
CONNECTING People | Homes | Things | Industries | Vehicles
Bring 5.5G into Reality
5G-Advanced
Digital now
HUAWEI

5G-Advanced

Since they first went commercial in the 1980s, mobile communications technologies have steadily advanced, decade by decade. 5G, the 5th generation of wireless mobile, has rapidly gained ground worldwide since its launch and will be widely used for at least another decade.

At the 2020 Global Mobile Broadband Forum, Huawei released its 5.5G industry vision for pushing 5G forward. It featured a shift from connectivity of everything to intelligent connectivity of everything. And in 2021, 3GPP formally called for the evolution of 5G as 5G-Advanced (5G-A).

By October 2022, Huawei and the rest of the industry had reached the consensus on the four key features 5.5G should provide: 10Gbps downlink, 1Gbps uplink, 100 billion device connections, and native intelligence. These features are key to meeting increasingly diverse service requirements as the digitalization of every part of our lives advances.

In 2023, Huawei and industry partners identified four additional 5G evolution driving forces:

- 5G capabilities enhancement to promote the development of the 5G industry.
- "Deterministic" network performance offering higher speeds consistently, to support immersive consumer applications like "expanded" (VR, AR, and XR).
- Reduced latency and 10 times faster uplink for industry applications.
- Expanded 5G coverage to support emerging applications like Internet of Vehicles (IoV).

As the actual cases in this brochure show, key 5.5G technologies and many others are being deployed right now around the world. We divided the cases in five categories: Connecting People, Homes, Things, Industries, and Vehicles. Read on to find out how 5.5G is transforming our world and how it will make your business more successful.

CONNECTING PEOPLE

With 5.5G, our senses are increasingly able to experience new realities, a virtual world providing richer ways to interact remotely. Technologies like AI generated content, glasses-free 3D industry, and new display technologies are enabling this. Virtual reality (VR), augmented reality (AR), and other forms of extended reality (XR) are becoming more and more common. Sport fans now feel like they're inside the stadium when watching a soccer match. And video games feel almost too real when played in 8K virtual reality with your best friends.

CONNECTING HOMES

5G Fixed Wireless Access (FWA) simplifies distribution of broadband service to buildings that can't be easily connected to fiber. Now, FWA^2 takes things to the next level by providing several times more bandwidth and reduced latency. Carriers can broaden their FWA customer base by offering guaranteed performance with FWA^2. And home users, just by equipping their homes with a 5G router (customer premise equipment, or CPE), can enjoy immersive cloud games and HD videos.

CONNECTING THINGS

RedCap (Reduced Capability) is a lighter version of 5.5G IoT connectivity using greener, high-value terminals. RedCap has been put into large-scale commercial use where a low latency and continuous coverage is essential for wireless industrial sensors and smart wearables technology. Meantime, 5.5G Passive IoT industry accelerates, enables visibility into the entire logistics production process, greatly improves resource management and logistics distribution efficiency.

CONNECTING INDUSTRIES

Flexible production has become the key to digitalization of the industry. 5.5G provides a large uplink, latency as low as 4ms with high reliability, enabling fully wireless connected factories to accelerate production line switching efficiency, improve quality inspection efficiency, and thus, boosting up production capacity. It is estimated that there will be 1 million 5G private networks worldwide in 2030 to meet the network requirements of fully connected factories.

CONNECTING VEHICLES

Smart vehicles are increasingly popular around the world and the Internet of Vehicles (IoV) industry is advancing. 5.5G enables road sensing beyond the driver's line of sight and makes transportation safer. In addition to connected vehicles, it also supports vehicle cloud services and vehicle-road synergies, helping the automotive industry become more intelligent and connected. By sensing traffic status on roads in real time, 5.5G will realize efficient synergies between people, vehicles, and roads.

5G-Advanced

GLASSES-FREE 3D DEPLOYED AT ASIAN GAMES IN HANGZHOU

Powered by 5.5G, networks let viewers feel as if "the football flies out of the screen"

10 times
Network performance improvement

95% guaranteed
Latency of 20ms

10 Gbps
Peak downlink rate

In September 2023, visitors at the 19th Asian Games in Hangzhou enjoyed a special treat. Within range of 13 base stations providing 5.5G coverage, they were able to watch events at the Games on glasses-free 3D devices. As an official event partner, China Mobile Zhejiang provided ultra-fast connections and diversified 3D content and capabilities, creating the industry's first immersive, intelligent 3D game watching experience, without cumbersome glasses.

Glasses-free 3D is an emerging technology that is available from more and more devices already on the market. A hurdle to wide adoption has been network performance. Naked-eye 3D requires high bandwidth and consistently low latency in both uplink and downlink to provide real-time response to movements capturing and thus 3D reconstruction of the physical environments where action is taking place. In Hangzhou, 5.5G provided up to 10Gbps and a deterministic latency consistently below 20ms.

> *In the past, I needed a pair of 3D glasses to watch and I felt a bit dizzy. But with glasses-free 3D, I can watch any movie in 3D and feel fine. These devices can also convert 2D live streams into 3D. I just watched a 3D football game, and it felt like the football was flying out of the screen.*
>
> Comment from a spectator who experienced glasses-free 3D during the Asian Games in Hangzhou

In addition to watching events on new devices supporting glasses-free 3D, spectators could also transform their own with a special screen film costing less than USD6. Either way, pool events felt real, as if water was splashing out of the screen.

Within the next two years to 2026, it's expected that new 5.5G services like interactive multi-person 3D, glasses-free 3D, 8K HD, free-viewpoint watching and simultaneous multi-game streams will increase carriers' traffic between 80% to 250%, and push the industry to formulate standards for 10Gbps experience and ubiquitous 1Gbps networks.

