Voices from Industry • Perspectives • Tao of Business • Winners

09/2024
ISSUE 45
www.huawei.com

WinWin

UAE: du's 5G-A Strategy is Founded on Technology Innovation and a Clear Business Case

du UAE

China Mobile Shanghai

China Mobile ShangHai: Stepping up 5G-A Commercialization to Help Build a 5G-A² City

China Unicom Beijing

Elevating Innovation: China Unicom Beijing Paves the Way for Commercial 5G-A

China Telelcom Shanghai

Fostering an F5G-A All-optical 10-Gigabit Ecosystem

HUAWEI

Building a Fully Connected, Intelligent World

RAN Intelligent Agents for Improved Network Capabilities

Learn More

Foreword

Advancing 5.5G and Embracing the AI Era

This year has been a year of firsts. 2024 marked the first year of both commercial 5.5G deployment and on-device AI applications, and the rapid evolution of AI is continuing to reshape services, data, and decision-making. Productivity has begun a profound transformation and enterprises are becoming more efficient, more innovative, and more competitive. This has accelerated upgrade in all industries and brought us even closer to a truly digital and intelligent world.

The demand for intelligent ICT products and solutions, from individuals, families, and enterprises, are giving rise to more application scenarios for ubiquitous intelligent services. This means huge opportunities for the ICT industry.

Content interaction for individuals will transform, driving a spike in network traffic. This will be underpinned by generative AI and full-modal technologies which enable more efficient and higher-quality interactions, as well as the emergence of human-model interactions.

The boundaries of the Internet of Everything will also expand, from humans to digital humans, vehicles to smart vehicles, and enterprise production assistance to core parts of production. These expanded connectivity boundaries will change the way we live and work.

For individual users, AI is creating more and more advanced multi-dimensional experiences. As ways of interaction change, network traffic models and business logic are also changing. The features and capabilities of 5.5G make it ideal to drive experience monetization. AI is built into more devices, like mobile phones, wearables, and vehicle cockpits. AI mobile phones can autonomously orchestrate apps and generate user interfaces in real time to facilitate one-stop services. AI assistants will be able to quickly and accurately respond to instructions and serve users anytime, anywhere. However, this means networks must deliver more on all fronts. Diversified performance requirements in bandwidth, latency, and deterministic experience will drive network evolution and reshape business models. The telecom industry can already provide differentiated, scenario-based services and experiences for different user groups. More monetization factors beyond just network traffic have also emerged, like rates, computing power, and VIP assurance. These are pushing traffic-based carrier monetization to become more experience-based. Carriers can also leverage their huge user bases and continued AI innovation to create more services and value for users, and achieve a new round of business growth.

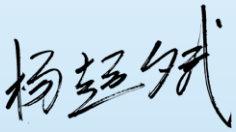
For families, communication service scenarios are evolving from home security to smart homes, as demand for more and more diverse experiences arises. Home assistants and agents powered by home computing devices that serve as small home AI brains, alongside cloud-based big AI brains, will offer real-time intelligent decision-making for smart home devices and services. They will also support personalized settings based on the habits and needs of individual family members, making homes more comfortable and convenient. To meet these more diversified needs, carriers can provide integrated packages leveraging home networks that are evolving from gigabit speeds to 10-gigabit speeds. On top of basic data and bandwidth packages, carriers can provide privileges and premium services that comprehensively enhance user experience. Accelerated commercial adoption of 10-gigabit packages is expected to occur in 2025 to offer consumers more intelligent, convenient, and personalized smart home services, lifting home broadband to a new level.

Finally, for enterprises, service operations are moving past digitalization and on to intelligent transformation, driving the adoption of converged cloud, AI, and security services on top of basic private-line and private-network services. Carriers can invest in multiple areas here, including cloud, edge, and devices, to achieve growth through industry intelligent transformation and inference. They can provide combinations of standardized offerings and AI to small- and medium-sized enterprises to help them implement simplified, service-oriented, and standardized edge AI inference services. These, alongside inclusive AI capabilities from smart devices, can meet the needs of numerous industries. In addition, AI will continue evolving and empowering more industries. In manufacturing, education, healthcare, and more, the integration of connectivity, networking, and AI technologies is fostering new products, services, and business models. Examples of these include the low-altitude economy and passive IoT. The application of AI in diversified scenarios is set to enhance both production capacity and production quality.

We will need intelligent computing target networks to support all of these experience and industry upgrades. We will move away from centralized computing power deployment and towards distributed deployment models, and cloud-edge-device computing power collaboration will become a trend. This means we need differentiated networks for accessing computing power and connecting resources within and between intelligent computing centers. We will need to build a unified, collaborative, and efficient intelligent computing target network to create "a nationwide computer" that delivers efficiently integrated and flexibly scaled computing, transport, and storage resources. This will facilitate new service models such as computing power leasing and industry-specific model incubation. It will also improve end-to-end AI application experience, and create new industry opportunities. Telecom foundation models and smaller models are pushing network automation towards level-4 autonomy, which will significantly improve network O&M efficiency and energy efficiency.

Over the next decade, we will continue to embrace AI and move even faster towards an intelligent world. 5.5G will have an essential role to play. Huawei looks forward to working with all industry partners to explore better ways to build networks and achieve business success, provide more abundant digital experiences, and help industries go intelligent.

By Yang Chaobin,
Board Member
Chairman of the Investment Review Board
President of ICT Products & Solutions
Huawei



WinWin

Published by
ICT Sales & Service Dept.
Huawei Technologies Co., Ltd.

Sponsor
Li Peng, Liu Kang

Editor-in-Chief
Song Xiaodi

Contributing Editor-in-Chief
Shen Shixiong, Yao Xiangxiang, Chen Jipeng

Editors
Cai Wei, Chen Quanbao, Gao Pengcheng, Gou Boru, Guo Ping, Kang Yu, Huang Rui, Luo Xini, Ma Jinge, Qian Hao, Shen Yubin, Tao ling, Tang Xiaoqiang, Wu Kun, Wu Xiaofeng, Xu dongjian, Zhou Qian, Zhu Wei, Samuel Luke Winfield-D'Arcy

For the electronic version, please visit:
https://carrier.huawei.com/en/winwin/45

E-mail: winwin@huawei.com
Address: G1, Huawei Industrial Base, Bantian, Longgang, Shenzhen 518129, China
Publication Registration No.:
Yue B No. L015060029

Copyright © Huawei Technologies Co., Ltd. 2024. All rights reserved.
No part of this document may be reproduced or transmitted in any form or by any means without prior written consent of Huawei Technologies Co., Ltd.

Disclaimer
The contents of this document are for information purposes only, and provided "as is". Except as required by applicable laws, no warranties of any kind, either express or implied, including but not limited to, the implied warranties of merchantability and fitness for a particular purpose, are made in relation to contents of this document. To the maximum extent permitted by applicable law, in no case shall Huawei Technologies Co., Ltd be liable for any special, incidental, indirect, or consequential damages, or lost profits, business, revenue, data, goodwill or anticipated savings arising out of or in connection with any use of this document.

Read on your phone

CONTENTS

01 COVER STORY

UAE: du's 5G-A Strategy is Founded on Technology Innovation and a Clear Business Case P6

Saleem Alblooshi,
CTO, du UAE

02 VOICES FROM INDUSTRY

China Mobile Shanghai: Stepping up 5G-A Commercialization to Help Build a 5G-A² City P10

China Mobile Shanghai

Elevating Innovation: China Unicom Beijing Paves the Way for Commercial 5G-A P14

Yang Lifan,
Deputy General Manager,
China Union Beijing

China Telecom Shanghai: Fostering an F5G-A All-optical 10-Gigabit Ecosystem P19

Ji Hongfeng,
General Manager, Marketing Department,
China Telecom Shanghai

03 PERSPECTIVES

5G-Advanced Poised for Take-off in 2024 P23

Mobile World Live

5G-Advanced as a Booster for the Transformation to an AI World P26

Yang Guang,
Senior Principal Analyst, Service Provider Strategy and Mobile Infrastructure, Omdia

04 TAO OF BUSINESS

From 5G to 5G-A: Charting a New Course for Business Success with Further Innovation P30

James Chen,
President, Carrier Sales Department, Huawei

The New 5G-A Journey: Embracing New Opportunities in Mobile AI P34

Cao Ming,
President, Wireless Network Product Line, Huawei

5G-A Core with Native Intelligence: Gateways, Business Models, and the Value of Connectivity P38

George Gao,
President, Cloud Core Network Product Line, Huawei

05 WINNERS

e& UAE: Leading in 5G-Advanced and Building the Intelligent Green Network P43

Marwan Bin Shakar,
Senior Vice President of Wireless and Access, e& UAE

AIS Leads Thailand's Digital Revolution with 5G P47

Mark Chong Chin Kok,
Deputy Chief Executive, AIS

Telefónica: Paving the way from 5G SA to 5G-Advanced P50

Cayetano Carbajo,
Director for Core,
Transport and Service Platforms, CTIO Office,
Telefónica Group

CTM: 5G-A Takes Digital Macau to a New Era P53

Hudson Lou,
Director of
Network & Services Development, CTM

Entel Propels Chile into F5G-Advanced Era P56

Luis Uribe,
Chief Technology Officer, Entel

UAE: du's 5G-A Strategy is Founded on Technology Innovation and a Clear Business Case

As a leading provider of telecoms and digital services in UAE, du has historically put 5G at the heart of its commercial offering, focusing on 5G investment, monetization and an enhanced customer experience. In keeping with its pioneering approach to the technology, du is today making 5G-Advanced a key priority.

By Saleem Alblooshi,
CTO, du UAE

A history of 5G innovation

Those who know du's 5G history will be aware that we launched our "5G Leading" strategy in 2019. Having partnered with Huawei to unveil the world's first 5G-Advanced (5G-A or 5.5G) demonstration villa in 2022, we announced the commercialization of 5G-A in February 2024, and published details of our 5G-A strategy together with our vendor partner.

Today we provide 5G service to 98.5% of the population in the UAE, a historically high 5G benchmark which has been verified by several independent parties.

Anyone who has visited Dubai will know that it is a city full of superlatives: the highest building, the biggest shopping mall, the biggest indoor snow-park, the most luxurious hotel, and the widest highways. As the top telecom service provider in the UAE, we are always trying to provide the best experience to our consumers and visitors.

A clear business case for 5G-A

5G-A is one of the technologies which will help us to achieve that target. It will provide 10 Gbps to each user, 10 times that which can be achieved with 5G. And in phase 1, we are going to develop three component carrier (3CC) TDD coverage nationwide, which can provide

> The business case for 5G-A is clear. A 12.6% growth in home broadband use in 2023 resulted in a historical high of 600,000 users for our FWA offering.

up to 5 Gbps to each user. In the coming years, we will embrace 5G-A to massively enhance the experience for our customers.

The business case for 5G-A is clear. A 12.6% growth in home broadband use in 2023 resulted in a historical high of 600,000 users for our fixed-wireless access (FWA) offering. Even with fiber penetration in the UAE at 97% (mainly accounted for by our competitor), du itself still accounts for around 20% of the home broadband market. Since du launched its FWA business in 2021 the number of users has doubled in two years, while utilization of the network has reached more than 25% overall, with hundreds of sites achieving more than 80%.

By launching our 5G-A network we can provide an unimpaired and even better experience to customers as traffic levels continue to grow. As a result of our FWA business we can also explore new use cases, such as guaranteed quality of experience, RedCap features, Passive IoT, and other capabilities.

Partnership is a driver of innovation

Cooperation between Huawei and du goes deeper in 5G-A, with milestones being realized one after another. Together, the two companies have witnessed how continuous evolution of wireless networks can bring mobile users the convenience, superior network performance, and enormous possibilities of an innovative service experience.

As well as support for cutting-edge technologies such as passive IoT and native intelligence, 5G-A is opening up new business opportunities. Operators around the world

have varied spectrum conditions and service requirements, but carrier aggregation can be performed on the existing sub-6 GHz large-bandwidth spectrum to quickly deliver a downlink peak rate of 5 Gbps.

du has taken the lead in setting up a large-bandwidth 3CC TDD commercial network. To further improve the 5 Gbps download rate, spectrum such as millimeter wave (mmWave) can be utilized to provide an ultimate 10 Gbps experience in the downlink and accommodate more service scenarios, thereby creating huge market opportunities.

From 5G-A vision to reality

After three years of work, 5G-A has progressed from vision to reality, and all of the standards, services, products, terminals, business, and policies are ready. Firstly, 3GPP Release 18 will be frozen in the first half of this year. And five connections in people, home, things, industries, and vehicles are constantly expanding the boundaries of connectivity.

For terminals, 3CC devices such as smartphones and CPE are mature, and RedCap terminal modules are being continuously enriched. Also, rich business models are there to support monetization of uplink and latency capabilities. Finally, many countries have issued policies to fully support the development of 5G-A.

