# EMBARK ON A NEW JOURNEY TOWARD DIGITALIZATION

CHINA TELECOMMUNICATIONS CORPORATION LIMITED

## CHINA TELECOM CSR REPORT 2021

# REPORT SPECIFICATION

## ◉ Time Frame

This is the 2021 CSR Report of China Telecommunications Corporation Limited. It covers the whole year of 2021 with some sections beyond this time frame.

## ◉ Scope of Organization

Organizations covered in this report include China Telecommunications Corporation Limited, its branches and subsidiaries held by it. In the report, China Telecommunications Corporation Limited is also referred to as "China Telecom (CT)", the "Group Company", "the Company", "we", etc.

## ◉ Release Cycle

This is an annual report that is released every year.

## ◉ Content Description

This report responds to the major topics concerned by China Telecom's stakeholders to the greatest extent, including regular topics and annual highlights. Data and stories are mainly collected internally with some references to public media news. Amounts of money herein are all in RMB unless otherwise stated.

## ◉ Reference Standards

This report was compiled by taking references from the Guidelines for Central SOEs to Fulfill Corporate Social Responsibilities and the Guidelines for SOEs to Better Fulfill Corporate Social Responsibilities issued by the State Owned Assets Supervision and Administration Commission of the State Council (SASAC), the Guidelines for Preparation of CSR Reports in China (GB/T 36001-2015) issued by the former General Administration of Quality Supervision,

Inspection and Quarantine of China and the Standardization Administration of China, the CSR Management Scheme for ICT Industry in China (2016 version) issued by China Association of Communication Enterprises, the Guidelines for Preparation of CSR Reports in China (CASS-CSR4.0) issued by Chinese Academy of Social Sciences, as well as the Sustainability Reporting Guidelines (G4) by the Global Reporting Initiative (GRI).

## ◉ Guarantee of Reliability

Information disclosed in this report is true and aims to reflect CT's market, social and environment performance in an objective and comprehensive manner.

## ◉ Access to Report and Extended Reading

Our CSR report is available in Chinese and English, in print and online. The online version can be downloaded from our website (http://www.chinatelecom.com.cn).

China Telecom has been publishing CSR reports for 12 years consecutively. For more information on the Company's fulfillment of its CSRs, please visit our website for inquiry or download and read previous CSR reports.

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# DIALOGUE WITH THE MANAGEMENT

**KE Ruiwen**
**Chairman & Party Secretary,**
**China Telecommunications Corporation Limited**

**Q: General Secretary Xi Jinping has always prioritized the development of digital technologies and the digital economy. As the main force in building China's cyber strength and Digital China as well as in maintaining cyber security, how can China Telecom play its role in building Digital China?**

**KE Ruiwen:** In recent years, committed to its original aspiration to act as the main force in building China's cyber strength and Digital China as well as in maintaining cyber security, China Telecom has adhered to a customer-centered philosophy and drawn upon its own resources in proposing the comprehensive implementation of the "cloud migration and digital transformation" strategy. It is actively engaged in building itself into a service-oriented, technology-driven and secure enterprise to leverage the multiplier effect of digital factors and stimulate the vitality of the digital economy, so as to contribute significantly to interconnecting the information "artery" for socio-economic development and empowering the digital transformation of diverse industries.

**Accelerate the development of digital information infrastructure to build a solid network foundation for Digital China.** Giving full play to the advantages of its underlying network and based on a correct understanding of the development trend of the cloud, we pioneered in the industry in proposing the idea of development through cloud-network integration. After several years of practice, the cloud-network integration has evolved into its 3.0 version. We keep focused on developing 5G SA networking and have set up the world's first commercial 5G SA network; we have implemented the "Broadband China" strategy in a comprehensive manner and taken the lead in building gigabit networks. We've promoted the development of cloud computing, with our China Telecom Cloud becoming the world's largest cloud operated by a telecom carrier. We've created a "2+4+31+X+O" architecture for cloud resource layout and established data center parks in Inner Mongolia and Guizhou, together with a large number of key data center nodes, which are highly in line with the "West computes data for East" national project.

**Leverage the advantages from cloud-network integration to actively expand digital applications.** We've accelerated the in-depth penetration of the next generation information and communication technologies (ICTs) into digital governments, the digital economy and digital society for high-quality economic and social development. We've expedited industrial digitalization through active empowerment of traditional industries toward transformation and upgrading. We engage ourselves in active promotion of services for a digital life and build rural information highway to contribute to rural revitalization. We are also active in assuming the responsibility in the safe operation of smart epidemic prevention systems such as those for travel history inquiry and "health codes", playing our own part in fighting the epidemic with advanced technologies.

**Improve security and controllability to consolidate the security "base" for Digital China.** We've built a security capability pool covering 31 provinces to secure the clouds, networks, edge nodes and terminals, and continued to improve the security protection for clouds and networks. We've made coordinated efforts in planning a cloud-network end-to-end security capability system featuring integrated data, aggregated capability, unified architecture and open ecosystem. We've continued to expand security products and services and built the only "Cloud Dam" platform in China with full network coverage and global reach to provide industry-leading, tailored security services for industry customers. We've independently developed the cloud-network security capability management platform, the 5G-based automated orchestration system and other key core capabilities with unified security standards to ensure data security compliance.

**Adhere to green and low-carbon development to fulfill the responsibility borne by a central State-Owned Enterprise (SOE).** We've taken multiple approaches to green clouds and networks. We've adopted self-developed intelligent system for energy-saving in base stations to reduce their energy consumption, and optimized the design for new data centers with advanced green technologies such as evaporative cooling, liquid cooling and distributed Li-ion batteries to improve energy efficiency, reduce energy consumption and lower carbon emissions; we've adopted green energies, including self-generated ones, to promote energy saving and carbon reduction. We've also managed to keep reducing network energy intensity by streamlining network architecture, building all-fiber networks and at the same time, gradually removing less integrated, small capacity and high energy-consumption old equipment from existing networks.

**Forge ahead in a new journey and make contributions in the new era.** China Telecom follows the guidance of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era and is committed to its original aspiration to act as the main force in building China's cyber strength and Digital China as well as in maintaining cyber security. We will seize major opportunities in the development of the digital economy with comprehensive implementation of the "cloud migration and digital transformation" strategy to promote quality business development, continue to grow ourself into a world-class enterprise and write a new chapter in telecommunications sector in the new era, with an aim to make new and greater contributions to the efforts in building a modern socialist country in all respects and embrace the convening of the Party's 20th National Congress with practical actions.

**SHAO Guanglu**
**President & Deputy Party Secretary,**
**China Telecommunications Corporation Limited**

**Q: Can you specify what China Telecom achieved in fulfilling its CSR in 2021?**

**SHAO Guanglu:** In 2021, profound changes unseen in a century evolved rapidly across the world, a new round of technology revolution and industrial transformation accelerated, and the wave of digitalization swept the world, all of which were further expedited by the COVID-19 pandemic; the next generation ICTs were spreading across the economy and society in all aspects, pushing socio-economic development into a smart digital era. With such rare development opportunities, China Telecom carried out comprehensive implementation of the "cloud migration and digital transformation" strategy and adhered to CPC's leadership in strengthening technology innovation, upgrading products and services, promoting green development, and improving corporate governance, thus empowering the sustainable development of the economy and society with smart intelligence.

**Enhance innovation to solidify the foundation of Digital China.** We pursued technology innovation-driven development, improved the R&D asset layout, promoted independent control over core technologies, and facilitated the application of scientific and technological advances. We continued our efforts in building intelligent and comprehensive digital information infrastructure as well as in developing communication networks in remote areas. We managed to set up the world's largest 5G SA network under a co-investment and shared model, implemented an upgrade plan toward all-fiber networks, built new types of metropolitan area network and made an all-out effort in the "West computes data for East" project under a "2+4+31+X+O" architecture for resource layout, creating the world's largest cloud run by a telecom operator. We also consolidated the security base of information infrastructure, provided intelligent security services and built network security ecosystems.

**Optimize services to create a better life together.** We expanded scenario-based, comprehensive and intelligent information services, with focuses on upgrading digital entertainment and digital home businesses, and vigorously promoted the development of smart communities and digital villages, so as to keep diversifying digital life style. We strengthened the innovative application of digital information technologies to empower various industries, creating more than 200 application scenarios such as 5G + smart city, 5G + smart manufacturing and 5G + smart health. We continued to raise service awareness through extensive activities to address difficulties for our customers and by narrowing the "digital divide" among the elderly people. We kept improving smart service capabilities to build China Telecom's reputation as "a trustworthy brand" in a comprehensive manner.

**Refine actions to help build a harmonious society.** Staying true to the philosophy of green development, we implemented the national targets of "carbon peak and neutrality" as well as the green and low-carbon requirements for the industry, released action plans for carbon peak and carbon neutrality, and integrated green ideas and capabilities into our "cloud migration and digital transformation" strategy. We provided assistance and support to more than 1,400 designated localities to help them achieve effective poverty alleviation together with rural revitalization, for which we won 4 national honors. We enthusiastically participated in activities for public good and encouraged employees to carry forward the spirit of volunteering through active participation in various forms of volunteer services, one result of which was over 6,000 "CT Stations for Love" that provide warm services for free to the general public. Built upon our advantages in big data and AI, we stepped out and took on the responsibility of secure operation of smart epidemic prevention systems including those for travel history inquiry and "health codes", playing our own part in fighting the epidemic with advanced technologies.

**Deepened reforms to improve corporate governance capabilities.** We fully implemented the three-year action plan for SOE reform and continued to deepen reforms in areas such as cloud computing and industrial digitalization, and improved the modernized corporate governance systems and capabilities. We followed the people-oriented concept in treating employees with care and love, protected their legitimate rights and interests and focused on establishing harmonious labor relations, doing our best to achieve common growth of both the employees and the enterprise. We continued to improve our compliance management system, abide by industry regulations, strengthen audit supervision and improve Party conduct and build a clean organization, consolidating the foundation for high-quality development of China Telecom.

Look ahead into the future, China Telecom will seize the precious opportunity brought by the development of the digital economy, follow the guidance of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era and stay true to our original aspiration. We'll better shoulder our responsibilities and fully implement the strategy of "cloud migration and digital transformation", with a view to grow into a world-class enterprise that is service-oriented, technology-driven and secure, so as to satisfy the people's growing needs for a better life and make greater contributions to social and economic sustainability!

# TOP MANAGEMENT

KE Ruiwen
Chairman, Secretary of
Party Leadership Group

SHAO Guanglu
Director, President, Deputy Secretary
of Party Leadership Group

LIU Guiqing
Vice President, Member of
Party Leadership Group

FU Yongzhong
Head of Discipline Inspection and
Supervision Team, Member of Party
Leadership Group

TANG Ke
Vice President, Member of Party
Leadership Group

XIA Bing
Vice President, Member of Party
Leadership Group

LI Yinghui
Chief Accountant, Member of Party
Leadership Group

LI Jun
Vice President, Member of Party
Leadership Group

# HIGH-QUALITY DEVELOPMENT LED BY PARTY BUILDING

Under the guidance of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, China Telecom implemented the guiding principles of the important instructions by General Secretary Xi Jinping as well as decisions and plans of the Party Central Committee. It had thorough understanding of the decisive significance of establishing Xi Jinping's core position on the Party Central Committee and in the Party as a whole and of defining the guiding role of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era; it was keenly aware of the need to maintain political integrity, think in big-picture terms, follow the leadership core, and keep in alignment with the central Party leadership; it stayed confident in the path, theory, system, and culture of socialism with Chinese characteristics; it upheld General Secretary Xi Jinping's core position on the Party Central Committee and in the Party as a whole, and upheld the Party Central Committee's authority and its centralized, unified leadership; and it kept enhancing our capacity for political judgment, thinking, and implementation.

## Enhancing Political Work of the Party

China Telecom put the guiding principles of the important instructions by Comrade Xi Jinping as the first item on its agenda of Party building, with systematic consolidation thorough study of these principles under a long-term, well-developed learning mechanism to ensure the solid implementation of these principles and the decisions and plans of the Party Central Committee. Bearing in mind what is of vital importance to the nation, it actively engaged itself in building national cyber strength and Digital China and maintaining cyber security, which is its original aspiration, fulfilling its responsibilities as a central SOE with practical actions.

## Strengthening the Development of Management Teams at Different Levels

China Telecom closely followed the Party's organizational line for the new era and identified clear principles in selecting members of management teams at all levels. It strengthened efforts in the building of executive teams, with focus on training, selecting and promoting outstanding young candidates. It made steady progress in reforming the employment, HR and distribution systems, and actively explored a market-based selection mechanism that allowed competent candidates to volunteer for their intended posts, together with a pilot "nomination-based system" to recruit the management team members. It also carried out a "Talents for a Strong Enterprise" program, set up a leading group for the work related to sci-tech professionals, with several major initiatives formulated, and continued to promote the "special talent zone" mechanism to further stimulate the vitality of talent teams.

## Promoting Deep Integration of Party Building and Production and Operation

China Telecom consolidated and pushed forward the guidelines from the National Party Building Meeting for SOEs through serious "stock taking", and continued to enhance the development of Party branches with a view to fortify the capability of several hundreds of primary-level Party branches, work with several thousands of selected organizations in joint Party building programs and enable tens of thousands of organizations to access inclusive financial services through joint Party building efforts. To be more specific, it enhanced Party building among primary-level Party branches, promoted the establishment of Mini "Red" Branches, and organized Party officials to led the implementation of the "cloud migration and digital transformation" strategy and actively participate in key tasks such as technological innovation, epidemic prevention and control, and communication guarantee for disaster relief; it furthered "Party Building with China Telecom" themed activities, engaging governments, communities and customers in related efforts to transform the political function of the Party organization into real-life practices in speeding up development, deepening reforms and serving the public; it drove the development of the Communist Youth League (CYL) through Party building in activities such as the "Cloud Migration and Digital Transformation • Youth Leadership" activity, the 2021 Youth Innovation and Creativity Competition/The Seventh "i-Creation" Dark Horse Contest, the "CT for the Future" Studio, in order to motivate the innovative young people.

**Mini "Red" Branches in practical service for the public**

▲ A group photo of the Beijing Branch's Mini "Red" Branch

The Party Branch of the Customer Service Center of the Beijing Branch further developed its Mini "Red" Branches by building an elderly service system that provided services to elderly subscribers for more than 200,000 times, adding warmth to CT services.

### "Party Building with China Telecom" to strengthen Party building at primary level

On October 29, 2021, the Party Branch of the Cloud-Network Center of the Jiujiang Branch joined hands with the First Party Branch of the ICT Office of the Jiujiang Municipal Government under the "Party Building with China Telecom" program and went to Tianmin Village Primary School to teach ICT-related knowledge to the students and bring them donated sporting goods, making people-centered services closer to local residents.

▲ The Party Branch of the Cloud-Network Center of the Jiujiang Branch and the First Party Branch of the ICT Office of the Jiujiang Municipal Government distributing sporting goods to the students, October 29, 2021

### Going all out for communication guarantee in major events

In order to ensure the success of the 15th Conference of Parties to the UN Convention on Biological Diversity, the Trunk Line Center of the Kunming Branch gave full play to the role of its Party Branch as a trusted battle fortress led by Party members with strengthened network coverage, improved network quality and necessary drills, providing strong support to secure a successful conference.



▲ In July 2021, the Trunk Line Center gave full play to the role of its Party Branch as a trusted battle fortress led by Party members in network guarantee for the conference



### "Cloud Migration and Digital Transformation · Youth Leadership" Promotion Campaign

On January 5, 2021, China Telecom held a promotion campaign for the "Cloud Migration and Digital Transformation · Youth Leadership" -- Youth "Contribution to a New Era" Action to identify outstanding cases in the "Cloud Migration and Digital Transformation · Youth Leadership" activity and commend role models among young participants, inspiring CYL members to make contributions to a new era.

▲ Scene from the promotion campaign for the "Cloud Migration and Digital Transformation · Youth Leadership" -- Youth "Contribution to a New Era" Action

# High-quality Party History Learning and Education

China Telecom systematically summed up the development history of telecommunications, from "half set of radio transceiver" to "remote cloud supervisor", and from "Digital Fujian" to Digital China, producing valuable take-aways that needed to be carried forward: the revolution-originated telecom spirit that requires the industry to "follow the Party's command, never forget why it started, always put people first, reform and innovate, advocate the role of science and technology, and ensure secure and smooth-functioning services"; four venues including China Telecommunications Museum were shortlisted in the first batch of patriotic education centers of central SOEs; it strengthened the work in political awareness raising with necessary improvement to enhance the leading role of political thinking; as a result, the Study on Approaches to Empowering Quality Development of SOEs with "Red" Gene for a New Era was selected as material for the Seminar on the Historical Experience of Party Building to Celebrate the 100th Anniversary of the Founding of the Communist Party of China, and two study results won First Prize for Outstanding Study Results in the Workshop on Political Awareness Raising through Party Building in Central SOEs; it carried out a selection to commend outstanding Party members and primary-level Party branches, with a view to fully demonstrate the leading role of commended models, and educate and motivate its employees to actively engage in the company's reform and development.

### Staff calligraphy, painting and photography exhibition themed "Original Aspiration along the 100-Year Revolutionary Journey Travelled by the Telecom Industry"

In August 2021, in order to celebrate the 100th anniversary of the founding of CPC and carry out Party History learning and education activities, the Zhejiang Branch held a staff calligraphy, painting and photography exhibition themed "Original Aspiration along the 100-Year Revolutionary Journey Travelled by the Telecom Industry". In the exhibition, members of Zhejiang Branch's Painting and Calligraphy Club as well as its Photography Club celebrated the CPC centenary in the form of art with their own brushes and lenses and supported Party History learning and education, enthusiastically demonstrating the century-old Party right in its prime.

▶ The picture shows audiences at the calligraphy, painting and photography exhibition of the CT Group Labor Union



### Party History Knowledge Contest

On September 24, 2021, the Guangdong Branch launched a Party history knowledge contest under the theme "A Century-long Journey of Extraordinary Struggle · Even Firmer Original Aspiration after 100 Years". After fierce competition in the preliminary rounds, a total of 10 teams - Shenzhen, Guangzhou, Dongguan, Foshan, Zhongshan, Shantou, Shanwei, Zhaoqing Branches Heyuan branches as well as the Smart Cloud-Network Operation Center made it to the provincial final.

Such contest helped all CT employees review the glorious history of the Party over a hundred years, promote the Party history learning and education throughout the company, and guided the majority of Party members to inherit and carry on the Party's glorious traditions and fine work styles when learning Party history, firm up their ideals and convictions, and carry forward the revolutionary spirit and traditions, so as to improve their work with greater enthusiasm, more dedication and more pragmatic working style.



▲ The picture shows a group photo of employees of the Guangdong Branch participating the Party history knowledge contest

# FORGING AHEAD: MAJOR EVENTS IN PARTY HISTORY LEARNING AND EDUCATION IN CHINA TELECOM

The Party with a century-long history is right in its prime. Now, it's ready to open a new chapter, drawing upon its glorious past, and embark on a new journey.

In 2021, a critical year marking the centennial celebration of our Party and the critical juncture where the timeframes of the Party's two centenary goals converge, the CPC Central Committee with Comrade Xi Jinping at its core made a major strategic decision: to carry out Party history learning and education among all Party members.

"Looking back on the course of the Party's struggles and charting the course for the future, we must study and review the party's history and carry forward the its valuable experience." On February 20, 2021, a campaign was launched in Beijing on Party History Learning and Education, where General Secretary Xi Jinping delivered an important speech, urging efforts from all Party members to study the Party's history, understand its theories, do practical work and make new advances.

With thorough study on and implementation of the guidelines from General Secretary Xi Jinping's important speeches at the campaign launched on Party history learning and education, the celebration of the 100th Anniversary of the Founding of the Communist Party of China, and the Sixth Plenary Session of the 19th CPC Central Committee, and following the requirements of the Party Committee of the State-owned Assets Supervision and Administration Commission of the State Council (SASAC), China Telecom developed big-picture political thinking and planned carefully its activities in learning the Party's history with solid progress made under the guidance of the Fifth Advisory Group for Party History Learning and Education among Central SOEs. All CT officials and staff, led by 14,000 Party organizations and 160,000 Party members across CT Group, joined the campaign on Party history learning and education at greater depth and used the knowledge learned to guide their practical routine work, with a view to gain a profound understanding of the historical inevitability of upholding the Party's leadership, strengthen their confidence in the Party's leadership, develop strong moral character, and unswervingly follow the path of socialism with Chinese characteristics, thus achieving the goals to study the Party's history, understand its theories, do practical work and make new advances.

### China Telecom launched a campaign to call on all to learn the Party's history

On March 3, 2021, China Telecom launched a campaign calling on all Party members to learn the history of the Party based on its well-designed plan.



### Party members and executives from all entities within China Telecom Group were organized to participate in the campaign to report on the learning and education of the Party's history under the SASAC framework/among central SOEs

On March 18, 2021, China Telecom participated, in a virtual form, in the campaign to report on the learning and education of the Party's history under the SASAC framework/among central SOEs. Audiences included those from branches at provincial, municipal and county levels with a total number of around 20,000 members within the CT system.



### Hao Peng, Secretary of the Party Committee and Chairman of SASAC, made an inspection tour to China Telecom

On March 11, 2021, Hao Peng, Secretary of the Party Committee and Chairman of SASAC, paid a visit to China Telecom to inspect on and guide the company's effort in Party history learning and education, during which he also held discussions with executives and employees of the company.



### Members of the Party Leadership Group of China Telecom went to different operations to inspect on and guide local activities in the learning and education of the Party's history

In late March 2021, members of the Party Leadership Group of China Telecom went to various cities to inspect on and guide Party organizations at different levels in Party history learning and education, with an aim to allow Party members and officials to further understand the great contributions and fundamental achievements of the Party in uniting and leading the people for the Chinese nation, thus gaining more profound understanding of the course travelled by the telecom industry, under the leadership of the Party, to grow from scratches, develop and thrive in the past one hundred years.



### Wang Qinmin delivered a report at a workshop held by China Telecom on the learning and education of the Party's history

On March 31, 2021, China Telecom held a reporting workshop on the learning and education of the Party's history to further study General Secretary Xi Jinping's important exposition on Digital China, and invited Wang Qinmin, Vice Chairman of the 12th National Committee of the Chinese People's Political Consultative Conference (CPPCC) and Director of the National E-government Expert Committee, to give a report on this topic.



### All-China Federation of Trade Unions and China Telecom jointly launched the "CT Station for Love" campaign

On May 10, 2021, All-China Federation of Trade Unions (ACFTU) and China Telecom jointly launched the "CT Station for Love" campaign in Beijing, marking that China Telecom became the first partner enterprise in the industry recognized by ACFTU under the "Service Station for Outdoor Workers" brand, and suggesting the attempt to motivate the telecom industry to open and share service resources.



### China Telecom organized a special (expanded) reading workshop on Party history learning and education in Zunyi for core members in theoretical study under its Party Leadership Group

From April 19 to 23, 2021, China Telecom held a special (expanded) reading workshop on Party history learning and education in the Cadre Academy in Zunyi, Guizhou, for core members in theoretical study team under CT's Party Leadership Group to learn the glorious achievements of the Party, with a view to gain a profound understanding of the historical inevitability of upholding the Party's leadership, strengthen their confidence in the Party's leadership, develop strong moral character, and unswervingly follow the path of socialism with Chinese characteristics, thus achieving the goals to study the Party's history, understand its theories, do practical work and make new advances. It also organized in-depth themed seminars to boost synergy within the CT Group to open up new pictures of high-quality development, taking in account the characteristics of the industry and its practical conditions.



### Ke Ruiwen, Chairman and Secretary of Party Leadership Group of China Telecom, shared the story behind the "half set of radio transceiver"

On May 17, 2021, Ke Ruiwen, Chairman and Secretary of Party Leadership Group of China Telecom, shared the story behind "the half set of radio transceiver" as a keepsake narrator in the "Century-old Keepsakes" program.



### Activities of China Telecom in Party history learning and education reported by *People's Daily*

On June 1, 2021, the *People's Daily* introduced the effective measures taken by China Telecom to study and educate on the history of the Party, pass on the revolutionary gene, and carry out the "Practical Things for the People" activities to address the urgent needs, difficulties and daily headaches for the general public.



