China Advances Global 6G Standardization

Policy

By ZHONG Jianli

The Ministry of Industry and Information Technology (MIIT) of China recently announced its commitment to fostering a unified global standard for 6G technology, heralding a new era of international industrial innovation collaboration.

Zhang Yunming, vice minister of MIIT, underlined the necessity of nurturing a consensus and promoting close collaboration among global industry, academia, research and application sectors, in order to advance the innovation and cooperation for 6G, the next-generation comprehensive digital infrastructure.

MIIT has been actively driving various initiatives encompassing the research of 6G development requirements, technological R&D, as well as international cooperation.

Earlier this year, China's proposal of five categories of 6G typical scenarios and 14 key performance indicators was

The 6G communication technology is exhibited at the 2023 Zhongguancun Forum held on May 28, 2023 in Beijing. (PHOTO: VCG)

wholly adopted by the International Telecommunication Union in its 6G vision and requirements recommendation document.

The IMT-2030 (6G) Promotion Group of China has actively bolstered international exchanges and cooperation, signing memorandums with the European 6G Smart Networks and Services Industry Association (6G-IA), Korean 6G Forum, and the Telecommunications Standards Development Society of India.

Zhang stressed the need to cement original innovation, particularly in advancing key technologies such as new wireless network technologies, propelling the convergence of mobile communication with other sectors such as intelligence, sensing, and computation. He also said it's necessary to accelerate the development of integrated 5G applications to strengthen the foundation for 6G applications.

In addition, Zhang called for efforts to enhance international communication and deepen cooperation to steer the formation of unified global standards for 6G.

Wang Zhiqin, head of the IMT-2030 (6G) Promotion Group and deputy director of the China Academy of Information and Communications Technology, highlighted three novel scenarios of 6G application: the integration of communication and sensing, the convergence of communication and AI, and ubiquitous IoT.

She added that in the future, 6G will connect not only humans but also a myriad of intelligent entities such as robots and the metaverse.

5G Revolution Shapes the Future

By ZONG Shihan, CHEN Chunyou & SONG Ziyan

The 2023 World 5G Convention held in Zhengzhou, Henan province in central China, from December 6 to 8, saw experts discuss technological breakthroughs and propose industrial paths for 5G development, drawing a blueprint for a better future.

Accelerating technology evolution

Wu Hequan, an academician of the Chinese Academy of Engineering(CAE), said at the convention that with the rapid development of information technology represented by 5G, cloud computing, big data and artificial intelligence, major countries and international organizations are strengthening research on 5G-Advanced and 6G, competing for first-mover advantage in the new round of science and technology revolution and industry reform.

Although 5G technology still faces various challenges, there are directions for its development. Among them, terahertz technology and Reconfigurable Intelligent Surface (RIS) are attracting attention.

Terahertz is a unit of frequency, denoting one trillion cycles per second. Terahertz technology refers to the use of electromagnetic waves in the terahertz region of the electromagnetic spectrum. RIS is a programmable structure that can be used to control the propagation of electromagnetic waves.

Yao Jianquan, an academician of the Chinese Academy of Sciences (CAS), pointed out that for 5G's evolution to 5G-Advanced and 6G, the network bandwidth and transfer rate have to be improved and time delay reduced. Competition among major economies over terahertz technology has already begun.

According to Yao, although humans do not yet fully understand and apply terahertz technology, the technology has shown advantages in some industries. In addition to mobile communication based on fingerprints, invisibility, safety and other factors, terahertz has vast application prospects in the field of biomedicine.

According to Cui Tiejun, another academician of CAS, RIS is one of the solutions to technological challenges of 6G. Its typical feature is that it can control the propagation of electromagnetic waves in real time and process digital information to connect the digital world and physical world. Since the RIS concept was proposed in 2014, his team has developed a complete information metamaterials system and promoted its application in multiple fields, Cui added.

Enabling industry development

With its improvement and popularization, 5G technology has begun to play a key role in various industries.

It has enabled scientific drilling in unmanned areas tens of thousands of meters deep and hundreds of kilometers away, said Sun Longde, an academician of CAE, adding that in the Daqing Oilfield in Heilongjiang province,

5G is used for data acquisition, reducing inspection time from days to 20 minutes.

In manufacturing, 5G is helping with data acquisition and high-precision positioning. In the medical field, it plays a role in emergency treatment, remote diagnosis and hospital management. In agriculture, the integration of new digital technology and biotechnology has ushered in an intelligent breeding era.

The main application of 5G is in industrial Internet, which has achieved results in machine vision and remote-controlled robots, and will play a greater role in discrete manufacturing and process manufacturing as it improves, Wu said.

"From a drop of oil to a thread, from a piece of iron to a section of steel, from heavy equipment to shoes, hats, clothing, and snacks, 5G has evolved from single production to large-scale production, from peripheral auxiliary to core production," said Li Pizheng, executive director of China Mobile.

First Phase of Commercial Subsea Data Center Completed

Case Study

By WANG Zhuhua & ZHONG Jianli

In the azure waters off the coast of Lingshui in south China's Hainan province, a milestone of technological innovation has been achieved after a 1300-tonne data pod was lowered to its designated position under the sea.

As the core equipment of Hainan's demonstrative Underwater Data Center

A set of data pods are lowered into the sea in Hainan. (COURTESY PHOTO)

(UDC) project, the pod successfully docked with its base and completed necessary tests, marking the completion of the first phase of the world's first commercial UDC project.