Global 5G-A commercialization is accelerating. More than 10 operators have announced 5G-A commercial plans, and more than 30 operators have carried out related technical verification. In the Middle East, leading operators such as du, have taken the lead in achieving large-scale commercial use of 5G-A. Operators in Europe, Asia Pacific, and Latin America have actively verified the 10 Gbps capability to prepare for the commercial use of 5G-A in 2024.

Planning for the next phase

After working with 5G for 5 years of development, the technology's capabilities in mobile and FWA are much clearer. However, we need to think about how we can enable industries' digitalization. In du, we call it Beyond Core Revenue. We started with a strategy named "ENABLE" which we have now updated as "RENABLE". We would like to create more streams which can help operators to monetize the network.

For example, can we open the network APIs to different industries? How can we bundle the network and cloud together and provide differentiated services? How will 5G-A change the manufacturing industry? How will FWA and fiber-to-the-home (FTTH) cooperate with each other? We need to work together with leading vendors like Huawei so that we can find the answers.

China Mobile Shanghai: Stepping up 5G-A Commercialization to Help Build a 5G-A² City

China Mobile Shanghai

On June 25, China Mobile Shanghai held a commercial 5G-A launch themed "Magic Speed Program for Extraordinary Experience". At the event, the operator launched three commercial service packages for consumers as part of its exploration of business models that meet the diversified needs of different user groups in the 5G-A era.

This is an important step for China Mobile Shanghai as it spearheads the commercial adoption of 5G-A. 2024 marks the launch of commercial 5G-A. China Mobile started commercial 5G-A deployment this March and plans to bring 5G-A coverage to more cities by the end of the year. China Mobile Shanghai has been pioneering 5G-A exploration and commercialization. It has commercialized 5G-A at scale and delivered superior user experience through contiguous network coverage.

China Mobile Shanghai has been tireless in its efforts to maintain its lead in 5G-A. On July 6, at the closing ceremony of the 7th World AI Conference held in Shanghai, the Shanghai Municipal Government and China Mobile announced their strategic cooperation to make Shanghai a "5G A² Demonstration City". The two parties are expected to work together to promote deeper integration of 5G-A with AI.

Network construction: Creating value with differentiated advantages

Over the course of a year, China Mobile Shanghai deployed a large-scale commercial 5G-A network with contiguous coverage. The network achieved 100% 5G-A coverage at famous landmarks like Lujiazui and the Bund, as well as in 10 key settings, urban expressways, and trunk roads.

In the Watertown Lobby area, we built 10-gigabit optical network infrastructure to deliver high-speed and large-capacity connectivity. The use of 10-gigabit connectivity technology significantly improved communication network speeds and capacity in the area, helping turn Watertown Lobby into a demonstration area for digitalized agricultural machinery production and rural governance.

Leveraging 5G-A's network capabilities, China Mobile Shanghai achieved record-high test speeds on devices available in the market: 5 Gbps peak downlink rate, over-500 Mbps peak uplink rate, and 2.5 Gbps average experienced rate.

China Mobile Shanghai also built the first 5G-A demonstration network based on three-component carrier (3CC) aggregation for a metro line in Shanghai. This innovation has set an industry benchmark by providing faster and more stable connectivity for metro riders.

We believe that user willingness to embrace the 5G-A era will depend on our ability to provide differentiated network advantages. We have been actively exploring ways to improve user experience with such 5G-A-based advantages.

The first advantage is 10 Gbps downlink. By introducing millimeter wave (mmWave) 3CC aggregation technolo-

gy, 5G-A can deliver 10-fold higher downlink rates than 5G. The second advantage is the ability to boost the connectivity of all things. With passive IoT capabilities, 5G-A can be applied in many new domains, such as warehousing and logistics. This will promote IoT adoption and development. The third is integrated sensing and communications. 5G-A can support high-precision sensing at low cost for all domains. The fourth is more deterministic network performance, which can play a vital role in the industrial Internet. China Mobile Shanghai achieved excellent latency and deterministic performance in the Jinqiao demonstration area project.

Experience-based packages:

Accelerating commercial 5G-A

The three commercial service packages we launched this June can deliver differentiated experiences to users.

The 5G-A business travel package offers users network speeds of up to 3 Gbps downlink and up to 200 Mbps uplink. This enables stutter-free videoconferencing, higher-definition display, and faster file transfer for premium business travelers. It also offers users access to applications like 5G New Calling, cloud PC, and DragonPass travel services.

The 5G-A livestreaming package offers users network speeds of up to 2 Gbps downlink and up to 150 Mbps

> We believe that user willingness to embrace the 5G-A era will depend on our ability to provide differentiated network advantages. We have been actively exploring ways to improve user experience with such 5G-A-based advantages.

uplink. This allows them to enjoy smoother streaming in higher definition and more real-time interaction.

The 5G-A games package provides networks speeds of up to 2 Gbps downlink and 150 Mbps uplink, allowing gamers to enjoy smoother, more stable gameplay with lower latency.

For terminal devices, China Mobile Shanghai worked with device vendors to launch two glasses-free 3D devices and four 5G-A mobile phones. The combination of AI and glasses-free 3D technologies allows users to experience 3D visuals without having to put on any additional devices.

Continued innovation: Exploring the integration of 5G-A with AI

The integration of 5G-A with AI is a key direction for digitalization. China Mobile Shanghai is committed to helping transform Shanghai into a 5G A^2 city. A^2 refers to the convergence of 5G-A and AI. AI-integrated 5G-A networks will have significantly higher intelligent capabilities. For example, AI enhances calling services to provide new user experiences, such as AIGC digital avatars and intelligent customer service. AI also enables the Internet of Vehicles (IoV) to implement training in the cloud and inference at the edge, enabling more intelligent autonomous driving.

Using the power of AI to enhance product experience, we have launched a range of innovative applications, such as 5G New Calling, mobile cloud disks, video RBT, mobile HD, cloud phones, mobile healthcare, and cloud PCs.

With the 5G New Calling application, for example, we use both AI and computing capabilities to provide users with a new calling experience that features consistent HD and visualized interaction, as well as other intelligent functions like fun calling, real-time transcription, intelligent translation, and AI data.

We recently launched a mobile cloud disk application called AI Store. For video RBT applications, we launched new AI features like speech-to-video and AI dancing.

For industry sectors, China Shanghai Mobile will explore and incubate benchmark vertical projects like smart communications, smart low-altitude connectivity, smart metro, smart IoV, and new-type manufacturing, injecting new momentum into Shanghai's digital and intelligent transformation and socioeconomic development.

In the IoV sector, we worked with Huawei on the Jinqiao Intelligent Connected Vehicles Demonstration Area. Leveraging 5G-A's integrated-sensing-and-communications and wide-coverage capabilities, this collaboration enabled low-cost and easy-to-adopt IoV applications, setting a new benchmark in smart transportation.

China Mobile Shanghai has also unveiled a 5G-A Industrial Internet Lab, through which we will carry out technical verification, solution research, and performance testing. This will allow us to create 5G-A applications for core industrial Internet production lines and support new industrialization efforts.

Exploration and innovation: Accelerating the transition to commercial 5G-A

The Shanghai Municipal Government has formulated a clear strategy to transform Shanghai into a dual-10-gigabit city marked by both 5G-A and 10-gigabit optical networks by the end of 2026. The government and China Mobile are jointly working to transform Shanghai into a "5G A^2 Demonstration City" and set the tone for Shanghai's development over the next three years in three directions: consolidating network capabilities, fostering more effective applications, and stimulating industry vitality.

Looking ahead, China Mobile Shanghai will continue to expand 5G-A site coverage and explore innovative AI-integrated applications. We will continue to promote commercial 5G-A applications and products, and create prosperity in collaboration with industry partners.

Elevating Innovation: China Unicom Beijing Paves the Way for Commercial 5G-A

By Yang Lifan,
Deputy General Manager, China Unicom Beijing

3GPP's Release 18 has finally been frozen and the key technologies, products, and the ecosystem underpinning 5G-A are becoming increasingly mature. This means the world is ready for commercial 5G-A. This milestone took center stage at MWC 2024 in both Barcelona and Shanghai, sparking vibrant discussions across the industry. This evolved and enhanced version of 5G will clearly lead the industry to new heights in network capabilities.

Global operators are simultaneously ramping up their 5G-A testing and commercial trials. According to a GSMA Intelligence survey, half of all global operators are expected to roll out commercial 5G-A networks within two years of relevant standards being released.

In January, China Unicom Beijing worked with Huawei to further their years-long collaborative innovation under the 5G Capital initiative by completing the first large-scale 5G-A networking demonstration in China.

This included 1:1 network verification in three distinct key locations: Beijing Financial Street in the city center, the Beijing Long Distance Call Building, and the Workers' Stadium, showcasing a range of innovative technologies and applications. The demo has provided feasible, deployable, and replicable experience for network construction and application development to help bring 5G-A into reality.

As the 5G race reaches its halfway point, China Unicom Beijing has taken this opportunity to reflect on its innovation journey over the past few years. Our experience has helped us identify five key strengths needed for 5G network development: a steadfast core commitment to high-bandwidth strategies, 200 MHz network in core areas, core competitive strength in intelligent operational capabilities, pioneering innovation in networking (as seen in our 5G-A Financial Street project), and the success of previous projects such as the 5G Capital project.

A Global Benchmark: Four years of collaborative innovation

5G Capital is an innovation program jointly established in April 2020 by China Unicom Beijing and Huawei, which was built upon the companies' years of successful collaboration. The initiative used advanced operational models and cutting-edge technology to set a standard for large-scale commercial deployment. It aimed to establish Beijing as the home of the world's leading 5G network. In 2021, China Unicom Beijing was already a pioneer in public media-driven large-scale testing and introduced 12 performance indicators to create a new paradigm for network evaluation road testing. In 2022, China Unicom Beijing then became the world's first carrier to deploy large-scale contiguous coverage with 200 MHz bandwidth, making Beijing the first city in the world to have 200 MHz bandwidth networking. In 2023, the 5G Capital project redefined intelligent operations by establishing comprehensive 5G network assessment standards. It used AI to transform user experience by integrating dynamic and static elements to achieve smart operations. Over these four years, China Union Beijing and Huawei collaborated wholeheartedly, consistently leading 5G innovation, which ultimately earned them the 2022 GLOMO 5G Industry Partnership Award. These successful construction and operational practices are continuing to serve as benchmarks and guidelines for global 5G development.

In 2024, as commercial 5G-A sits just on the horizon, the 5G Capital collaborative innovation project is gearing up for its next phase. In January this year, China Unicom Beijing partnered with Huawei to complete China's first large-scale 5G-A network demonstration under the project. Industry experts and the media were invited to experience comprehensive contiguous coverage in three key areas: Beijing Financial Street in the city center, the Long Distance Call Building, and the Workers' Stadium. Various industry representatives were also invited to an industry event to discuss commercial 5G-A.

This 5G-A project is exemplary in many ways. Beyond delivering exceptional experience and large-scale network coverage, its importance lies in the real-world 1:1 networking that has achieved a seamless 5G-A experience with a minimal number of base stations, paving the way for the potential large-scale deployment of 5G-A.

China Unicom Beijing's large-scale 5G-A networking demonstration project brings three key benefits to the industry. First, the project delivers critical network capabilities. 5G-A enhances network performance in terms of both speed and latency by up to 10 times. According to the project tests, in the Financial Street demonstration area, the network achieved a peak downlink rate of 10 Gbps and consistently perceived speeds exceeding 5 Gbps. At the Workers' Stadium, an exceptional uplink speed of 4 Gbps was also recorded.

Second, this project verified key 5G-A technologies. In the large-scale 5G-A networking demonstration project, China Unicom Beijing successfully tested technologies such as Extremely Large Antenna Array (ELAA), high- and low-frequency coordination, and intelligent beam management. These technologies are crucial for achieving consistent downlink speeds of 5 Gbps with a 1:1 high- and low-frequency site configuration.

Third, the project verifies the end-to-end capabilities needed for the planning, construction, maintenance, and optimization of 5G-A networking. The project achieved optimal performance and user experience, laying the groundwork for future large-scale 5G-A network deployments.

> Historically, each generation of mobile communication technology has run into at least one significant bottleneck, and that is where next-gen applications have emerged. For 4G, the bottlenecks we saw were high-definition video and interactive services. These applications have already flourished under 5G. Right now, the bottlenecks are in AI and industrial control, which are the key areas for 5G-A and future 6G breakthroughs.

Sustained collaborative innovation: Overcoming challenges, optimizing networks, seizing opportunities

Advanced technology is only truly "achieved" when it sees large-scale industrial application. The future success of 5G-A hinges on its ability to achieve widespread deployment and broad application across diverse scenarios. 5G-A must achieve large-scale deployment if we want to deliver truly universal services to users, support the growth of various industries, and remain economically viable. This same principle also held true in previous generations of mobile networks.

But opportunity inevitably comes hand in hand with challenges. Before we can achieve large-scale application, the next phase of 5G-A development must address multiple issues like indoor and outdoor deployment, end-to-end sensing, and ensuring the worst-case performance indicators. Overcoming these challenges will depend on continuous innovation in network construction, optimization, and maintenance.

