



Deeply Practiced the
Responsibility of Scientific and
Technological Innovation
with the Insight of
“Trend”



Technology is the foundation of the country's prosperity, and innovation is the soul of the nation's development. China Unicom is committed to become the national team for the development in operations and services of digital information infrastructures, and target to be the key force in establishment of Cyber Superpower, Digital China and Smart Society, and the frontline troop in the integration and innovation of digital technologies. Focusing on serving national strategies, supporting and leading high-quality enhancement as its key development, the Company has upheld a strong coordination with its overall development and security, focused on improving the traction of original technology demand, source supply, resource allocation, transformation, and application capabilities. It has also accelerated the construction of a world-class enterprise, and strive to play a better role as a central enterprise in achieving self-reliance in the development of science, technology, and also building a modern industrial system.



Measures adopted in 2021

- The Company optimised the scientific and technological innovation system, increased R&D investment, strengthened incentives for scientific and technological innovation, and released the "Torch Plan" of China Unicom ecological cooperation.
- The Company accelerated the creation of the original technology sources and promoted major technical breakthroughs.
- The Company upgraded the smart middle platform, integrated, and shared the core businesses, core capabilities, core data and core processes across the country, and built the smart middle platform into a key engine for comprehensive digital transformation.
- With the continuous improvement of industrial innovation layout, the national engineering laboratory for the next-generation Internet broadband business application was included in the national engineering research centre for new sequence management, so as to create an innovative consortium of industry-university-research-application.



Actions to be taken in 2022

- The Company will actively carry out the construction of technological innovation ecosystem, continue to improve the technological innovation mechanism, and stimulate the potential of technological innovation.
- The Company will focus on the five main responsibilities and main businesses, i.e. Big Connectivity, Big Computing, Big Data, Big Application and Big Security, so as to promote the significant technology researches and achieve notable technological breakthroughs.
- The Company will continue to iterate and improve the five middle platforms, four major APPs, the intelligent customer services, and strengthen its operational security, while improving the user perceptions as well.
- With reliance on the National Engineering Research Centre, the Company will actively participate and support key national strategic tasks and key projects.

Deepening the Innovation of Scientific and Technological Innovation Mechanism

In order to promote independent innovation, it is undoubtedly crucial to overcome institutional barriers, and maximise the potential of technology as the primary productivity. China Unicom further deepened and improved the reform of the scientific and technological system, improved the scientific and technological innovation system and enhanced its organisational structure, and built an efficient scientific research system, in order to, improved its efficiency of the innovation system, and strived to stimulate innovation vitality.

Improving the scientific and technological innovation system

China Unicom constantly improves its technological innovation system and optimizes its technological innovation organisation. In 2021, it established a leading group of scientific and technological innovation to coordinate the planning of technological innovation, to strengthen the basic management of technological innovation and increase the investment in research and development.

- China Unicom thoroughly implemented the requirements of the SASAC on promoting central enterprises to increase its capital injection in scientific and technological innovation, and improved the intensity of R&D investment. By the end of 2021, R&D investment has reached RMB4.792 billion, representing a year-on-year increase of 61.7%.
 - Explored and implemented the mechanism of "leadership revelation" and "horse racing", and carried out 44 group-level technology research projects.
 - In terms of system and regulation, the Company managed to have a standardization of newly developed management activities, released the management measurements for R&D projects, the positive and negative list of R&D activities, and established the framework for the technological innovation process system.
 - Built a comprehensive management plan for achieving the whole processes of scientific and technological development. It has also improved the management rules for the registration and identification of its development, and established a scientific and technological achievements specialized mechanism covering all branches and subsidiaries.
 - Strengthened the construction of scientific and technological innovation talents, established the Group's standard certification system for scientific and technological innovation capabilities, and introduced overseas high-level scientists.

Increasing incentives for scientific and technological innovation

China Unicom has further improved its incentive system for scientific and technological innovation through extensive research and consultation. In 2021, the Group has issued RMB71,944,000 of awards for scientific and technological innovation development, which was doubled up as compared to 2020. It has continued to maintain a rapid growth momentum and greatly stimulated the vitality of scientific researchers.