### China Telecom held a special (expanded) study seminar on Party history learning and education for core members in theoretical study under its Party Leadership Group

On June 18, 2021, China Telecom held a special (expanded) reading workshop on Party history learning and education for core members in theoretical study team under CT's Party Leadership Group to learn the important article of General Secretary Xi Jinping - *Make Good Use of Red Resources, Pass on Red Genes, and Sustain Red Legacies from Generation to Generation*. Exchanges and discussions were conducted on carrying forward "red" telecoms genes and promoting the spirit of "red" telecommunications.



### The Fifth Advisory Group for Party History Learning and Education among Central SOEs arrived in China Telecom to guide related work

On June 4, 2021, the Fifth Advisory Group for Party History Learning and Education among Central SOEs arrived in China Telecom to advice on related work. Wang Binghua, head of the Fifth Group, made a speech and proposed requirements, following which Ke Ruiwen, Chairman and Secretary of Party Leadership Group of China Telecom, reported on the company's efforts in Party history learning and education.



### China Telecommunications Museum was renovated to exhibit the century-old "red" telecom industry

On June 20, 2021, the newly-renovated China Telecommunications Museum was open to the public. Under the theme of "Telecom Centennial with Revolutionary Inheritance", it took people to revisit the historical achievements of China's telecom industry, which has grown from scratches, leapfrogged and taken off with self-dependence and hard work.

**China Telecom organized an event to commend outstanding Party members and primary-level Party branches to celebrate the 100th anniversary of the founding of the Communist Party of China**

On June 28, 2021, China Telecom organized an event to commend outstanding Party members and primary-level Party branches to celebrate the 100th anniversary of the founding of the Communist Party of China. During the event, the Company reviewed the glorious history of the Party, promoted the "red" telecom spirit and commended outstanding Party members and primary-level Party branches, with a view to inspire and motivate cadres and employees to keep in mind the Party's history, strengthen their beliefs, pass on revolutionary spirit and shoulder due responsibilities to usher in a new chapter in telecom development.



**4 China Telecom venues were selected into the first batch of 100 patriotism education bases run by central SOEs**

On the occasion of the 100th anniversary of the founding of the Communist Party of China, SASAC named the first batch of 100 patriotism education bases run by central SOEs. Among these bases, China Telecom had 4 venues selected.



▲ China Telecommunications Museum

▲ Site of former Nanjing Telecom Administration

▲ Shanghai Telecom Museum

▲ Sichuan International Radio Station & The Communications Museum

**General Secretary Xi Jinping's important speech at the celebration of the 100th anniversary of the founding of the Communist Party of China inspired great response in China Telecom**

On July 1, 2021, the celebration of the 100th anniversary of the founding of the Communist Party of China was held solemnly at Tiananmen Square, Beijing. Xi Jinping, General Secretary of the CPC Central Committee, President of China and Chairman of the CPC Central Military Commission, delivered an important speech. Party members, cadres and employees from across China Telecom Group actively listened to or watched with excitement, through various channels, this important speech by General Secretary Xi Jinping, celebrating the centenary of the Party.



**China Telecom Party Leadership Group thoroughly studied and implemented the guidelines in General Secretary Xi Jinping's important speech at the celebration of the 100th anniversary of the founding of the Communist Party of China**

On July 2, 2021, China Telecom held a special (expanded) learning workshop for core members in theoretical study team under CT's Party Leadership Group to study and implement the guidelines in General Secretary Xi Jinping's important speech at the celebration of the 100th anniversary of the founding of the Communist Party of China. It also had thorough exchanges and discussions, taking into account actual situations, to plan approaches to studying and implementing these guidelines.



**China Telecom held a special lecture to study and implement the guidelines in General Secretary Xi Jinping's important speech on July 1st and made arrangements accordingly**

On July 15, 2021, China Telecom held a special lecture to study and implement the guidelines in General Secretary Xi Jinping's important speech on July 1st, inviting Zhang Shujun, member of the Central Advocacy Group for Party History Learning and Education, former Deputy Director and Secretary General of the Party History Research Office of the CPC Central Committee, former council member of the Party History and Literature Research Institute of the CPC Central Committee, to make a themed report.



**On-site supervision by the Fifth Advisory Group for Party History Learning and Education among Central SOEs on China Telecom's "stock-taking"**

On August 30, 2021, in line with the deployment of the Party Committee of SASAC, the Fifth Advisory Group for Party History Learning and Education among Central SOEs supervised China Telecom's work in "stock-taking", through listening to reports, interviews and consulting materials, among others, on the implementation of the guidelines from the meeting of Party Building among SOEs.



**China Telecom held a Party Leadership Group meeting for thorough study and implementation of the important speech made by General Secretary Xi Jinping at the Sixth Plenary Session of the 19th CPC Central Committee and guidelines from the plenary**

On November 20, 2021, China Telecom held a Party Leadership Group meeting to continue thorough study and implementation of the guidelines of the Sixth Plenary Session of the 19th CPC Central Committee, with a focus on learning and understanding the guidelines from General Secretary Xi Jinping's report and important speech at the plenary, and to study ways to deploy awareness raising campaign for group-wide learning.

**China Telecom held a seminar on studying and implementing the guidelines in General Secretary Xi Jinping's important speech on July 1st**

From August 23 to 27, 2021, China Telecom held a seminar on studying and implementing the guidelines in General Secretary Xi Jinping's important speech on July 1st, with a view to learn and implement the guidelines from General Secretary Xi Jinping's important speech at the celebration of the 100th anniversary of the founding of the Communist Party of China, implement the decisions and plans of the CPC Central Committee as well as relevant requirements from the SASAC seminar for central SOE's leaders, stay firm in rolling out the strategy of cloud migration and digital transformation, and make an all-out effort to secure a good beginning for the company's high-quality development during the 14th Five-Year Plan period.

**China Telecom held an (expanded) Party Leadership Group meeting to learn and understand the guidelines of the Sixth Plenary Session of the 19th CPC Central Committee**

On November 14, 2021, China Telecom held an (expanded) Party Leadership Group meeting to learn and understand the guidelines of the Sixth Plenary Session of the 19th CPC Central Committee, and to study ways to deploy relevant measures in Group-wide awareness raising and the implementation of those guidelines.

**China Telecom an (expanded) Party Leadership Group meeting to study and discuss the Resolution of the Central Committee of the Communist Party of China on the Major Achievements and Historical Experience of the Party over the Past Century**

On November 17, 2021, China Telecom held an (expanded) Party Leadership Group meeting to thoroughly study and implement the guidelines of the Sixth Plenary Session of the 19th CPC Central Committee, focusing on studying and discussing the Resolution of the Central Committee of the Communist Party of China on the Major Achievements and Historical Experience of the Party over the Past Century and the Note on the Resolution of the Central Committee of the Communist Party of China on the Major Achievements and Historical Experience of the Party over the Past Century.

**An (expanded) seminar themed "In-depth Study and Implementation of the Guidelines of the Sixth Plenary Session of the 19th CPC Central Committee" was held by core members in theoretical study under CT's Party Leadership Group**

From November 22 to 26, 2021, core members in theoretical study under CT's Party Leadership Group held an (expanded) seminar in Beijing, themed "In-depth Study and Implementation of the Guidelines of the Sixth Plenary Session of the 19th CPC Central Committee".

**China Telecom organized Party members and officials from across CT Group to participate in the report meeting on studying and implementing the guidelines of the Sixth Plenary Session of the 19th CPC Central Committee among Central SOEs**

On December 2, 2021, the Party Committee of SASAC held a report meeting on studying and implementing the guidelines of the Sixth Plenary Session of the 19th CPC Central Committee among Central SOEs. China Telecom joined the meeting via video links, with extensive participation of branches at provincial, municipal and county levels.



**Ke Ruiwen, Chairman and Secretary of Party Leadership Group of China Telecom, went to tech- and innovation front-line to educate on the guidelines of the Sixth Plenary Session of the 19th CPC Central Committee**

On December 3, 2021, Ke Ruiwen, Chairman and Secretary of Party Leadership Group of China Telecom, visited primary-level Party branches to educate tech professionals on the guidelines of the Sixth Plenary Session of the 19th CPC Central Committee and exchanged observations and reflections during their learning activities.



**China Telecom won two First Prizes in outstanding study results at the Seminar on Party Building and Political Awareness Work among Central SOEs**

The Seminar on Party Building and Political Awareness Work among Central SOEs commended outstanding study results in 2021, in which both the Study on Promoting and Carrying forward the Revolutionary Gene by State-owned Enterprises and the Study on the Development and Application of the Evaluation System on In-depth Integration of Primary-level Party Branches into Production and Operation recommended by China Telecom for submission won the First Prize, making China Telecom the only central SOE that won two First Prizes.



**China Telecom Wrapped up on its Party History Learning and Education**

On January 14, 2022, China Telecom held a wrap-up meeting on Party history learning and education as an approach to implement the guidelines from the important instructions in General Secretary Xi Jinping's speeches as well as the guidelines from the central wrap-up meeting for Party history learning and education. It comprehensively summarized and systematically collated the practices, effectiveness and experience of group-wide Party history learning and education, and made arrangements for consolidating and expanding what had been achieved in such activities in order to promote its high-quality development and embracing the convening of the Party's 20th National Congress with practical actions.

# COMPREHENSIVELY ADVANCE CLOUD-NETWORK INTEGRATION

When presiding over the 34th group study session of the Political Bureau of the CPC Central Committee, General Secretary Xi Jinping proposed to "accelerate efforts in building new types of infrastructure, enhancing strategic planning and building intelligent and comprehensive digital information infrastructure featuring high-speed, ubiquitous access, space-ground connectivity, cloud-network integration, smart intelligence, agility, eco-friendliness, low-carbon, security and controllability", marking that cloud-network integration officially became an important part in developing China's digital information infrastructure.

In 2016, China Telecom took the lead in the industry to propose the development toward cloud-network integration, and was the first telecom operator in the world to propose such concept. In 2018, China Telecom released the industry's first white paper on cloud-network integration. In 2020, it was again the first to release the 2030 Technology White Paper on Cloud-Network Integration. After several years of practice, the concept evolved to a new stage: cloud-network integration 3.0. By strengthening technology innovation and optimizing resource allocation, CT promoted multi-element aggregation and innovation, including DCs, networks, computing power, clouds, big data/AI, security and eco-friendliness, accelerated the development and upgrading of digital information infrastructure, and actively provided more high-quality and efficient comprehensive intelligent information products and services to the whole society, making important contributions to connecting the information "artery" for socio-economic development.

## Cloud-Network Integration: An Inevitable Approach to Building National Cyber Strength

General Secretary Xi Jinping has emphasized that we must seize the historical opportunity of informatization development, and build cyber strength through independent innovation. Cloud-network integration has strategic significance in building China's cyber strength.

## Cloud-network integration is the inherent requirement for technology self-reliance

China is the first country to propose cloud-network integration, whose level of development is at the forefront worldwide. Strengthening the originality and leading technology research of cloud-network integration to form local advantages can drive progress in a series of related technologies such as server chips, operating systems, open source software and hardware, and provide an important vehicle for the integration and collaboration of artificial intelligence, big data, blockchain, Internet of Things (IoT) and many other innovative technologies.

**The joint innovation project of China Telecom and Huawei won the Second Prize in the 2020 National Science and Technology Advancement Award**

On November 3, 2021, at the 2020 National Science and Technology Awards, the technology achievements of "Technological Innovation and Industrialization of Ultra-Large Intelligent Backbone Routers" participated by China Telecom won the Second Prize of the National Science and Technology Advancement Award.

▶ On November 3, 2021, the joint innovation project team of China Telecom and Huawei took a photo in front of the Great Hall of the People

## Cloud-network integration is a solid support to the development of the digital economy

The traditional architecture, in which clouds and networks are separated, cannot satisfy large-scale cloud migration required by enterprises as a result of the rapid development of the digital economy. On the basis of unifying underlying technologies, supply methods and operation management of cloud and network resources, cloud-network integration transforms cloud-network capabilities to services and effectively promotes innovation and operation model changes in converged industry applications to empower various industries.

**Build the global base for 5G-enabled intelligent manufacturing**

The ZTE Global Base for 5G-enabled Intelligent Manufacturing jointly built by Nanjing Branch and ZTE is located in the Binjiang Development Zone in Nanjing. It can produce five 5G base stations per minute and send them to all places around the world. Adhering to the strategy of "making 5G with 5G", China Telecom and ZTE took the Binjiang factory as a practical opportunity to enable the transformation of ZTE toward intelligent manufacturing, while jointly addressing the contradiction between the customization needs and large-scale promotion of 5G industry applications.

On December 4, 2021, the 5G to Empower the Electronics Manufacturing Industry - "Making 5G with 5G" in the Electronics Industry: the Innovative Practice of ZTE Nanjing 5G Factory won the First Prize in the National Chapter of the 4th "Blooming Cup" 5G Application Competition.

▲ Aerial view of the ZTE factory

## Cloud-network integration is an effective guarantee for safeguarding national information security

Business and data security has become one of the most concerned factors in the cloud migration of core systems of the key national departments and enterprises. Through cloud-network integration, terminals, networks and clouds, separated from each other in the old security architecture, can be connected to build an integrated security system with defense, detection, response and prediction capabilities, so as to maintain information security for Party, government and military organizations as well as in key fields such as electricity, transportation and finance.

**Build the network security dam**

China Telecom took the lead in introducing the "Cloud Dam" – a cyber attack protection service product with global coverage - into CTCloud, leading to an average annual defense against 330,000 times of large-scale cyber attacks, disposal of 282,000 phishing websites, and saving of economic losses worth of hundreds of million yuan.
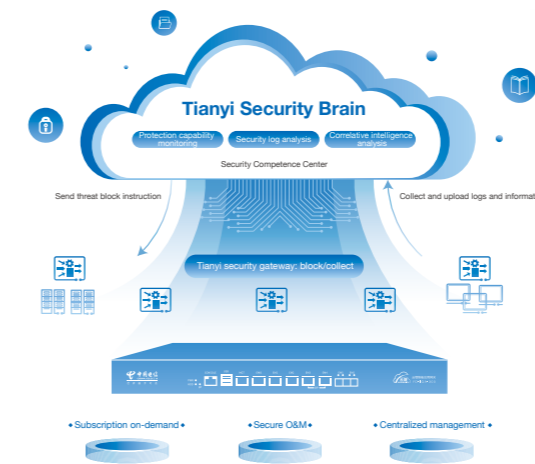
▲ China Telecom released the "Security Brain" service
China Telecom Tianyi Security Brain provides standardized security services such as traffic control, intrusion prevention, attack blocking, virus detection & kill and online behavior auditing
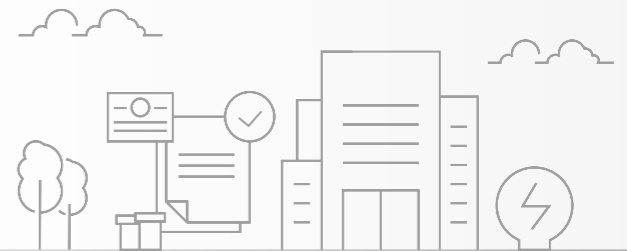
# Implement the Strategy of Building National Cyber Strength to Consolidate the Digital Information Infrastructure for Cloud-Network Integration

The key to implementing the strategy of building national cyber strength and developing digital information infrastructure for cloud-network integration lies in strong technology, wide coverage, large-scale promotion of information infrastructure to upgrade toward cloud-network integration, with a view to increase penetration and encourage more businesses to migrate to the cloud and use smart data for empowerment, so as to lay a solid foundation for the sustainable development of the digital economy. Staying true to its original aspiration of building national cyber strength and Digital China, and safeguarding network security in practices, China Telecom implemented the strategy of "cloud migration and digital transformation" in a comprehensive manner and intensified scientific and technological innovation with an aim to accelerate the development and upgrade of digital information infrastructure with cloud-network integration as its core feature.

## High-speed and ubiquitous access

China Telecom has built a high-speed, ubiquitous premium network in an all-round way: the world's first, largest and fastest 5G SA shared network, with more than 690,000 5G base stations up and running, and network coverage in all cities, counties and some developed towns across the country. It took the lead in upgrading the gigabit optical network to provide coverage in all cities in China. It operated ChinaNet (the broadband Internet) and CN2-DCI (premium bearer network) and built a large-scale domestic optical trunk connectivity with a total length over 400,000 kilometers. Relying on its optical networks, it built ROADM, the world's largest all-fiber network, as well as the premium government/enterprise OTN network covering more than 300 cities in China.

### 2021

- Worked with China Unicom to build 5G networks nationwide under the co-investment and shared model, with more than **690,000** 5G base stations in use

- 5G networks covered all cities, counties and some developed towns in China

- Implemented the all-fiber network upgrade plan and built the ROADM, an all-fiber transmission network with national coverage and the world's largest capacity

- The "Cloud Dam" boasted a traffic cleansing capacity over **5T**, with its security capability pool covering more than **50** nodes in key cities across the country

- Constructed a multi-channel, optical network "artery" with a total length of **320,000** kilometers in four districts with six horizontal trunks and eight hubs

- CN2-DCI (multi-service bearer network) and government/ enterprise OTN (optical transmission network) covered all eight hub nodes and data centers in major cities across the country, with the backbone network bandwidth exceeding **300T**

- New metropolitan area networks were deployment in **17** provinces; **1.47** million new 10G PON (passive optical network) ports were built, and the gigabit network covered **160** million households

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### All operating subways were covered by 5G signals

At the end of 2021, the Hefei Branch successfully completed the 5G communication system renovation project for Hefei Metro Line 1, 2 and 3. Together with Metro Line 5 and 4, 5G coverage was achieved in all operating subways in Hefei.

▶ In 2021, employees of the Hefei Branch were provisioning 5G signals for subways

### 2000M home broadband was launched

On November 22, 2021, the Shanghai Branch officially launched the 2000M home broadband package, bringing users high-quality experience featuring millisecond-level network latency, above-gigabit high bandwidth, etc.

▶ On November 19, 2021, the Shanghai Branch held a press conference for the 2021 Digital Life Festival, titled "Gigabit Connectivity at Home for A Beautiful, New Digital Life Enabled by China Telecom"

## Space-ground connectivity

China Telecom has basically developed the network capability to connect the space with the ground. It built a wide-area, ubiquitous, intelligent network based on ground connectivity, extended from satellite networks and organically integrating the satellite-to-earth communication networks. It continued to build an integrated sky-earth-cloud-network capability system with "satellites in space, ground-based networks, hub connectivity and cloud resource pools" to enable integrated supply and operation of sky-earth-cloud-network business resources, providing comprehensive intelligent information services featuring land-sea-air-space connection, intelligent cloud-network-terminal integration and interconnection of all things without any blind area.

### "Tiantong-1" Satellite Mobile Communication Application System was selected as the leading scientific and technological achievement at the World Internet Conference

In September 2021, at the Wuzhen Summit of the World Internet Conference held in Wuzhen, Zhejiang, China Telecom's "Tiantong-1 Satellite Mobile Communication Application System" project was selected as the World's Leading Internet Technology Achievement. The "Tiantong-1" satellite mobile communication application system uses S-band and can support a user capacity of 500,000, providing all-weather voice, SMS and data communication services so that "you can communicate wherever you can see the sky".

▶ In July 2021, during the heavy rainstorm in Zhengzhou, the Henan Branch opened the Tiantong satellite service to ensure the smooth communication of the general public

# Cloud-Network integration

China Telecom was active in promoting the implementation of computing infrastructure for cloud-network integration. It implemented the national strategy of "West Computes Data for East", furthered the development of computing infrastructure and formed a "2+4+31+X+O" cloud and big data center layout, which is highly aligned with the site selection and business positioning of national hubs for national integrated big data centers, as well as the classification of core clusters and urban data centers, with a view to fully implement the "West Computes Data for East" strategy.

### Beijing-Tianjin-Hebei Big Data Intelligent Computing Center (phase-I) was officially put to operation

China Telecom's Beijing-Tianjin-Hebei Big Data Intelligent Computing Center project covers an area of 246 mu, with a planned total construction area of 372,000 square meters and total investment around 10.2 billion yuan. It is designed as an important node and guarantee for China Telecom to promote the "2+4+31+X+O" cloud and big data layout. It is an intelligent computing power park built against the highest standards and also one of the four core bases of cloud computing of China Telecom's CTCloud.

▶ Real scene of China Telecom's Beijing-Tianjin-Hebei Big Data Intelligent Computing Center (phase I)

### CTCloud 4.0 released

On November 12, 2021, the CTCloud Forum was held in Guangzhou on the occasion of the 2021 International Digital Technology Exhibition & Tianyi Smart Ecosystem Expo and the fully upgraded CTCloud 4.0 was launched at the Forum. CTCloud 4.0 enables multiple states and chips on one cloud with cloud-network integration, consistent architecture, and unified scheduling and O&M. At the same time, the upgraded products and technologies have brought comprehensive improvement in the computing power, storage and network of the CTCloud. Relying on "5G + industry cloud + AI", the 4.0 version focuses on cloud-migration in social management, public services, ecological environment, economic adjustment and other areas to enable the digital transformation of various industries.

▶ The picture showed the newly upgraded CTCloud logo

# Smart intelligence and agility

China Telecom accelerated the capacity building to support intelligent and agile services. It promoted the intelligent scheduling of clouds and networks, to allocate network resources as required by the cloud, make the network adaptive to the cloud, and deploy the cloud and the network in an integrated manner. 5G could be the best practice for cloud-network integration at the current stage. Meanwhile, it continued to promote automated and intelligent cloud-network operation so that service provisioning could be finished within minutes and recovery from disruptions also done in minutes. With the introduction of key technologies such as the digital twins and AI-based automatic orchestration, the packaging, scheduling and supply of cloud-network resources, data and capabilities could be done in an integrated manner to empower extensive cloud-network applications across the industry.

### China's first MEC smart edge data center was put into operation

In 2021, the first MEC smart edge data center in China built by Chengdu Branch based on independent innovation was put into operation in the Future Medical City in the eastern New District of Chengdu. Network edge was moved closer to users' campuses, together with the cloud, for localized business application data with low latency to improve user experience.

▶ In 2021, the MEC smart edge data center located in the Future Medical City in the eastern New District of Chengdu was officially put into operation

# Eco-friendliness and low carbon

China Telecom accelerated the green and high-quality development of its data centers by introducing such advanced green technologies as evaporative cooling, liquid cooling and distributed Li-ion batteries in new large/super-large data centers, renovating old ones and exploring the approach to green energies to create low carbon or zero carbon data centers. Efforts were made in full to build green and low-carbon 5G networks through low-carbon network construction, operation and O&M. Other actions included streamlining the network architecture, building all-fiber networks, and creating intelligent and minimalist IP networks to drive the continuous reduction of network energy intensity.

### Vigorous efforts to promote green, low-carbon operation of mobile base stations

The Guangdong Branch actively implemented the national strategic goals for carbon peak and neutrality, and promoted green and low-carbon operation and development models of mobile base stations. It took the lead in the industry in independent R&D of AI + big data base station platform for intelligent energy-saving, as well as independent research of intelligent algorithm for energy consumption prediction, algorithm for 4G/5G common coverage, etc. In 2021, 100% of its 4G/5G base station equipment achieved smart energy saving, equaling to more than 88 million kWh of energy throughout the year and saving 57 million yuan in electricity bills.

▲ In the Qiantou community east of the city, staff of China Telecom and China Southern Power Grid verified the differential protection service of distribution network based on multi-station, integrated 5G+MEC network

# Security and controllability

China Telecom shouldered its responsibility in securing key infrastructure, and accelerated the development of an end-to-end security capability system featuring "data integration, capability aggregation, unified architecture and open ecosystem". Based on cloud-network integration, it speeded up the pace of cloud integration, and built a security capability pool with nationwide coverage. It strengthened data-driven efforts in deploying security data centers at both CT group and provincial levels to enable aggregated processing of basic security data, threat detection and security situation prediction, providing security situation awareness across its assets.

### Tianyi Security Brain won the 2021 IDC Best in Future of Trust Award

In October 2021, the Tianyi Security Brain Project won the 2021 IDC Best in Future of Trust award, becoming the only telecom operator awardee. This award is designed for global cybersecurity and recognizes organizations that have always been trusted by their customers.

▶ In October 2021, Tianyi Security Brain won the 2021 IDC Best in Future of Trust award at the 6th IDC (International Data Corporation) Annual Ceremony for Digital Transformation hosted by the world-renowned IT market research institution.