When it comes to construction, our focus remains on advancing network capabilities. When the network is deployed at a certain scale, this involves leveraging big data to precisely target specific weaknesses and enhance network capabilities. With 5G-A, China Unicom Beijing and its partners are utilizing 800 MHz high-frequency products to achieve full-bandwidth coverage for ultra-wideband applications. We are also integrating the BladeRRU series to aggregate low-band and mid-band frequencies, while leveraging dual-frequency Massive MIMO and ELAA dual-frequency array technologies to enable seamless coverage across high and low frequencies. This approach simplifies site configurations capable of delivering peak rates ranging from 5 Gbps to 10 Gbps.

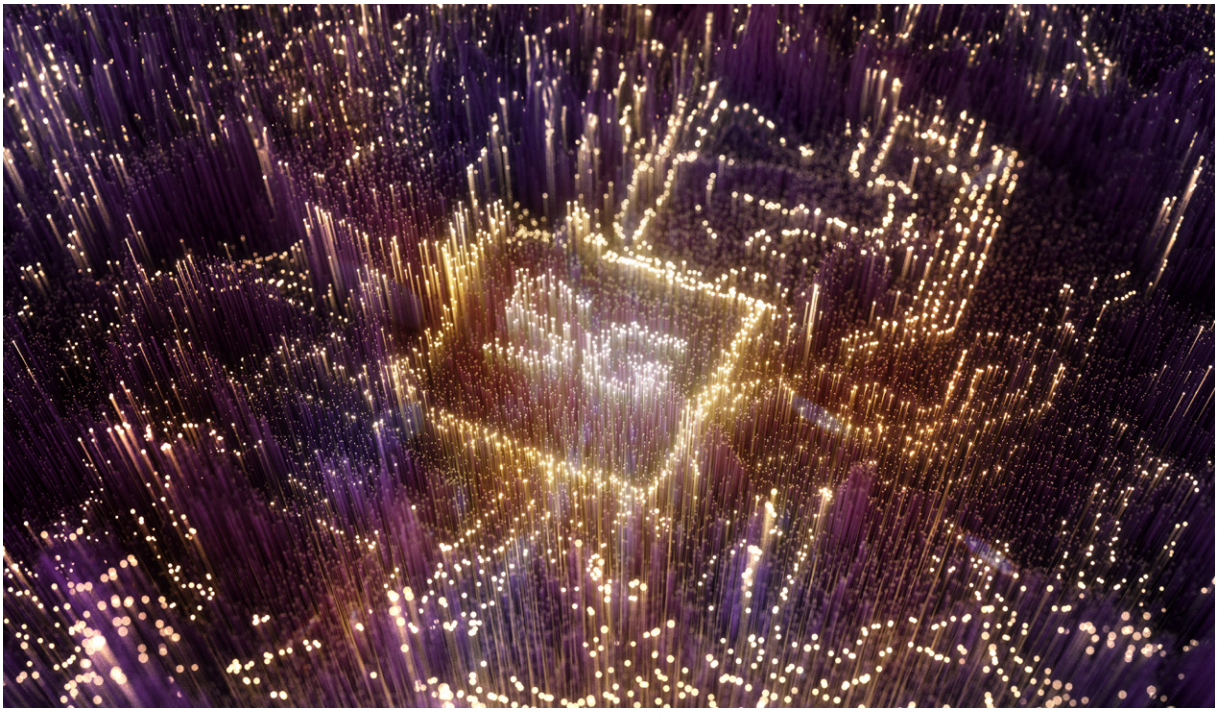
In optimization, we are focusing on the smallest elements to achieve a seamless 5G-A experience with minimal base stations through high- and low-band frequency coordination and 1:1 networking. The "smallest elements" refer to three key dimensions:

1. Geographical elements: These elements specify different segments of the entire network down to specific regions, grids, individual base station coverage areas, and even to specific buildings and floors, allowing for targeted support to meet personalized needs.
2. Network elements: These elements specify intelligent configuration at the smallest level, from base stations to cells, carriers, antennas, beams, and even down to individual parameters.
3. Time elements: By significantly shortening the network analysis cycle from the industry standard of months to days, or even hours, we can implement a new iterative optimization model based on network data, guided by quality data feedback, and driven by targeted optimizations, to continuously advance differentiated enhancements.

In terms of maintenance, digitalization can ensure network stability. We have established a digital operations and maintenance system that supports decision-making analysis, service ticket command and dispatch, special situation pre-processing, and detailed scenario insights. By integrating AI into the smallest production units, we can quickly filter out abnormal data from large volumes of maintenance data, pinpoint issues, and implement intelligent, end-to-end service tickets in the production process. This system enables precise and automated resource management, and realizes digitalization with visualized, geospatial, E2E management capabilities which significantly improves accuracy and efficiency.

Fueling 5G-A growth: Get ready for a boom of innovative applications

With the rapid commercialization of 5G-A, high-profile application scenarios are drawing increasing attention. Many innovative applications have already emerged, such as the glasses-free 3D, ultra-high-definition (UHD) shallow compression encoding, and XR split rendering applications China Unicom Beijing showcased earlier this year at our 5G Capital event.



Many are asking what the killer app for 5G-A will be. Historically, each generation of mobile communication technology has run into at least one significant bottleneck, and that is where next-gen applications have emerged. For 2G, that bottleneck was websites, which led to 3G supporting numerous web-based applications. For 3G, the bottleneck shifted to video, resulting in 4G kicking off a surge of video applications. For 4G, the bottlenecks we saw were high-definition video and interactive services. These applications have already flourished under 5G.

As we move towards 5G-A, the defining applications will mirror 5G's current limitations. Right now, the bottlenecks are in AI and industrial control, which are the key areas for 5G-A and future 6G breakthroughs.

Predicting exact applications is always a gamble. The most impactful uses may not come from the telecom sector as they more often align with societal developments. The demand for societal progress will inevitably drive advancements in the telecommunications industry. We should never underestimate people's desire for a better life. Once 5G-A's capabilities are fully unleashed, a wave of new applications will naturally follow.

Currently, the industry is exploring new applications that connect people, vehicles, objects, businesses, and homes. For instance, in people connectivity, 5G-A's enhanced deterministic experience capabilities will accelerate the shift from the 2D to the 3D mobile Internet. China Unicom Beijing is leading the way here in consumer applications with offerings like cloud gaming and innovations such as glasses-free 3D and XR split rendering.

In the realm of the Internet of Things (IoT), the cost of RedCap modules is steadily dropping, kicking off the widespread commercial adoption of the Internet of Video Things (IoVT) across China. This application now covers more than 80% of industry sectors. At the same time, the industry is actively validating passive IoT which will not just upgrade all walks of life but will also connect production, warehousing, and logistics, empowering the entire processes of fully-connected factories.

Moreover, 5G-A applications are rapidly gaining ground in B2B scenarios across various industries. China Unicom Beijing, alongside partners such as China Media Group and Huawei, has launched the world's first UHD shallow compression encoding real-time production system. Harnessing the robust capabilities of 5G-A networks, including ultra-large uplink and low latency, this system ensures stable real-time video backhaul and simplifies the complex cable setups in broadcasting studios.

Working together to continue leading by innovating

5G-A is poised for robust growth in 2024. The recent 3GPP Rel-18 standard freeze marks a significant milestone. Globally, many countries and regions are stepping into a new phase of 5G-A development, recognizing that network infrastructure will increasingly drive digital economic growth. China is currently a leader in the digital economy and has reaffirmed its commitment to advancing research and development in 5G-A and 10 gigabit optical networks.

From 2G to 5G-A, communication technologies have evolved rapidly, but the fundamental principles remain steadfast. Mobile network advancements not only require us to adhere to established norms, but also to strive for balanced excellence. We must make insightful decisions to pursue innovation.

5G-A stands as the next summit for operators to ascend. Built upon the foundation of our 5G Capital initiative, China Unicom Beijing will continue to collaborate with partners like Huawei and actively explore novel deployment models for 5G-A, accelerating its commercial adoption. Through continuous technological and business innovation, our goal is to deliver exceptional network experiences and dedicated services, spearheading digitalization and intelligence.

China Telecom Shanghai: Fostering an F5G-A All-optical 10-Gigabit Ecosystem

The launch of commercial F5G-A marks the beginning of an all-optical 10-gigabit era. 10 gigabit networks deliver instantaneous data transmission and enable leading-edge applications like smart city and cloud gaming to thrive, laying the foundation for a full-fledged digital China.

As a world-leading operator, China Telecom Shanghai plays a key role in Shanghai's initiative to build a dual-10-gigabit city. Using 50G PON technology, the operator launched a 10-Gigabit Cloud Broadband Demonstration Community and an All-optical 10-Gigabit Cloud Broadband Cooperative Industry Innovation Demonstration Base to enable iterative network upgrades with new services. This will make networks more productive and accelerate the city's transition towards the 10-gigabit era.

By Ji Hongfeng,
General Manager, Marketing Department,
China Telecom Shanghai

Three drivers behind evolution from gigabit to 10-gigabit broadband

China has the world's largest optical fiber network and largest number of gigabit broadband users. The country is currently making every effort to transition from the gigabit era to the 10-gigabit era. This evolution is being driven by three key factors.

The first driver is surging demand for emerging services like XR and the metaverse. With the rise of virtual reality (VR), augmented reality (AR), and the metaverse, users will require increasingly higher speeds and lower latencies. The immersive experiences created by

these services will require networks to transfer massive amounts of data in real time to ensure seamless interaction, making 10-gigabit networks a necessity.

The second driver is innovative technologies like 50G PON. 50G PON is the next-generation PON network standard after 10G PON. It features ultra-high bandwidth, low latency, and flexible application-specific slicing. With over five times more access bandwidth, higher-quality service support, and stronger network security, 50G PON is now the only option for major carriers looking to deliver 10-gigabit broadband access.

The third driver is the use of fiber to connect all things. With the emergence of applications related to the Internet of Things (IoT), smart city, and Industry 4.0, all things being connected will become the norm. 10-gigabit networks will be the foundation for applications like smart homes, telemedicine, autonomous driving, and smart factories. This will make our lives more connected and intelligent.

In May this year, the Shanghai Municipal Communications Administration and the Commission of Economy and Informatization released the All-optical 10-Gigabit City of Shanghai Action Plan (2024–2025). The plan calls for Shanghai to take a forward-thinking approach to build world-leading 10-gigabit optical network infrastructure. By 2025, Shanghai's 10-gigabit optical network infrastructure system will take shape, leading China in both breadth of coverage and depth of application. This infrastructure will power Shanghai's digital and intelligent transformation.

Specifically, the Action Plan has identified 15 key tasks in three areas related to 10-gigabit optical networks: infrastructure construction, integrated application inno-

vation, and industry-wide technological innovation.

The first area is significantly improved capacity of 10-gigabit optical network facilities. There will already be tens of thousands of 50G PON ports, with 50G PON and FTTR deployed in all new residential buildings, commercial buildings, and industrial parks. There will be more than 45,000 OTN nodes per 10,000 people, and at least three 400GE hyper-converged data center case studies will be built.

The second area is accelerated and integrated application of 10-gigabit optical networks. Over 20,000 10-gigabit broadband users will be developed by building 100 10-gigabit optical-network communities, 100 10-gigabit optical-network commercial buildings, and ten 10-gigabit optical-network benchmark campuses. Breakthroughs will be achieved in industry applications in domains like smart manufacturing and smart tourism, with at least three benchmark cases developed in each key domain.

The third area is sustained innovation in 10-gigabit optical network technology. Significant progress has been made in innovative technologies such as new-type optical fiber, multi-mode 50G PON evolution, 800+ Gbps ultra-high-speed transmission, metro pooling wavelength division multiplexing (WDM), and optical autonomous networks. These developments will help form a standardized system for 10-gigabit optical network technologies and applications, and will push telecom enterprises to establish at least three 10-gigabit optical network innovation centers.

Pioneer: China Telecom Shanghai helps make Shanghai the first 10-gigabit city

Shanghai is a national leader in digital infrastructure, and China Telecom Shanghai is at the forefront of the city's ICT development. China Telecom Shanghai helped enable Shanghai to become the first city of optical networks and the first gigabit city, and is now helping turn it into the first dual-10-gigabit city. Through these efforts, the operator has created a new "smart cloud Shanghai" architecture using ultra-broadband pipes based on optical fibers and edge cloud services. The resulting 10-gigabit cloud broadband delivers the highest-quality network services to the people of Shanghai.

The operator chose not to rest on its laurels. Under the guidance of the government's industrial policies, China Telecom Shanghai—a key player in local network construction and information services—is leading the innovation of 10 gigabit optical-network applications.

In March this year, China Telecom Shanghai launched the world's first 50G-PON-based 10-Gigabit Cloud Broadband Demonstration Community. The average download speed per household was 9,391 Mbps, meaning 200 high-definition (HD) photos could be uploaded and downloaded in just one second.