- The Company increased the support of strategic incentive resources, including the development of the industrial chain length and technology resources. It has also enhanced the introduction of leading talents and innovation teams, the transformation of scientific and technological achievements, and the development of scientific and technological innovation activities.
- The Company has made good use of the medium and long-term incentive policy, and vigorously carried out equity dividend incentives for technology-based enterprises. It has also actively carried out medium and long-term incentives for the transformation of scientific, technological achievements and share returns, furthermore, it also explored and implemented incentive methods in line with its own characteristics.
- The Company strengthened the incentive orientation of scientific and technological innovation, implemented differentiated incentive resource allocation, and increased the allocation of remuneration to the key scientific research personnel which is responsible for scientific research projects.

Strengthening the ecological cooperation in scientific and technological innovation

China Unicom has adhered to open cooperation and strengthened the joint innovation of industry, university, research, and application. It has released the “Torch Plan” for China Unicom’s ecological cooperation, and put forward the “1 + 3 + 5 + N” scientific and technological innovation cooperation system. While focusing on the single blueprint of scientific and technological cooperation planning, it has established three cooperation models, which are, joint research and development, strategic investment and platform cooperation. It has also provided five major empowerments, through application demonstration, scale promotion, cooperation operation, research and procurement collaboration, investment and industry collaboration. Furthermore, it has also accelerated the implementation and operation in N forms, such as forming industrial alliances, joint laboratories, developing industrial demonstration bases and getting capital support. The Company has established 7 joint laboratories with industry-leading scientific research units and universities such as Pengcheng Laboratory, Beijing Academy of Blockchain and Edge Computing, Beijing University of Posts and Telecommunications, Wuhan University and China Eastern Airlines. It has also signed 7 strategic agreements to carry out the construction of technological innovation ecosystem actively and effectively.



Announcing the China Unicom’s Scientific and Technological Innovation Cooperation Torch Plan

In December 2021, China Unicom officially released the “Scientific and Technological Innovation Cooperation Torch Plan” at the 2021 Partnership Conference to empower the five key responsibilities and businesses. It also consolidate the foundation for cooperative development. At the same time, it has also promoted and announced the development of the Reconfigurable Intelligent Surface (RIS) Technology Alliance Initiative and the Intelligent Super Perception Industry Joint Initiative.

Strengthening Core Technology Research

In order to firmly grasp the initiative of innovation and development, it is crucial to accelerate the technology growth of “bottleneck” in important fields, and break through the industrial bottleneck effectively. China Unicom has given a full play as the main role of central enterprises in the scientific and technological innovation, and bravely served as the “source” of original technology, tapped into the “no man land” of science and technology, accelerated the breakthrough of “bottleneck” technology in important fields, explored the potential of digital technology, and promoted the safety, stability, independency and controllability of the industrial chain and supply chain.

Undertaking major national scientific research projects

China Unicom has adhered to the country’s major national needs and actively undertook major national scientific research projects.

Undertaking national projects

In 2021, China Unicom undertook 7 national key R&D projects and have passed all the inspections.

- In the demonstration of “multi-mode network and communication”, the Company took the lead in showing the procedures of research and application of the industrial passive optical network architecture and system may smoothly conduct with ultra-low latency, ultra-large connection, safety, reliability, and also two other skills such as multi-scale network slicing and intelligent adaptation.
- The Company has undergone joint partnerships to take part in 8 special projects for the industrial basic reconstruction and high-quality development of manufacturing industry.
- The Company led the major national science and technology project, “Research and Development and Test of 5G Business for Industrial Manufacturing” in order to achieve great research results. It has also won the second prize of Scientific Progression Award by the Chinese Institute of Electronics.

Leading national key projects

- The key project under the 2018 National Key Research and Development Programme “High-Tech Winter Olympics – Constructing Reliable 5G Communication and Advanced Network Demonstration in Complex and Extreme Conditions” has achieved continuous 5G coverage over 87 Winter Olympics venues as well as the Beijing-Zhangjiakou High-speed Railway, Beijing-Chongli Expressway, Zhangjiakou-Chengde Expressway (Chongli Section) and other important transportation links in the three designated areas in Beijing and Zhangjiakou. The project has sufficiently met the needs of communication during the period of Winter Olympics.