# ENHANCE INNOVATION

## SOLIDIFY THE FOUNDATION FOR DIGITAL CHINA

Regarding technological self-reliance and self-improvement as the strategic support for corporate development, China Telecom accelerated the development of intelligent and comprehensive digital information infrastructure featuring "high-speed, ubiquitous access, space-ground connectivity, cloud-network integration, smart intelligence, agility, eco-friendliness, low-carbon, security and controllability". It promoted network coverage with high quality to bridge the digital divide between urban and rural areas. It ensured the secure and smooth network operation to support the development of the digital economy.

## Improve Network Coverage

### Service for remote areas

China Telecom conscientiously implemented the strategy of building national cyber strength by solidifying network foundation, vigorously promoting 5G and gigabit optical networks and continuously improving network coverage in remote rural areas with better network quality. In 2021, it undertook the task to construct the sixth batch of nearly 5,000 4G base stations for universal service, providing a solid network support to consolidate and expand the outcomes of poverty alleviation and to effective transition to rural revitalization.

**Overview of China Telecom Network Coverage in 2021**

| Optical network coverage in urban areas | Optical network coverage in townships | Proportion of southern administrative villages covered by fiber-optic broadband |
|---|---|---|
| **94.1%** | **91.3%** | **97.6%** |

| 4G network coverage among urban and rural population | Proportion of China's administrative villages covered by 4G networks | Proportion of user ports with fiber-optic broadband access at 100Mbps and above |
|---|---|---|
| above **98%** | **96%** | **93%** |

| In-flight internet traffic | Maritime broadband traffic | |
|---|---|---|
| **59.1** TB | **21.1** TB | |

**Universal service for economic development**

Since the start of the digital village project, the Tibet Branch was active in shouldering its responsibility and mission as a central SOE, with successive implementation of projects dedicated to rural network development: four batches of universal telecom service pilots, re-farming of 800MHz LTE in rural areas, fiber-optic broadband access in administrative villages within 5-kilometer diameter of townships, improvement of basic network capabilities in rural areas, 4G coverage in over 90% of administrative villages, fiber-optic broadband connection in over 90% of administrative villages, 4G coverage in over 90% of national highways (incl. scenic spots), etc. It built a total of more than 200,000 optical ports in administrative villages as well as more than 4,950 4G base stations, and laid more than 40,000 kilometers of various optical cables.

In 2021, the Haixi Branch overcame such challenges as poor construction conditions, long distances and construction difficulties brought by the permafrost, and actively discussed construction-related matters with local governments, townships and herdsmen, successfully completing the sixth batch of universal telecom services. As a result, it was awarded the "Industry Model" title by the Qinghai Provincial Communications Administration for this sixth batch of universal service pilots in 2021.



▲ In 2021, telecom network engineer from the Guizhou Branch went to villages to enable residential network access

**Communication services for special areas**

The Dulongjiang Town is located in the northwest boarder of Yunnan Province. Due to its unique landform with "two mountains alongside one river" and special geological structure, it is only connected to the outside world by a Level-4 highway that only accommodates the passage of an ordinary sedan and it is the last town in the country to achieve road connection.

Practicing the idea of "breaking all telecom silos", the Yunnan Branch set up a high-throughput, portable satellite station at Ka-band in the Dulongjiang Town, which was equipped with the "Tiantong-1" satellite phone self-developed by China to address poor communication quality whenever local fiber-optic cables were damaged and caused communication disruption.

▲ In 2021, the Yunnan Branch succeeded in installing the Ka-band high-throughput portable satellite station in Dulongjiang

# Support to coordinated regional development strategy

China Telecom conscientiously implemented major regional strategies and strategies for coordinated regional development, with solid progress made in major projects in the Beijing-Tianjin-Hebei region, the Guangdong-Hong Kong-Macao Greater Bay Area, the Yangtze River Delta, the Chengdu-Chongqing region and other regions.

**China Telecom Actions to Support Regional Development in 2021**

| Area | Action |
| --- | --- |
| Beijing-Tianjin-Hebei coordinated development | • The first phase of the Beijing-Tianjin-Hebei Big Data Intelligent Computing Center was officially completed and put into production in the fourth quarter of 2021 to support the national strategy of "West Computes Data for the East"<br>• Established China Telecom Digital City Technology Company and actively created digital city prototypes to further contribute to the development of Xiong'an<br>• Started the construction of China Telecom Smart City Industrial Park & Xiong'an Smart City Operation Center, playing an important role in promoting high-quality "new infrastructure" and smart city development in the Xiong'an New Area |
| Integrated development of the Yangtze River Delta | • Signed agreements including the Strategic Cooperation Framework Agreement for Deepening 5G Innovative Applications to Support the Digital Transformation of the Yangtze River Delta and the Strategic Cooperation Agreement between the Shanghai Municipal People's Government and China Telecom Corporation Limited during the 14th Five-Year Plan Period, further playing an important role in regional development<br>• Joined the Developer Alliance for Yangtze River Delta Demonstration Zone of Green and Integrated Development to integrate China Telecom's efforts into the development of the Demonstration Zone<br>• Held the first Science and Technology Festival · Yangtze River Delta Forum, during which the Yangtze River Delta Innovation Alliance, China Telecom-Shanghai Xinchuang (ITAIC) Ecosystem Cooperation Alliance and Joint Laboratory for Digital Life were inaugurated to enhance technology innovation capabilities<br>• Established Lingang Computing Power (Shanghai) Technology Company to undertake the special construction project of Lingang Global Data Hub |
| Development of the Guangdong-Hong Kong-Macao Greater Bay Area (GBA) | • Published the China Telecom Action Outline for Empowering the Development of Digital Greater Bay Area with the "1+1+3+1" structure, that is, 1 "new infrastructure +" digital base as the cornerstone, 1 digital hub as the core, 3 scenarios (digital government, digital economy, and digital society) as the pillar, and 1 digital ecosystem as the guarantee to empower the smart, digitalized GBA<br>• Initiated joint action on digitalizing GBA and discussed new ideas for digital GBA development, embracing the new development pattern of GBA |
| Chengdu-Chongqing dual-city economic circle | • Officially signed investment agreement on China Telecom Digital Industry Base in Western (Chongqing) Scientific City<br>• Sichuan and Chongqing cancelled long-distance charge on fixed telephony service, helping the Chengdu-Chongqing region become an important growth enabler for high-quality development |

**Empower the development of the digital economy in GBA**

On November 12, 2021, the Digital GBA Development Forum was held in Guangzhou on the occasion of the 2021 International Digital Technology Exhibition & Tianyi Smart Ecosystem Expo. Under the theme of "Cloud-enabled New Blueprint of the Greater Bay Area with Data-driven New Development Pattern", the forum fully demonstrated China Telecom's active response to the call on GBA development, firm implementation of the strategy of cloud migration and digital transformation, and active exploration in leveraging 5G and innovative cloud-network integration for practices in new types of supply of digital infrastructure, with a view to support the diversified development of a world-class GBA driven by smart intelligence.

▲ In 2021, the Guangdong Branch launched a joint action for GBA development together with representatives from Huawei, Inspur and other tech champions, scientific research institutions, associations, high-tech zones, etc.

▲ The Shanghai Branch worked with the Children's Hospital of Fudan University in the first 5G + blockchain application integration model. Relying on its advantages in private 5G network and the characteristics of blockchain, CT established the first 5G emergency referral system in China for newborns with difficult and critical diseases, with which the 120 ambulances could function as consultation centers - sick children were practically "checked in at hospital" the minute they got onboard the ambulance

▲ On September 28, 2021, the Sichuan Branch used cloud computing, big data, IoT and other technologies to create comprehensive smart tourism solution with Jiuzhaigou Scenic Spot, helping the efforts in build smart scenic spots

# Safeguard Secure and Smooth Network Operation

China Telecom has always stood at the forefront in network development and security. With a vision to "protect network security and provide first-class services", it solidified the security foundation of information infrastructure, improved intelligent security services and nurture network security ecosystem, making every effort to ensure secure and smooth communication for the sound development of the economy and society.

# Maintain network and information security

China Telecom complies with the Cyber Security Law of the People's Republic of China and other laws and regulations, conscientiously implements relevant requirements from the Ministry of Industry and Information Technology, the Ministry of Public Security and other ministries and commissions on network and information security, and cooperates with government bodies to crack down on cybercrimes in accordance with applicable laws. With the goal of building a security-oriented enterprise, it continued to strengthen corporate security capabilities and deployed security products.
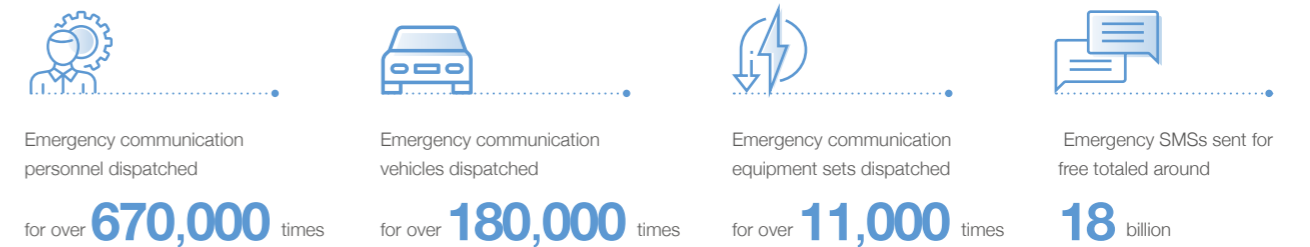
**Main Actions to Maintain Network and Information Security in 2021**

| Area | Main Measures | Examples of Results |
|---|---|---|
| Organizational and Institutional Building | • Continued to give play to the role of Chief Security Officer and promoted the monthly reporting system for greater security capabilities<br>• Formulated the 14th Five-Year Plan for network and information security around building a security-oriented enterprise | • Participated in the security chapter of the "Blooming Cup" 5G Application Competition, with 11 projects shortlisted in the final 30 security projects, and the "Practice in and Application of Security Service-based Platform for 5G MEC Applications" winning a First Prize<br><br>• Expanded industry-leading product and service series: DDoS attack protection, Tianyi Security Brain, Security Level Assistant, Trusted Communication, Anti-Fraud Online, etc.<br><br>• Jointly initiated the establishment of "Tianyi Industry Alliance for Network and Information Security" with renowned universities, scientific research institutions and partners |
| Capacity building | • Strengthened capabilities in cloud security protection and completed security level assessments for CTCloud resource pool<br>• Built secure 5G networks and continued to lay the security foundation for 5G<br>• Optimized the security product and service system, and promoted the development of cyber security ecosystem<br>• Continued to improve cyber security training system, and nurtured a team of politically reliable, highly skilled security professionals | |
| Hazard prevention and proactive service | • Carried out comprehensive investigation and rectification of risks and hidden danger<br>• Provided strongly support to protect a clean cyber space | |
| Guarantee for major events | • Completed cyber security-related tasks for major events throughout the year | |

### Road to the future protected by Tianyi

On March 26, 2021, the "Tianyi Industry Alliance for Network and Information Security" (hereinafter referred to as the Alliance) was officially established. The Alliance pooled ecosystem advantages in resources and collaboration to further improve the security of critical infrastructure, and vigorously promote the growth of the security industry with more, stronger and updated security products and capabilities, so as to support the development of informatization, create a clean cyber space and provide services to the people and the society for high-quality economic development.



▲ Publicity photo of the establishment of the Tianyi Industry Alliance for Network and Information Security on March 26, 2021

# Ensure unblocked communication

China Telecom faithfully fulfills its mission in ensuring secure and unblocked communication, fighting against earthquakes, typhoons, floods, landslides and other natural disasters, and guaranteeing communication for major events. It completed communication guarantee for flood control and disaster relief efforts in Henan, Zhejiang, Shanxi, Fujian, Hubei, Shaanxi, Guizhou and other provinces, and provided communication support to 8 major events including the International Import Expo in Shanghai, the Boao Forum for Asia and the 14th National Games.

### 2021 Emergency Communication Overview

Emergency communication personnel dispatched
for over **670,000** times

Emergency communication vehicles dispatched
for over **180,000** times

Emergency communication equipment sets dispatched
for over **11,000** times

Emergency SMSs sent for free totaled around
**18** billion

### Support to the successful convening of the 4th China International Import Expo

On November 10, 2021, the 4th China International Import Expo (CIIE) concluded in Shanghai, during which the Shanghai Branch demonstration various innovative 5G applications from 5G communication guarantee to digitalized network security protection.



▲ On November 10, 2021, staff of the Shanghai Branch tested signals together with staff from the CIIE organizer

### Cross-region interaction to support rescue and disaster relief against the typhoon "fireworks"

In 2021, the No. 6 typhoon "Fireworks" struck the Zhejiang Province severely. Against such backdrop, China Telecom immediately initiated the cross-region emergency communication guarantee plan, and organized a backbone team for over-the-air emergency communication platform from the Guangdong Branch, who travelled for 17 hours a day without any rest, to use the platform to provide over-the-air emergency communication network with high-throughput satellite routing for the Ningbo Emergency Command Headquarters and local residents nearby to assist efforts in disaster mitigation and relief.



▲ In 2021, the backbone team for over-the-air emergency communication platform from the Guangdong Branch was building over-the-air emergency communication network in disaster-stricken areas in Zhejiang

### All-out effort to guarantee smooth communication against rainstorm

In July 2021, an extraordinary heavy rainfall hit the majority places in Henan continuously. Overcoming difficulties including the shortage of communication equipment and materials, the Henan Branch took an urgent move in setting up a flood control and rescue commando to transport communication materials to the front line of disaster relief as quickly as possible, and made every effort to repair damaged computer rooms and base stations, in order to guarantee unblocked communication for the general public.



▲ During the "July 20" heavy rainstorm in Zhengzhou in 2021, China Telecom employees repaired communication facilities despite of numerous difficulties

# Strengthen Technology Innovation

China Telecom attaches great importance to the critical role of technological innovation in promoting high-quality development of the economy, society and enterprises. It regards technological self-reliance as the strategic support for corporate growth, with focuses on frontier research, cloud-network integration, network & information security and digital platform, and promotes technology innovation in a systematic manner in terms of strengthened technological innovation system layout (RDO), independent control over core technologies, more and greater achievements in innovation, enhanced nurturing of technology talent teams, deepened system and institutional innovation and facilitated R&D ecosystem, with a view to take solid steps towards "a technology-driven enterprise with independent control over critical technologies and joining the first camp of innovative sci-tech enterprises.

## Strengthen independent technology innovation

● China Telecom strengthened the role of technological innovation as the strategic support to enterprises, and continued to enhance the transformation of scientific and technological achievements, in order to gain greater influence in the industry.

More than 180,000 units of self-developed indoor distribution system (IDS) based on 5G frequency shift MIMO (multiple input and multiple output technology) was deployed in 28 provinces, reducing the comprehensive energy consumption per unit area by about 55% as compared with the digital IDS;

The self-developed lightweight UPF (user plane function) became the first in the world to complete the open N4 interface verification, and was selected in SASAC's first batch of Recommended Catalogue of Innovative Scientific and Technological Achievements by Central SOEs;

The self-developed smart energy-saving system for base stations was deployed in 31 provinces with a total of 2.83 million sectors, saving over 400 million kWh of electricity every year.

● China Telecom strove for breakthroughs in technology awards, patents and international standards.

In 2021, the number of applications for domestic invention patent and PCT (Patent Cooperation Treaty) by China Telecom increased by 3 times and 13 times respectively. Throughout the year, China Telecom led or jointly led the formulation of 46 international standards, with 981 contributions accepted by the International Organization for Standardization (ISO) and 46 people holding management positions such as ISO directors, chairmen and rapporteurs.

● "Technological Innovation and Industrialization of Ultra-Large Intelligent Backbone Routers" under joint R&D won the Second Prize of the National Science and Technology Advancement Award

● "Tiantong-1" satellite mobile communication application system project was selected as "the World's Leading Internet Technology Achievement"

● Authorized invention patent "Multimode Antenna and Base Station" won the Patent of Excellence at the 22nd China Patent Award ceremony

● "Cloud-based 5G Network and Product Development and Application" and "Critical Technologies and Applications of Autonomous Satellite Mobile Communication in Civil Application System" won a First Prize in Scientific and Technological Advancement awarded by China Institute of Communications

● Three international standards including "Interconnection of Ultra-Large Video Surveillance Systems" won the First Prize in Scientific and Technological Advancement awarded by China Communications Standards Association

**Lightweight UPF was selected in SASAC's Recommended Catalogue of Innovative Scientific and Technological Achievements by Central SOEs**

The lightweight edge gateway UPF independently developed by China Telecom Research Institute overcomes the challenge in unified access from new fixed-mobile converged bearer equipment on the edge, and supports data offloading, enhanced security services and capability sharing, with ultra-high throughput at 100Gbps, extremely low latency at microsecond level, software-hardware decoupling and flexible adaptation, ToB customization, etc.

▶ Lightweight UPF can promote the implementation of 5G applications for vertical industries, accelerate the layout of new 5G infrastructure, promote the development of open edge industries, and explore new directions for network development

# Develop the ecosystem for scientific research cooperation

China Telecom has intensified cooperation with the industry, universities and research institutes, strengthened the integration of upstream and downstream resources for innovation, worked with national laboratories, well-known universities and research institutes, and ecosystem partners in joint research to promote research through application and facilitate the application of quantum, cloud-network integration, security, AI and other major research achievements.

**Main Actions in Developing the Ecosystem for Scientific Research Cooperation in 2021**

| Area | Main Action |
| --- | --- |
| Quantum communication | Promoted the application of quantum communication technology and China-developed commercial encryption technology, with the commercial launch of the first operator's product for quantum encryption |
| Fundamental network | Promoted cooperative R&D of network equipment and operation platform, among others, and explored the transformation from traditional order-based procurement model to a new model of embedded cooperation, accelerating the replacement by independently produced local products with faster upgrading |
| Cloud computing | Carried out strategic cooperation on such as hardware chips, and software systems and other technologies for an upgraded version of innovation consortium |

**Strengthen scientific research cooperation for high-quality development**

China Telecom and the Northeastern University jointly established a laboratory for innovation through integrated industrial control and industrial networks, which used industrial "PON+5G" technology to build a "dual-Gigabit" optical network base for industry customers with improved industrial PON capabilities to satisfy different level of security requirements for different services under various scenarios.

▶ The Global Industrial Internet Conference was held in Shenyang, Liaoning Province from October 18 to 20, 2021. Under the theme of "Empowering Industry with 5G · Intelligent Cloud-Network Integration for the Future", China Telecom exhibited in its pavilion four core contents – "red" telecom history, new cloud-network integration, smart applications and secure industrial production

# Strengthen intellectual property management

China Telecom continued to improve its intellectual property management system with strengthened IPR protection. It conducted training and awareness activities on IPR protection and requirements in using pictures, fonts, audio-visual materials, etc. involved in corporate operation and management, and circulated relevant guidelines. It organized legal awareness campaigns such as the "World Intellectual Property Day" and the "National Intellectual Property Week" to raise IPR awareness among its employees. In 2021, it continued to strengthen invention patent application in the fields of 5G, cloud-network integration, network and information security, etc., increase patent protection for core technologies and products, enhance overseas patent layout and application, and improve IPR-related international influence and competitiveness to secure all its IPRs.

# OPTIMIZE SERVICES
## CREATE A BETTER LIFE TOGETHER

China Telecom adheres to "customer-centricity" and serves customers whole-heartedly. Drawing upon its own advantages, it provides support to the digital life and empower the digital transformation of the economy and society.

## Enjoy the Digital Life

Relying on its capabilities in cloud-network integration, China Telecom created digital entertainment, provided intelligent, customized household solutions, supported intelligent community management with applications such as smart access control and property management platform, and promoted the development of digital villages around rural governance and other applications.

## Digital entertainment

With 5G technology, China Telecom aggregated high-quality contents for e UHD, CTCloud Gaming, CTCloud-based VR and other applications to enable4K/8K UHD, 360° live broadcast, VR video, VR games and other experience scenarios across multiple terminals, bring user a new audio-visual experience in digital entertainment.

### e UHD

With advanced 5G technology, China Telecom aggregated high-quality contents to create a comprehensive video platform that boasts of 4K, UHD airdrop and 360° live broadcast scenarios, bringing users a new audio-visual experience with "New 5G Viewing".

### CTCloud gaming

With 5G network's large bandwidth, low latency, edge computing and other advantages in cloud-network integration, China Telecom built a premium service platform to provide high-quality content and cross-terminal experience for 5G users to enjoy the fun of gaming on-demand.

### CTCloud-based VR

With its capabilities to integrate 5G network and VR technology, China Telecom created super entertainment experience in the 5G era for users to enjoy VR videos, VR gaming and other entertainment services, indulging themselves in the immersive VR entertainment experience through the powerful 5G connection.

### "5G-based Tour in Guangxi on the Cloud" live cam streaming

In March 2021, on the occasion of the ethic festival on March 3 among the Zhuang ethic minority in Guangxi, the Guangxi Branch launched the live cam streaming service for scenic spots in the form of new media such as "cloud-based live broadcast, short videos and VR-based live broadcast", attracting 8 million viewings.

▲ In March 2021, staff of the Guangxi Branch were proving guarantee to the live cam streaming service for "5G-based Tour in Guangxi on the Cloud"

# Digital home

**Household WiFi**

Committed to providing users with high-speed, full-coverage, and scenario-based household WiFi solutions, China Telecom address the users' headaches caused by slow WiFi speed, poor coverage, difficult networking, difficulty in connecting smart devices, etc.

**e HD**

Based on its ultra-fast broadband network, China Telecom used set-top boxes and TV sets as receiving terminals to provide users with audio-visual products including video, education, gaming, reading, information services and other content services.

**e Housekeeper**

Based on its capabilities in intensive video operation platform and CTCloud storage, China Telecom provided users with home security and housekeeping products, through which users could check video logs stored both at home and on the cloud anytime, anywhere, so as to keep an eye on the elderly and children staying at home.

**Smart Home**

Drawing upon its advantages in cloud-network integration, China Telecom integrated various smart home terminals as well as product resources of ecosystem partners, to enable the interoperability of digital home, smart community, digital village platform and others, providing customers with comprehensive household information solutions.

### Smart home to "light up" the digital life

With the help of various terminals and communication methods such as WiFi, IoT, 4G and 5G, the smart home solution realized seamless network coverage, remote control of connected smart devices, security surveillance, home entertainment and other diversified and intelligent application scenarios.



## e Communication Assistant

Relying on 5G and AI capabilities, BestTone Information Service launched the new e Communication Assistant, whose system could provide missed call reminder, smart phone answering, voicemail and other functions for nearly 130 scenes in daily life such as real estate transaction, express delivery, job search, etc., with constantly expanded and updated scenarios.

### Main function

The missed call reminder notifies the owner of related information in a timely manner via SMS or WeChat push when his/her mobile number is inaccessible, busy or not answered because the phone is turned off/out service, so as to ensure that important calls are never missed.

Smart phone answering can select and configure an intelligent robot to answer incoming calls when the owner's mobile number is inaccessible, busy or not answered because the phone is turned off/out service. The robot communicates with the caller through several rounds of conversation to determine his/her identity and intention and records the whole conversation. When the call is over, a reminder is sent to the owner in real time via SMS or WeChat for the user to check.

Voicemail automatically transfers incoming calls to the voicemail box in the form of voice messages when the owner's mobile number is inaccessible, busy or not answered because the phone is turned off/out service. At the same time, the system will send related information to the owner in real time via SMS or WeChat, which is convenient for the user to check voice messages.

# Smart community

Through intelligent connection, equipment management, etc., China Telecom enabled real-time, automatic communication between residents, smart home appliances and public facilities within a community, improving the scientific, intelligent and refined community management and services.

### Build smart community platform

The smart community platform built by the Guiyang Branch was based on intelligent front-end equipment and big data, and used intelligent analytics to effectively curb improper behaviors such as throwing waste from higher floors, improving the sense of security and satisfaction of residents in the community.



"With the smart platform to oversee throwing of waste from higher floors and real—time video, the level of community governance and prevention was improved, and we feel much safer now."