In addition, 10-gigabit optical networks allow multiple household members to stream glasses-free 3D video, watch XR video with headsets, and play HD cloud games at the same time, creating countless possibilities for future AI applications.

Within the 10-Gigabit Cloud Broadband Demonstration Community, China Telecom Shanghai's CNY399 and above home broadband package users can receive a six-month trial of 10-gigabit cloud broadband at no additional charge.

To lead the high-quality development of the all-optical 10G industry, China Telecom Shanghai unveiled the world's first All-optical 10-Gigabit Cloud Broadband Cooperative Industry Innovation Demonstration Base (the "Demonstration Base") on May 17 this year. The Demonstration Base showcased a number of innovative services, including 10-gigabit cloud network attached storage (NAS), 3D ultra-HD livestreaming, fast cloud e-sports, and 3D optical-sensing health.

This Demonstration Base, located in Shanghai Posts and Telecommunications Design Institute, has seen the completion of its phase I project and will soon be open to the public. The Demonstration Base seeks to lead 10-gigabit industry innovation from four aspects.

The first is innovation incubation. China Telecom Shanghai will work with industry partners to explore new applications of 10-gigabit optical networks to fulfill the emerging intelligent needs of individuals, families, and enterprises, and push digital smart life forward.

The second aspect is commercial verification. When promoting its services, China Telecom Shanghai uses 50G PON's support for smooth evolution to realize zero

modifications to optical distribution networks (ODNs) on the live network. End users can choose to upgrade on demand using a convenient service model.

The third is demonstration and promotion. China Telecom Shanghai plans to closely integrate 10-gigabit access with cloud applications as they launch marketing campaigns to bring high-quality 10-gigabit services to more homes and enterprises in Shanghai.

The fourth aspect is ecosystem collaboration. China Telecom Shanghai will work with ecosystem partners to first cover 16 administrative districts of Shanghai with 10-gigabit optical networks, as an initial move of the city's 10-gigabit plan. This move aims to quickly build consensus, facilitate industry maturity, and unlock the value of 10-gigabit optical networks.

Building an F5G-A all-optical 10-gigabit ecosystem to facilitate a Digital China

China Telecom Shanghai has been pioneering dual-10-gigabit exploration and evolution to help Shanghai achieve its goal of building a global dual-10-gigabit city powered by 5G-A and 10-gigabit optical networks by the end of 2026.

China Telecom Shanghai calls on players across the industry value chain to invest more and jointly explore best practices in the construction of F5G-A 10-gigabit optical network infrastructure, accelerate integrated application innovation, and expand the depth and breadth of applications. By creating a platform for open collaboration with players from different domains, an F5G-A all-optical 10-gigabit ecosystem will take shape. This will create more complementary advantages for shared success.

Looking ahead, China Telecom Shanghai will continue to work with industry partners to invest in the all-optical 10-gigabit industry and support Shanghai's All-optical 10 Gigabit City initiative. These efforts will help turn China into a cyberpower and create a more productive, digital China.

5G-Advanced Poised for Take-off in 2024

Over the past few years, Huawei has pushed the development of 5G-Advanced, which is also known as 5G-A, and those efforts are coming to fruition in 2024 as operators are now in the process of moving to the commercial phase for launching services and applications.

Reprinted with permission from Mobile World Live

The initial start of the 5G-Advanced era began with 3GPP Release-18, the scope of which was finalised in December 2021.

With operators at different stages of monetising their next generation networks, 5G-Advanced provides them with a flexible framework to support massive use cases, such as millions of sensors for industrial IoT, while catering to specific types of traffic profiles.

During MWC24, Mobile World Live caught up with three operator executives to discuss the latest developments related to 5G-Advanced now that some of the testing and validation measures are completed.

Orange

Emmanuel Chautard, SVP Operations and Networks Economics of Orange Group, stated there are several factors driving the onset of 5G-Advanced, including new services such as XR that require higher network capabilities to deliver low latency and higher bandwidth.

He also noted 2 billion services require intelligent connections with low latency to meet the demands of increasingly complex scenarios. Lastly, Emmanuel stated industry standards and industry ecosystems are maturing, both of which set the stage for 5G-Advanced developments and deployments.

Pioneering Operators Discuss the First Year of 5G-A Commercial Use

"Overall, 5G-Advanced is a result of business development and technical standards development," he explained.

HKT

Sheldon Yau, CTO of HKT, stated 5G-Advanced is important in the evolution of 5G networks, as well as for staying ahead of competitors. He also noted how crucial it is in the evolution toward 6G.

Yau highlighted 5G-Advanced's multi-dimensional capabilities, such as Passive IoT (P-IoT) as well as integrated sensing and communications, which in turn will give rise to new technologies and applications. He noted HKT plans to acquire more spectrum resources to build 5G-Advanced networks and become an industry leader over the next decade.

du

Dr. Mahmoud R Sherif, Head of Innovation and Technico Business Development at du, said his company has enabled standalone (SA) 5G in its network as part of a plan to launch 5G-Advanced.

Dr. Sherif cited the superior downlink and uplink speeds and capacity of 5G-Advanced as the primary reasons for deploying it. While the current version of 5G is lagging in terms of uplink speeds, he noted 5G-Advanced provides fibre-like speeds for mobile broadband users, guaranteed.

He noted du is also exploring how to use 5G-Advanced to upgrade downlink speeds to up to 300 Mbps to 500 Mbps, whether it's through 3CC or multi-carrier link aggregation.

"If we get this, then we can offer things like fibre-like fixed wireless access with a guaranteed experience," he said. "It would be an excellent proposition for our current fixed wireless uses."

5G-Advanced use cases

Emmanuel stated Orange has already assessed some key 5G-Advanced technologies, including a 6GHz test

and P-IoT verification. As Orange expands the reach of its SA 5G network across Europe, 5G-Advanced services will also improve network energy efficiency to lower power consumption.

As for use cases, he explained Orange is exploring end-to-end slicing for cloud gaming as well as additional new applications for various gaming scenarios, and a next generation, real-time communication service.

Dr. Sherif stated 5G-Advanced is the perfect network for providing the best customer experience across 3D devices such as the Apple Vision Pro.

5G-Advanced also holds the promise of connecting low cost, low power devices using reduced capability (RedCap). RedCap, which was first introduced in Release 17, is expected to provision devices with low power consumption including industrial IoT sensors.

Dr. Sherif noted Redcap breaks the price barriers to enable operators to offer services and applications, such as warehousing, CCTV and digital production “at very competitive prices”.

He also sees 5G-Advanced as one of the main pillars for connected vehicles due to its robust network capabilities.

Monetisation of 5G-Advanced

Orange’s Emmanuel Chautard stated large-scale 5G-Advanced networks will enable new services such the metaverse but noted operators “need full interoperability with service platforms, both core network and RAN”.

“We are not sure of the adoption of such services,” he explained. “However, we want to be ready to host them, to manage the quality of service and to provide sufficient capacity on our networks to guarantee performance with the right monetisation framework, leading to a relevant return on investment."

Technology breakthroughs

Orange’s approach for deploying extensive 5G-Advanced service is using mid-band spectrum, which is in the range from 1.8GHz to 2.6GHz, while also combining C-Band and mmWave on high band spectrum.

“Combining these two together, we can build a very high quality 5G-Advanced network to maximise the spectrum value,” he said.

HKT’s Yau stated the operator is looking to technological breakthroughs in the fields of URLLC and mMTC.

“URLLC can enable a large number of key services, and mMTC will profoundly change the business landscape,” he said.

HKT has deployed 10G capable, 5G-Advanced networks in popular shopping malls in Hong Kong. Yau noted 5G-Advanced offers stable 10 Gbps speeds to support upgraded digital experiences such as AR shopping, navigation and gaming, which in turn increase customer engagements.

Going forward, HKT will introduce P-IoT technology to produce more IoT products and apply it to verticals such as healthcare, construction, transportation, and logistics.

Yau stated P-IoT can enable automatic payments by allowing customers to use barcodes instead of standing in line at a retail store. It also lets shoppers pay for items on their shopping cards automatically by using P-IoT.

Dr. Sherif stated 5G-Advanced has roughly ten times the capabilities compared to the current generation of 5G, with the bonus of “a lot more spectrum coordination such as the basic TDD 3CC that we are already in the process of deploying”.

“In addition, the extremely larger antenna array technology can provide fibre-like fixed wireless access with a guaranteed experience,” said Dr. Sherif. “This brings the possibility for speed monetisation on top of the traditional volume-based monetisation.”

5G-Advanced as a Booster for the Transformation to an AI World

By Yang Guang,
Senior Principal Analyst, Service Provider Strategy and Mobile Infrastructure, Omdia

AI applications generate new requirements for the network

Applying artificial intelligence (AI) in telecom services has become a focus topic among communication service providers (CSPs). At MWC 2024, leading CSPs demonstrated their innovative services based on AI technologies.

Deutsche Telekom presented a visionary AI phone concept with its technology partners. The AI-based assistant can replace the countless apps on the smartphone. “Like a concierge, the assistant understands your goals and takes care of the details.” Deutsche Telekom also showed an AI-based product for the home market - a roving robot router - which can move around the house and control smart appliances and fixtures.

At the same event, SK Telecom demonstrated a series of applications rooted in telco-specific large language models (LLMs), such as AI-based virtual agents featuring chatbot capabilities, an AI-based system for filtering spam and smishing, etc. The Asian CSP sees the rise of personal AI assistants as a game changer and is "preparing a separate personal AI assistant service for the global market."

CSPs also actively collaborate with leading AI companies to develop AI-based enterprise services and improve internal operational efficiency. For example, Telenor announced the collaboration with NVIDIA during MWC 2024 to bring AI across the Nordic region, providing AI-based services to startups, enterprises, and government entities and transforming internal operational efficiencies.

With the development of AI-based services, Omdia estimates AI traffic will grow in two phases:

- Phase 1 spans 2024 to 2027 – B2B applications will drive AI traffic growth. Upstream video and image analysis (and response) will be key AI activities that generate large traffic flows.
- Phase 2 spans 2028 to 2030 – Consumer-led AI collaboration and entertainment traffic will migrate to new immersive media formats, which will generate a large amount of data downstream.

Omdia predicts that AI traffic will grow to 64% of the global total data traffic by 2030. Meanwhile, AI-enriched interactions will also generate requirements for more complex service-level agreements (SLA) and higher network capacity.

Diverse AI applications have different requirements for network bandwidth, latency, reliability, etc. Integrating generative AI and immersive technologies could foster innovative services and stimulate new experiential demands. To satisfy the diverse requirements with a single physical network, end-to-end and flexible SLA management capabilities should be implemented to orchestrate network resources across the entire network, from network core to network edge, sites, and even devices.

Meanwhile, some AI applications require persistent high

> With the development of AI-based services, Omdia estimates AI traffic will grow in two phases. Phase 1 spans 2024 to 2027 – B2B applications will drive AI traffic growth. Upstream video and image analysis (and response) will be key AI activities that generate large traffic flows. Phase 2 spans 2028 to 2030 – Consumer-led AI collaboration and entertainment traffic will migrate to new immersive media formats, which will generate a large amount of data downstream.

bandwidth and low latency, which limits network utilization, restricts CSPs' overprovisioning, and raises costs. CSPs must further increase network capacity to support persistent high-volume AI-enriched traffic.

5G-Advanced can meet the growing demands

According to the industry's common view, early 6G rollouts will not happen until 2030. CSPs must rely on 5G and its enhancement to support the growing AI-enriched traffic. Thus, 5G-Advanced is the right technology that emerges at the right time.

The multi-band single-cell (MBSC) technology of 5G-Advanced can aggregate carriers in multiple frequency bands into a single cell to deliver optimal user experience and improve network capacity. Recently, e& UAE achieved a recorded data speed of 30.5Gbps through an aggregation of multiple carriers across high-band and mid-band spectrums (1600 MHz in mmWave and 300 MHz in C-band), which demonstrated the great potential of 5G-Advanced in improving user experience and network capacity.

The extensive network capacity combined with network slicing capabilities of 5G standalone architecture can effectively meet the demand of AI traffic on complex SLA management and can also enable CSPs to provide experience-based service plans that are a new attempt to monetize mobile broadband networks.

CSPs in China's mainland and Hong Kong, Thailand, North America, etc. have provided network slicing based consumer services, such as China Unicom Guangdong branch's VIP uplink service plans, AIS Thailand's QoS living network app, Verizon's event slicing services, etc. These innovative services demonstrate the potential for CSPs to leverage 5G-Advanced capabilities to build sustained mobile broadband business cases.

In enterprise and vertical industry markets, the 5G Reduced Capability (RedCap) can effectively improve the affordability of 5G connectivity for industrial IoT applications while providing full network slicing capabilities to meet the demand for complex SLA management. Therefore, 5G RedCap has become a perfect connectivity solution for B2B AI applications, such as machine vision or automatic remote control.