- The key project under the 2019 National Key Research and Development Program “High-Tech Winter Olympics – Research and Demonstration of Efficient and Intelligent Vehicle Network Technology for Winter Olympics” has developed the master system of 5G intelligent vehicle network business platform, which supports the collaboration among human-vehicle-road-cloud, “5G + Beidou” high-precision positioning, and autonomous vehicle dispatch. It has demonstrated ten major scenarios of business operation, such as autonomous vehicle connection, mobile sales, unmanned distribution and drive assistance in the district of Shougangyuan during the Beijing Winter Olympics. It is expected that the project outcomes will be formally applied in the events of the Beijing Winter Olympics.

Carrying out key and core technology research over the challenges

China Unicom has organised and implemented critical technology research in order to accelerate the forging of the long-term plates in the fields of new generation network, 5G enhancement, Big Data, and Vehicle Internet.

New generation of network core technology

China Unicom’s next-generation of network innovation system (CubeNet3.0), has been confirmed by a panel of experts led by Academician Wu Hequan and Academician Liu Yunjie. The experts believe that the results are technologically advanced, innovative and forward-looking. The outcomes are conducive to creating a new generation of digital infrastructure that can be widely applied, flexible, customizable, synergetic, intelligent, and secure.

Tracking the trend of forward-looking technology evolution

China Unicom has conducted foresight research on 6G scenarios and has moderately surpassed several forward-looking technologies, such as quantum information.

- The Company has conducted the three 6G standard closing projects and two initiation projects. The research outcomes of our Unicom’s 6G viewpoints have been continuously shared with and channeled to ITU/IMT-2030/3GPP/CCSA and other organisations.

- The Company has promoted joint R&D of the prototype system of intelligent ultra-surface technology, conducted end-to-end test system demonstration in the peripheral region of Huairou, and promoted the establishment of the industry alliance of intelligent ultra-surface technology.

- The Company has promoted the research on the integration of low-cost, miniaturization, chip-based quantum communication equipment, and traditional communication networks. Based on the research on the security improvement plan of the quantum communication system blockchain technology, the Company has also completed the development of the prototype of the quantum encryption cloud platform.

Overcoming the “bottleneck”

China Unicom has carried out risk analysis on the “bottleneck” of the current supply chain in the fields of IT and CT, which sorted out and identified 22 major risk points of the IT line and 18 points of the CT line. Risk response plans for each risk point have been proposed, laying out the strategic idea of “reducing risk to breakthrough” to organise core technology research that provides suggestions to reduce risks. In 2021, to tackle the “bottleneck” risks, the Company has focusedly examined the controllable and independent problems, and has invested nearly RMB1 billion in research and development to launch 15 core technology breakthrough projects in the field of domestic substitution. Risk reduction plans are proposed in combination with the core technology breakthrough tasks undertaken by the SASAC to overcome the “bottleneck” issue.

- We have promoted intelligent network transformation, developed network AI test bed and MR intelligent maintenance auxiliary system, etc., as well as defined a measurable grading method to evaluate automatic driving networks.

- We have constructed a prototype of the digital twin model of broadband access network to establish an integrated and internet-oriented operating model to access network planning, construction, maintenance, and operation.

- We have independently designed and developed an IP network simulation system, the prototype of the digital twin system network architecture and built the digital twin system for the National New District (Xiong’an).

- We have held the 2020 AIA Cup AI 5G Network Application Competition and ITU AI/ML in 5G Challenge, Network AI Forum.

- We have supplied AI capabilities and applications, opened up smart networks, perception analysis, AI algorithm models, application services and other capabilities. We have also reshaped the smart city operation model and created applications, such as new effective urban governance, new convenient public services, new industry upgrade, and new livable and green ecology, in order to reconstruct a new form of citizen experience.

The core technology for Internet of Vehicles

The core technology of “Internet of Vehicles” focuses on six key issues, including 5G private network capabilities, edge collaborative computing, safe and reliable terminals, common ability aggregation, capability open service, and pan-scene operation. It induces a top-level architecture design “Intelligent Vehicle-Road Collaborative System”, and creates critical products and solutions, namely “1 intelligent integrated network, 1 common service platform, 2 vehicle-road intelligent terminals, and N-type collaborative service scenarios”. The results have been released at the 2021 China Unicom Partners Conference: Technology Innovation Summit Forum.

- By the results of the project, China Unicom joined the “Central Automobile Enterprise Digital Transformation Collaborative Innovation Platform” and was selected as one of the council members.