——Xu Ruimei, head of the Village Working Team dispatched to Siyuan Community by Maling Sub—district Office of Xingyi City, Guizhou Province
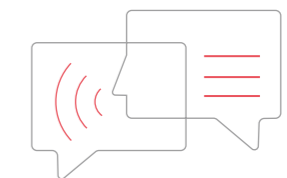
▲ The picture shows the large screen of the smart community platform built by the Guiyang Branch

**Create "smart" community governance**

Fujian CCS set out to ensure the sense of happiness of community residents and provided functions including community party building, flexible parking, epidemics prevention and control, policy release, neighborhood mutual assistance, service guide, voting, satisfaction survey, lifestyle guide, check on throwing of waste from higher floors, smart fuse and smart elderly care, taking into account actual conditions in the Shuixiang community in Fuzhou with focuses on five core scenarios – leadership by party building, safe community, community service, flexible parking, and property management - to build a new, digitalized smart community in Shuixiang, improve refined community management, strengthen the quality of property services, improve residents' living experience and create the sense of gain, happiness and security for a better community life.



▲ The picture shows local TV station promoting the smart community created by Fujian CCS

## Digital village

Based on the safe village program, China Telecom integrated its capabilities in village accessibility and IoT to build the "digital village platform" for digitalized village governance and smart life.

**"Cloud Platform for Digital Village" lights up the dream of a "beautiful village"**

Centering on the e Housekeeper capabilities, the Zhejiang Branch built the "Cloud Platform for Digital Village" based on 5G, AI, IoT, video, cloud-network integration, etc., to help create beautiful villages with strong organization, economic prosperity and unique characteristics.



▲ The picture shows the digital village platform built by the Zhejiang Branch

## Empower Digital Transformation

China Telecom strengthened the innovative application of digital information technologies with the launch of a series of digital capability platform based on cloud-network integration, and opened more than 2,000 "atomic capabilities" such as communication, cloud and security to the industry, introducing 50 core AI algorithms and 300+ scenario algorithms to build a digital ecosystem with industries and inject intelligence to empowerment socio-economic transformation and upgrading.

In 2021, China Telecom led the establishment of the Tianyi IoT Industry Alliance and the 5G Industry Innovation Alliance to jointly explore 5G empowerment for industries, generating 5G application solutions covering 20 industry categories and more than 200 scenarios. The commercialization project for customized 5G networks covered all 15 key industries in the "Set Sail" Action Plan for 5G application, with more than 1,200 projects implemented throughout the year.

### China Telecom 5G to empower thousands of industries

| 5G+ smart city | 5G+ smart manufacturing | 5G+ smart mining | 5G+ smart agriculture | 5G+ smart healthcare |
|---|---|---|---|---|
| **21** | **71** | **14** | **3** | **10** |
| 5G+ smart culture and tourism | 5G+ smart grid | 5G+ smartpPort | 5G+ smart iron and steel | 5G+ smart chemical industry |
| **7** | **13** | **11** | **8** | **13** |
| 5G+ smart education | 5G+ smart finance | ...... | | |
| **2** | **2** | | | |

## 5G+ smart city

China Telecom leveraged IoT, cloud computing, big data, blockchain, artificial intelligence, 5G and other new information technologies to promote the deep integration of informatization, industrialization and urbanization for the development of smart cities.

**Support to digital twins-based urban development**

The Shenzhen Branch and Tianyi IoT Technology joined hands with Nanshan District, Shenzhen, Guangdong Province in the benchmarking project of 5G empowerment to demonstrate smart city governance, and created the first "5G+AIoT digital twins perception platform" based on CIM and BIM technologies to establish 1:1 digital twin of the city for urban data integration; efficiently build the perception systems, networks and platform, so that the physical city and its digital twin could co-exist and map against each other, the city's operating conditions could be perceived in real time, and cloud-based urban platform could be built to share data and enable the rapid development of multi-scenario applications for smart city to meet various needs.
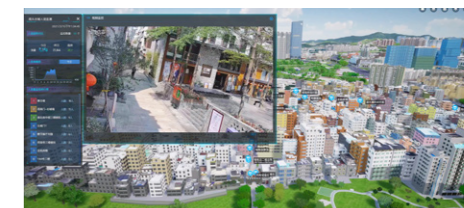


▲ The picture shows the large screen of "Shenzhen Wisdom"

## Some examples of functions

**5G private government network + 5G mobile phone**

Realized efficient coordination among more than 10,000 civil servants, law enforcement personnel and granularity-based management personnel in the whole region, so that governance could be done as easy as using one's arms to move one's hands

**5G light pole + camera + smart platform**

Efficient supervision to reduce traffic violations by electric bicycles by 56% year-on-year, with the casualty rate dropping by about 80% year-on-year

**5G base station + smart light pole**

Timely information delivery, diversion of crowds, emergency command

**5G unmanned vehicle**

Patrols, inspections and delivery of materials

## Empower government cloud

The Sichuan Branch and Yunshang Tianfu Technology jointly helped build Deyang into a smart city based on the "Chengdu on the Cloud" cloud computing center and the digital capabilities of CTCloud to build a government cloud.

The Deyang government cloud platform can support the business upgrade of 56 commissions, offices and bureaus in the city, as well as the upgrade and service relocation of 126 business units and 337 business systems; more than 100 smart application scenarios such as Deyang Connected Citizens and Deyang Online Office with "approval and processing done in seconds", to promote the implementation of the "1+1+3+N" (1 batch of infrastructure, 1 set of digital base, 3 information support systems and N smart demonstration applications) architecture for the new smart city Deyang.

The Deyang Branch followed the general idea of "one cloud for the whole city", with focus on three core needs - government affairs, people's livelihood and commercial services, to deeply nurture key scenarios such as the urban brain and the migration of district/county-level applications to the cloud, improve the development of the government cloud system, and create a first-class government cloud that laid a solid foundation for local smart city efforts.

On July 28, 2021, the Deyang Government Cloud was recognized as the "Top Ten Cases in Digital Government in 2021" at the 2021 Trusted Cloud Conference hosted by the China Academy of Information and Communications Technology (CAICT).



▲ In 2021, the Deyang government cloud project was recognized as one of the Top Ten Cases in Digital Government by CAICT

# 5G+ smart manufacturing

Committed to promoting the digital transformation of industries and enterprises, China Telecom relied on "5G + cloud-network integration + AI" to empower the manufacturing industry with greater digitization, interconnection and intelligence, to actively contribute to building an industrial powerhouse.

### From "manufacturing" to "smart manufacturing"

The Guangdong Midea Kitchen Appliance Manufacturing Co., Ltd. mainly engages in consumer appliances, HVAC, robotics and automation systems. It has 59 assembly lines with an annual production capacity of more than 40 million units. The production units need to frequently adjust the production lines, equipment and logistics layout according to marketing seasons, equipment's technical transformation, production capacity, etc. and the workshop networks also need to adapt to changes in the production line.

China Telecom, Huawei and Midea jointly established a special working group to formulate a complete 5G smart factory solution based on the actual production needs of Midea's Malong production base. It took them 16 months to build an industry-leading, 5G-based smart Midea factory, which integrated 5G into all aspects of production and operation to the greatest extent with 11 typical 5G + industrial Internet scenarios.

After the launch of Midea's 5G smart factory, it was expected to save 13% of CapEx each year, or about 3 million yuan, and 21% of OpEx, or 8 million yuan, with remarkable results in quality and efficiency improvement.

"Our production puts very high requirements on network latency, stability and security. With the help of 5G+MEC technologies, a series of technical problems were solved in construction, and now we have the leading smart workshops and factories. "

—— Liang Zhengfeng, Guangdong Midea Kitchen Appliance Manufacturing Co., Ltd.
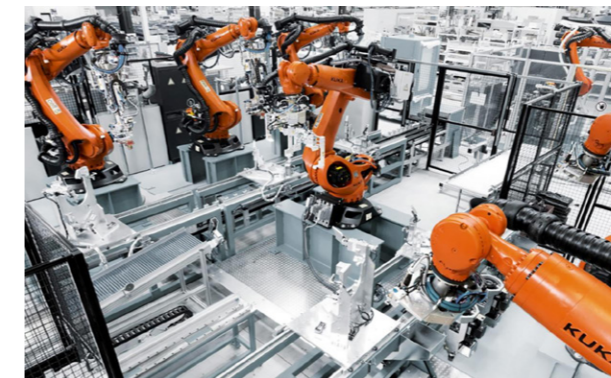


▲ In 2021, the robotic arm "danced freely" in the smart factory



▲ Panoramic view of Midea's 5G smart factory. 20,000+ data collection points were deployed in the campus, integrating various technologies to create a 5G+UPF+MEC solution to enable 11 5G+ industrial Internet application scenarios

### Create the digital twin for transparent factory

The Yuxi Xinxing Iron and Steel is located in Yuxi, Yunnan Province. Its business includes ferrous metal smelting and rolling, metal product processing and sales, coke and coking by-products, etc. Currently, it has an annual production capacity of 2 million tons, with a per capita production capacity of 630 tons per year. Since the Thirteenth Five-Year Plan period, it has set the goal to "replace manual labor with robots, automation and smart intelligence" in accordance with the upgrading requirements of the steel industry.

The Yunnan Branch used 5G technology to help the Yuxi Xinxing Iron and Steel to build a digital twin for transparent factory, setting an industry benchmark with high-standard information system and innovative applications in production safety management, manufacturing control, logistics and warehousing, campus management, etc.
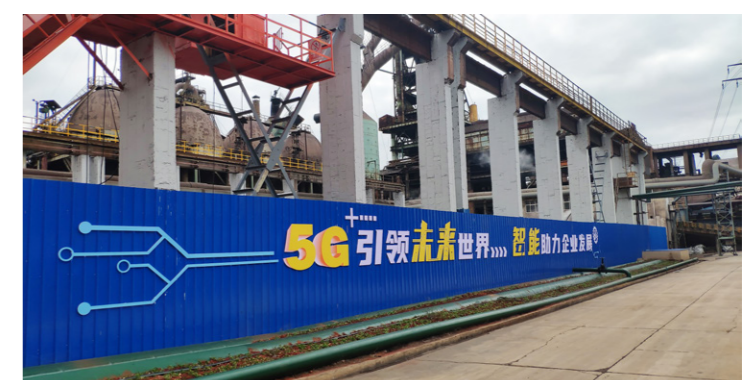


▲ The Yunnan Branch built a digital twin for transparent factory of Yuxi Xinxing Iron and Steel

**Some application examples of digital twins for transparent factory**

Taking the digital twin as the base, the once unconnected information could interact with each other, allowing data to be circulated throughout the entire process within the factory.

Used 5G networks to decouple crane transformation, reducing the cost from the original 2 million to 700,000 yuan, while enabling workers in the factory to see, control and manage the crane at a distance.

5G-based smart helmets solved the problem of lack of sight during manual operation, and tried the best to avoid contact with toxic and harmful gases in waste water, achieving zero injury, increasing production efficiency by 62.5% while directly saving more than 3 million yuan in labor costs each year.

Built an automatic billet conveying and tracking system by using MEC and visual AI technology to accurately identify the exact position of billets with a temperature above 1000 degrees in each transportation process, and to use data-driven PLC to control the start, stop and speed of the motor for process connection and monitoring to achieve automatic connection of multiple production processes in the production line. Reduced occupational hazards and safety risks caused by high temperature and was expected to save labor costs by 480,000 yuan per year.

# 5G + smart mining

China Telecom leveraged its technological advantages to build mine digitized and ICT-enabled mine sites for active perception, automatic analysis of and rapid response to mine production, occupational health and safety, technical support and logistical support to build smart mines.

### Build 5G-based smart mines

The Shaanxi Branch made full use of IoT, big data, cloud computing, artificial intelligence, digital twins and other new technologies to integrate various systems in smart coal mines for intelligent connection of massive mining equipment, interoperability and integration of system data, and unified network systems, in order to realize unmanned mining to the greatest possible extent to improve the overall safety at mine sites.



▲ Employees of the Shaanxi Branch provisioning equipment at a mine site of the Shendong Coal Group

# 5G + smart agriculture

China Telecom used cloud computing, big data, IoT and other new information technologies to provide real-time monitoring data, transaction data, planting guidance, agricultural product management, smart equipment management and other functions, effectively promoting the modernization of the agricultural industry and rural areas.

**Support to fully intelligent, digitalized rice planting**

The Shanghai Branch, the Tramy Group and the Wuhan University jointly set up an industry-university-research synergy team to build a demonstration area for 5G+MEC-based, fully intelligent and digitalized rice planting, with a view to monitor crop growth in real time and conduct data analytics for decision-making, saving water by 10%-35%, reducing the use of nitrogen fertilizer by 10%-30% while increasing the yield by 5%-20%.



▲ In 2021, employees of the Shanghai Branch were conducting field experiments

"The demonstration area for fully intelligent, digitalized rice planting realized innovations and breakthroughs focusing on 'fast speed, precision, accuracy and ease of use'. 'Fast speed' refers to the application of farmland machine vision in the demonstration area supported by 5G+MEC; 'precision' is achieved with the application management platform for 'collection−transmission−interpretation−simulation−decision-making'; 'accuracy' means to use AI and other technologies to accurately interpret data related to water, fertilizer, pests and crop diseases and predict yield; 'ease of use' means it's easy to be deployed with low cost and low threshold, thus suitable for large−scale duplication."

——Lu Ying, Deputy Director of Pudong Enterprise Customer Center of the Shanghai Branch

### Build smart beekeeping platform

The Tianyi Security Technology Company built a smart beekeeping management platform for Longnan City, introducing advanced digital technologies such as AI and mobile applications to built a brand-new hive management system and promoted digitalized, intelligent beekeeping.

**Build a digital management and command platform for smart beekeeping**

Based on the CTCloud's intelligent AI system, and with the help of HD display and conference system, security monitoring, digital beehives, etc., a digital management and command platform was built for smart beekeeping, enabling real-time monitoring and remote monitoring, product safety traceability, remote training, interactive communication, remote diagnosis and treatment, nectar distribution statistics, beekeeping assistance, etc., which improved the safety and convenience of beekeeping.

**Main functions of smart beekeeping management platform**
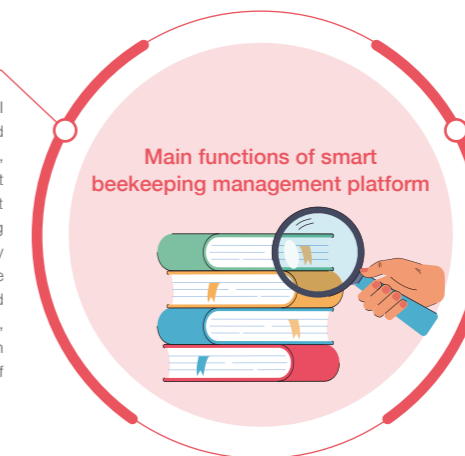
**Build digital hives**

Beekeeper can monitor honey collection on their mobile phones. Compared with traditional ones, digital hives are equipped with solar panels and QR codes. By scanning the code, beekeepers can learn the temperature, humidity, number of bees and other related information, reducing the insect risks and the workload of bees to clean their hives. It also reduces labor costs and energy consumption and increases honey production. During the bee-dividing period, beekeepers can use the mini-cameras installed on the hive to judge the willingness of the bee colony to divide themselves through AI-based analysis, obtain accurate predictive information on bee-dividing, and understand the safety situation of the bee farm area in real time.

At present, the smart beekeeping management platform covered tens of thousands of bee colonies, benefiting 26,000 beekeepers and saving 50% of labor costs. In 2021, a total of 400,000 boxes of bees were cultivated in Longnan, with the total output value of the bee industry reaching 280 million yuan. The beekeeping industry gradually formed a development model of "leading enterprises + cooperatives + farmers". In Liangdang County alone, 35 large-scale bee cooperatives participated in the planning of 100 large-scale bee breeding bases in the county, including 5 large-scale bee-breeding bases and 28 large-scale bee-breeding demonstration farms, improving the scale and standardization of bee breeding.

### The first 5G remote surgery for Kashin-Beck disease

On May 4, 2021, Lin Jianhao, a professor of Peking University People's Hospital and head of the medical expert group of the ninth batch of Fujian's Tibet Support Team, was in the teleconference center of Peking University People's Hospital and controlled robots of the People's Hospital of Karuo District in Qamdo, Tibet via China Telecom's 5G network to perform a hip replacement surgery for patients with Kashin-Beck disease 3,000 kilometers away.



▲ On May 4, 2021, the expert team of Peking University People's Hospital using 5G network to conduct remote consultation



▲ In 2021, the smart beehive collected data in real time to help beekeepers know the temperature, humidity, number of bees and other related information

> "What is the hive temperature and humidity now? In the past, we had to check the box every day, but now it's much easier – just check it on your mobile phone." "Check the data in the morning, and then at night, then you can clearly know where most honey is kept and the beekeeper team will moved there accordingly. You can also do tests in two places at the same time, and see which one is better, without having to visit multiple sites as in the past." "There is a card reader on the digital beehive door which gives you all data at a glance. You'll immediately how many bees are in and how many came out."
>
> ——Major beekeeper in Longnan, Gansu Province

### 5G for "rural access to medical services"

Adopting the "Internet +" model, the Guilin Branch extended public services to the countryside, leveraging the "5G + smart medical care" project to benefit the people from ICT development. The availability of high-quality medical resources at primary level saved "the trouble of visiting hospitals with smart connectivity". The rate of doctor visits in Gongcheng County increased from 70.2% in 2017 to 89.6% in 2020, providing more convenience to people in remote areas seeking medical care.

# 5G + smart healthcare

China Telecom leveraged its advantages in cloud-network integration, and drove the intelligent transformation of traditional health management and elderly care industries through the integration and innovation of 5G, cloud computing, big data and health and medical industries.



> "There are several cases of such telemedicine service each week, which effectively solve the problem in medical service availability and accessibility in remote towns and villages."
>
> ——Dr. Tang Renli, Remote Ultrasound Diagnosis Center, People's Hospital of Gongcheng Yao Autonomous County

▲ The picture shows a doctor in remote consultation

### 5G + remote nursing care

Remote nursing care is based on 5G and integrates edge computing, AI, XR and other information technologies. It uses limited medical manpower and equipment resources to extend care to the patient's bedside, provides mobile and remote services in disease diagnosis, monitoring and treatment, with more frequent interaction with the patients, and expands the coverage of medical capabilities of high-end medical services.

With the help of 5G networks, medical robots, panoramic cameras, VR glasses, etc., the family members of a patient can visit him/her by wearing a pair of VR glasses at designated places in the hospital. A medical robot equipped with panoramic cameras will automatically go to the bed of the patient, and send back 8K panoramic video in real-time via 5G networks, thus realizing immersive visit and conversation.

> "I haven't seen her since she was admitted to SICU after a successful operation on February 4. We can only know her conditions by calling the doctor. Although the doctor said that she was recovering well, we still feel worried since we can't see her. Today, through the VR visit, we finally meet each other. What a great relief!"
>
> ——Family member of Ms. Gao, the patient

# 5G + smart culture and tourism

China Telecom used various advanced technologies such as cloud computing, IoT and mobile communications, and relied on unique cultural and tourism resources to launch smart culture and tourism solutions for better quality of tourism services.



### "VR-enabled cherry blossom sightseeing"

In March 2021, the Wuxi Branch used VR technology to launch the "5G for Enjoying Cherry Blossoms" activity, under which citizens and tourists experienced "VR-enabled cherry blossom viewing" anytime, anywhere.




▲ On February 8, 2021, the Sichuan Branch assisted the West China Hospital of Sichuan University in the official application of the first 5G + medical robot + VR visiting system in SICU

### "Lanterns on the Cloud "

The Zigong Lantern Festival has a long-standing reputation. With a history of more than 800 years, it began in the Tang and Song Dynasties, flourished in the Ming and Qing Dynasties, and became a popular activity in the contemporary era. It is one of the most influential large-scale folk festivals in China promoted by the National Tourism Administration in foreign cities, boasting as the "Best Lantern Festival in the World".

In 2021, China Telecom assisted the Zigong Municipal Government of Sichuan Province and the Sichuan Provincial Department of Culture and Tourism to hold the Zigong International Dinosaur Lantern Festival, using 5G technology integrated with 4K, 8K, VR, AI loading, etc., on China Telecom's IPTV platform and e UHD APP to broadcast the Festival online, so that people across the country could experience the charm of the Zigong Lantern Festival from all angles without leaving their home.

In addition to China Telecom IPTV in 31 provinces, platforms such as CCTV, Tencent, iQiyi, Xiaodu, bilibili, Douyin and Kuaishou also broadcasted the Lantern festival on the cloud, with a total viewing of 372 million on major platforms.


▲ At 8 p.m. on February 12, 2021, the "Zigong Lanterns on the Cloud to Celebrate the Chinese New Year" activity was kicked off with the support of e Video

# 5G + transportation & logistics

### 5G-enabled fully intelligent Hairun Terminal at Xiamen Port

The Port of Xiamen has a cargo throughput of 207 million tons, ranking 7th in China and 14th in the world. Working at traditional container terminals can be very challenging: the operation of bridge cranes and gantry cranes requires multiple operators in different shifts. The operator sits in the cab 30 meters above the ground, bowing their heads and bending over to perform all operations, a labor-intensive approach with safety risks.

The private 5G network at Hairun Terminal formed wireless connectivity through three-dimensional coverage of multiple points and areas; by adding a small core network, it provided high-quality private network services with large bandwidth and low latency. The private 5G network ensured the security of data by moving the small core network closer to the edge (such as the Ruyi mode), so that the terminal data could be kept within the port area to prevent external failures from affecting the operation of internal networks.

Remote control against industrial-level communication requirements | Intelligent supervision requirements | Intelligent driving requirements | Device access requirements


▲ China Telecom staff provisioning 5G base station for the terminal


▲ Data monitoring in computer room for the Terminal

"The transformation of traditional container terminals to smart ones is a natural trend and an important part of the new infrastructure. 5G fully supports the intelligent development of the entire Hairun terminal. From automatic loading and unloading, automatic yard to unmanned driving, it helps the entire loading and unloading process of the terminal to be automated."

——Huang Zirong, Chief Engineer of Xiamen Port Holding Group Co., Ltd., a leading port enterprise in Fujian Province

"5G has become the 'neural network' of the smart terminal. In the smart transformation of the entire Hairun Terminal, 5G mobile communication network is like the 'neural network' of the entire terminal. Correspondingly, the 5G mobile communication network has played an essential role in the transformation of the Hairun Terminal." "The 5G transformation of the Hairun Terminal covered all production elements across the terminal, effectively supports the intelligent production management system, and reduces the cases when terminal operation is stopped due to any problem."

——Li Meizhen, Deputy General Manager of Xiamen Container Terminal Group Co., Ltd.

### Smart highway with easy toll collection

The Guangzhou Airport Expressway is a transportation hub between the downtown area and the northern area as well as the new Baiyun International Airport. There are countless entrances and exits to the expressway, and congestion often occur at peak hours on weekdays and on holidays. The frequent congestion leads to a decrease in the capacity of toll stations and affects the rapid passage of vehicles on the main line of the airport expressway.

Based on its big data and AI capabilities, the Tianyi Security Technology built China's first comprehensive digital twin solution based on multi-camera tracking for Guangzhou Airport Expressway, enabling high-speed passage without any toll poles and improving traffic efficiency, thus alleviating the congestion of airport expressways lasting for many years.

**Key features of the integrated solution for easy toll collection**

**01**
3D modeling

The Tianyi Security Technology connected map data by the airport high-speed intelligent transportation system, and represent key targets in the form of 1:1 digital twins in real-time, including equipment and facilities, traffic flow, and key vehicles.

**02**
Digital twin system

The digital twin system supported digital perception of license plate, car model, toll collection status, vehicle color, location and heading angle, and could track and analyze key vehicles from macro, micro, and first-person perspectives.

**03**
Intelligent precise coordinates guidance system

Used intangible approaches for toll gates on the main roads to get rid of ETC toll bars, precise instruction, collection of all receivables and alerts on abnormal payment.

**04**
Vehicle management

Distinguish the information of each vehicle and display it in the system to guide the vehicles that fail to pay the toll and push instruction information to the screen.

**05**
Low-latency response

The driver can get the information pushed by the system to the screen in time.

**06**
ETC's special situation processor

When a vehicle fails to pass the ETC toll gate, the driver only needs to follow instructions, place the ETC card on the special situation processor, and wait for the system to read such information as the entry toll gate to finish payment and continue the journey.