5G-Advanced can also empower CSPs to explore new market segments. For example, Chinese CSPs are testing integrated sensing and communication (ISAC) to enable low-altitude aviation delivery services, which could create new revenue sources for CSPs and support the business expansion of logistics companies. The sensing data, in turn, can be fed into AI models and algorithms to improve aviation traffic management capabilities, building a win-win model between CSPs, the logistics industry, and authorities.

The 5G-Advanced ecosystem is maturing

The development of 5G-Advanced has been accelerating since early 2024. China Mobile, the largest mobile operator in the world, announced in early February that it has deployed more than 100,000 5G RedCap base stations, achieving seamless 5G RedCap coverage in 52 Chinese cities. In late March, China Mobile launched 5G-Advanced consumer services in 100 Chinese cities and targeted launching the service in more than 300 Chinese cities by the end of 2024.

During the SAMENA Leaders' Summit in May, the United Arab Emirates launched the 5G-A country program and announced plans for the UAE to set sail for 5G-A nationwide. Recently, Zain Saudi Arabia also announced the plan to launch 5G-Advanced commercial services in the top eight Saudi cities in 2024-2026 and then extend the service to 18 main cities in 2027-2030.

These progresses will boost the maturity of the 5G-Advanced ecosystem regarding devices and applications, which will benefit CSPs in the leading 5G markets and also support the 5G rollouts in the second-wave 5G markets, such as Latin America and Southeast Asia. CSPs in these regions could deploy 5G-Advanced features from day one when they launch 5G services to improve monetization capabilities and explore B2B markets.

With increasing deployments worldwide, 5G-Advanced will become an essential part of digital infrastructure in the second half of the 2020s, supporting diverse AI applications and boosting the transformation to an AI era.

From 5G to 5G-A: Charting a New Course for Business Success with Further Innovation

By James Chen,
President, Carrier Sales Department, Huawei

While primary innovation unleashes tech dividends, secondary innovation accelerates business success

Many inventions have had a significant impact through secondary innovation. While primary innovation creates the tech itself, secondary innovation focuses on the practical side of its application and finding new solutions to issues that impede the realization of its full potential, its ability to contribute to thriving industries, and larger-scale adoption. As 5G advances towards 5G-A, the industry is getting ready to take another big step forward. Secondary 5G innovation offers insights into new ways to enable the success of 5G and accelerate business monetization with 5G-A.

China is leading the way in the scale and quality of 5G development. 5G and many other information technologies have become an integral part of China's economy and society. By May 2024, there were more than 890 million 5G users in China, and they accounted for 53% of the communications network traffic. China has more than 3.5 million 5G base stations, and more than 30 million 5G IoT connections. 5G's direct impact on China's total economic output is valued at CNY5.6 trillion.

Why has 5G been so successful in China? What can we learn from the Chinese carriers' exploration, practices, and innovation with 5G? I think it boils down to three things: scenario innovation, integrated innovation, and collaborative innovation. This article will explore these three types of innovation with reference to multiple hot-button topics, including livestreams by Internet influencers, New Calling, cloud phones, the Internet of Vehicles (IoV), and the Internet of Video Things (IoVT).

Scenario innovation: Reinventing the value of user groups and scenarios to accelerate multi-metric network monetization

Livestreaming has become an important Internet application. China has an estimated 150 million registered livestreaming users. In some popular locations or streaming scenarios, many hosts may be present concurrently. Some may even use multiple smartphones to connect to different livestreaming platforms at the same time. Livestreamers need solid network connectivity support to ensure that their livestreams are smooth and in high definition. Otherwise, they are likely to lose some viewers and even their followers.

This means livestreaming has particular requirements for network experience. To meet these requirements, more than 15 provincial carriers in China have released livestreaming packages with a guaranteed uplink experience. These offerings have helped the carriers drastically increase their average revenue per user (ARPU).

Four factors contribute to Chinese carriers' success with livestreaming packages: the quick mining of potential customers, well-aligned selling points, rock-solid experience guarantees, and sustained user retention. Carriers are leveraging the large 5G uplink bandwidth and preferential network access capabilities to meet the specific requirements of livestreaming users.

The success of livestreaming packages has opened up new possibilities for uplink network monetization. As network capabilities continue to improve, carriers are starting to offer new service capabilities such as network acceleration at the user and service levels, deterministic experiences, and tangible experience improvement in order to extend 5G network monetization from livestreaming to even more scenarios, user groups, and applications. In this way, secondary 5G innovation is helping carriers reinvent the value of user groups and scenarios to accelerate multi-metric network monetization.

Integrated innovation: Building new gateways to industry IoT services through network-cloud-intelligence synergy

New Calling and cloud phones are shaping up as new gateways to personal digital services. IoV and IoVT are creating new opportunities for industry-specific connectivity. Chinese carriers have explored the possibilities and mapped out a new development path based on 5G-cloud-AI synergy.

New Calling had attracted over 10 million users within eight months of its launch. Combining AI generated content (AIGC) with New Calling is only the beginning of next-level experiences. Moving forward, Huawei will work with carriers to tap into more high-value consumer-facing and business-facing scenarios. Joint operation teams are being set up to help carriers build applications that revolutionize user experiences, such as intelligent enterprise assistants that are capable of interaction. These better-quality, more appealing products will continue to attract new users and drive up the number of monthly active users (MAUs). In the future, we can integrate multiple calling products and capitalize on network-cloud-intelligence synergy to make New Calling a new gateway to information services for all scenarios.

Huawei's cloud phones became commercially available on

> The business success of 5G and 5G-A is only possible through tireless exploration and practice, and it requires consistent innovation and development. I believe that a three-pronged approach is the key: We need to reinvent the value of user groups and scenarios for multi-metric network monetization, leverage network-cloud-intelligence synergy as the impetus for service development, and promote collaborative innovation such as New Video to boost traffic.

May 17, 2023. More than 18 million people are currently using cloud phones. These cloud phones deliver a high-resolution, smooth user experience – 2K resolution and a latency as low as 100 ms – rivaling that of physical phones. On top of offering exciting new products, carriers have also taken solid steps to improve operations. China Mobile Zhejiang has made a showcase with its Cloud T Card, which features one cloud phone, 1 TB of dedicated data, 1 TB of cloud disk space, and various other benefits, all on one SIM card. Within three months of launch, China Mobile Zhejiang saw a 40% increase in MAUs, and 2.5-times higher dataflow of usage (DoU). Going forward, Huawei will work with carriers to support the evolution of the ecosystem and its products, incubate new AI applications, such as AI-assisted image cropping, collaboration, and translation, and make cloud phones the new gateway to personal computing and AI applications.

IoV and IoVT have huge market potential. Reduced capability (RedCap) technology provides high-performance and cost-effective connection capabilities. Currently, RedCap has a mature ecosystem encompassing chips, modules, and devices, and it can help carriers quickly amass a portfolio of success cases. With contiguous network coverage, and alongside new capabilities like slicing and edge cloud computing, new high-value applications such as autonomous-driving model training and report recognition by AI cameras will be developed to support new IoT services for industries, such as smart manufacturing and industrial automation.

Collaborative innovation: Boosting video service traffic through E2E industry collaboration

Video services, which include short videos, long videos, and video calls, typically have a resolution of 540p or 720p, meaning there is plenty of room for improvement. As part of its efforts to improve consumer experience and maximize China's network capabilities, Huawei advocated a move towards a full-HD era at the recent forum on the high-quality development of mobile video services in the AI era. Huawei also called for industry players to work together to make breakthroughs in glasses-free 3D content, technologies, and experiences, so that everyone can benefit.

Leading carriers are pioneering the transition from 5G to 5G-A. At MWC Shanghai 2024, leading 5G-A carriers, including China's three major carriers (China Mobile, China Telecom, and China Unicom), Hong Kong Telecom, the UAE's du, and Omantel, came together for the Global Launch of the 5G-A Pioneers Program. More than 30 carriers around the world have already completed 5G-A technical verification, and 15 carriers have started 5G-A commercial deployment.

For vehicles, 5G-A extends standalone intelligence to vehicle-to-everything (V2X) intelligence, expanding business potential from connectivity to cloud and computing power. For IoT, 5G-A supports passive IoT, opening up a new space for hundreds of billions of IoT connections. For new industries, 5G-A brings even more opportunities. 5G-A provides integrated sensing and communications for the low-altitude economy, and this market is expected to be worth over CNY1 trillion in the future.

China's 5G development shows that business success is not achieved overnight. A renowned Chinese football commentator once said, "Please don't think that victory is as within reach as a dandelion on Mt. Ada's hillside." The business success of 5G and 5G-A is only possible through tireless exploration and practice, and it requires consistent innovation and development.

To sum up, I believe that a three-pronged approach is the key: We need to reinvent the value of user groups and scenarios for multi-metric network monetization, leverage network-cloud-intelligence synergy as the impetus for service development, and promote collaborative innovation such as New Video to boost traffic. Huawei will support carriers and work with industry partners to drive secondary 5G innovation, pioneer 5G-A exploration, and charter a new course for 5G business success.

The New 5G-A Journey: Embracing New Opportunities in Mobile AI

By Cao Ming,
President, Wireless Network Product Line, Huawei

2024 is set to be an extraordinary year for the mobile communications industry. Even five years after its commercial launch, the development of 5G continues to accelerate. The commercial launch of 5G-A this year will inject new momentum into the ongoing wave of digitalization. The six essential factors for 5G-A are already in place: standards, services, products, devices, business models, and policies. 3GPP Release 18-the first standard version of 5G-A-was frozen in June as scheduled. 5G-A has already been commercially launched at scale in China and some countries in the Middle East, and operators in Europe, Asia Pacific, and Latin America are actively verifying 5G-A. More than 60 operators and partners have announced plans to commercially launch 5G-A by the end of the year. 5G-A devices are maturing, and more than 50 models of devices and modules are expected to be put into commercial use this year.

2024 is also the first year of AI being integrated onto devices. This presents transformative new opportunities for the mobile industry. AI foundation models are helping to transform text- and image-based interactions into multimodal interactions. There are now more than 1,300 foundation models. Chip-level and system-level AI capabilities are boosting the maturity of AI devices. By the end of 2024, hundreds of generative-AI devices, such as

AI phones, glasses, and robots, will be able to support around-the-clock applications. In addition, millions of AI applications will provide real-time intelligent services to assist with day-to-day life, teaching, photography, etc.

The launch of both 5G-A and AI devices will mark the beginning of a mobile AI era. The development of mobile communications is about increasing the number of connections, diversifying business models, and expanding service scope. Over the past 30 years, the industry has reaped the benefits of the mobile voice, mobile Internet, and mobile video eras. The fast-approaching mobile AI era is also expected to transform society, and create many opportunities within the mobile industry.

Expanding scope: From basic communications to five-domain connectivity and ISAC

Demand for both connectivity services for people, things, vehicles, industries, and homes, and for integrated sensing and communication (ISAC) is increasing. Such services are expected to bring huge social and economic benefits, but will also require stronger networks.

Immersive and interactive services improve connectivity experiences for individuals. More and more services for individuals are becoming cloud-based, providing 3D content, and delivering immersive experiences. We are going through breakthroughs in glasses-free 3D technology, and the related technologies such as display, tracking are developing fast, delivering natural and comfortable 3D experience. Cloud-based services like 5G cloud phones are growing fast, with cloud and devices collaborating to meet the needs for diverse applications and services. Global operators are actively verifying their ability to deliver speeds of at least 5 Gbps.

Diversified IoT connections for all scenarios boost both the quantity and quality of connections for things. 5G-A IoT will cover high-, medium-, and low-speed connections for all scenarios, and this will reduce costs and increase the number of connections. Reduced capability (RedCap) technology is on its way to being commercially adopted at scale to provide connectivity for manufacturing, in-vehicle devices, and wearables. Passive IoT is maturing and will soon be able to make consumers' lives easier by connecting everyday items such as clothes and food, while also making factory production, warehousing, and logistics more transparent and visible.

Connectivity for core production makes industries more efficient. The development of smart and flexible manufacturing is making 5G essential for the core links in production chains. 5G-A's improved capabilities like low latency, high reliability, large uplink, and accurate positioning will enable factories to go completely wireless, and this will reduce costs and improve efficiency.

Ultra-reliable smart transportation requires enhanced connectivity for vehicles. The Internet of Vehicles (IoV) will transform vehicle-cloud synergies into vehicle-road and vehicle-vehicle synergies. 5G IoV has already been verified for 95% of transportation settings. The results showed that there were 25% fewer accidents and vehicle flow speeds increased by more than 20% with 5G IoV.

Diverse-service smart homes rely on better connectivity applications for homes. Home services are diversifying from videos for display solely on TVs to easy-to-use smart appliances, click-and-play cloud gaming, and immersive 3D displays on large screens. In regions such as the Middle East, leading operators are already offering 10-gigabit home broadband to satisfy users' needs and enrich home entertainment.

ISAC innovations go beyond connectivity to unlock new business opportunities in all-domain sensing. Innovation in ISAC technology has enabled 5G-A to extend its capabilities from communications to sensing. This means that it can support a variety of applications, such as those that sense blind spots on the road, give warnings about accidents, detect marine vessels, support unmanned ships, facilitate low-altitude drone-based logistics and delivery, and assist with urban management. These ISAC applications can unlock new opportunities for economic development.