- Relying on the base of the core mission application demonstration – Tianjin Haijiao Park Demonstration Base, China Unicom led and submitted the project “5 GV2X Vehicle-Road Collaborative Pilot Application Based on Industry Specific Network”, which won the first prize in “Industry Virtual Private Network” and the second prize in the national finals of the “4th Blooming Cup” 5G Application Competition in 2021 hosted by the Ministry of Industry and Information Technology.

- We have cooperated with the National Intelligent Commercial Vehicle Quality Inspection and Testing Centre to build the largest and most complete 5G/MEC vehicleroad collaborative test bed in China; in addition, we have established the “5G vehicle-road collaborative joint test research centre”.

Intensifying research in the area of basic hardware and software

China Unicom has accelerated the improvement of its shortcomings in the area of independent and controllable basic software and hardware. It has improved the core technological capabilities in the terminal field, and solved the problems such as core deficiency, core technology and core components. In 2021, the Company carried out differentiated competitiveness innovation mainly in the fields of CT and IT independence and controllability, and also, the development in 5G, optical network, cloud-network integration, digital innovation, Internet-oriented transformation and security has as well as been highly focused.

- The Company has obtained a number of research results, such as the first domestic millimeter wave micro-station that has used localized core components in China, the first light-weight Internet of Things TLS transmission protocol based on the new state-level public key authentication technology in China, the self-developed controllable white box router based on self-developed operating system, the technology system and related standards of independent controllable communication cloud, and the first molding card integrated cellular network module without pre-built number in the industry.

Promoting research on fundamental common technology

China Unicom has adhered to innovation-driven development, increased investment intensity, promoted breakthroughs in basic common technologies and consolidated the basic capability platform of Yunda Wuzhi Chain and Security. It has also strengthened the development of cloud computing, Big Data, Internet of things, AI, blockchain and security, increased the supply of self-developed products in the fields of digital government, smart city, industrial internet, public security and emergency management, created a professional level of comprehensive digital services, and achieved an independent development of its core technologies.

- In the field of cloud computing, it has supported the commercialisation of virtualization and cloud-native dual engine computing power base, and achieved a capacity of 100,000-level for its container scheduling technique.



Newly released the brand "Unicom Cloud"

At the 2021 China Unicom Partnerships Conference, Mr Liang Baojun, deputy general manager of China Unicom, officially announced that Unicom Cloud has been upgraded comprehensively, and the brand of cloud computing business has also been fully renewed. The upgraded Unicom Cloud can provide more than 280 IaaS and PaaS products to meet customers' cloud adoption needs in general scenarios. Based on the core infrastructure capability of Unicom Cloud 3.0 operating system, China Unicom has built seven scenario-based clouds, namely IoT sensing cloud, digital storage cloud, smart video cloud, smart chain collaborative cloud, 5G edge cloud, autonomous and controllable cloud and hybrid cloud. All these has helped to provide reliable support for the cloudification, Big Data analytics and intelligent transformation for thousands of industries.

- In the field of Big Data, we carried out multi-source heterogeneous data collection, exchange technology and ultra-large-scale task that has distributed scheduling technological innovation, in order to achieve the support for PB-level data volume.

- In the field of Internet of Things, we have self-developed the Internet of Things (IoT) connection management platform – Yanfeizhilian, which could have allowed a volume of 160 million connections, surpassing Jasper to become the main connection platform.

- In the field of blockchain, China Unicom Chain BaaS platform has enhanced cross-cloud and cross-chain service capabilities, and supported the integrated services with multiple cloud computing platforms such as Unicom WO Cloud, Alibaba Cloud and Tencent Cloud, as well as, with the blockchain framework such as XuperChain, FISCO BCOS.

- In the field of security, the Company strengthened the security innovation of the Internet of Things, and achieved the high-efficiency detection technology of large-scale network encryption that could detect data, and as a results, the average detection rate of https protocol metadata and mirror data was > 85%.

In 2021, China Unicom signed a proposal with 27 units that has included State Grid Corporation of China, China Construction Bank, Beijing Academy of Blockchain and Edge Computing, and initiated the establishment of the "Changan Chain Ecological Alliance". At the same time, China Unicom joined the "China Science and Technology Association Engineer Consortium" as a council member, and joined the "Quantum Information Network Industry Alliance" as vice chairman.