Pu Ding, general manager of the project said data centers are fundamental to the storing, computing and processing of information, and are the backbone of Internet services.

"The UDC represents a new, eco-friendly, and low-carbon data center system. By placing IT infrastructure such as servers within pressure vessels on the seabed, the center utilizes gravity heat pipe technology, employing the flow of seawater for natural cooling of the data center equipment. This approach offers advantages such as green, low carbon, safe, reliable, and cost-efficient," said Pu.

In December 2022, the UDC project deployed its first two data pods, which will work in tandem with the newly deployed one to form the world's largest underwater data pod cluster.

According to Li Jiawen, vice president of Hailan Cloud, the technical provider of the project, these pods not only serve as data storage facilities, but also function as a supercomputer on the seabed. Packed with intelligent computing equipment, they can process over four million high-definition images in 30 seconds, equivalent to the workload of 60,000 traditional computers operating simultaneously.

The project is planned to be executed in three phases. The first phase includes the deployment of three sets of underwater data pods. Subsequent phases will witness the construction of 30 and 100 data pods respectively.

Comparing the undersea project with a land-based traditional data center of similar scale, Pu said, "Once the entire project is completed, it is projected to save 122 million kWh of electricity, reduce the land area needed by 68,000 square meters, and conserve 105,000 tons of freshwater annually."

He added that through comprehensive design and development of marine infrastructure, the underwater data center, when combined with offshore renewable energy, marine monitoring and ocean farming, can promote the intensive utilization of marine resources, facilitating the synergistic development of the digital economy and marine economy.

The exploration of UDCs initially began with Microsoft in 2015. After three sea trials and retrievals, Microsoft's experiments confirmed that servers operating in a sealed and inert gas environment on the seabed exhibited eight times more reliability than those in land-based data centers.

"The Hainan project team, after innovating current international advanced technologies, not only fills the gap in China's development of marine engineering and data center infrastructure, but also positions its overall technology and industrial capabilities at the forefront internationally," said Li.

S&T Daily Partners with Nouvelles d'Europe

By LI Linxu

In its latest move to promote the dissemination of sci-tech innovation achievements, *Science and Technology Daily (S&T Daily)* has established a cooperative news service relationship with *Nouvelles d'Europe*.

Zhang Biyong, president of *S&T Daily*, and Zhong Cheng, president of *Nouvelles d'Europe*, signed an MOU in Paris on November 24.

The two sides will conduct full cooperation in the exchange of news resources, such as sci-tech news in the forms of images, texts and videos, and also co-host relevant events.

Zhang presented the English Weekly Edition of *S&T Daily* to Zhong, and extended an invitation to Nouvelles d'Europe to join the IUSTC that was initiated by *S&T Daily*, aiming to enhance the communication and cooperation in the field of science and technology among global news agencies, think tanks and organizations.

Zhong introduced the development history of *Nouvelles d'Europe*, and accompanied the visiting delegation on a tour of the culture center of Nouvelles d'Europe, as well as its Chinese school.

Nouvelles d'Europe, established in 1983, is one of the most influential Chinese news organizations in continental Europe.

Zhang Biyong, president of *S&T Daily*, holds talk with Zhong Cheng, president of *Nouvelles d'Europe*, in Paris on November 24. (PHOTO provided by *Nouvelles d'Europe*)

Yangtze River Delta Leads Innovative Development

Shanghai is ranked third for high-quality research output according to the annual Nature Index report.

Leading the way in integrated development

The integrated development of the Yangtze River Delta is undergoing new major breakthroughs, which enhanced the region's leading and exemplary role in pursuing Chinese modernization.

The Yangtze River Delta is home to many industrial and supply chains for critical industries.

As a major automobile production base in China, a new energy vehicle (NEV) rolls off the production lines in the Yangtze River Delta every 10 seconds, according to Xinhua.

With the chips and software sourced from Shanghai, batteries from Jiangsu, and die-casting machines from Zhejiang, an NEV factory in the delta region can acquire all auto parts within a 4-hour drive.

This showcases the immense potential for synergy-driven development within the Yangtze River Delta, making it an example of collaborative success for the rest of the country.

The Miraculous Ecological Tale of Henan

The wetland microbial community helps remove pollutants from wastewater by catalyzing chemical reactions, biodegradation and biosorption. They also support vegetation growth. The water passes through the surface flow wetland and its quality is furtherimproved. It is then discharged into the nearby river, meeting discharge standards.

The wetland system also serves as a green lung and a sight for sore eyes for the nearby residents. "The plants remain green throughout the year except in winter, and people enjoy bringing their families here to see the beautiful scenery," apasserby told *Science and Technology Daily*.

Both the Zhengzhou Longhu Park and the Yuzhou Wetland Park exemplify the vision of providing a healthy living environment for the local people. Besides, it focuses on creating an integrated model that utilizes a clean environment to boost the economy.

For example, Sunzhuang, a village in Zhengzhou close to the Yellow River, has been hosting seed technology expos for several years.

The latest exhibition in October this year showcased over 6,500 new vegetable varieties. The participants included top breeding teams from 31 provinces, municipalities and autonomous regions across the country. International and foreign-funded enterprises such as Syngenta, Nunhems, Rijk Zwaan, Enza and Hazera were also present.

"The seed expo provides a platform for displaying newly developed vegetable varieties. In the future, we will strengthen cooperation with research institutions and enterprises, promote new and superior varieties, and contribute to rural revitalization,"Jiang Junping, director of the seed tech expo, said.