**07**
ETC's weather adaptability

Fully adaptive to the real environment on the highway, and can be used against low visibility such as at night and in heavy fog.
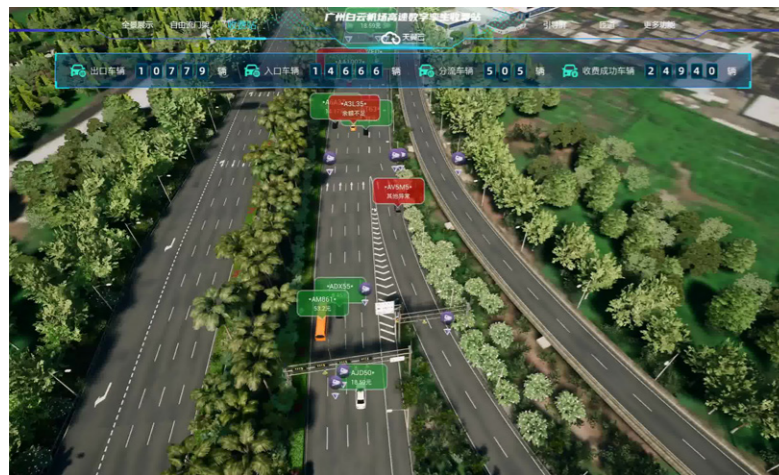
▲ Digital twins in transportation system: when a car is running on the road, systems deployed on the cloud can "see" its model, license plate and other information, so that an ETC system can directly collect the toll without the need for the car to slow down when passing the toll gate.
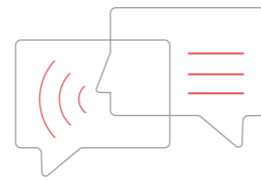
"With the ETC terminal for special situation, ETC-related special situations can be handled more efficiently with greater safety performance, significantly reducing congestions caused by ETC-related special situations."

——Zhong Yilin, Director of Operation & Control Center, Operation Branch of Guangzhou Communications Investment Group

### 5G-based smart aircraft maintenance

In 2021, the "5G+AR Remote Technical Support Platform" jointly developed by China Telecom and China Southern Airlines was officially launched in Chengdu and Kunming. To address deficiencies of traditional networks in supporting the use of AR glasses, such as network lags, disconnection and difficulty in locating problems, China Telecom gave full play to its own advantages to accelerate research efforts for breakthroughs in the field of 5G and AR, with a view to support the comprehensive application of AR technology in aircraft maintenance in civil aviation.



▲ China Southern Airlines maintenance team using AR-enabled smart glasses in aircraft safety check

# Serve Customers Attentively

Adhering to the concept of "customers first with attentive service", China Telecom has strengthened its service awareness, protected customers' rights and interests according to law, and improved customers' experience, to create a trustworthy image in an all-round way.

# Protect Customers' Rights and Interests according to Law

China Telecom implements national laws and regulations on the protection of rights and interests of customers and data security seriously, and has taken concrete steps to fully deal with communications fraud, harassing calls and spam messages.

**01 Implement the *Law of the People's Republic of China on the Protection of Consumer Rights and Interests and the Advertisement Law of the People's Republic of China* in earnest**

- Insist on providing products and services according to laws and regulations, strictly review the compliance of advertising, and continuously regulate the management of business charges.
- Revised the "China Telecom Brand Publicity Management Measures" by further strengthening the standardized management of advertising, preventing the risk of advertising management, and clear and strict prohibition of false publicity, exaggerated publicity, and comparative publicity, to maintain a good reputation in the industry.

**02 Actively put into effect the *Law of the People's Republic of China on Data Security and the Law of the People's Republic of China on Personal Information Protection***

- Implement internal systems such as "China Telecom Data Security Management Measures" and "China Telecom Management Measures on User Personal Information Protection".
- Improved the data security management system, further refined the data security management regime, promoted the implementation of standards for data classification and grading, important data identification, and data security compliance assessment, and carried out data security compliance assessment for key businesses and core systems, to timely identify and rectify risks.
- Carried out scenario-based user personal information protection in depth, and promoted the construction of user personal information "protection and risk monitoring platform, to improve the ability of autonomous discovery of risks.

**03 Take concrete steps in comprehensive governance**

- Strengthened the prevention and governance of phone numbers involved in illegal cases and fraud.
- Continuously deepened the control and governance of harassing calls and spam messages, and promoted in scale Tianyi Anti-harassment, a service that individual users can set up to intercept harassing calls. The numbers of reported harassing calls and spam messages have decreased by 31.7% and 19.7% respectively compared with 2020, remaining at low levels in the industry.

**Support Public Security Organ to Hunt down Fraudsters**

On September 26, 2021, the Ningxia Branch and the Anti-fraud Center of Yinchuan Public Security Bureau worked together and successfully rooted out a criminal gang that provided tools for overseas online fraudsters, and captured five suspects involved, with the amount involved being about 830,000 yuan.

**Live Streaming Activity on Anti-fraud**

The Shandong Branch cooperated with Shandong Provincial Public Security Department in organizing a special live streaming activity of "Police-enterprise cooperation on anti-fraud for all", which was watched by 190,000 people, won 12,000 likes and comments, and forwarded for nearly 50,000 times.

**Tianyi Anti-harassment Service Rolled out**

Tianyi Anti-harassment adopts big data and cloud-based intelligent interception and protection technologies to provide users with autonomous interception management services. In 2021, it safeguarded its 200 million registered users for 71.6 billion times, and intercepted 560 million calls.

# Improve Customers' Experience

Following the customer-oriented principle, China Telecom has carefully analyzed and studied the service problems pointed out by consumers, regarded every user complaint as a valuable opportunity for service improvement, and actively promoted problem solving, to drive digital service transformation, and continuously improve smart service capability and service quality.

| Area | Main Actions | Results |
|---|---|---|
| **Special actions to improve customer satisfaction** | • Promoted the solution to problems with concentrated user complaints, such as insufficient mobile network coverage in some areas, long waiting and handling time for businesses, and difficult connection with human customer agent.<br>• Implemented intensive operation of hotline service to government and corporate customers, with special seats in place in 31 provinces.<br>• Intensified the key capacity of the 10000 hotline service, and promoted the idea of "calling 10000 when you have a difficulty in business" by providing one-click connection with human customer agent for senior customers aged at 65 and above.<br>• Continuously promoted the reform of elderly-oriented services to provide convenient communications services for the elderly. | • Launched a new version of service navigation speech, and made the transfer from intelligent customer service to human customer agent easier to meet the needs for human agent services.<br>• Enabled customers to enjoy human-oriented remote services under 36 scenarios including anti-fraud and real-name based business handling without leaving home to feel as at the business hall. Such services are provided for 500,000+times in a month in average.<br>• Realized full digitalization of customer agent service: continuing to promote the rectification of work order dispatch for 5G, tariff and other hot service issues, and establishing an analysis model to find out the reasons for customer dissatisfaction; embedded an application of "management listening to 10000" within the Group to improve the customer voice transmission mechanism. |
| **Regulated product publicity** | • Kept optimizing the business registration form displayed to customers.<br>• Standardized the product name, remarks, warm tips and other contents, and presented the items in the business registration form in a unified order. | |
| **Promoted digital transformation of services** | • Further developed intelligent voice services, and expanded video-based remote counter service and other digital service methods, enabling customers to enjoy human-oriented service without leaving home. | |

## 📖 Elderly-oriented Service to Benefit More

The Lanzhou Branch delivered timely help in technological services to the elderly and solved the problem of digital gap in communications among the elderly group through parallel operation of traditional services and smart, information services, and through combination of online services and offline channels.

## 📖 Online Service to Feel as in the Business Hall

The "10000 remote counter" of the Hubei Branch has been able to provide 30 service functions in six categories, including SIM card replacement/change in different places, reporting of mobile phone loss /cancel of loss, out of service/service resumption, PUK code query, call transfer, broadband remote tutoring, etc., to provide users with one-stop, intensive customer service of "handling business at home".

## 🔴 Remote Counter Service of 10000 Hotline

The 10000 hotline remote counter service has integrated the convenience of online channels with the service scenario of face-to-face communication at the counter to provide users with counter services through video, voice and text interaction, making them feel as at the business hall without leaving home. With the service orientation of solving user problems, the remote counter continues to include new business handling scenarios. By the end of 2021, it had expanded from 14 service scenarios when it was just launched to 36.

The service scenario of "out of service for violation of regulations and remote resumption" has made remarkable effects. The remote counter provides video-based live detection, human-ID card comparison, ID card verification and other real name authentication methods for customers via the all media integration service platform, which not only safeguards the information of customers, provides convenience for remote service resumption, but also saves valuable time for customers. By the end of December 2021, the "out of service for violation of regulations and remote resumption" service scenario had provided service to customers for 166,600 times in a month in average, with the average acceptance time being 193 seconds, greatly reducing the travel time of customers to the business hall site and the queuing time to wait at the hall. The customer satisfaction rate reached 99.39%, up by 0.78 percentage points year on year, and the first-call resolution rate was 99.17%, up by 0.24 percentage points year on year.


▲ In 2021, the remote counter staff of 10000 hotline of the Qinghai Branch was solving business problems for a customer

**By the end of December 2021**

Monthly average service of "out of service for violation of regulations and remote resumption" service scenario

**26,830** times

Average acceptance time

**153** seconds

| Customer satisfaction rate | YoY increase by | First-call resolution rate | YoY increase by |
|---|---|---|---|
| **98.61%** | **2.6%** | **98.93%** | **2.7%** |


▲ The Shanghai Branch supported Shanghai's unified taxi platform "Shencheng Chuxing" to build intelligent taxi hailing phone booths by providing one-button smart car hailing screens for public phone booths, which have satisfied the daily travel needs of more people, enabling everyone to fully experience the efficiency and convenience of a digital city. The picture shows an intelligent taxi hailing booth on Yuyuan Road in Shanghai in December 2021


▲ In April 2021, the Changchun Branch held a micro lecture on anti-telecommunications fraud, where the staff explained common fraud means, relevant national regulations on real name registration system and legal responsibilities to users in detail, to raise their awareness of anti-fraud

Implementing the people-oriented development idea, China Telecom carried out special improvement work for satisfactory services in 2021, and tackled customer dissatisfaction problems in different fields to improve service quality. The measures include: actively organizing anti-fraud campaigns, strengthening the prevention and governance of fraud involving phone numbers, and promoting the governance of large data traffic cards and pluggable SIM cards, and special rectification in Internet of Things and other fields; unblocking users' appeal and complaint channels through 10000, online business hall, physical business hall and other channels; organizing "Day for Consumers' Rights and Interests", "General Manager Service Day", "Listen to 10000" and other activities to enhance communication and interaction with users; and carrying out an activity of "the general manager of the business department talking about service", to plant the service concept into everyone's mind, and promote all staff service.

| Main Actions | Specific Work and Results |
| --- | --- |
| Carried out broadband customer satisfaction prediction and improvement of perceived poor quality | • Built AI prediction models for "dissatisfied users" identification, in which 20 provincial companies achieved independent modeling, and 11 provincial companies joined hands with the Group Company for modeling<br>• Gathered more than 200 customer perception indicators of 6 types for governance<br>• Improved the ability to dispatch repair orders in a digital way and improved the poor broadband quality for 3.6 million users |
| Pushed forward intelligent management and control of complaints | • Achieved AI empowerment in the whole process of before, during and after the event. 25 provinces have completed the development of mandatory functions according to the specification requirements and passed the acceptance, initially realizing the expected goals of automatic complaint production, visualized complaint management and control, and intelligent complaint analysis |

# Service to Customers along the Belt and Road

China Telecom provides services to overseas customers through China Telecom Global Limited (hereinafter referred to as China Telecom Global) and China Communications Services International Limited (hereinafter referred to as CCS International, or CCSI), a wholly-owned subsidiary of China Communications Services Co., Ltd. (China ComService), and is committed to providing customers with efficient and high-quality communications solutions and comprehensive, intelligent information services, and actively performing social responsibilities in combination with the actual conditions of relevant countries/regions.

## Overseas Business and Service of China Telecom Global

China Telecom Global Limited provides comprehensive and high-quality information service solutions for international operators, multinational enterprises and individual customers (mainly overseas Chinese), including Internet access and transit services, data services, bandwidth services, unified communications services, data center services, cloud computing services, ICT services, fixed and mobile voice services, mobile virtual operation and global IoT connection services, professional customization services, industry solutions, telecom operation consulting and service outsourcing services. At present, China Telecom has 53 submarine cables in the world with a transcontinental capacity of 96T and 231 overseas PoP nodes. The Company will continue to be committed to creating value for customers' business transformation, and help customers achieve globally competitive advantages with world coverage, continuous growth and digitalization.

## Overseas Business and Service of China ComService

The products and services of China Communications Services Co., Ltd. cover three pillars – "Telecommunications Infrastructure Service (TIS)", "Business Process Outsourcing (BPO)" and "Applications, Content and Other Services (ACO)", including design, engineering & construction, supervision, network maintenance, channel services, facility management, IT application services, value-added voice services, value-added Internet services and other services. As of the end of 2021, the businesses of China ComService had covered China and dozens of countries and regions around the world, with the overseas customers mainly concentrating in Southeast Asia, the Middle East and Africa.

## Optical Fiber Connects the World and Lights up the African Dream

In 2021, Kenyan Company joined hands with Ahadi Wireless Limited to launch low-cost but high-quality home network services, and developed 65,000 registered broadband users just in two areas of Nairobi, including Githurai 44.



▶ In 2021, the Konnect School in Nairobi was providing free courses in language and culture for local teenagers with the help of high-quality distance education system

## Officially Full Commercial Use of DITO

On May 17, 2021, DITO Telecom, the third full-service telecom operator in the Philippines, and an overseas operation project of China Telecom, was officially put into full commercial use. DITO Telecom has operated network in more than 100 cities throughout the country, with network coverage of more than 48% and population coverage of more than 31 million, approaching one third of the national population of the Philippines.

Since its full commercial use, DITO has continued to build a stable and unobstructed network, provide professional customer service, and roll out highly competitive communications packages. With efficient market strategies and all-round promotion, one month after its full commercial use, DITO has developed more than one million users!



▲ In 2021, DITO carried out offline promotion in Manila, the capital of the Philippines

## Won the "International Customer Relationship Excellence Award" for the 10th Consecutive Year

On November 12, 2021, the 19th "International Customer Relationship Excellence Award" (2020-2021) ceremony was held in Hong Kong by the Asia Pacific Customer Service Consortium (APCSC). China Telecom won two corporate team awards and nine individual awards. This was also the tenth consecutive year that China Telecom had won the "International Customer Relationship Excellence Award".



▲ On November 12, 2021, the awarding site of "International Customer Relationship Excellence Award"

# REFINE ACTIONS
## HELP BUILD A HARMONIOUS SOCIETY

China Telecom continues to meet the people's growing needs for a better life, adheres to the concept of green development, and strives to realize the "dual carbon" goals of the country and the green and low-carbon requirements of the industry. We have made every effort to effectively link the work in consolidating and expanding poverty alleviation results with rural revitalization. We are enthusiastic in social welfare, and take normalized measures in COVID-19 prevention and control, to fully demonstrate the responsibility of a central SOE.

## Practice Green Development

### Build Green Networks

In 2021, China Telecom exerted efforts on green development and strictly controlled the growth of total energy consumption and the PUE (power usage effectiveness) value of large and super large data centers. We continued to use the contract energy management model to introduce social capital and technology to carry out energy-saving and emission reduction transformations while using our own special funds to support the orderly implementation of those work. We vigorously promoted the large-scale application of self-developed AI energy saving and other 4/5G base station intelligent shutdown technologies to improve the energy efficiency of base stations, which saved about 500 million kilowatt hours of electricity and about 375 million yuan of electricity bills in 2021. We proceeded the withdrawal of inefficient equipment and computer rooms from the network, and advanced configuration optimization of supporting facilities in computer rooms, to reduce power consumption and improve power efficiency. Through the joint construction and sharing of 4/5G base stations with China Unicom, we have saved more than 10 billion kilowatt hours of power and reduced emission of over 6 million tons of carbon dioxide annually. The comprehensive energy consumption per unit of information flow in 2021 was 3.7kgce/TB.

**Main Achievements in Promoting Energy Efficiency and Emission Reduction in 2021**

Comprehensive energy consumption per unit of information flow in 2021
**3.7** kgce/TB

Power saved by base stations
**500** million kWh

**Main Actions to Promote Energy Efficiency and Emission Reduction in 2021**

| Category | Main Actions and Progress |
|---|---|
| Management on energy efficiency and emission reduction | • Compiled a three-year rolling plan for energy conservation and emission reduction, and clarified the goals and key measures for "dual control" of total energy consumption and energy intensity.<br>• Detailed the assessment, reward and punishment system, and strictly controlled the growth of total energy consumption, and the PUE (power usage effectiveness) value of large and super large data centers.<br>• Established and improved the statistical monitoring system of energy consumption, organized training and exchange on energy conservation and emission reduction to improve the professional level of grassroots staff, and continuously promoted innovation in energy conservation and emission reduction management. |
| Elimination of outdated production capacity | • Continued the withdrawal of inefficient equipment and computer rooms from the network, and advanced configuration optimization and redundancy removal of supporting facilities in computer rooms, to reduce power consumption and improve power efficiency. |
| Energy efficiency and technological reform | • Vigorously promoted the scale application of self-developed AI and other intelligent shutdown technology for 4/5G base stations, to improve the energy consumption efficiency of base stations.<br>• Continued to use the contract energy management model to introduce social capital and technology to carry out energy-saving and emission reduction transformations while using our own special funds to support the orderly implementation of those work. |

## Energetically Promote New Operation for Green and Low-carbon Mobile Base Stations

The Guangdong Branch was the first in the industry to independently develop a smart energy saving platform for base stations based on AI + big data, and developed smart algorithm on energy consumption prediction, 4/5G total coverage algorithm, etc. In 2021, it saved more than 88 million kWh of energy and 57 million yuan in electricity costs.
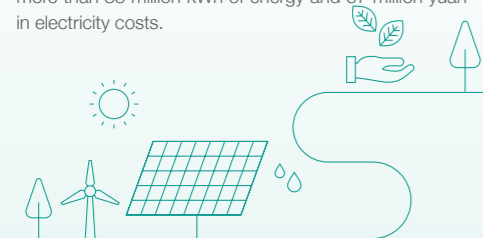
# Promote Green Supply

China Telecom has earnestly implemented the Bidding Law of the People's Republic of China and other procurement related laws and regulations, put into effect the "Procurement Management Measures of China Telecom Group" and other rules, actively responded to national policy adjustments, and continued to improve the supply chain system. In 2021, "China Telecom Group Procurement Evaluation and Testing Management Regulations (Provisional)", "Interpretation of Provisions of China Telecom Group Procurement Management Measures (Version 2021)" and other management systems were formulated or optimized. The Company sticks to a supply chain management concept with value procurement, sunshine procurement and green procurement as the core, perseveres in sincere cooperation with suppliers for mutual benefits and win-win results through enhanced communication, to drive suppliers to jointly fulfill social responsibilities.

In 2021, China Telecom kept promoting open procurement and bidding. Based on the requirements of the internal management system, the Company took multiple measures in parallel to drive suppliers to improve their performance and service levels in executing the contract. We implemented an information sharing mechanism with major domestic basic telecom operators on suppliers violating regulations and breaking promises, took incentive measures for outstanding suppliers, and disciplinary measures against unqualified suppliers. During the year, 109 cases of suppliers' misconducts involving collusive bidding, false bidding, refusal to perform the contract, and violations of discipline were handled. With list-based management approaches, object identification standards, and open handling rules, China Telecom is gradually building a supplier management system that combines positive incentives with negative punishments, to raise the awareness of suppliers in performing contracts and services, and promote them to cooperate in good faith.

## China Telecom Released the First Batch of Strategic Cooperation Suppliers and A-Level Product Suppliers

On November 12, 2021, China Telecom, together with 36 well-known enterprises in the industry, held the first E-Surfing Forum for Supply Chain in Guangzhou. During the conference, China Telecom released the first batch of strategic cooperation suppliers and A-level product suppliers, and commended relevant suppliers.

▲ On November 12, 2021, China Telecom released the first batch of strategic cooperation suppliers

China Telecom insists on giving priority to resource-saving and environment-friendly products, and promotes suppliers to jointly respond to climate change. We are active in building a green supply chain by incorporating green and low-carbon factors into the supplier evaluation system, carrying out a whole life-cycle cost management of the supply chain, increasing the deployment and application of energy-saving and low-carbon products, applying green procurement indicators to the procurement process, including environmental impact factors in the marking of a procurement project, and propelling suppliers to raise their awareness and ability of environmental protection. In 2021, we used air conditioning products and transformers with level-1 energy efficiency defined by the national standard, and intensified the examination of power consumption in the product life cycle, the weight score of which was about 30% higher than that of the previous batch. We promoted green production, green packaging and green warehousing and logistics by conducting a pilot project of new-energy freight vehicles in urban areas, and increasing the proportion of green recyclable packaging in the supply chain. In terms of supplier inspection, we have included production waste and other elements into the inspection scope. In terms of management of suppliers' misconducts, adverse impacts incurred by environmental protection related issues are included as a bad behavior of supplier for management, which covers all suppliers.

# Promote Green Projects

China Telecom has earnestly implemented the implementation opinions of the Ministry of Industry and Information Technology (MIIT) and the State-owned Assets Supervision and Administration Commission (SASAC) of the State Council on promoting co-construction and sharing of telecom infrastructure, and actively promoted the joint construction and sharing of communications infrastructure, such as base stations, pipelines and pole lines, which have effectively reduced repeated construction, protected the natural environment and landscape, and saved the consumption of land, energy and raw materials. Through promoting co-construction and sharing, China Telecom and China Unicom have created a new model of 5G construction and operation, laying a solid foundation for a new pattern of coordinated development in the domestic industry, and contributing Chinese solutions and wisdom to the win-win cooperation among global large enterprises.

In 2021, China Telecom comprehensively deepened co-construction and sharing with China Unicom in various fields. We accelerated the 5G construction, and opened 300,000 new 5G base stations while overcoming the impact of the pandemic and difficulties in procurement and supply. We gave full play to the complementary advantages of both sides in network resources, strengthened 4G/5G collaboration, took active measures in co-construction and sharing of 4G networks, and sped up the integration of 4G stock resources and the use of old stations. Within the year, 460,000 shared base stations were put into service, making the cumulative number of such 4G base stations exceed 600,000. More than 19,800 km of shared pole lines and 1,200 km of pipelines were provided.

The number of shared 4G base stations in service between the two parties

## 600,000+

## Comprehensively Deepened Co-building and Sharing with China Unicom

On December 6, 2021, China Telecom and China Unicom signed a "Memorandum on Comprehensively Deepening the Strategic Cooperation in Co-building and Sharing".

China Telecom has formulated the "China Telecom Management Measures for the Protection of the Electromagnetic Environment of Communications Base Stations (Trial Draft)" in response to the problems concerned by the government and the public, including cultivated land protection, equipment contamination, construction impact and electromagnetic radiation in the construction of communications projects, implemented environmental assessment and other environmental protection measures to ensure that the government regulatory requirements are met, and communicated with the public.

Give preference to the original premises and wasteland in selecting the site for base station construction to protect the cultivated land.

Field communications route survey should avoid mineral deposits, forests, grasslands, wildlife, natural relics, cultural relics, nature reserves, scenic spots, and other areas as much as possible. Try to avoid changing the surrounding environment when laying optical cables.

**Cultivated land protection**

**Equipment contamination**

**Construction impact**

**Electromagnetic radiation**

Give preference to equipment with no noise, no electromagnetic radiation, and no pollutants.

Monitor and evaluate the electromagnetic environment around the base station, strengthen communication with the community, and accept public supervision. Strictly control the quality of networked equipment and maintain a strict standard from the source. Adopt advanced technologies and refine the layout of base stations to ensure that electromagnetic radiation indicators are better than national standards.

- **5G BBU Spray Liquid Cooling System for Green Energy Saving**

Aiming at the pain points such as high power consumption and unscientific air flow organization of 5G base station equipment, China Telecom Research Institute worked with Guangdong Hi-1 Technology on liquid cooling technology. Taking into account the structural characteristics of BBU equipment, the first BBU spray liquid cooling solution was released, which is characterized by safe changes, efficient operation and easy maintenance. Now, the product has been widely used in the branches of Chongqing, Zhejiang, and Guangdong.

# Promote Green Office

Complying with 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, and implementing the "Energy Conservation and Emission Reduction Management Measures of China Telecom Group", we have applied the requirements of energy conservation and emission reduction to network planning, procurement, construction, operation, office and other production and operation activities, established and improved the energy consumption statistics and monitoring system, and organized training and exchange on energy conservation and emission reduction, to improve the professional level of grassroots personnel, and continue to promote innovation in energy conservation and emission reduction management.