Participating in the formulation of international and industry standards

China Unicom actively participates in international and domestic organizations to help determine standards and measures for the industry, which cover 5G, cloud computing, Big Data, Internet of Things, artificial intelligence, edge computing, blockchain, information security, and other strategic development areas. Such endeavour has effectively fostered the standardisation of the Company's cutting-edge research and development, improved our influence over the industry as well as our discourse power in the international network space.

- The Company has given much emphasis on intellectual property protection. We have laid out the "Outline for the Construction of a Intellectual Property Power (2021-2035)" and the "14th Five Year National Intellectual Property Protection and Application Plan", revised the measures for patent management, and strengthened our protection measures over the source of intellectual property as well as high-quality creation.

- In 2021, the Company has led the establishment of 33 new international standard measures and the publication of 25 international standard measures.

- The Company recommended experts to run a campaign for the management positions in 3GPP and ITU-T and has successfully gained 3 new positions. It has more than 100 active positions in several important international standard organisations such as ITU-T, 3GPP, GSMA, Linux Foundation, OpenInfra and open sources communities, including more than 20 key management positions.

- The Company launched the "China Unicom Standardisation" WeChat official account to build an academic exchange platform and has popularized the latest development of domestic and foreign standard research and open source communities.

- The Company has led the project initiation and project results in 3GPP, ITU-T, GSMA, ETSI, BBF, O-RAN, TIP and other important international standard organisations.

- The Company leading project "China Unicom Smart City Network Technology Research and Development" has won the first prize of the China Institute of Communications.

Responsibility performance indicators	2021
Number of leading international standards (article)	25
Number of leading industry standards (article)	38
Number of patents applied (item)	2,224
Number of patents granted (item)	1,128

Empowering Digital Transformation

China Unicom further promoted digital transformation, and built the smart middle platform as the core engine of comprehensive digital transformation, which stimulated data vitality, empowered digital transformation and upgrading, and created a new benchmark for digital transformation of central enterprises.

Consolidating digital capabilities

In 2021, China Unicom has adhered to intensive and independent research and development, upgraded the smart middle platform, upgraded and shared the core businesses, core capabilities, core data and core processes across the country, and built the smart middle platform into a core engine for comprehensive digital transformation. It promoted the digitisation of business operations, intelligent network operations, digital operation and management, and scenario-based data empowerment, and strengthened the connection of the Unicom Intelligence Brain.

Creating a unified digital base

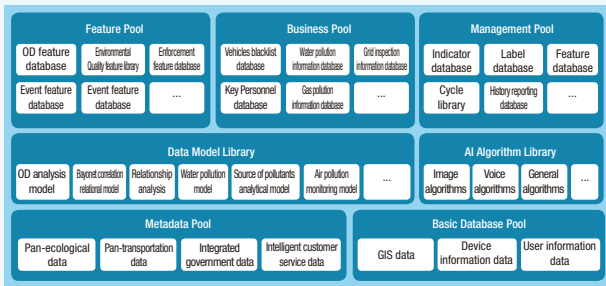
China Unicom's unified digital base was further consolidated to effectively support the Group's R&D, operation and maintenance and capacity sharing.

- It covers 6 Big Data centres, 36,000 + nodes, three major structures (X86/ARM/OpenPower), dual-engine container (Messos/K8s), and virtual and bare dual-machine, achieving full BMDOE connection, supporting 1,043 cloud applications, 10,000 cloud-based R&D and 250 million cloud codes, 1,500 + open capabilities and 1,100 million daily capacity adjustments.

Construction of five middle platforms

China Unicom completed the construction of 48 centres, 6 platforms and 9 skill buildings, achieving real-time order scheduling, one-point product release, network resource visibility, and full cloud data access.

- The Company focused on 16 core business scenarios in 8 categories, and completed the testing of business integration in all 31 provinces, ensuring the end-to-end availability of business services. The Company piloted intensive operation in 15 provinces to achieve the coordination of R&D, production and operation.



China Unicom ecological environment data middle platform chart

Based on the data middle platform and the business middle platform, China Unicom Shandong Branch focused on improving the quality of the ecological environment, scientifically applied cloud computing, Big Data, Internet of Things, mobile Internet and other technical means to improve the environmental management level of water, solid waste, comprehensive environmental law enforcement, environmental monitoring and other businesses. It further enhanced the ability of comprehensive environmental supervision, improved the level of information disclosure and government services, and achieved scientific comprehensive decision-making, precise environmental supervision, convenient public services, and business management informatisation. It has also initially achieved the effectiveness of Big Data construction of ecological environment in Shandong Province.