Transforming human-machine interactions: AI is creating new opportunities for comprehensive and intelligent upgrades

AI devices will revolutionize human-machine interactions in several ways. First, interactions will go from

> Over the past 30 years, the industry has reaped the benefits of the mobile voice, mobile Internet, and mobile video eras. The fast-approaching mobile AI era is also expected to transform society, and create many opportunities within the mobile industry.

being touch-based to multimodal. Second, information acquisition will go from retrieved content to AI-generated content (AIGC). Third, mobile devices will go from mobile phones to AI-assistant devices and embodied AI.

AI is becoming a bigger part of everyday life and will drive a boom in mobile traffic. AIGC is becoming mainstream. AI assistants are able to go through massive amounts of documents within seconds and intelligently generate content. This has improved interaction efficiency by a factor of more than 100. AIGC will also promote the multimodal production of content such as 3D videos and provide high-quality content like short-form videos and interactive movies. In addition, each device will have more than 100 local built-in AI models which will collaborate with cloud-based foundation models in real time. This means that human-machine interactions on a device will soon evolve into 100-times more machine-machine interactions.

AI makes travel as comfortable as being at home and delivers better user experiences and higher security. With intelligent cockpit services, the amount of time that people spend watching videos in their cars is expected to increase tenfold and in-car data traffic is expected to increase a hundredfold over the next two years. Intelligent driving services will need to upload more than 100 GB of data per month and this will be used to continually train the model and improve its accuracy. In addition, millisecond-level vehicle-road collaboration will increase traffic speeds by more than 20% while also reducing the number of accidents.

AI expands the connectivity of everything and creates

new value through universal and intelligent connectivity. The number of AI-assistant devices is expected to reach 5 billion by 2030. AI assistants will generate 10-times more data traffic than people do. Moreover, AI robots will be deployed in numerous industries, and are expected to serve in more than 80% of factories in developed countries by 2030.

Networks for AI and AI for Networks: Integrating 5G-A with AI improves both quality and efficiency

"Networks for AI" are the foundation of the mobile AI era. Huawei offers the world's first full series of 5G-A product solutions and the first Release-18-based commercial version of 5G-A. The company is focusing its innovation on five foundational capabilities—broadband, multi-band, multi-antenna, intelligence, and green development—to help operators efficiently deploy 5G-A networks.

In a bid to improve user experience, Huawei is facilitating the evolution of all frequency bands towards 5G-A to unleash the full value of all bands and consolidate the foundation to ensure a superior network experience. First, Huawei uses technologies like carrier aggregation and multi-band serving cells (MBSC) to aggregate spectrum resources on demand and develop 5G-A pipe capabilities with ultra-high bandwidth. Second, Huawei utilizes different frequency bands and implements multi-band collaboration using technologies like uplink-downlink decoupling and flexible spectrum access (FSA) to realize multi-metric network capabilities.

To intelligently connect everything, 5G-A networks need to evolve so that they are able to support multiple functions. They need to provide ubiquitous communication, sensing, computing, and intelligent capabilities to cultivate new applications. With ISAC's submeter-level accurate sensing capability, a 3D digital map of the physical world can be generated in real time to enable services like vehicle-road collaboration and the low-altitude economy. In the future, the convergence of communications and computing will enable computing power collaboration across clouds, edges, and devices and provide edge inference capabilities on the network side. This will reduce both latency and inference costs by more than 60% and enable real-time intelligent interactions.

"AI for Networks" comprehensively improves network productivity. As networks and services evolve, networks are becoming much more complex. Embracing AI is the key to improving network quality and efficiency.

Wireless agents are powered by telecom foundation models and wireless digital twin systems. They boost 5G-A intelligence and will transform O&M processes, network experiences, and service development models to help operators improve quality and efficiency.

For service operations, wireless agents simulate multimodal data such as topological data, environmental data, and traffic distribution data in real time to generate accurate user-experience snapshots, so that operators can accurately and quickly provision services. For fixed wireless access (FWA) services, for example, wireless agents can support online experience evaluation from multiple dimensions, such as coverage, latency, and capacity. This supports on-demand service package provisioning and shortens the time required for service provisioning from up to three weeks to less than one day.

For network optimization, wireless agents use high-dimensional modeling to generate a digital twin with which they can perform over 1,000 rounds of virtual iterative verification in minutes to identify the configurations with the best possible energy saving performance and user experience.

For troubleshooting, wireless agents can understand machine data and automatically plan and orchestrate tasks. This reduces the number of alarms by 90% and makes engineer site visits more efficient by enabling them to go directly to the problem and solve it quickly.

The mobile AI era provides fertile soil for innovative applications and business models. We believe that improving the capabilities of devices, pipes, and services will benefit all industry players. The mobile AI era will also revolutionize user experience, create new business models and growth opportunities for operators, and facilitate more intelligent and efficient productivity. Let's work together in this new era for a more digitalized and intelligent world.

5G-A Core with Native Intelligence: Gateways, Business Models, and the Value of Connectivity

By George Gao
President, Cloud Core Network Product Line, Huawei

5G has been commercially available for five years, and 332 operators in 116 countries and regions currently offer 5G services. 5G enables connectivity for all things to empower individuals, homes, and vertical industries. It is estimated that by the end of 2024, there will be more than 2 billion 5G connections and over 30,000 private 5G networks for industries.

2024 marks the commercial launch of 5G-A and the start of the 5G-A era. Leading operators around the world have released their 5G-A strategies. 5G-A is enhancing services, technology, and business, and is creating new business value by injecting momentum into four key areas: services, user experience, networks, and operations.

Core networks powered by native intelligence will be a prominent feature of mobile networks in the 5G-A era.

Service intelligence enables operators to create key gateways to services; network intelligence can help reshape business models; and operational intelligence helps re-create the framework of cloud-based infrastructure O&M. Together, these forms of intelligence will allow operators to implement network transformation strategies by increasing the number of revenue sources, reducing expenditure, and improving user experience.

Intelligent calling: A key gateway to B2C services and new growth

Driven by both new technologies and market demand, the calling business is evolving into an intelligent assistant and service platform.

First, the visualized voice calling service powered by AI-generated content (AIGC) is transforming the call interface. During an average 90-second phone call, users no long see a blank screen, but one that can display personalized content. Second, calls can serve as intelligent assistants powered by network intelligence. Users can enjoy efficient multimodal communications with features like auto transcription and real-time translation services. Third, the calling service is becoming a platform offering diverse services which can be accessed by dialing. Users can dial numbers to query and request telecom services, book a restaurant, or remotely access car insurance loss assessment services, without installing any apps. Calling will create new value for operators by enabling platform operations and this will unlock new growth potential.

New Calling saw large-scale deployment and commercial adoption in China in 2023. In the same year, it was verified in Europe, Latin America, Middle East, and Asia Pacific, and it is expected to be commercially adopted in these regions in 2024. In fact, many leading operators have already completed their commercial trials. New Calling is bound to take the world by storm and see widespread adoption in the near future.

Upgrade in video content generates explosive traffic growth

Video services are becoming more diversified, high-definition, and social. Demands for differentiated experiences are increasing as more people access video services through a wider range of devices. Short-form video applications have taken off all around the world and are used by a vast number of people on a daily basis. By December 2023, there were 1.55 billion short-form video accounts in China.

As video creation becomes faster and videos become more high-definition, 10 gigabit speeds are becoming essential. The emergence of AIGC and many new models of XR devices are increasing the diversity of video applications. Immersive applications are expected to become a staple of everyday life. This requires networks to support 10 Gbps rates and 20 ms latency. Video services are also being increasingly integrated with social networking features. Short-form video platforms that are powered by AI can analyze users' networking behavior and provide more accurate recommendations like interest-based follower recommendations and new ways of interacting, such as real-time interactive comments.

Enhanced experiences for different users and services

5G-A's enhanced air interface capabilities increases user-perceived speeds from 1 Gbps to 10 Gbps.

Statistics show that China has over 150 million registered livestreaming users, including 95 million active users, and this number continues to grow at a rate of more than 10% annually. Services like cloud gaming and online conferencing are also developing rapidly. Considering how fast operators' service assurance packages are evolving, high-value users are very willing to pay for deterministic experiences. Differentiated experience monetization has already been recognized as a trend in the market. This market could be worth more than CNY10 billion. It also offers operators the opportunity to develop new operation models that go beyond data traffic monetization.

China Mobile's 5G-A aims to enhance basic network experiences and improve data rates several-fold by using the three-component carrier (3CC) aggregation capability. Network-service collaboration is expected to enable the operator's services and networks to be aware of each other by the end of 2024. Experience

> The evolution from 5G core to 5G-A core not only represents technological progress, but also brings the telecom industry one step closer to being able to deliver intelligent, efficient, and personalized services.

differentiation capabilities are expected to become available in 2025 so that the operator can deliver guaranteed experiences.

Experience monetization with an intelligent 5G-A core network

The first batch of China Mobile's 5G-A demonstration service centers will be launched in 100 cities across China. In the future, all areas will be covered by 5G-A, multi-metric 5G-A packages will be customizable, and tiered-assurance 5G-A applications will be available. China Mobile will continue working with partners to develop 100 benchmark 5G-A industry applications by the end of the year to enable production and operations in a variety of industries.
The intelligent 5G-A core network enables the intelligent connectivity of everything by integrating intelligence and distributed gateways. The 5G-A core network, powered by native intelligence, enables operator services in three areas.

First, service intelligence is the foundation and driver of New Calling. The purpose of New Calling is to make calls more interesting, informative, and useful, thereby making the dialing pad a gateway to engaging and easy-to-use operator services.

In 2023, China Mobile launched a number of new services, including real-time translation, fun calling, visualized voice calling, and AI transcription. In just two months, the number of New Calling users in one province in China had increased by more than 1 million, and many of these new users were using paid services. New Calling services make communication more efficient and fun for users, while increasing data traffic and revenue for operators.

The New Calling platform is also expanding to the B2B market and hosting businesses and more third-party partners. In May 2024, China Mobile Jiangsu and Huawei jointly launched a number of New Calling-Advanced services, such as visualized voice calling+, AI customer service, and real-time voice-driven digital humans. These new applications make B2C and B2B calling services more engaging and intelligent, and improve user experience. With consistently high definition, visualized interactions, and higher efficiency, these applications will pave new pathways to success for the calling ecosystem.

50,000 private 5G and 5G-A networks are expected to be established in the B2B market, and 5G- and 5G-A-powered factories are predicted to account for more than 25% of all factories. The new MEC capabilities will drive deeper and more widespread industry digitalization. Connectivity services will also expand from workshops to production lines, and ultimately to all scenarios, enabling operators to gain access to business opportunities in various industries.

Second, network intelligence focuses on delivering differentiated user experience. Packages include experience-based benefits to meet the experience requirements of specific users, services, and scenarios. For specific users, such as subscribers to China Mobile's Go-Tone diamond packages, experience-based benefits are offered by default to guarantee user experience for all services and scenarios. Specific service assurance packages are available for services such as livestreaming and office services. Instant messaging assurance packages are available for specific scenarios, such as travel on high-speed trains and festivals.

The intelligent network experience assurance capabilities can overcome three common challenges that come with traditional experience monetization practices: the inability to accurately evaluate experience, unrefined assurance methods (static assurance), and unperceivable assurance. An intelligent core network can accurately evaluate user experience in real time and provide dynamic assurance accordingly. When assurance is being provided, users can see a message to this effect on their screens. Once the assurance provision ends, an experience assurance report is sent to the user by SMS. As a result, user experiences can be perceived, optimized, and monetized.

Network intelligence enables operators to go from traditional traffic monetization to experience monetization. Operators can establish an experience-based benefit

market and release differentiated experience packages to monetize user experience. This is not just about technological innovation, but also about transforming operators' business models.

Third, operational intelligence is the key to operating communications networks efficiently. It also drives the automation and intelligentization of operations and maintenance. When based on telecom foundation models, operational intelligence can enable cloud-based O&M. Role-oriented copilots, which help improve staff efficiency through professional Q&A and assisted O&M, and scenario-oriented agents that can understand user intentions and automatically orchestrate tasks to fix problems in complex scenarios are also available. At a Chinese operator's proof of concept (POC) pilot site, such intelligent capabilities are used to assist with ticket closure. 80% of tickets can be handled and closed without manual assistance from staff, and this saves the operator 750 person-days per month.

Intelligent 5G-A core: unlocking new business opportunities for operators

The evolution from 5G core to 5G-A core not only represents technological progress, but also brings the telecom industry one step closer to being able to deliver intelligent, efficient, and personalized services. The adoption and further development of 5G-A core network technology will make future telecom networks more intelligent, reliable, and efficient, create new user experiences, and cultivate new business models and growth opportunities for operators.

e& UAE: Leading in 5G-Advanced and Building the Intelligent Green Network

Already noted for being among the first operators globally to deploy 5G, e& UAE is now focusing on 5G-Advanced and building 5G business success. The company's broad-based, forward-looking strategy encompasses both mobile and fixed networks, as well as cutting-edge technologies such as artificial intelligence and machine learning, and zero-emission networks.