Promote water conservation and strive to reduce water consumption per unit of operating income. We advocate water conservation, and post water-saving tips at water facilities and appliances. We take continuous efforts to strengthen the management of water resource usage, carry out sewage discharge treatment, promote the recycling of production water, and actively use reclaimed water to replace tap water on the premise of meeting water requirements. We promote and popularize water-saving appliances, and regularly inspect and repair all links of the water supply system to prevent continuous water running, water dripping and leaks. Compared with the previous year, the total water consumption decreased by 1.21 million tons or 3.4% in 2021, and the water consumption per unit of operating income reduced by 13.5%. We have set a goal of total water consumption for 2022, which is no more than the average of water consumption in 2019 - 2021.

Promote the saving of paper and reduce the use of paper in business and office. We advocate saving paper and take technical and institutional measures to reduce its use. We have accelerated the digital transformation of the procurement supply chain, vigorously promoted e-procurement and e-order application for paperless operation in the whole supply chain process. We continue to promote electronic management of accounting files, electronic VAT invoices, electronic reimbursement filing and paperless operation of electronic invoices, and advance the direct online connection between the tax authority and the enterprise for tax declaration to reduce the use of paper documents.

Strengthen the recovery, disposal and utilization of waste materials, to save materials as much as possible and reduce environmental pollution. We abide by the principles of recycling and disposal of waste materials, divide responsibilities and management, and require qualifications for recyclers. We standardized the disposal forms and procedures, specified the approval authority and process of disposal decisions, efficiently cleaned up hazardous and harmless wastes and organized experience exchange, to effectively prevent disposal risks.

In 2021, we continued to enhance the professional management of waste, and propelled the standardized recycling and disposal of waste batteries, waste cables and waste terminals. In view of the large number of heavy metals, waste acid, waste alkali and other electrolyte solutions contained in waste batteries, improper disposal will cause environmental pollution.

Compared with 2020, the total water consumption in 2021 decreased by

**121** million tons

With a reduction of

**3.4%**

The water consumption per unit of operating income reduced by

**13.5%**

★ In centralized procurement, the bidder is required to be an enterprise in the list of green factories or clean production model enterprises announced by the MIIT. It must meet the "Lead Battery Industry Access Conditions" and pass the regulatory review. It must promise to recycle the used batteries.

★ A recycling and disposal management system for used batteries has been established, which requires to hand over waste copper cables to a professional third party for recycling and disposal; to extend the service life of lead-acid batteries and improve their service efficiency by promoting the development of optical fiber and increasing the investment in network operation and maintenance.

In 2022, China Telecom will continue specialized waste management, adhere to the principle of "recycling as much as possible", make public recycle and disposal of used batteries, waste cables, and waste terminals, and standardize the disposal operation to improve the disposal efficiency through the integrated whole-process disposal procedures.

# Promote Green Applications

China Telecom makes full use of the new generation of ICTs to build intelligent production and smart service solutions, to meet the needs of digital transformation in all walks of life, reduce energy consumption and carbon emissions, and contribute to the building of low-carbon production and green life.

## "Dual Carbon" Action Plan Released

On August 25, 2021, the National Low Carbon Day, China Telecom held a press conference in Beijing on "Energy Saving, Carbon Reduction and Green Development - China Telecom's Action Plan for Carbon Peaking and Carbon Neutrality".

## "Cloud Brain" Supports the Building of "Double Mountains Bank"

The "Double Mountains Bank" is an operation platform for Changshan City to capitalize the rights and interests of the owners of ecological resources under the guidance of the concept of "lucid water and lush mountains are invaluable assets", which established a three-tier conversion of resources, assets and capital under the premise of protecting the ecological environment.

The Changshan Branch has built a multi-dimensional and multi-level smart cloud brain platform for communication in the digital field through digital means. It is not only conducive to resource management and accurate positioning of required resource assets, but also good for integration of ecological resource projects, greatly improving the efficiency of investment promotion, and promoting the precise implementation of projects. By integrating the ecological resource data of various departments, it drives the optimization of the whole industrial chain and structure of ecological resources with data, improves the efficiency of activation, enhances the attractiveness of resources to capital, drives the growth of village collective economy, and finally makes efficient use of idle resources and increases the income of resource owners.

"Things that were previously unimaginable have become operable. This small step of success has greatly promoted the development of the stone industry. Stone can be mortgaged, and the stone industry will usher in a new spring."

− Mao Chuncai, person in charge of Zhejiang Yichen Culture and Arts Co., Ltd.

▲ The Cloud Brain system platform built by the Changshan Branch

# Assist Rural Revitalization

The year 2021 was the starting year for consolidating and expanding the achievements of poverty alleviation and effectively connecting with rural revitalization. China Telecom thoroughly studied and implemented the spirit of General Secretary Xi's important instructions on rural revitalization, resolutely implemented the relevant decisions and arrangements of the Party Central Committee and the State Council, placed rural revitalization in a more prominent position, grasped the "three insists", deepened the "three enhances", and promoted the "three transformations". The Company has won for four consecutive years the highest grade of "excellent" in the assessment of the effectiveness of targeted assistance from the central units, helped the Group's four designated counties and two paired-assistance counties for poverty alleviation (hereinafter referred to as "4+2" counties), and 1,438 designated villages of companies at all levels basically achieve the effective connection between poverty alleviation and rural revitalization, promoting the whole Group's assistance work to a new level. The Company won four national honors such as the advanced collectives and individuals in national poverty alleviation summary and commendation. The assistance work has been highly recognized by the Party and the state.

**Main Actions for Rural Revitalization in 2021**

| Category | Main Actions |
|---|---|
| Organizational support | The Company's party group attaches great importance to consolidation of poverty alleviation results and rural revitalization, and established a leading group for rural revitalization, with four party group members, including the Group's party group secretary and deputy secretary, serving as the group leader and deputy group leader, to strengthen the leadership of the Group's efforts on consolidation of poverty alleviation results and rural revitalization |
| | Established a government & enterprise department on agricultural and rural business, a rural revitalization research institute, and a digital life company, continued to increase resource investment, and established an ecological alliance on digital rural cooperation, to stimulate new momentum for rural revitalization |
| Team building | Intensified the selection of temporary cadres from the Group headquarters, and strengthened the support for cadres and talents for paired assistance in the new stage |
| | Selected and dispatched one science and technology special commissioner to Yanyuan County, a key paired assistance county for national rural revitalization, to support the development of local apple industry |
| Capital investment | Maintained fund investment at a level of no less than before by investing more than 100 million yuan in free donations to four designated counties throughout the year, introducing 17.26 million yuan of non-reimbursable assistance funds, and building 10 Group-level digital rural demonstration sites in the "4+2" assistance counties |

**Revitalization Efforts in 5 Areas in 2021**

| Area | Main Actions | Progress |
|------|-------------|----------|
| Revitalization through industry | Promoted smart agriculture, and facilitated production and marketing connection | • Developed a large number of benchmark demonstration projects based on local conditions, such as the planting of Agaricus Blazei Murill in Tianlin, the planting of apples in Yanyuan, and the special cultivation in Shufu<br>• Assisted the digital transformation and upgrading of local agriculture. By 2021, nearly 140 smart agriculture demonstration projects had been implemented throughout the country<br>• Realized 90%+ China Telecom broadband access in all administrative villages and villages out of poverty<br>• Relied on tyfo.com to provide a complete set of e-commerce services for industrial projects, and create online celebrity products through online and offline channels such as "one county, one product", live commerce, etc. |
| Revitalization through talents | Expanded the assistance team, broadened employment opportunities, and strengthened training and empowerment | • Selected excellent and mature officials to inject new vitality for rural development<br>• Implemented the "Assistance Plan on Employment of Thousands of Residents in One Hundred Villages" by employing people out of poverty during project implementation to reduce the risk of returning to poverty<br>• Provided training for over 4,000 grassroots officials, 500 rural revitalization foregoers and 10,000 technicians in the 4 designated counties throughout the year |
| Revitalization through culture | Improved cultural facilities, built a publicity area, and diversified the cultural life | • Strengthened the construction of supporting facilities such as rural libraries, small traditional Chinese learning classrooms, and cultural walls to lay a foundation for the development of rural culture<br>• Advanced the building of a cultural network at the county, township, village and household levels, and delivered excellent culture to villages and households through e Speaker, IPTV, rural information service station and other ICT products, to unblock the "last kilometer" in public cultural services<br>• Organized activities such as "I am a Chinese citizen", "I am in the same frame as the national flag", "Learn Mandarin before Going to school" and "Celebrate the 100th anniversary of the founding of the CPC", to enrich the cultural life of villagers and deepen their patriotism |
| Revitalization through improved environment | Continued capital investment and improved environment | • Donated funds to designated and paired-up counties<br>• Conducted projects such as landscape transformation and featured cultural tourism building to promote agriculture upgrading through green and sustainable development |
| Organization revitalization | Gave play to the leadership of Party building, and did practical work for the masses | • Gave full play to the leading role of party building, and carried out paired and joint construction activities with village level party organizations in the assisted areas through the activity "E-connection for party building"<br>• Opened the Tibetan, Uyghur and Yi languages versions of 10000 hotline services in Tibet, Xinjiang, Sichuan and other regions to provide special services for nearly 20 million ethnic minority people, so as to practice their original aspiration and warm the hearts of the people with services |

### Make every effort to effectively link the achievements of poverty alleviation and rural revitalization

Having won the battel against poverty, China Telecom put into practice the instructions of General Secretary Xi on effectively connecting the consolidation and expansion of poverty alleviation results with rural revitalization, enhanced the leadership of the organization and set up a special unit to drive smooth connection between the working systems. We launched and implemented a digital village building action, to inject digital driving force into the economic and social development of areas that have shaken off poverty. We further deepened designated assistance, and maintained investment no less than before, to promote the work of assistance to achieve remarkable results.



▲ In October 2021, Ke Ruiwen, Chairman and Secretary of the Party Leadership Group of China Telecom, went to Yanyuan, Sichuan, to investigate the work on rural revitalization

# Designated and Paired-up Assistance

In 2021, China Telecom continued to donate funds, send temporary officials to, implement assistance projects in, and help introduce industrial investment in the "4+2" counties. Focusing on stabilizing the long-term mechanism of poverty alleviation, the Company took assistance measures in various aspects, including industries, science and technology, consumption, education, and health. Besides, we also concentrated on addressing the different development needs of people who have been lifted out of poverty, and helped local people expand employment, develop the economy, and improve production and living conditions, so as to help create a new situation for "agriculture, rural areas and farmers".

**Officials Dispatched to Paired Counties in 2021**

| County Name | Dispatched Official Name | Role Served in the Paired-up County |
|-------------|-------------------------|-------------------------------------|
| Tianlin County | Nong Guoning | Member of Standing Committee of CPC Tianlin County Committee and Deputy County Head |
| Muli County | Liu Guoping | Deputy Head of Muli County |
| Yanyuan County | Huai Baohua | Deputy Head of Yanyuan County |
| Shufu County | Li Jintian | Deputy Head of Shufu County |
| Yanyuan County | Wang Ping | First Secretary of Dawanzi Village of Wodi Township in Yanyuan County |
| Muli County | He Fuyong | First Secretary of Mihe Village of Xiqiu Township in Muli County |
| Bianba County | Ma Xianyuan | Deputy Party Secretary of CPC Banbar County Committee |
| Bianba County | Chen Feng | Member of Standing Committee of CPC Banbar County Committee and Deputy County Head |
| Jiuzhi County | Ren Kebo | Member of Standing Committee of CPC Jiuzhi County Committee and Deputy County Head |

### Consumption-based Assistance for the Development and Growth of Characteristic Industries

On June 26, 2021, the departure ceremony for consumption-based assistance of tyfo.com was held in Tashmirik Township, Shufu County, Kashgar, Xinjiang. This was the second year in a row that China Telecommunications Co., Ltd., Sichuan Tianhu Yunshang Technology Co., Ltd. and Kashgar Jiang Guo Guo Agricultural Technology Co., Ltd. jointly held the departure ceremony for consumption-based assistance.



▶ On June 26, 2021, the Wuhan Branch purchased 5,900 boxes of 12 tons of fresh Muyage apricots for the purpose of assistance, and sent them to Wuhan by cold-chain transportation over a distance of 4,500 kilometers

### Organize Industrial Partners to Make Targeted Donations

In October 2021, the initiative on industrial donation to Muli jointly launched by the Group Company and the Terminals Company received positive responses and full support from the wide partners in the terminal industry chain. The Terminals Company had been communicating with the Muli County government, thinking for the people and responding to their needs. In just over ten days, 16 enterprises, including ZTE, responded to the initiative and donated 3,365 pieces of materials to Muli County, the value of which reached 1.263 million yuan.



### Medical Assistance Helps Improve People's Livelihood

Giving full play to its advantages, China Telecom promoted smart healthcare, and strengthened the application of 5G+IoT, big data, Internet cloud platform, and AI in imaging diagnosis and in the medical industry, to share medical resources and constantly improve the medical level of Yanyuan, to enable people in remote areas enjoy the same high-quality medical resources as those in large cities, and provide more convenient and satisfactory medical and health services for people in remote and out of poverty areas, and to provide strong medical support for rural revitalization.

▶ China Telecom aided hemodialysis center in the People's Hospital of Yanyuan County



### Industrial Assistance Helps Strengthen Hemopoietic Ability

Langping Township, Tianlin County, Guangxi, with the support of China Telecommunications Co., Ltd., established an industrial demonstration area for Agaricus Blazei Murill by importing the leading enterprise in the industry, the development of which has strengthened the collective economy of local villages, attracted villagers to work locally for income increase, and empowered rural revitalization.



▲ In providing industrial assistance, China Telecom established and improved a long-term mechanism for maintaining a stable status of out of poverty in Tianlin County

# Assistance Efforts for Revitalization of Different Rural Areas

While China Telecom keeps strengthening its assistance to the "4+2" counties, companies at all levels are also active in undertaking the assistance tasks arranged by local governments to help local villages and households out of poverty consolidate their poverty relief achievements.

#### "Yiqi Zhifu" Inclusive Finance

In order to fully boost rural economic and social development, China Telecom BestPay launched a plan named "Yiqi Zhifu" (becoming rich with BestPay and through smart means). This plan comprehensively upgraded the existing e-commerce practice results of BestPay, continued to enhance the role of e-commerce platforms and digital marketing in the promotion and sales of agricultural and sideline products, while promoting inclusive finance services in the countryside, to drive the upgrading of rural consumption, increase income for agriculture, assist the operation and development of rural micro, small and medium-sized enterprises, and realize the digital transformation of agriculture industry in rural areas.



#### Efforts in Assisting Revitalization of Rural Education

The Anhui Branch took active measures in integrating IPTV ecological chain resources, and cooperated with multiple partners such as BesTV and Doushen Education in building a standard basketball court and plastic track for Banqiao Primary School in Yanghe Village.



▲ On March 11, 2021, the "Zhenxing Playground", which was jointly built by the Anhui Branch and its IPTV partners - BesTV and Doushen Education, was officially completed at Banqiao Primary School in Yanghe Village, Taihu County, which is a designated village for assistance of the Anhui Branch

#### Small Soybean, Big Industry

Guangdong Vocational College of Post and Telecom made full use of the good opportunity of land circulation and the policy of rehabilitation and replanting in villages having shaken off poverty, and took industrial cooperation as the key to consolidate and expand poverty relief achievements and promote rural revitalization. It carried out in-depth cooperation with enterprises under the administration of Daping Township, helped build a modern enterprise on the production, processing and sales of bean products, and jointly drove the effective development of Daping bean products industry.



▲ In April 2021, Guangdong Vocational College of Post and Telecom further deepened cooperation with Meiike Company in Xingning, a Daping town managed enterprise, and carried out all-round cooperation on marketing and other aspects. The two sides complemented each other with advantages and strengths, and accelerated the revitalization and development of the bean industry, helping local farmers to become rich, and contributing to rural revitalization through industrial assistance.

# Promote Charitable Undertakings

China Telecom is enthusiastic in participating in social welfare undertakings, and has implemented the Welfare Donations Law of the People's Republic of China and other laws and regulations, as well as "Measures for the Management of China Telecom Group's External Donations". Following the principles of "being voluntary, non-remunerated, clear rights and responsibilities, acting within the limit of resources, being honest and trustworthy", the Company proactively helps the disadvantaged groups; supports the development of the science, education, culture, physical and health courses through various means by giving full play to its advantages; and encourages employees to carry forward volunteerism to actively participate in voluntary service activities.

## Support to Disadvantaged Groups

The Company cares for the elderly and assists social vulnerable groups such as the disabled, disadvantaged children and disaster victims by means of providing service care, employment assistance, donations and mobilizing employees to donate money and materials.

The "CT Station for Love" conveys warmth and care. China Telecom, together with the All-China Federation of Trade Unions, held the launching ceremony of "CT Station for Love", and became the first enterprise in the industry to gain its recognition for a joint-built brand. The "Station for Love" provides a place for the elderly, the disabled, environmental sanitation workers, express delivery people and other groups to popularize smart technologies and to take a rest, demonstrating the social responsibility and mission of China Telecom people. In 2021, more than 6,000 "CT Stations for Love" were built, of which 83 were rated as the "Most Beautiful Labor Union Service Station for Outdoor Workers in 2021" by the All-China Federation of Trade Unions, making the Company ranking first among all enterprises in terms of the number of awards.

### "CT Station for Love" Warms People's Hearts in Cold Winter

On December 21, 2021, the 16 "CT Stations for Love" in the whole region of the Ili Branch carried out a theme activity of "CT Station for Love's Warm Greetings - Salute to City Beauticians", inviting sanitation workers, police, empty nesters, etc. to spend a warm time with them in this cold winter.

▶ On December 26, 2021, the Ili Branch, together with the "CT Station for Love" of the South Jiefang Road business outlet in Yining City, and the Xiehaier Community of Dunmaili Street in Yining City, invited more than 20 people in the area, including the sanitation workers who had just left the morning shift, the police who had left the night shift, and the empty nesters, into the staff cafeteria of China Telecom to make dumplings with the company's staff

### "CT Station for Love" Contributes to the Building of a Civilized City

The Jingdezhen Branch uses the "CT Station for Love" to provide free rest places, tea and free charging equipment for outdoor workers such as sanitation workers and takeaway delivery people, and medical gauze and Band Aids for the public to use in emergency situations. It contributed to the building of Jingdezhen into a national civilized city through warm services.

▶ In 2021, the first four business outlets of the Jingdezhen Branch had set up the "CT Station for Love" service area, 18 business outlets provided services for the elderly and the disabled, and the services of nearly 100 love ambassadors covered each district and county in the city

# Support to Science, Education, Culture and Health

### Digital Learning Supports Community-level Grassroots Party Building

China Telecom Party School takes the initiative to do a good job in empowering grassroots party building based on the principle of digitalization, informatization and intelligence. In July 2021, the Party School of China Telecom and the Baili Community, Kangqiao Township, Pudong New Area, Shanghai organized an activity of "E-connection for party building" to enrich the means of Party members' learning and education, and realized daily, regular, quantifiable and evaluable education of Party members by virtue of technology.

**Assist Community-level Grassroots Party Building**

♡ Providing diversified online learning materials

♡ Guiding communities in online education and training

♡ Making a "buffet" for independent learning according to individual needs

"This tool is so convenient that as long as you open the link in the WeChat Group, you can directly see the live broadcast of high-quality courses and learning materials. We Party members can learn anytime and anywhere."

~ Secretary Cao of the Party Committee of the Baili Community

▲ The staff of the Party School of China Telecom has communicated with the community workers for many times. They sorted out nearly 70 courses of excellent internal curriculum resources, and optimized the "cloud training" online learning application product/function, forming a resource package with China Telecom characteristics and the advantages of the Party School to enhance the grassroots Party building capability, and promote the learning and education form of community Party building work to change from traditional to modern, from closed to open, and from entity to virtual.

# Promote Social Virtues

### "Warm the ancient city with love and help, and donate blood for the people"

Life calls for blood, with love being offered. To promote the spirit of dedication and support the anti-COVID-19 work, under the initiative of the Party Committee, the Labor Union and the Youth League Committee of the Baoding Branch, more than 300 officials and workers of the company actively responded to the call, and took the initiative to participate in blood donation activities respectively at the main venue of the municipal company and the sub-venues of the county sub-branches on November 9, 2021, to contribute love to the society, and demonstrate the great love and selfless dedication of the Baoding Branch people of China Telecom.
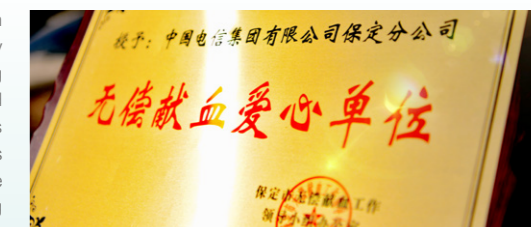
### Warm Loneliness with Love

The Customer Service Department of the Hainan Branch has actively organized the action of caring for children with autism before and after the Autism Day for five consecutive years.

▶ On April 1, 2021, about 40 volunteers from the Customer Service Department of the Hainan Branch participated in the volunteer service activity of "Warm Loneliness with Love," where volunteers were dedicated to serving autistic children

# Jointly Fight Against COVID-19

At present, the COVID-19 prevention and control situation is still complex, and we still face great pressure in preventing inbound cases and domestic resurgences. China Telecom has always maintained a clear mind, adhered to the strategy of preventing inbound cases, resolutely gotten rid of the idea of loosening control, and paid close attention to all aspects of pandemic prevention and control, so as to consolidate the hard-won achievements.

## Examples of Products for Pandemic Prevention & Control

The full name of this product is "NB-IoT-based intelligent reminder of door and window status", which can be mounted on the door of each isolated room to monitor the opening and closing status of the door in real time 24 hours.

**Intelligent door contact**

For customers with large outbound call volume and urgent completion time, we provide standard questionnaire template and cooperate to develop outbound call script for automatic outbound call by robots. For epidemiological survey with complicated and individualized problems, we provide outbound call service by customer agent.

**Outbound calls for epidemiological survey**

All video devices are managed by a unified back end for multi-frequency monitoring, cloud-based review, storage and other functions, to meet the hierarchical management needs at different levels, effectively realize contact tracking of relevant personnel, and 24-hour continuous control. It solves the difficulty of towns in monitoring the access of village personnel in real time, and offers scientific prevention and control during the pandemic.

**e Housekeeper**



▲ On September 17, 2021, the Zhangzhou Taiwanese Investment Zone in Fujian started the construction of a mobile cabin hospital. The Zhangzhou Branch contacted the management committee of the Taiwanese Investment Zone immediately to understand the network support needs of the isolation sites, and develop the optical cable laying and indoor broadband installation plans. By the early morning of September 22, 2021, all optical cables at the isolation sites had been laid in place, the first batch of 115 sets of broadband had been delivered for use, and the first batch of people for designated isolation had successfully moved in.



▲ In July 2021, a COVID-19 infection associated with inbound cases happened in Xiamen, Fujian. The Xiamen Branch quickly established a support team to connect with the city's big data center and the district health commissions, to provide communications support for the whole city's nucleic acid testing.

### COVID-19 Fight in Ruili

Ruili is a city subordinate to Dehong Dai and Jingpo Autonomous Prefecture, Yunnan Province. It is located in the west of Yunnan, with an administrative area of 944.75 square kilometers. Ruili connects with Mangshi in the east, Longchuan County in the north, and Myanmar by mountains and rivers in the northwest, southwest and southeast, with villages facing each other.

The situation of the border between China and Myanmar is very complicated as fields, villages and cities of the two sides are adjacent to each other. Since the end of March 2021, the pandemic broke out wave after wave. This small city in the southwest border area with a border line of nearly 170 kilometers has experienced four lockouts and multiple incidents of group stowaways... Ruili's pandemic prevention and control faces great pressure.