Building a smart Intelligence Brain

China Unicom built the Unicom Intelligence Brain and released it through the Partner conference, laying a solid foundation for smart operation.

- Achieved 100% of intensive core business system.
- Achieved 100% of centralised 10010 hotline.
- Achieved 100% of completed smart middle platform.



China Unicom Intelligence Brain release

At the 2021 China Unicom Partners Conference, Mr. He Biao, deputy general manager of China Unicom, officially released the Unicom Intelligence Brain Product. "China Unicom Intelligence Brain" is committed to build an iconic and leading brain-type intelligent middle platform and an ultra-computerised cloud-network engine, and build a scenario-based and intelligent central nervous system featuring high-speed ubiquitous, cloud-network integration, computing networks integration, security and reliability, and intelligence and agility. China Unicom's Intelligence Brain is connected with thousands of smart operation scenarios internally, and agilely achieved the empowerment and integration of thousands of industries externally.



Smart Operation System Chart

China Unicom Shanghai Branch has built a smart network operation brain, which has subverted the traditional working model and significantly improved production efficiency. Taking resources and data as the foundation of digital twins, the Company built the decision-making capability of "Network Brain" through the digital intelligence rules. At present, 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 enhanced the transformation of operation model which the automation handling rate of network events has reached to 99.625%, hence, comprehensively empowers the digital operation of network.

Activating value of data elements

China Unicom has revitalized its Big Data, by giving full play to the value of data and technical elements, focusing on areas such as urban governance, population, economy and employment, and key industries such as government affairs, emergency response, ecology, culture and tourism, transportation, agriculture, industry, housing and construction, and finance. It adhered to independent research and development, and built key industries data platforms and application products.

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

Optimising the Layout of Industrial Innovation

China Unicom has integrated its innovative R&D capabilities, actively applied for and participated in the construction of national laboratories, focused on key areas to explore innovative models of industry, university, research and application, and improved the layout of industrial innovation.

Building a national research and development centre

China Unicom has played the role of central enterprise in innovation, actively applied for and participated in the construction of national-level laboratories, and took the lead in organising the application of the National Engineering Laboratory for the Next Generation of Internet Broadband Business Services. It was officially approved by the National Development and Reform Commission, and was included in the National Engineering Research Centre for new sequence management. During the evaluation period, the National Engineering Laboratory for the Next Generation of Internet Broadband Business Application seized the opportunities that are arising from the development of industrial Internet and the transformation of network broadband and software to achieve breakthroughs in new network architecture, key 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 Cyberpower, Digital China, Smart Winter Olympics and pandemic prevention and control. In the future, the Company will further improve its organisational structure, strengthen its own construction, increase investment in R&D resources, gather new network architecture, next generation Internet and broadband technology, and combine with the Company’s new strategy to continuously strengthen, optimise and expand its development.

Creating a consortium of industry, university, research and application

China Unicom focused on key regions such as the Beijing-Tianjin-Hebei Region, the Yangtze River Delta, the Guangdong-Hong Kong-Macao Greater Bay Area and Sichuan-Shaanxi-Chongqing Region, it actively explored the layout of the regional science and technology innovation centres of state-owned enterprises, and built an innovation consortium of industry, university, research and application. In 2021, the Western Innovation Institute and Chongqing 5G Integrated Innovation Centre were established in Xi’an and Chongqing to explore the innovative model of industry-university-research-application.

In April 2021, China Unicom has entered into a strategic cooperation framework agreement with the People’s Government of Shaanxi Province, where China Unicom will be entitled to utilize optimally the resources of the Shaanxi University to jointly establish the Western Innovation Institute in collaboration with Xi’an Jiaotong University, Xidian University and Xi’an University of Posts and Telecommunications. On 6 September 2021, China Unicom Western Innovation Institute Co., Ltd. was officially established; the institute will focus on overcoming the “bottleneck” risks in key core technologies, laying out innovation chains, such as fundamental research, technology development, achievement transformation, talent cultivation and industry incubation around the connections of the industrial chain. The institute will build a collaborative innovation platform to gather together key resources, such as talents, technologies, products and businesses, innovation ecology, and pilot demonstration of scientific and technological innovation.