By Marwan Bin Shakar,
Senior Vice President of Wireless and Access, e& UAE

Charting the way in 5G services and fiber deployment

In 2023, we saw significant growth in the uptake of 5G services at e& UAE. A 40% rise in 5G device adoption led to an increase in the 5G traffic ratio of 42%, and helped drive enhanced user satisfaction, increased loyalty, and greater monetisation of 5G services. This improvement in the user experience with 5G technology is reflected in Etisalat's overall Ookla 5G net promoter score (NPS) which ranks the company in the No.1 position globally.

The launch of revamped consumer and enterprise packages across all of Etisalat's 5G deployment demographics during the year was supported by

the expansion of our work at e& UAE, where 5G development had reached 98.9% by the end of 2023. We are expecting to exceed 99% in 2024, with the 5G colocation ratio in indoor infrastructure also expected to increase from 79% to 94% by year end.

During the GITEX 2023 global technology event in Dubai, Etisalat announced the commercial launch of 5G as well as some hard assumptions, and we are working with more and more devices. Gradually, Etisalat will provision these devices to enjoy the added benefits of 5G technology.

On fixed as well, we are testing the latest 50G PON technology in collaboration with Huawei, as well as the 100G technology that we tested during GITEX two years ago. We are No.1 in Fiber to the Home (FTTH) penetration, and soon we will launch an FTTH service, bringing the latest technology to our customers in the fixed domain as well.

Maintaining market leadership

Building on Etisalat's aggressive, customer-centric approach, our goal is to steer society towards an understanding that anyone can have access to superfast broadband speeds.

Hence, Etisalat aims to collaborate with partners and invest in cutting-edge emerging technologies like transport backbone, 5G-Advanced (5G-A), 50G PON, artificial intelligence and machine learning (AI/ML), and quantum networking. In addition to this, Etisalat will continue to drive innovation and digitalization across the organization, both internally and externally, leveraging technologies such as 5G, AI, big data, cloud, and automation.

In the enterprise domain, Etisalat will continue to grow its service offering to the business sector and expanding the portfolio of devices and products by offering Network as a Service and private networks.

A multi-pronged approach to 5G-Advanced

e& has made significant progress in testing and deploying the key pillars of 5G-A technology as stipulated in the 3GPP Release 18, and aims to position the UAE at the forefront of future evolved 5G networks for consumers and enterprises alike.

> e& has made significant progress in testing and deploying the key pillars of 5G-A technology as stipulated in the 3GPP Release 18, and aims to position the UAE at the forefront of future evolved 5G networks for consumers and enterprises alike.

For 5G-A, Etisalat is working on multiple fronts with partners spanning across enhanced mobile broadband, lower latency, IoT connectivity, automation, precise positioning, and open architecture. Etisalat has started deployment in new 5G carriers in the FDD and TDD bands to activate three- and four-carrier aggregation. In addition to this, Etisalat is also expecting to use millimetre wave (mmWave) for fixed-wireless access (FWA) and enterprise private use cases.

Etisalat is planning to roll out 5G RedCap features and its 5G network once the ecosystem is commercially available. 5G-A will hasten AI and ML to enable efficient network operation optimization. Etisalat has already laid a foundation by activating large numbers of use cases where these capabilities are built around an orchestration platform.

In terms of fibre, e& UAE is staying ahead of the curve, having already deployed XGS-PON 10 Gbps symmetrical base optical network technology in order to enable ultrafast broadband speeds up to 10 Gbps in both the downlink and uplink. This supports the transition from GPON to XGS-PON but isn't just about higher speeds. It is a fundamental shift in network capability. XGS offers higher bandwidth capacity compared to GPON, allowing us to cater to the ever-growing data demands of our customers.

Building on strategic partnerships and ecosystem development

We want to continue our strategic partnerships with vendors such as Huawei in order to fully utilise the unique capabilities of 5G and 5G-A networks. Through joint innovation with our technology partners, we have already succeeded in reaching 10 Gbps speeds in the 6 GHz frequencies, which have recently been adopted for the IMT bands.

To further monetise 5G, Etisalat will explore the possibilities of exposing its network APIs to create more relevant use cases for networks and customers alike, so effectively moving beyond pure connectivity to deliver value-added services.

Etisalat will also work to maintain its collaborations with hyper-scale application providers, device developers, vendors, and specialist vertical market players in order to build a robust ecosystem.

Supporting the UAE's net zero strategy through technology innovation

Zero emission networks are a critical focus area for the telecommunication industry as it transitions towards a more sustainable future, and e& has set a target of net zero emissions by 2030 in UAE as part of a commitment to reducing its environmental impact.

Areas that Etisalat is working on include digitalization, and investment in the use of AI/ML to reduce carbon footprint. Modernization of cell sites which focuses on consolidating hardware at the site to reduce footprint, can improve energy efficiency, while using renewable energy sources such as solar power to move more traffic towards 5G will also help to reduce emissions.

The journey towards zero carbon emissions in mobile and fixed networks involves collaboration efforts across the industry, and encompasses technological advancement in all areas of technology and critical design. Competition among all suppliers is driving new technologies to be greener in the future.

AIS Leads Thailand's Digital Revolution with 5G

Amid the vibrant landscape of Thailand's telecommunications industry, Advanced Info Service (AIS) stands as a beacon of innovation and progress, catering to over 40 million subscribers nationwide. Mark Chong Chin Kok, Deputy Chief Executive of AIS, talks about his insights into AIS's 5G business practices in Thailand. As a leading telecom operator in the country, AIS is committed to providing users with an exceptional digital experience and has achieved notable breakthroughs in recent times.

Mark Chong Chin Kok,
Deputy Chief Executive, AIS

The following article is an adapted version of Mark Chong Chin Kok's interview.

WinWin: As a leading telecom operator in Thailand, AIS is known to be committed to providing users with an excellent digital experience and has made some notable breakthroughs in recent times. Could you explain how AIS got to this stage and its latest progress in 5G commercial use?

Over the years, AIS has evolved into Thailand's premier mobile operator, consistently driving innovation and pushing the boundaries of connectivity to deliver exceptional services to our vast customer base. We

By investing in a robust 5G network and harnessing the power of AI, AIS is redefining the digital experience. AIS is steadfast in its commitment to driving Thailand's digital transformation and shaping the future of connectivity in the country. This will chart a course towards a more connected, intelligent, and sustainable future for all.

have established a robust foundation consisting of 5G networks, home Internet, and 5G platforms for various industries. We have also fostered connections and collaborations with businesses of all types and scales, aiming to provide customers with a diverse range of products to fit their needs.

AIS recognized early on that providing an excellent digital experience begins with an excellent network. We foresaw the transformative potential of 5G technology and its ability to revolutionize the way people connect, communicate, and conduct business. In response, we made significant investments in building a robust 5G network that covers 90% of the country's population. In certain cities, like Bangkok and those on the eastern seaboard, we provide practically 100% coverage. But beyond having a good network, we also needed to ensure that the network could deliver the necessary download speed, uplink speed, and low latency that modern users, such as gamers, require.

WinWin: As a pioneer in 5G commercial success, can you share the highlights of AIS's experiences in 5G commercial use?

At the core of our 5G strategy lies the Living Network, a revolutionary framework designed to empower users with unprecedented control and customization over their network experience. Through the Living Network, our users gain access to three distinct modes — Boost, Live, and Gamer — each tailored to cater to specific needs and preferences. Whether it's enhancing download speeds, facilitating high-density video streaming, or minimizing latency for gaming enthusiasts, the Living Network offers users unparalleled flexibility and versatility in optimizing their network performance. By putting control directly into the hands of users, AIS is redefining the digital experience and setting new standards for connectivity and convenience.

Beyond its consumer-centric initiatives, AIS is driving digital transformation across a wide range of industries through the deployment of cutting-edge 5G solutions. By collaborating with businesses and enterprises, we are leveraging the power of 5G to unlock new opportunities for growth, innovation, and efficiency. From manufacturing and healthcare to logistics and entertainment, we are revolutionizing industry processes and operations through the implementation of private and quasi-private networks, enabling transformative applications such as autonomous manufacturing, remote healthcare, and immersive entertainment experiences. Examples of our work in this include partnering with companies like Siam Cement Group to enable autonomous mining through a private 5G network and collaborating with Toyota Siam to monitor factory electricity currents to ensure machine quality. These endeavors address consumer requirements and enterprises' needs alike.

WinWin: Considering the new opportunities that AI and developments in network-cloud-intelligence convergence could bring, what can AIS contribute? What's the company's business plan and roadmap for the future?

In addition to our investments in 5G infrastructure, we are aiming to harness the power of artificial intelligence (AI). We've embarked on experiments with AI solutions aimed at raising employee productivity and improving operational cost efficiency. For instance, we've launched a voice AI for debt collection on behalf of agents, demonstrating its comparable effectiveness to human agents but at a significantly lower cost. We plan to implement other AI solutions to further improve cost efficiencies, such as AI chatbots for call center transactions.

Ultimately, AIS remains steadfast in its commitment to driving Thailand's digital transformation and shaping the future of connectivity in the nation. With 5G technology as its cornerstone and innovation as its guiding principle, we are charting a course towards a more connected, intelligent, and sustainable future for all. As Thailand continues its journey towards digitalization, we are ready to lead the charge, empowering individuals, businesses, and communities to thrive in the digital era and beyond.

Telefónica: Paving the way from 5G SA to 5G-Advanced

Cayetano Carbajo, Director for Core, Transport and Service Platforms at Telefónica Group CTIO Office since 2019 has big ambitions for Telefónica.

Telefónica wants to create new monetizable 5G services and it is on a transformation journey to leverage automation and AI to deliver those goals, said Mr. Carbajo in an in-depth interview with Roberto Kompany, Principal Analyst for Mobile Infrastructure Service at analyst firm Omdia.

By Cayetano Carbajo,
Director for Core, Transport and Service Platforms, CTIO Office, Telefónica Group

Telefónica's autonomous network journey

During the interview we discussed Telefónica's progress in deploying 5G standalone (SA) core, the importance of deploying automation and AI, network monetization and the importance of collaboration. Some of my key takeaways from this interview:

Telefónica has deployed 5G Standalone (SA) core in its major markets and will proceed to deploy monetizable use cases: Telefónica understands the benefits and agility that a containerized and cloud-native 5G SA core will bring to deliver monetizable services, such as network slicing and low latency use cases. It has deployed what it calls a common core, where this consists of servicing both 4G and 5G subscribers in Brazil, Germany, Spain and the UK, using a convergent core network. This combined type of core network allows the operator to focus on reducing the operational complexities by managing a

single platform. One of the challenges mentioned was the lack of availability of a wide range of 5G SA compatible devices. Nonetheless, it is believed that this will be resolved soon.

Telefónica continuously scouts the market for potential use cases and looks to prove their commercial viability. Some of these can include but not limited to computer vision and autonomous vehicle control.

Automation and AI will help manage network complexity: Networks are becoming more and more complex, and Telefónica wants to be able to have TM Forum level four for automation standards in 2025. "That means that we want to have closed-loop automation by 2025 in our main markets", said Mr. Carbajo. Without automation, management of the network becomes unfeasible. Mr. Carbajo also believes that AI tools will utilize the large amount of data that the network generates, from alarms, statistics, and telemetry to help improve network operations and this is also an opportunity to improve productivity and deliver benefits to the customer.

Besides AI, Telefonica has two strategic priorities for automation. One is using continuous integration, continuous deployment, continuous testing (CICDCT) pipeline that it has built and on which it will integrate its vendors to automatically deliver, test and roll out new software releases for its platform. CICDCT is one of the key pillars of cloud-native technologies, that will help facilitate better 5G core network functions' lifecycle management. Using this tool, operators can benefit from today's faster rate of software releases, in order to roll out new services, monetize their networks and remain competitive in the market.

The second strategic priority is using in service software upgrade (ISSU), a manner to upgrade network nodes while these are still in operation and without having a maintenance window. This will greatly reduce the operator's operating costs and reduce downtime of parts of the network during an upgrade process. Telefónica has already implemented ISSU in some markets for some of the subscriber data management network functions. "So, this is the realization of one of the promises of cloud-native technology where you have containers, and you can upgrade the micro services one by one", said Mr. Carbajo.

Operators must innovate with new services: In today's market environment where some of operator's traditional communication services have lost relevance, it is even more important for operators to be creative and develop new and interesting services. One such service that will open new horizons and intrigue customers is the New Calling service where some of its use cases include visualized voice calling creating personal avatars, facilitating real-time two-way translations, or improved interactive menus. The industry including handset manufacturers should collaborate to deliver these use cases to customers.

