the Best “Solution” of the 2021 ICT China Innovation Award issued by the China Association of Communication Enterprises at PT Expo China .
- China Unicom won the Champion Award of ITU WSIS ICT E-Environment.
- China Unicom won the Scientific Progress Award of Chinese Institute of Electronics.
- Unicom Digital Technology Co., Ltd. won the “2020 Outstanding CMP Case” issued by TC608.

Description of the Report

Reporting period	From 1 January to 31 December 2021, some sections exceeding aforesaid period.
Release frequency	The sustainability report of China United Network Communications Group Company Limited is an annual report.
Organizational coverage	The report covers China United Network Communications Group Co., Ltd., and its subordinate institutions. For the convenience of expression, “China Unicom”, “the Group”, “the Company” and “We” are used respectively in the report.
References	Guiding Opinions on State-owned Enterprises to Better Perform Social Responsibilities, SASAC; The Ten Principles of the UN Global Compact; Guidelines for preparation of Report on Performance of Corporate Social Responsibility, Shanghai Stock Exchange; Guidance on Environment, Society and Governance Report, HKEX; Social Responsibility Report Preparation Guidance, AQSIQ and SAC; Guide on Preparation of China Corporate Social Responsibility Report – Telecommunications Service (CASS-CSR 3.0), Chinese Academy of Social Sciences (CASS); Guide on Preparation of China Corporate Social Responsibility Report (CASS-CSR 4.0), CASS; Guide on Sustainable Development Report (latest edition), Global Reporting Initiative (GRI); Social Responsibility Management System for China Information and Communications Companies, China Association of Communications Enterprises.
Clarification about the data	The 2021 data quoted in this report are final statistical data. In case of any discrepancy between the financial data herein and those in annual report, the annual report shall prevail.
Report quality assurance	The Board of Directors and all directors undertake that the information disclosed in the report is authentic, complete and correct, with no false record or misleading statement.
Language versions and availability	The Sustainability Report of the Company is issued in Chinese and English in forms of paper and electronic editions. For the online version of the Chinese report, please visit the website of China Unicom: http://www.chinaunicom.com.cn . For the online version of the English report, please visit the website of Global Compact: http://unglobalcompact.org .
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Note:

- For details about 102-24, 102-25 and 201-4, please refer to the annual report of the Company in 2021, at <http://www.chinaunicom.com.cn>.
- The ozone depleting substance (ODS), nitrogen oxide (NOX), sulfur oxide (SOX) and other major gases mentioned in 305-6 and 305-7 are not the main emissions of the Company.
- The relevant system or process referred to in 102-28 and 102-56 will be established gradually.

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A1	P50-53, 81	A2.5	See Note 3	B3	P44-46	B6.1	N/A
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A1.3	See Note 1	A4	P28-30, 50-53	B4	P44	B6.4	P40
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A2.1	P81	B2	P47-48	B5.2	P24, 32, 52	B7.3	P24
A2.2	P81	B2.1	P80	B5.3	P59	B8	P32, 35-36, 62-66
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A2.4	P52	B2.3	P47-48	B6	P27, 39-41	B8.2	P62, 81

Note:

- As China Unicom is large in size and its services have a wide coverage, the total of the waste (including hazardous and non-hazardous waste) referred to in A1.3 and 1.4 has not been counted in classification comprehensively. Through substantive topic identification, we mainly reported the recycling and reuse of the main resources used by the Company in operation such as cables, rechargeable batteries, terminals and general materials. In future, the Company will further complete relevant data statistical system.
- As the amount of waste from network operation is directly related to the rapid development of the network and the continuous renewal and iteration of equipment, and the generation and treatment of hazardous waste is not a category critical to the operation of the Group, the waste reduction objective involved in A1.6 is not available temporarily. We mainly reported on the measures to build a green supply chain and strengthen recycling.
- Since the main business of the Company is telecom service, the packaging material used for finished products referred to in A2.5 is not applicable to the Company's practical business condition.
- The product recovery indicator involved in B6.1 is not applicable to the actual business of the Company. The Company mainly reported on the maintenance of network information security, emergency communications support and protection of customers' rights and interests according to law through the identification of substantive topics.

Feedback

Dear reader,

Thank you very much for reading this China United Network Communications Group Co., Ltd. Sustainability Report 2021, which is our 15th sustainability report publicly released to the society. In order to better provide valuable information to you and other stakeholders, facilitate supervision of our work in the field of social responsibility, as well as improve our capability in sustainable development, we sincerely invite you to offer us your opinions and suggestions to this report.

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• You're from:

A. Customer B. Shareholder C. Government D. Community E. Partner F. Media G. Social group H. Others (please specify)

• Your overall evaluation of China Unicom's Sustainability Report is:

A. Excellent B. Good C. Fair D. Bad E. Very bad

• What do you think about China Unicom in fulfilling its economic, social and environmental responsibilities:

Economic responsibility A. Excellent B. Good C. Fair D. Bad E. Very bad

Social responsibility A. Excellent B. Good C. Fair D. Bad E. Very bad

Environmental responsibility A. Excellent B. Good C. Fair D. Bad E. Very bad

• What do you think about the response and disclosure to the concerns of stakeholders?

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• What do you think about the information, data and indicators released in this report in terms of clarity, accuracy and completeness?

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Accuracy A. Excellent B. Good C. Fair D. Bad E. Very bad

Completeness A. Excellent B. Good C. Fair D. Bad E. Very bad

• Is this report easy to read in terms of content arrangement and format design?

Content arrangement A. Easy B. Fair C. Not easy

Format design A. Easy B. Fair C. Not easy

• Other opinions and suggestions on China Unicom's sustainable development work and this report:

Thank you for your feedback and time!



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