The Yunnan Branch actively fulfilled its social responsibility as a central SOE with a high sense of responsibility and mission by giving full play to its ICT advantages in 5G + optical fiber network + cloud, and made achievements in supporting the COVID-19 prevention and control work. It was highly recognized and praised by the Joint Prevention and Control Working Group of the State Council, the CPC Yunnan Committee and the Yunnan Government, the Yunnan Health Commission and local Party committees and governments.

| Main Actions | Specific Measures |
|---|---|
| **Built an information platform against the COVID-19 with emergency communications support** | Assisted in completing the deployment of the immunization planning platform (vaccination system platform) of Yunnan Health Commission. |
| | Developed a personalized anti-COVID-19 system for Dehong, which is capable of data statistics, user center, system settings, nucleic acid testing records and statistics and other functions. |
| **Undertook the basic communications support task, to ensure smooth services for important meetings and fixed private line** | Provided support to important video conferences of the government, and the provision of fixed telephone and private lines related to key events. |
| | Expanded, upgraded and supported regional networks in such as the Pandemic Prevention and Control Headquarters of Ruili, the surroundings of hospitals in Ruili, and Ruili Municipal Government Building. |
| | Provided high-speed network access, safe private line, speed increase, dual-route protection and all-weather support services for all vaccination sites in the province. |
| **A variety of cloud applications for free use** | Ensured continuous study while classes suspended with CTCloud Classroom, which was offered free of charge for 6 schools and nearly 10,000 students. |
| | Assisted pandemic prevention and control command and dispatching through CTCloud Meeting, which was provided freely for all government departments, schools, and hospitals in Dehong Prefecture, supporting all units to hold more than 500 cloud conferences, with more than 7,400 participants. |
| | Produced 4K high-definition TV boot screen to disseminate COVID-19 prevention information to 150,000 users in Dehong Prefecture. |



"After the installation of Dehong Anti−COVID−19 System, we can improve the environmental safety of our place, because when a customer enters the store, we first need to know whether his/her nucleic acid testing result is within the validity period, and should detect his/her temperature as quickly as possible, so as to protect ourselves as well as all customers who come to the store for shopping."

– Qiu Meizhi, manager of Daxing Variety Store in Ruili

▲ On April 3, 2021, the Dehong Branch put into service Ruili's first COVID-19 vaccination appointment service on the nucleic acid testing information platform "COVID-19 Response in Dehong". Citizens can make an appointment by selecting a nearby vaccination site and vaccination time from the "vaccination appointment" option of the mini program, which is simple and convenient

# DEEPENED REFORM
## FOR BETTER CORPORATE GOVERNANCE

While putting Party building at a leading place, China Telecom has fully implemented the three-year action on SOE reform, and continued to deepen reform in key areas. The Company cares about employees and takes measures to stimulate the vitality of both the enterprise and the employees. It strengthens compliance management to consolidate the foundation for high-quality development.

## Stimulate Vitality with Reform

With the focus on returning to A-share market, China Telecom has been fully implementing the three-year action of SOE reform, promoted further reform in the fields of government and corporate service, cloud, and technological innovation, and improved the modern enterprise system and market-oriented operation mechanism, to drive the modernization of corporate governance system and governance capability.

## Intensify Corporate Governance

Positioned as a "service-, technology-, and security-oriented" enterprise, China Telecom has introduced strategic investors from key areas such as cloud network, security, and industry digitalization to further improve the Company's governance and market-based operating mechanism, where the Board of Directors is responsible for strategies, decisions, and risk prevention while the management is responsible for operation, implementation, and management enhancement. The Company has made further efforts on authorization and delegation of authority to build companies at all levels into market-oriented players with equal responsibilities and rights within the Group, and form a governance mechanism of China Telecom characterized by "law-defined rights and responsibilities, transparent rights and responsibilities, coordinated operation, and effective checks and balances."

Promoted subsidiaries at all levels that meet the setup requirements of the board of directors (BoDs) to strengthen the development and regulate the operation of the BoDs, with external directors in majority, and fulfill the mandates of the BoDs.

Drove the power delegation from the BoDs of subsidiaries at all levels to the management by levels and categories, and put into practice the working mechanism that the general manager of the subsidiary is accountable to and reports to the BoDs.

In December 2021, China Telecom organized a workers' congress, before which it carefully organized the solicitation of proposals to facilitate the orderly participation of workers' representatives in China Telecom's governance. The workers' representatives submitted more than 100 proposals reflecting the grass-roots situation and the employees' aspirations.

China Telecom respects and actively implements employees' right to know, participate and supervise, unblocks employees' appeal channels, puts into practice democratic management systems such as workers' congress and transparency in corporate affairs, and encourages employees to participate in corporate management.

### Overview of Employee Participation in Corporate Management through Workers' Congress

Proposals from employee representatives (Unit: piece)

| 2019 | 2020 | 2021 |
|------|------|------|
| 1956 | 1356 | 1506 |
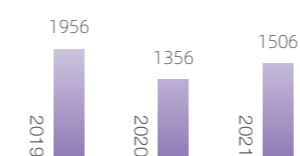
Training for employee representatives (Unit: time)

| 2019 | 2020 | 2021 |
|------|------|------|
| 55 | 47 | 47 |
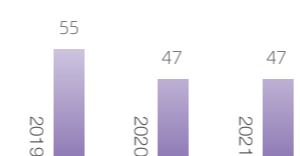
▲ On April 11-12, 2021, the Seventh Meeting of the Third Workers' Congress of the Sichuan Branch was held in the main venue of this provincial company and branch venues in the form of teleconference. A total of 164 provincial employee representatives attended the meeting

# Push on Organizational Reform

Seizing the opportunity of digital development, China Telecom accelerated the building of a new customer-centered organizational system, built a vertically integrated cluster for government and corporate services, established and improved organizations, mechanisms and processes in, such as, research and development, integrated delivery, platform operation and iterative services. We continued to deepen the reform of specialized companies, improved the supply capacity of digital products, such as cloud network, security, industrial digitalization, and household DICT, and explored new markets and new tracks, to strengthen the leading edge of comprehensive intelligent information services.

### Deepen Reform of Specialized Companies

Established companies in digital life, digital village and security technology to enhance the competitiveness and influence in the field of digital life and network & information security. Completed the reform of the cloud company from a branch company to a subsidiary, to improve its technological strength and market competitiveness in the cloud computing field

### Deepen Reform of Government and Corporate Services

Set up 13 service departments for the government and corporate sector, promoted the establishment of an industrial research institute, and built supporting mechanisms in budget accounting, investment management and incentive

### Deepen Reform of Regional Companies

Established Xiong'an Digital City Company and Shanghai Lingang Computing Power Company, and carried out the comprehensive pilot reform of the Shenzhen Branch in terms of authorization and decentralization

## Stimulate the Vitality of the Company

China Telecom has established and improved a market-oriented mechanism that places equal emphasis on incentives and constraints, fully implemented a tenure system and contractual management of managers, and improved the market-oriented employment system that takes labor contract management as the core and post management as the basis. The Company improved the distribution mechanism that determines remuneration based on performance contribution, took good advantage of policies for a variety of medium- and long-term incentives, and guided companies at all levels to achieve a reasonable flow of personnel, which means those who are capable will take the posts, those who are excellent will be rewarded, those who are incapable will step down, and those who are inferior in capability will be sifted out, to fully stimulate the enthusiasm, initiative and creativity of the staff.

**1.**
The "Measures for the Tenure System and Contractual Management of Managers of Enterprises Affiliated to China Telecommunications Co., Ltd." and the "Measures for the Management of Professional Managers of Enterprises Affiliated to China Telecommunications Co., Ltd." were released for full implementation in provincial, municipal and county level companies and subsidiaries at all levels. The signing rate of contract-based annual performance goal by managers at all levels reached 100%, and the signing rate for tenure reached 95%.

**2.**
Focusing on the contract-based tenure system, we drove the reform of three systems for the goal of flexible instead of fixed leadership, salary and post-taking by taking into account capabilities, and promoted market-oriented operation mechanism. The adjustment and exit rate of China Telecom's leaders at all levels is more than 5% for inferior performance and incapability, which has further stimulated the vitality of the team.

**3.**
We systematically sorted out and implemented medium and long-term incentives such as equity and dividend incentives as planned, and ensured such implementation in qualified enterprises to build a new pattern of big incentives.

# Care About Employees

China Telecom protects the rights and interests of employees in accordance with the law, pays attention to the establishment of harmonious labor relations, supports trade unions to perform their functions, encourages employees to participate in management, helps employees improve their capabilities, and strives to grow together with employees.

## Promote Employee Development

China Telecom has continued to promote talent team building, intensified employee training to improve their ability and value, and publicized the deeds of model workers to encourage the employees to carry forward their spirit.

### Strengthen the building of the operational and management talent team

While focusing on the strategy of cloudification and digital transformation, we strengthened the staffing of the management of provincial companies, and accelerated the implementation of the tenure system and contractual management.

Further broadened the vision in talent selection and employment, actively explored new selection mechanisms in innovation units, and tried the nomination system and the open competition mechanism.

Continued to select and train high-quality, professional and outstanding young officials.

### Attach importance to outstanding young officials

Cultivated and selected outstanding young officials. Among the newly promoted officials this year, the cadres for secondary posts and who were born after 1970s account for 68%, and those for secondary deputy posts aged 45 and below account for more than 1/3.

More than 25% of the management cadres of the Party group are outstanding young cadres at or below the age of 45.

### Enhance the building of the professional talent team

Actively imported leading talents in big data, cloud computing and other fields, and built teams of experts in big data, AI, IT cloud and industry.

Vigorously employed graduates from the transformation field. We continued to implement the "Spark Program" and "Prairie Fire Program" to cultivate high-end professionals.

### Intensify the building of front-line skilled talent team

Organized large-scale vocational skills training to improve the professional ability of employees, strengthened the transformation and upgrading of skills of key groups, and enhanced the skills training of employees in new business types and new models.

Empowered front-line employees through skill certification. In 2021, we carried out certification work for 30 categories and 96 levels, with a total of 342 examinations covering 180,000 people.

### Intensify training for employees

Actively organized employee training, with a focus on employees' knowledge and skills of duty performance.

Continued to strengthen the internal trainer team by newly recruiting 1,100 group-level internal trainers and 807 group-level internal trainers for trial. Now there are more than 14,200 internal trainers at all levels, with a total lecturing time over 259,600 hours.

Organized targeted ability improvement training courses to enable front-line employees accurately. The online university courses had been studied for 229,600 times, with an average learning time of 40.73 hours per person.

### Facilitate employees to improve their capabilities and values

Organized 15 labor skills competitions to tap innovation talents in cloudification and digital transformation.

Continued to build innovative studios, recommended 10 of which to the China National Defense, Posts and Telecommunications Union, and explored the establishment of Guangdong China Telecom Model Worker Innovation Studio Alliance to concentrate efforts on innovation.

### Promote the spirit of model workers

Won 30 national honors and 117 provincial and ministerial honors in 2021.

Three collectives won the National May Day Labor Certificates of Merits, seven individuals won the National May Day Labor Medals, and 12 collectives won the title of National Worker Pioneers. The Company ranked the first in the communications industry in terms of awards number.

Held the "May Day" commendation symposium and publicized the national model workers and other advanced models through New Year ring back tone and Douyin short videos to promote the spirit of model workers, labor spirit and craftsmanship.

## Promote the Spirit of Model Workers and Commend Advanced Models

In 2021, China Telecom selected 72 group-level advanced collectives and 258 group-level worker models.



## "Tengyun Cup" IT & Cloud Migration Skill Competition

On May 14, 2021, the "Tengyun Cup" IT & Cloud Migration Skills Final was held, which adopted the on-site defense mode, with six contestants representing Hubei, Jiangsu Team 2, Hebei, Jiangsu Team 1, Sichuan, and Fujian Cloud Teams in the final match.



# Care about Employees' Life

China Telecom continues to strengthen communication with employees, understand their demands, increase care for them, and strives to improve their sense of happiness, acquisition and security.

### More close communication with employees

We have improved the closed-loop management mechanism for collecting, analyzing, handling and feeding back employees' demands, and strengthened communication with employees through face-to-face communication, emails, etc., to further understand their thoughts, work and living conditions, as well as hot issues that they pay attention to.

We helped employees solve practical problems and difficulties, provided them with convenient services, and devoted particular care to retirees, model workers and technological innovation workers, young employees, cadres for poverty relief and their families, overseas employees and their families, as well as employees with family difficulties.

### Better working environment for employees

We allocated a special fund for the "small facilities in four types" (small canteens, small bathrooms, small toilets and small activity rooms) to improve their long-term cost mechanism and build them with high quality.

We have built oxygen supply facilities in 135 grassroots units with the elevation above 3,000 meters in six provinces of Tibet, Qinghai, Gansu, Sichuan, Yunnan and Xinjiang, to improve the working and living conditions of employees in high-altitude areas.

### Higher living quality for employees

The "water purification project" was implemented to improve the drinking water quality of employees. More than 8,000 grassroots units have used water purifiers and other equipment, enabling the change from "having water to drink" to "having good water to drink".

We have been continuously building rooms of mother and infant to satisfy the special needs of female employees.

We organized cultural and sports activities that employees are willing to participate in, to help employees balance work and life, and improve their sense of happiness.

### More efforts on assistance and solicitude

In view of the pandemic situation in Jiangsu, Hunan, Henan, Hubei, Yunnan, Sichuan, and Shaanxi, earthquakes in Yunnan, Qinghai and Sichuan, heavy rain in Henan, Hubei and Shanxi, heavy snow in Liaoning, Jilin, Heilongjiang and Inner Mongolia, and typhoon "In-Fa" in relevant provinces, we guided and urged relevant trade unions of provincial companies to exert efforts on assistance and solicitude.

### Organize recreational and sports activities

Yunnan Telecom Public Information Industry Co., Ltd. organized diversified recreational and sports activities for employees, such as badminton, table tennis and basketball games, to strengthen their friendship and improve their happiness.

### Build rooms of mother and infant and care for pregnant staff

In 2021, the Zhejiang Branch built mother and infant rooms and cared for pregnant employees, to improve their happiness.

### Hold a marathon

On April 18, 2021, the Hunan Branch held its second "Yima Dangxian" Marathon in Juzizhou, Changsha. 1,000 runners gathered in Juzizhou Island to promote the sportsmanship and enhance the cohesion of the company by participating in a half marathon.

China Telecom strengthened communication with employees to understand their demands, increased care to them, organized an activity of "sending health to the grassroots", and took actions to meet their spiritual and cultural life needs, to improve their sense of happiness, acquisition and security.

▲ In 2021, the Yunnan Branch held an online get-together and performance where all the performers and hosts were served by the staff, reflecting the efforts and joy of the telecom front-line personnel who worked hard and were busy in the Spring Festival promotion.

▲ On June 10, 2021, China Telecom Information Industry Company organized an activity of making zongzi for the Dragon Boat Festival in the staff canteen of the second hub. The employee representatives of departments delivered the cooked zongzi to the employees who sticked to their posts to share the fruits of labor together.

▲ On the eve of June 1 Children's Day in 2021, the Bozhou Branch organized a "Happy 5G Journey" to celebrate the festival. Nearly 30 children participated in this activity, through which they experienced intelligent life with 5G application scenarios, VR cinema, VR games, and whole house intelligence and learned about smart devices.

▲ On July 20 to 30, 2021, the Qinghai Branch held an orientation training camp for new employees to help them integrate into the company family and feel the warmth of home in a multi-level, all-round and three-dimensional way through a multi-dimensional teaching model with rich content and diverse forms.

# Safeguard Employees' Rights & Interests

China Telecom abides by relevant laws and enables employees to enjoy their rights and interests in labor, democracy, and culture, and strengthens the management of labor employment to ensure legal and regulated employment. Following the principle of equality, voluntariness and consensus, in accordance with the Civil Code of the People's Republic of China, the Labor Contract Law of the People's Republic of China, the Trade Union Law of the People's Republic of China and other laws and regulations related to labor employment and the protection of employees' rights and interests, China Telecom has formulated and implemented the "Notice on Distributing the 'Labor Contract of China Telecommunications Co., Ltd. (Model)'" and other documents, which requires to sign written labor contracts with employees to protect their basic rights, fulfill the obligations of both parties, specify working hours and vacations, implement standard working hour system, timely and fully pay salaries and social insurance, and specify the circumstances of termination of labor contracts. The Company continues to improve the business operation mode and job classification related to labor dispatch, by clarifying the employment forms of various posts, regulating the dispatch agreements signed with labor dispatch units, inspecting if the dispatch units and dispatched workers have signed labor contracts, and urging them to do so, as well as paying salaries and social insurance on time in order to protect the rights and interests of those dispatched workers.

The Company adheres to employment policies such as gender equality and equal pay for equal work, and offers promotion opportunity to employees. The Company deals with the individual information of employees according to law, and protects their privacy and ensures information security. The Company also implements a paid vacation system for employees to protect their rights to rest and leisure.

As China Telecom strictly implements the relevant requirements of the "Regulations on Prohibition of Child Labor", child labor is prohibited and forced labor is prevented in the Company. The recruitment management methods have defined the age requirements of candidates, to avoid the use of child labor. There was no event related to child labor or forced labor in the Company in 2021.

China Telecom has conscientiously implemented the Law of the People's Republic of China on Work Safety, and made overall plans to do a good job in work safety under normalized COVID-19 prevention and control, to consolidate the foundation of work safety management. China Telecom fully implements the main responsibility of the enterprise, established and improves the safe production responsibility system for all employees, strictly assesses safe production, and widely carries out the publicity, education and training on safe production laws and regulations and safety knowledge. The Company continuously strengthens the supervision and inspection of safe production, strengthens the early warning and risk prevention and control of meteorological disasters and their secondary disasters, strictly implements the system of taking posts with certificates for special operators, and keep improving the quality of the safe production team.

### Enhance institutional development

- Pay attention to the management of employees' occupational health, and formulated management systems related to occupational safety and labor protection articles.
- Regularly organize supervision and inspection of the operation site of the employees, and urge the design and construction unit to design and install according to the indoor lighting, noise, temperature and humidity and other standards.

### Improve working environment

- Continuously improve the working environment and working conditions of employees to effectively protect them from occupational diseases.
- Inspect the operation site, urge the employer to distribute necessary labor protection articles for employees according to regulations and standards, and require employees to wear and use them correctly.

### Attach importance to the physical and mental health of employees

- Provide free physical examination for all employees every year, continue to organize psychological health consulting activities and assistance work for employees, and opened a psychological service hotline, to actively help employees reduce stress.
- Strengthen nucleic acid testing and promote staff vaccination against the COVID-19.
- Carry out an activity of "Caring for overseas children of China Telecom, we are in action" to help expatriates and overseas students of our employees solve emergency difficulties.

### "Safe Production Month" series of publicity activities

In June 2021, the Peixian Branch carried out various publicity activities during the Safe Production Month.

### Staff health cabin launched

In 2021, the staff health cabin of the Fuzhou Branch officially opened, which is equipped with health monitoring instruments, psychotherapy chairs, and regular expert consultation services. Employees may operate on their own and conduct daily indicator monitoring for early warning according to their own conditions.





### Organize psychological counseling and training for employees

The cold and hypoxia environment in Tibet has always seriously affected the health of employees. To better care for employees, the Tibet Branch, based on the actual needs of employees and taking into account their physical and mental conditions in production and operation, offered psychological counseling and training for employees in Shigatse, Shannan, Linzhi and Naqu.



# Enhance Compliance Management

China Telecom has always insisted on operating in accordance with the law and in good faith, and abides by relevant laws, regulations and industrial regulatory rules. We have been continuously improving the compliance management system, strengthened the organizational leadership, enhanced the management system and the operating mechanism, to cultivate a compliance culture. We implement the *Cyber Security Law of the People's Republic of China*, the *Data Security Law of the People's Republic of China*, the *Personal Information Protection Law of the People's Republic of China* and other laws and regulations, strengthen compliance management in key areas such as anti-monopoly and anti-unfair competition, network and information security, overseas operations and DICT services, promote the integration of compliance management into the production and operation of China Telecom, fasten safety belts and wear protective clothing for the Company, to ensure its sustainable and healthy development.

# Operation in Compliance with Laws and Regulations

China Telecom continues to promote operation in accordance with laws and regulations, to comprehensively improve its corporate governance capability and level. China Telecom Co., Ltd. revised the Articles of Association and the rules of procedure of its three meetings, and improved a number of management systems such as raising funds, external guarantees, connected transactions, and information disclosure. The Company continues to improve the internal control manual and authority list, promote "smart finance", "smart legal affairs handling", "smart audit" and other work, and enhance risk prevention ability by using AI and other new technologies, to ensure the legal compliance of corporate operation and management, and the authenticity and integrity of financial reports and related information. The Company has comprehensively carried out major risk identification and assessment, and strengthened efforts in major risk tracking and control. For the whole year, the Company has maintained a trend of steady operation and controllable risks, and no major violations occurred.

**Promote and implement the *Data Security Law of the People's Republic of China* and the *Personal Information Protection Law of the People's Republic of China***

Based on the actual situation of the enterprise, China Telecom carried out systematic learning and publicity from five aspects of institution, specification, process, agreement and system, and identified hidden problems to effectively prevent legal risks, and fully improve the data security and personal information protection level of the Company.

**Have won the title of "Guangdong Province Enterprise of Observing Contract and Value Credit" for ten consecutive years**

The Guangdong Branch has always adhered to the concept of integrity in operation, established and improved the contract management system and process, standardized the signing of contracts and strictly performed them, to protect the interests of customers and suppliers, and create a good market environment for honest operation. It also consciously accepts the supervision and management of administrative authorities such as market supervision, and displays a good image of honest operation according to law.

## Strengthen Audit Monitoring

China Telecom has implemented the new requirements of the central government on internal audit in earnest with an aim to "guard against risks, ensure implementation, promote development, and improve value", and given full play to the role of audit in "examining economy" to support the Company's reform and high-quality development. In 2021, the Company audited more than 240,000 items, put forward over 2,600 management recommendations and helped improve over 2,000 institutional items.
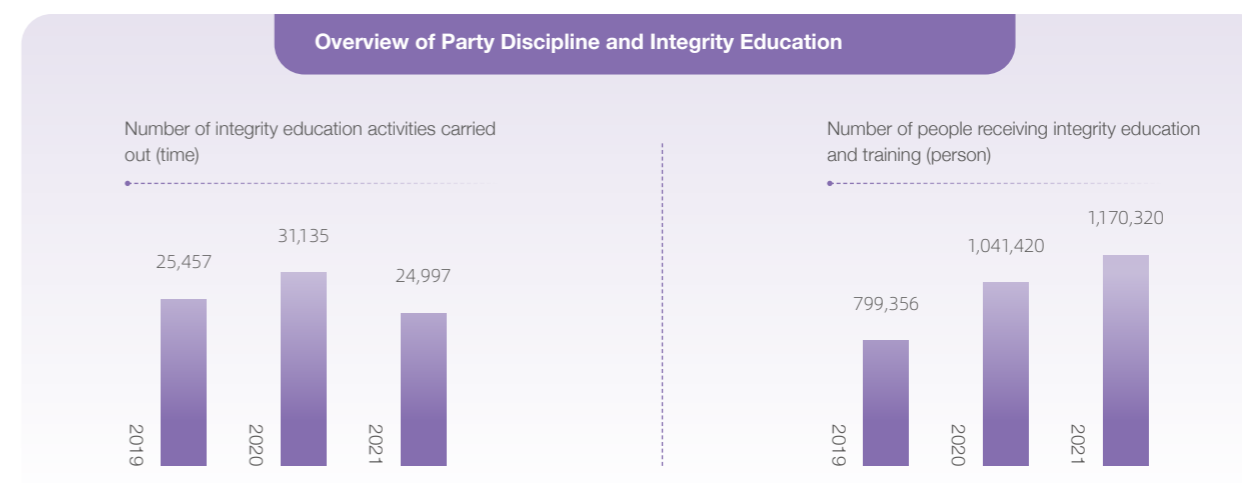
Continued to strengthen audit supervision on the effectiveness of the compliance management system and the internal control management system, and enhanced the inspection of key units and key fields while ensuring the full coverage of the audit for three years, to promote the companies' honest and compliant operation, and prevent and resolve major risks

**01**

Established and improved the internal audit leadership system, strengthened the unified control of the audit work of the whole Group, and further enhanced the audit management system. Accelerated the digital transformation of audit, and strengthened the coordination with internal audit supervision, to further improve the quality and efficiency of audit work

**02**

Paid close attention to the rectification of problems identified in audit, and strengthened the building of a long-term mechanism, to transform audit rectification outcome into governance effectiveness

**03**

Improved the accountability system for illegal operation and investment, ascertained the responsible people according to law and regulations, and checked common problems, to raise the compliance and bottom-line awareness of managers at all levels

**04**

## Party Discipline and Clean Governance

China Telecom has achieved good results in improving Party conduct, upholding integrity, and anti-corruption by fulfilling its responsibility in strict Party governance, and strengthening supervision, discipline enforcement and accountability.
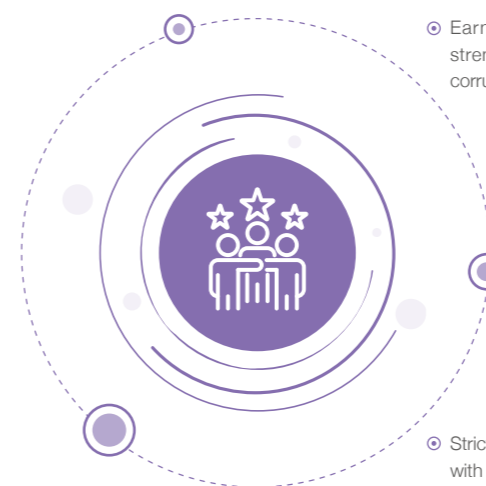
⊙ Earnestly enforced laws and regulations on honest administration and anti-corruption, strengthened the construction of systems, mechanisms and culture, and strictly prevented corruption such as bribery, extortion, fraud and money laundering

⊙ Established and improved five mechanisms for clean and honest administration, including education for prevention, system supervision, punishment and accountability, fault tolerance and correction, and inspection

⊙ Conducted clean education and discipline education, formulated an integrity guidebook and other codes of conduct, opened and operated an official account of "Clean China Telecom"

⊙ Set up a mailbox and hotline for accepting accusations against the Company's personnel and complaints about relevant handling, as well as criticisms, opinions and suggestions on clean and honest administration and anti-corruption

⊙ Strictly implemented the "Working Rules for Discipline Inspection and Supervision Organs to Deal with Reports and Accusations", to handle reports and accusations according to rules, disciplines and laws, and fulfilled confidentiality requirements to effectively protect the rights of whistleblowers

### Overview of Party Discipline and Integrity Education

Number of integrity education activities carried out (time)

| 2019 | 2020 | 2021 |
|------|------|------|
| 25,457 | 31,135 | 24,997 |

Number of people receiving integrity education and training (person)

| 2019 | 2020 | 2021 |
|------|------|------|
| 799,356 | 1,041,420 | 1,170,320 |

## Responsibility Management

China Telecom earnestly implements the requirements of the CPC Central Committee, the State Council and various ministries and commissions on corporate social responsibility, continues to integrate social responsibility into its development strategy, operation and management, and actively fulfills its social responsibilities.