Telefónica sees three avenues to network monetization: The operator values the improved connectivity and network speed that 5G and 5G-Advanced deliver. However to better monetize the network, Telefónica is exploring three main avenues. These are collaboration within Open Gateway community to expose network capabilities through application programming interfaces (APIs) and facilitate third party developers to create monetizable applications for the end customer. The second is network slicing, and while this has been talked about within the industry for a number of years, Telefónica believes that dynamic slicing will soon unleash significantly higher quality of experience (QoE) especially for the business-to-business (B2B) market. Mobile edge computing is the third path to improving network monetization, where customers will have access to applications that will run close to them, but still within the operator's infrastructure, delivering improved low latency communications and computing services.

Collaboration is key and the Joint Innovation Center helps to promote this: The collaboration Telefonica has had with Huawei over the last 20 years has helped build new state-of-the-art technologies, such as 800G & Super C+L, Alps, SRv6 for the transport network infrastructure, CDCT automation, New Calling, future architecture evolution, ultra-reliability in core network. Other joint collaborations have been in the areas of automation and network programmability, where Huawei staff have reacted fast to resolve the operator's challenges quickly.

> Automation and AI will help manage network complexity: Networks are becoming more and more complex, and Telefónica wants to be able to have TM Forum level four for automation standards in 2025. “That means that we want to have closed-loop automation by 2025 in our main markets”, said Mr. Carbajo.

CTM: 5G-A Takes Digital Macau to a New Era

In the bustling city of Macau, where tradition meets innovation, the convergence of 5G and AI is reshaping the landscape of connectivity and driving forward the world's digital transformation agenda. Hudson Lou, Director of Network and Technology Development at CTM, talked to WinWin about the intricacies of Macau's digital evolution.

By Hudson Lou,
Director of Network & Services Development, CTM

Established in October 1981, CTM stands as the leading telecom service provider in Macau, offering a comprehensive suite of mobile, fixed lines, fiber broadband, and enterprise solutions. With CITIC Telecom as our major shareholder, CTM is committed to advancing technology and deploying cutting-edge solutions to realize a smart living environment in Macau. Our relentless pursuit of innovation is fueled by a vision to create a Digital Macau and establish the city as a renowned smart city on a global scale.

A testament to partnership: CTM and Huawei

Nestled within Macau's vibrant streets lies a monumental

> With 5G penetration soaring to an impressive 75% within a year, CTM's market leadership reflects our deep understanding of local needs and our commitment to delivering tailored solutions across diverse industries.

achievement: complete coverage with both 5G and full fiber infrastructure. This remarkable feat is a testament to the enduring partnership between CTM and Huawei, a collaboration that spans a decade of innovation and progress. Our strategic alliance has enabled us to achieve full fiber coverage and territorial 5G deployment, supporting both non-standalone (NSA) and standalone (SA) architectures.

Empowering communities with 5G

The rapid adoption of 5G technology underscores Macau's readiness to embrace the digital era. With 5G penetration soaring to an impressive 75% within a year, CTM's market leadership reflects our deep understanding of local needs and our commitment to delivering tailored solutions across diverse industries.

The introduction of 5G has unlocked a world of possibilities for Macau's residents and businesses. From ultra-fast download speeds to low latency connectivity, 5G technology has revolutionized the way we live, work, and play. CTM's comprehensive 5G network ensures that all sectors of society can benefit from this transformative technology, from healthcare and education to transportation and entertainment.

Driving innovation with smart solutions

CTM's 5G network is driving economic growth and enhancing the quality of life for Macau's residents through various initiatives. These include the adoption of immersive VR content in education, the use of 5G and IoT platforms for fleet management, the implementation of high-security 5G private networks by government department, and the establishment of a 5G cross-regional private network for university science research.

As Macau continues to evolve into a smart city, CTM remains committed to providing even more innovative solutions for daily use. By leveraging new technologies such as AI, extended reality and spatial video, CTM aims to enhance business experience and promote network evolution for operators in Macau.

Charting the path to smart city development

Looking ahead, 5G emerges as a cornerstone in Macau's journey towards becoming a smart city. CTM, leveraging its expertise in multi-endpoint services, is poised to play a pivotal role in shaping the city's digital future. Through collaboration with government agencies, businesses, and academia, CTM aims to create a comprehensive digital ecosystem that opens up a brand-new, yet localized, digitalized economic model.

Embracing the future with 5G-A

As a pioneer in innovation, CTM is ready to embrace the next technological frontier: 5G-A. With plans to launch 5G-A in Macau by 2024, CTM aims to elevate connectivity to new heights, offering unprecedented speed, reliability, and security. And with the support of our long-term partner Huawei, we look forward to unlocking the potential of 5G-A, harnessing the power of edge computing and AI to create transformative experiences for our customers.

The future of connectivity in Macau is bright, and CTM is leading the way. With the launch of 5G-A on the horizon, we are excited to usher in a new era of innovation and progress. Together with our partners and stakeholders, we will continue to push the boundaries of what is possible and ensure that Macau remains at the forefront of technological innovation.

Entel Propels Chile into F5G-Advanced Era

In today's digital age, the evolution of telecommunications networks plays a pivotal role in shaping the future of nations. Luis Uribe, Chief Technology Officer of Entel, introduces Entel's role in ushering Chile into the 800G open F5G-Advanced era, the transformative impact it holds for the country's digital landscape, and future plans to accelerate 200G optical transport network (OTN) to metro networks and achieve co-site deployment with optical line termination (OLT) equipment, ultimately building a green all optical network.

By Luis Uribe,
Chief Technology Officer, Entel

Entel, officially known as Empresa Nacional de Telecomunicaciones S.A., is the largest telecommunications company in Chile. Established in 1964 by the Chilean government, Entel was tasked with enhancing the country's telecommunications quality and infrastructure. Today, Entel offers a wide range of services including mobile telephony, fixed line services, Internet services, and digital television. The company continues to innovate and expand, solidifying its position as a leading player in the telecommunications industry.

Entel's multifaceted presence in Chile's digital realm

Entel plays a multifaceted role in Chile's digital ecosystem,

> As a key technology of the F5G-Advanced era, the 800G backbone network provides the foundation for digital innovation and economic growth over the next decade.

encompassing mobile business, technology innovation, home Internet services, and digital solutions for businesses. At the heart of our operations lies the optical transport network, a critical component of Entel's overarching business strategy.

As a leading technology and telecommunications company in Chile and Peru, Entel is committed to building a world-class network infrastructure that delivers unparalleled service experiences to our subscribers. The optical transport network serves as the bedrock for our mobile services, broadband offerings, and enterprise solutions, providing ultra-large bandwidth, ultra-low latency, and a simplified architecture to meet the evolving needs of businesses and consumers alike.

Pioneering the evolution of Entel's optical transport network

The future evolution of Entel's optical transport network is guided by industry standards and technological advancements. With the release of the F5G-Advanced standard by European Telecommunications Standards Institute (ETSI) last year, defining the generation of optical transport networks up to 800G, Entel is poised to lead the charge in Chile's digital transformation journey.

Entel's optical network evolution mirrors the global industry's trajectory, marked by significant milestones and groundbreaking initiatives. From deploying the first 10G wavelength-division multiplexing (WDM) system on the backbone network in 2005 to embarking on the Big Bang project in 2017, and finally to building a 100G backbone network covering the entire country of Chile, Entel has been at the forefront of technological innovation.

In line with the F5G-Advanced standard, Entel launched the world's first national backbone network in 800G, setting a new benchmark for optical network excellence

in Chile. Looking ahead, we are committed to further enhancing our backbone network infrastructure, with plans to deploy 400G/800G backbone networks nationwide and accelerate the adoption of 200G OTN in metro networks and achieve co-site deployment with OLT equipment. We believe a green all-optical architecture will help us to build the best fixed broadband (FBB) services and mobile broadband (MBB) services in Chile.

Empowering Chile's digital strategy with the 800G backbone network

Entel's 800G backbone network, known internally as the Galileo Project, is set to play a pivotal role in Chile's 2035 Digital Strategy. As a key technology of the F5G-Advanced era, the 800G backbone network provides the foundation for digital innovation and economic growth over the next decade.

The Galileo Project encompasses extensive infrastructure for world-class fixed networks, spanning major cities from Arica to Puerto Montt and extending to extreme areas such as Easter Island and Punta Arenas. With capacities of up to Nx800 Gbps and high availability of up to 99.999%, the Galileo Project is prepared to deliver high-capacity services with unparalleled reliability.

In alignment with Chile's commitment to achieving carbon neutrality by 2050, Entel is dedicated to building a greener and more eco-friendly network. The Galileo Project incorporates advanced technologies such as full optical switching and intelligent green management systems, designed to lower power consumption and improve energy efficiency.

Charting a sustainable and digitally inclusive future

As we chart the course towards Chile's digital future, at Entel we remain steadfast in our commitment to driving innovation, sustainability, and inclusivity. The 800G era heralds a new chapter in Chile's digital journey, one defined by limitless possibilities and transformative potential.

Together, with our partners and stakeholders, Entel looks forward to leading Chile into a future where connectivity knows no bounds, and where technology serves as a catalyst for progress and prosperity for all.

HUAWEI

Building a Fully Connected, Intelligent World

5.5G ERA

Monetizing User Experience with Huawei IPE

Huawei Intelligent Personalized Experience (IPE) Solution

A smarter and easier digital life with dedicated service experience assurance for different needs

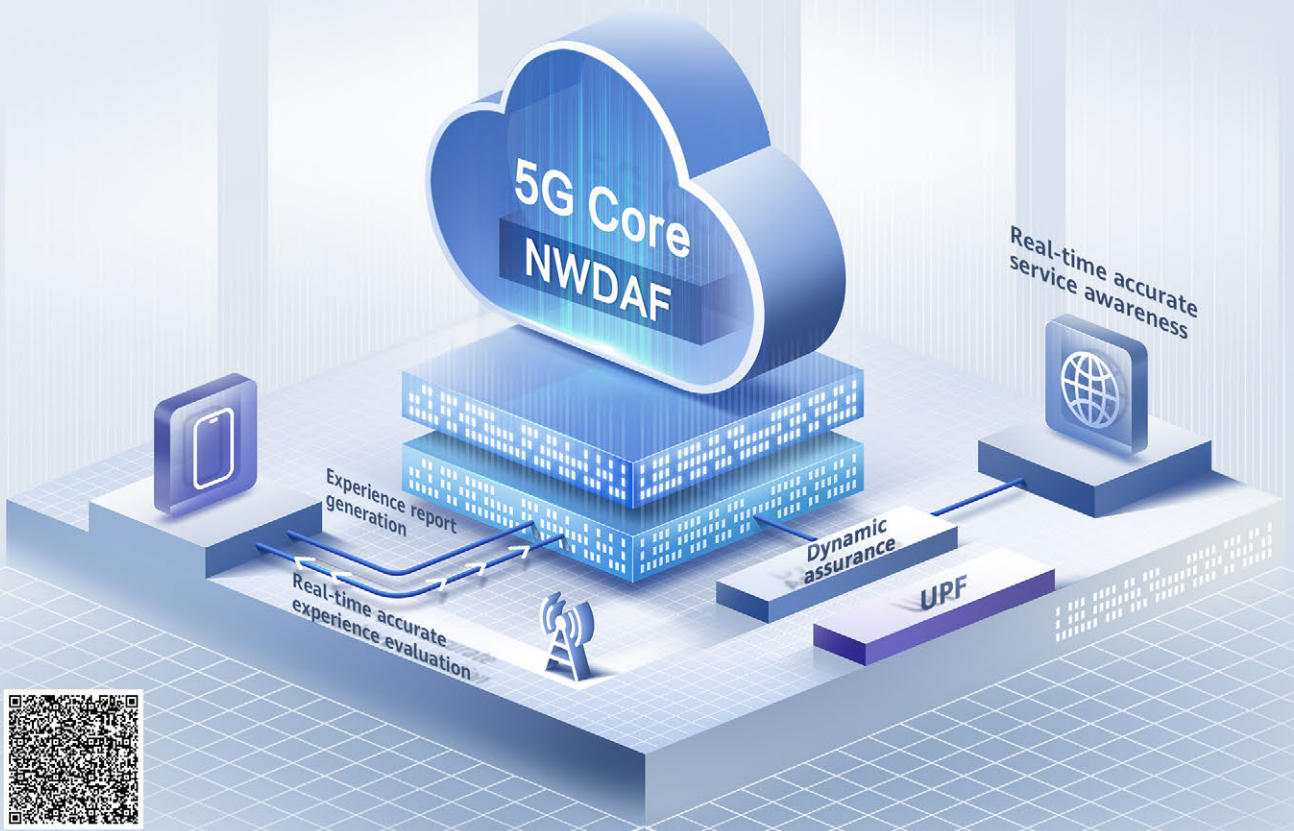
Guaranteed user experience with service-specific assurance

- Stutter-free livestreaming
- Smooth conferencing
- Low-latency gaming
- Uninterrupted video streaming

Comprehensively enhanced user experience

Better experience | Premium services | Meticulous care

- Dedicated assurance for conferencing and livestreaming
- Assurance notifications sent via SMS



Learn More