In 2021, the Group Company further improved its social responsibility management, and studied, formulated and issued social responsibility management measures. It is the first time that the social responsibility report of China Telecom Co., Ltd. was compiled and published successfully and separately in A shares and H shares. Internally, China Telecom carried out the selection of outstanding cases of the Group Company and the selection of advanced individuals in corporate social responsibility (CSR) management. In 2021, we selected and commended 27 outstanding CSR cases and 7 advanced individuals in social responsibility management. Externally, the Company submitted outstanding cases for high-level selection and conducted a closed-loop management of the CSR. The responsibility performance cases we selected, "Following the 5G SA development strategy, and enabling economic and social transformation and upgrading", and "Fighting against COVID-19 overseas to show the responsibility of China Telecom, and delivering warmth and love through cohesion", were respectively included into the Blue Paper on Corporate Social Responsibility of Central SOEs (2021) and the Blue Paper on Overseas Corporate Social Responsibility of Central SOEs (2021) published by SASAC of the State Council. By collecting 170 questionnaires from readers of our CSRs, we analyzed readers' views, expectations and suggestions on China Telecom's CSR and on its fulfilling of social responsibilities, to provide reference for improving the preparation of future CSRs and promoting social responsibility work in 2022. In accordance with the provisions of Appendix 27 to the HKEX Listing Rules (the "Environmental, Social and Governance Reporting Guide"), besides China Telecom Co., Ltd., another company under the Group - China Communications Services Co., Ltd. listed in Hong Kong also issued its ESG (Environmental, Social and Governance) Report in 2021.

# AFTERWORD

## About Us

China Telecommunications Corporation Limited is an ultra-large communications operator in China. It has ranked as a Fortune Global 500 company for many years in a row. It specializes in integrated information services including mobile telecom, Internet access & application, landline, satellite communications, and ICT integration with total assets of 989.8 billion yuan and 390,000 employees.

China Telecommunications Corporation Limited is owned by the central government and funded by the state. The State-owned Assets Supervision and Administration Commission of the State Council (SASAC) fulfills the responsibility as an investor on behalf of the State and dispatched personnel to set up a Supervision Committee at the Group Company. The Group has set up Board of Directors as required by the SASAC, which is the top decision-making body and under which there are the Nomination Committee, the Auditing and Risk Management Committee, and the Remuneration and Appraisal Committee.

China Telecommunications Corporation Limited has operating organizations in 31 provinces (autonomous regions and municipalities directly under the central government), America, Europe and Asia. The Group controls 4 listed companies including China Telecom Corporation Limited, China Communications Services Corporation Limited, New Guomai Digital Culture Corporation Limited, and Beijing Global Safety Technology Corporation Limited.

Total assets of the Group Company

**989.8** billion yuan

Total number of staff of the Group Company

**390,000** people

## Organization Chart of China Telecommunications Co., Ltd.

China Telecommunications Co., Ltd.

Discipline Inspection and Supervision Team

Holding Listed Companies

Headquarters

Main branches, subsidiaries and affiliated institutions

China Telecom Co., Ltd.

China Communications Services Co., Ltd.

New Guomai Digital Culture Co., Ltd.

Beijing Global Safety Technology Co., Ltd.

General Affairs Office (Office of the Party Leadership Group, of the Board, and Security Department)

Corporate Strategy Department

Marketing Department

HR Department (Organization Department of the Party Leadership Group)

Finance Department

Cloud-Network Development Department

Cloud-Network Operation Department (Big Data and AI Center)

Customer Service Department

Network and Information Security Management Department

Auditing Department

Legal Department (Compliance Management Department)

Technology Innovation Department

Party Leadership Group Inspection Office

Party-People Work Department (Publicity Department of the Party Leadership Group)

Trade Union

5G Co-investment and Sharing Department

Global Business Department (Global Company)

Capital Operation Department (Investment Company)

Government and Corporate Information Service Group

Channel Operation Center

Procurement and Supply Chain Management Center

Main branches, subsidiaries and affiliated institutions

China Telecom branches in 31 provinces/autonomous regions/municipalities directly under the central government

China Telecom Global Limited

BestTone Information Service Co., Ltd.

China Telecom Digital Intelligence Technology Co., Ltd.

Tianyi Telecom Terminals Co., Ltd.

Tianyi E-Commerce Co., Ltd.

Tianyi Security Technology Co., Ltd.

Tianyi IoT Techology Co., Ltd.

Tianyi Digital Life Technology Co., Ltd.

Finance Company

Tianyi Security Technology Co., Ltd.

China Telecom Talent Development Center

China Telecom Research Institute

China Telecom branches in 31 provinces/autonomous regions/municipalities directly under the central government

China Telecom Group Investment Co., Ltd.

China Telecom Satellite Communications Co., Ltd.

Xinyuan Public Information Development Co., Ltd.

Tianyi E-Commerce Co., Ltd.

Tianyi Finance & Leasing Co., Ltd

Tianyi Technology Venture Capital Co., Ltd.

China Telecommunications Museum

# Table of KPIs

| Essential Responsibility | 2019 | 2020 | 2021 |
|---|---|---|---|
| Call drop rate of mobile communication (%) | 0.10 | 0.05 | 0.03 |
| Call completing rate of mobile communication network (%) | 97.57 | 99.07 | 99.14 |
| 4G international roaming countries and regions | 174 | 220 | 228 |
| 5G base station (*10,000) | 8 | 38.4 | 69.0 |
| Cities covered by 5G network | 50 | 337 | 337 |
| Call completing rate for landline phones (%) | 92.45 | 93.05 | 92.55 |
| Packet loss rate of backbone network of broadband Internet ChinaNet (%) | 0.03 | 0.06 | 0.03 |
| Broadband coverage rate in administrative villages in 21 southern provinces/ autonomous regions/municipalities directly under the central government (%) | 96.7 | 97 | 97.6 |
| Internet backbone interconnection bandwidth (Gbps) | 8,416 | 12,305 | 17,315 |
| International interconnection bandwidth (Gbps) | 8,766 | 9,985 | 10,792 |
| Emergency communication staff dispatched (person-time) | 69,817 | 146,397 | 676,075 |
| Number of rural channel outlets (*10,000) | 16.2 | 13.1 | 12.6 |
| R&D input as a percentage of income (%) ① | 3.25 | 3.35 | 3.38 |
| Number of new patent licensed | 840 | 957 | 1,100 |
| Total tax paid (*100 million yuan) | 101.2 | 67.6 | 122.6 |
| Number of people employed (*10,000 people) | 2.1 | 1.9 | 2.0 |
| Labor productivity of employees (*10,000 yuan/person/year) | 119.4 | 126.4 | 139.1 |

| Responsibility to Shareholders | 2019 | 2020 | 2021 |
|---|---|---|---|
| Total assets (*100 million yuan) | 9,010 | 9,078 | 9,898 |
| Main business income (*100 million yuan) | 4,496 | 4,762 | 5,092 |
| Ranking in Fortune Global 500 | 141 | 158 | 126 |
| Total profit (*100 million yuan) | 269.0 | 275.1 | 302.1 |
| Asset-liability ratio (%) | 44.7 | 44.9 | 43.0 |
| Value-maintained and value-added rate of state-owned assets (%) | 110.3 | 104.8 | 103.9 |

| Responsibility to Customers | 2019 | 2020 | 2021 |
|---|---|---|---|
| Number of mobile subscribers (million) | 335.6 | 351.0 | 372.4 |
| Among which: 5G subscribers (million) | 4.6 | 86.5 | 187.8 |
| Number of users of landline phones (million) | 115.6 | 112.6 | 111.4 |
| Number of wired broadband users (million) | 178.8 | 187.2 | 200.7 |
| Among which: FTTH/O users (million) | 167.3 | 177.5 | 190.4 |
| Number of IPTV subscribers (million) | 130.0 | 133.6 | 137.9 |
| Mobile service satisfaction (points)* | - | - | 81.56 |
| Fixed Internet service satisfaction (points) | 79.5 | 78.9 | 80.95 |
| Landline voice service satisfaction (points) | 87.6 | 87.6 | 87.44 |

| Responsibility to Employees | 2019 | 2020 | 2021 |
|---|---|---|---|
| Percentage of employees joining trade unions (%) | 100 | 100 | 100 |
| Number of grassroots trade union organizations | 1,965 | 2,429 | 2,731 |
| Ratio of male to female employees (male : female) | 2.2:1 | 2.2:1 | 2.2:1 |
| Percentage of ethnic minority employees (%) | 5.3 | 5.5 | 5.6 |
| Percentage of female managers (%) | 20.0 | 19.9 | 20.3 |
| Coverage of health and safety training (%) | 98 | 98 | 98 |
| Work-related injury and death (person) | 0 | 1 | 0 |
| Per capita training time (hour/person) | 29.8 | 22.6 | 43.16 |
| Employee turnover rate (%) | 3.7 | 3.4 | 3.5 |
| Funding for care (*10,000 yuan) | 14,158 | 28,149 | 34,453 |

*Note: The data on user satisfaction in 2021 is from the Ministry of Industry and Information Technology (MIIT). In 2021, the MIIT optimized the telecom user satisfaction index (TCSI) model, combining the satisfaction of mobile Internet users and mobile voice users into the mobile service satisfaction. The optimized model includes the mobile service satisfaction, the fixed Internet service satisfaction, and the landline voice service satisfaction.

| Environmental Responsibility | 2019 | 2020 | 2021 |
|---|---|---|---|
| Consumption of electric energy during operation (hundred million kWh) | 211.6 | 249.4 | 280.9 |
| Electric energy saved (hundred million kWh) | 4.6 | 6.6 | 13.3 |
| Consumption of gasoline (10,000 tons) | 12.3 | 11.7 | 12 |
| Consumption of diesel (10,000 tons) | 2.8 | 2.9 | 2.9 |
| Consumption of natural gas (10,000 cubic meters) | 1,791 | 1,990 | 2,213 |
| Consumption of purchased heat (million kilojoule) | 1,594,362 | 1,462,360 | 1,554,071 |
| Energy consumption per unit of information flow (kgce/TB) | 4.6 | 4.2 | 3.7 |
| Number of trainees on energy saving and emission reduction (person-time) | 7,970 | 11,918 | 3,357 |
| Power consumption per carrier frequency at base station (kWh/carrier frequency) | 1,096 | 1,255 | 1,391 |
| Percentage of green procurement (%) | 84 | 97 | 98 |
| Disposed waste (ton) | 106,034 | 90, 258 | 76,962 |
| Income from waste disposal (100 million yuan) | 18.6 | 12.7 | 7.87 |
| Online trading volume of proprietary electronic channels (100 million yuan) | 186.1 | 262.8 | 753.2 |
| Staff per capita learning time in online college (hour) | 18.4 | 50.2 | 40.73 |
| **Public Welfare Responsibility** | **2019** | **2020** | **2021** |
| Total social (external) donation (10,000 yuan) | 20,565 | 29,164 | 24,158 |
| Total time length of volunteer service (10,000 hours) | 61.86 | 74.14 | 65.13 |
| Number of volunteer activities (person-time) | 121,083 | 140,000 | 137,400 |

# Main Honors

| Award to | Honor | Awarded by |
|---|---|---|
| China Telecommunications Co., Ltd. | Class A for 2020 Business Performance Evaluation of the Central SOEs Executives | SASAC, State Council |
| | 2021 Outstanding Contribution to the Asia Mobile Industry | GSMA |
| | 2021 Excellence Award | TMT Industry Association |
| | ATD Excellence in Practice Awards for the strategic decoding project | Association for Talent Development (US) |
| | Grade A for Party Building Responsibility System Assessment of Central SOEs | SASAC, State Council |
| China Telecom Co., Ltd. | ESG Leading Enterprise Award | Bloomberg Businessweek/Chinese Edition |
| | 2020 A-Level Organization for Tax Credit | State Taxation Administration |
| | "Asia's Best CEO", "Asia's Best CFO", and "Asia's Best CSR" | Corporate Governance Asia |
| | The Best of Asia – Icon on Corporate Governance", "Asian Corporate Director" | Corporate Governance Asia |
| | "Excellence Award for H Share & Red Chip Entries" and "Certificate of Excellence in Environmental, Social and Governance Reporting" | Hong Kong Management Association |
| | "Most Outstanding Company in Hong Kong – Telecommunication Services Sector", and "Overall Most Outstanding Company in Hong Kong" | Asiamoney |
| China Communications Services Co., Ltd. | Ranked the 4th in the "100 Most Competitive Software & IT Service Enterprises 2021" | China Information Technology Industry Federation |
| | "The Best TMT Company" 2021 | The 6th "Golden Hong Kong Equities Awards Ceremony" co-organized by Zhitong Finance and Tonghuashun Finance |
| | "Asia's Icon on ESG", "ESG Influencer" and "Asian Corporate Director" | The "16th Asian ESG Award" held by Corporate Governance Asia |
| | Gets rankings on the "2021 FORTUNE China 500" (the 87th and "2021 Forbes Global 2000" (the 1,337th) | FORTUNE China and Forbes |
| | "Honored Company", ranked the second in all five award categories within Overall (Small & Midcap), including "Best CEO", "Best CFO", "Best IR Professional", "Best IR Program" and "Best ESG" | "2021 All-Asia (ex-Japan) Executive Team" rankings by Institutional Investor |
| | "Asia's Best CEO", "Asia's Best CFO" and "Best Investor Relations Company" | The 11th Asian Excellence Award 2021 organized by Corporate Governance Asia |

# OUTLOOK

In 2022, China Telecom will carry out the following tasks in fulfilling its social responsibilities:

## Promote responsibility management

We will resolutely implement the decisions and arrangements of the CPC Central Committee and the State Council, stand in the new development stage, implement the new development philosophy, and build a new development pattern. We will earnestly fulfill the responsibilities of a central SOE, practice high-quality development, continue to promote responsibility integration, and make innovation in responsibility fulfillment practice. We will better the working mechanism on responsibility, actively respond to the concerns of stakeholders and continuously enhance efforts on responsibility, and improve our responsibility management capability.

## Drive development of new infrastructure

We will focus on cloud-network integration 3.0, promote the new infrastructure represented by 5G, and accelerate the arrangement for new infrastructure that integrates 5G, cloud, network and digital technologies. We will steadily advance 5G network construction through co-building and sharing and with SA technology, use high-quality networks to serve more users, and provide high-quality services. We will fully support major regional strategies and promote network construction and universal services in remote and poor areas. We will promote technological innovation and independent control of key core technologies. We will strengthen network information security, and improve emergency communications support capacity, to ensure secure and unblocked networks. We will enhance smart service capability and improve our customer service level.

## Empower digital economy development

We will lead the digital innovation ecosystem, strengthen cooperation with industrial partners and accelerate the pace of innovation. We will promote technological innovation in the areas of 5G SA and cloud-network convergence, actively explore the IT application in the fields of industrial Internet, smart city, education, health care and residential services, continue to enable the digital transformation of traditional industries, and propel crossover cooperation in the whole industrial chain, to help the development of the cause related to people's livelihood and fully promote the development of digital economy.

## Work together for a harmonious and beautiful society

We will continue to abide by laws, comply with regulations, and insist on integrity in operation. We will practice the concept and follow the road of green development, strive to further reduce the energy consumption per unit of information flow, and take active participation in the development of ecological civilization. We will make every effort to promote rural revitalization, help paired areas consolidate and expand the achievements in poverty alleviation, gradually achieve effective connection with rural revitalization, and contribute to local rural revitalization. We will always be customer-oriented and effectively protect the rights and interests of users. We will keep protecting the rights and interests of employees, improve the talent team building system, fully mobilize the enthusiasm of employees, and stimulate their vitality. We will carry forward the spirit of model workers and craftsmanship, and care for the lives of employees. We will actively support the development of social undertakings such as science, education, culture and health. We will widely take part in the "Belt and Road" development, and fulfill social responsibilities overseas to assist the economic and social development in relevant countries/regions.

## Rating Report of China Telecom CSR Report 2021

Commissioned by China Telecommunications Co., Ltd., the Chinese Expert Committee on CSR Report Rating selected experts to form a rating team and give a rating to "China Telecom CSR Report 2021" (hereafter referred to as "the Report").

### I. Basis of Rating

The rating work is based on the "Guidelines for Preparation of CSR Reports in China (CASS-CSR 4.0)" of Chinese Academy of Social Sciences and the "Rating Standard of CSR Reports in China (2020)" of the Chinese Expert Committee on CSR Report Rating.

### II. Process of Rating

1. The rating team reviewed the CSR Report Process Information Confirmation Letter and related evidentiary materials submitted by the Report preparation team;

2. The rating team evaluated the compilation process and contents of the Report, and drafted a rating report; and

3. The vice chairman of the Chinese Expert Committee on CSR Report Rating and the leader and expert of the rating team reviewed and signed the rating report.

### III. Conclusion of Rating

#### Procedural Performance ( ★★★★★ )

The Group's Corporate Strategy Department has set up a report preparation team to take charge of the specific preparation work, and the Chairman and the President of the Company were responsible for controlling the overall direction and topics, as well as the final review of the Report. The Company positioned the Report as an important tool to improve performance transparency, better social responsibility management, develop corporate culture, enhance communication with stakeholders, and spread the image of the Company as a responsible enterprise with clearly defined value proposition. It identified substantive topics according to relevant national macro policies, benchmarking analysis with the industry, corporate development strategy, stakeholder surveys, etc. It drove the subordinate companies - China Telecom Corporation Limited and China Communications Services Corporation Limited - to independently produce and publish their ESG to generate a multi-level report system. The Department planned to release the Report on the official website and present it in electronic and printed versions in both English and Chinese as well as other forms such as a long figure version, demonstrating outstanding procedural performance.

#### Substantive Performance( ★★★★★ )

The Report systematically discloses key topics in the telecom industry in detail, such as ensuring communications quality, innovation in products and services, dealing with customer complaints, protecting customer information, safeguarding emergency communications, closing the digital gap, co-building and sharing of base stations, supporting digital transformation, development and application of environmental protection technologies and managing electromagnetic radiation, demonstrating outstanding substantive performance.

#### Completeness ( ★★★★☆ )

The Report systematically discloses 86.57% of the key indicators of the telecom industry from such aspects as "Enhance Innovation to Solidify the Foundation for Digital China", "Optimize Services to Create a Better Life Together", "Refine Actions to Help Build a Harmonious Society" and "Deepened Reform for Better Corporate Governance", and is leading in completeness.

#### Balance ( ★★★★☆ )

The Report discloses negative data and information including "call drop rate of mobile communication", "packet loss on ChinaNet backbone", "work-related injury and death", "employee turnover rate", "number of customer complaints", "customer complaint rate", and "child labor and forced labor", with an outstanding balance performance.

#### Comparability ( ★★★★★ )

The Report reveals comparable data about 63 indicators in three consecutive years, including "cities covered by 5G network", "main business income", "number of mobile subscribers", "number of volunteer activities", "consumption of electric energy during operation", and "greenhouse gas emissions in operation", and made horizontal comparison of the rank, which is the 4th, in the "100 Most Competitive Software & IT Service Enterprises". In conclusion, it is excellent in comparability.

#### Readability ( ★★★★★ )

Themed with "Embark on a New Journey toward Digitalization", the Report systematically presents the responsibility performance concept and practices of the Company to the stakeholders and the results in 4 chapters, showing the deep understanding of China Telecom on corporate social responsibility. The cover design adopts the hand-drawn illustration style, and integrates "cloud", "base station" and other signs to highlight the industry characteristics, which improves the recognition of the Report. The reference to testimonials from stakeholders proves the effectiveness of China Telecom in performing social responsibility, strengthening the communicability and spread effect of the Report. The simple and fresh design style, the properly matched pictures and texts, and rich and detailed cases and performance data, make it excellent in readability.

#### Originality ( ★★★★ )

The Report includes two responsibility features of "Forge ahead: Major Events in Party History Learning and Education in China Telecom" and "Comprehensive Promotion of Cloud-Network Integration", which focus on the actions of the Company in study and education of the Party history, and in cloud-network integration, demonstrating the responsibility of a central SOE. The research, development and release of the "Measures for Social Responsibility Management of China Telecommunications Co., Ltd. (Trial)" has enhanced the standardization of social responsibility management and suggests excellent originality.

#### Overall Rating ( ★★★★★ )

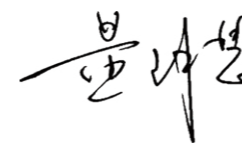As evaluated by the rating team, the 2021 China Telecom CSR Report is rated five-star as an outstanding CSR report.
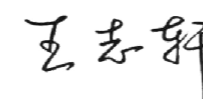
China Telecom CSR Report won five-star rating for the 11th year in a row

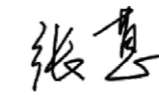### IV. Suggestions for Improvement

1. Increase disclosures of core industrial indicators to further improve the completeness of the report.

2. Increase the detailed disclosure of the deficiencies in the performance of responsibilities, to further improve the balance of the report.

Vice Chairman of Chinese Expert Committee on CSR Report Rating

Leader of the Rating Team

Expert of the Rating Team

Issuing date: August 19, 2022

Scan here to check corporate rating

# Reader Feedback Form

Dear Readers:

Thank you for taking time to read China Telecom CSR Report 2021.

If you have any advice or suggestions on this report or on China Telecom's CSR performance, you are welcome to fill in the following form and send it to us by post, fax or email. For contact information, please refer to the Report Specification on the first page.

Thank you very much for your attention and support to China Telecom!

Corporate Strategy Department, China Telecom

August 2022

1. Do you think this report can inform you of China Telecom's performance in social responsibilities?

A. Excellent B. Good C. Not bad D. Bad E. Not informed

2. How do you evaluate China Telecom's actions in moving toward a new development stage?

A. Excellent B. Good C. Not bad D. Bad E. Very bad

3. How do you evaluate China Telecom's achievements in fulfilling social responsibilities in 2021?

A. Excellent B. Good C. Not bad D. Bad E. Very bad

4. In your opinion, which areas should China Telecom improve in this report? (Multiple Choices)

A. Framework and logic B. Substance and integrity C. Language expression D. Report design E. Others _____

5. Please leave your other advice or suggestions:

Please let us know more about you if convenient:

Name:                                          Occupation:

Contact:                                       Employer:

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