> *In the future, a lot more applications will support glasses-free 3D, such as video calls, short videos, livestreaming, games, and e-shopping, accelerating the arrival of the 3D Internet era.*
>
> **Xu Linzhong**
> Senior Researcher, Network Planning Technology Department, China Mobile Zhejiang

HONG KONG TELECOM MAXIMIZES SPECTRUM VALUE WITH MMWAVE

The group leans into 5.5G to realize 10Gbps downlink, 1Gbps uplink, and provide XR experiences in CBD areas

23%
Mobile traffic increase

300,000
AR users in business districts

Hong Kong's one of thriving business centers, Causeway Bay, is famous for heavy foot traffic and densely-built high-rises. This poses tremendous challenges to seamless coverage of users, as they frequently move from building to building, and indoors to outdoors.

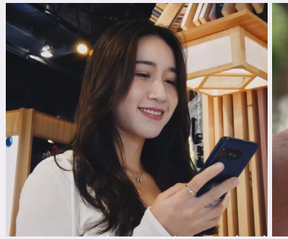
Hong Kong Telecom (HKT) is of the world's top 5 carriers by 5G user penetration rate with nearly 38% of its mobile customers subscribing to 5G packages. Since the second half of 2023, HKT started its band evolution journey onto 5.5G network by building sites providing 400MHz mmWave and C-band coverage to deliver continuous mobile network coverage in high-traffic outdoor areas. Coupled with a high-speed, low-latency fiber backhaul to support its sites, HKT has built Causeway Bay into a 10-Gbps business district.

On the other side of the harbor in the Kowloon business, shopping, and tourism district of Tsim Sha Tsui, HKT used Huawei's digital indoor distribution devices—LampSite for Sub-3Ghz, C-band, and mmWave spectrum to deliver a 5.5G experience of 10Gbps everywhere and to everyone.

Thanks to the gigabit performance, HKT helped malls to upgrade visitors' experience with new services such as AR-aided shopping, indoor navigation, and gaming. Since launch, more than 300,000 AR users in the business districts of Hong Kong have used the new services, and nearly 1,000 merchants joined in the AR business, resulting 23% YOY increase of network traffic in its business districts at year-end 2023.

The Hong Kong 5.5G network has shown the huge potential of its technology in some major events. During the Victoria Harbour Fireworks Show in October 2023, eight aerial cameras alternated through the mmWave SA(Standalone) network. The ultra-low latency feature of 5.5G is a new breakthrough in 5.5G technology, which transmits captured images to live TV in real time.

> *"We are committed to providing extremely fast uplink and low latency network. By making use of millimeter wave technology, Redcap and Passive IoT devices, I truly believe we can unlock all the business potentials of 5G in the coming few years."*
>
> **Sheldon Yau**
> CTO, HKT



ZAIN IS CREATING DIGITAL OASES WITH 5.5G IN THE DESERTS OF SAUDI ARABIA

The carrier's FWA² rollout delivers guaranteed home and business network performance

Saudi Arabia launched its ambitious Saudi Vision 2030 plan to support small-and medium-sized enterprise development and improve the quality of life of its residents. One of the core pillars of the strategy is providing top quality broadband access across the Kingdom.

Traditionally, optical deployment in the Kingdom was held back by the extreme heat, with temperatures frequently exceeding 50 °C in the summer. So, Zain KSA turned to 5G Fixed Wireless Access (FWA) for home users and small businesses which only needs a CPE (Customer Premise Equipment) device to convert 5G signals to high-performance Wi-Fi.

FWA has been a runaway success with Zain's Saudi users doubling every year since 2020. Currently, as many as 10% of FWA users connect 10 devices per CPE and using new services such Extended Reality (XR), gaming, and IoT. By 2025, customers are expected to need 500Mbps speed to support these new services.

Zain KSA and Huawei designed their FWA² solution to meet the requirements of three specific user segments: First, there is FWA Pro solution for home users. It utilizes an innovative networking model that combines a single wireless CPE and a single fiber per room to support multiple applications. Its deployment consists of ELAAs (extremely large antenna arrays), carrier aggregation technologies, and high-performance 5G CPEs. The solution guarantees stable ultra-high downlink speed of over 300Mbps and a latency under 10ms to support 8K videos, large-scale cloud gaming, home security monitoring, and VR sports for multiple concurrent home users. It has brought 30,000 new subscribers within a month of launch.

500Mbps
Guaranteed downlink

50%
CPE power-saving with 5G RedCap

30%
5G FWA user experience improved

20%
5G FWA² enterprise users increased

Second is Zain KSA's new FWA Lite solution for users without any home broadband or those that are better served by lower-speed network. With RedCap CPEs, this solution offers downlink rates of up to 150Mbps, 30% higher user experience than 4G WTTx and 50% lower power consumption than standard 5G CPEs. Zain KSA plans to migrate 200,000 4G WTTx users to 5G FWA with this solution in 2024 and the solution is ideal for bringing home broadband to two million more unconnected people in other Gulf Cooperation Council (GCC) countries.

The third user segment Zain KSA has targeted with their new FWA solution is business users like retail outlets, warehouses, and banks pursuing digital transformation. The new FWA Biz solution is designed to grow the super uplink service market for SMEs using the deterministic assurance provided by 5.5G high-bandwidth private lines. The solution provides guaranteed uplink rates between 50Mbps and 1Gbps, with a latency under 20ms, and 99.99% reliability. Zain KSA's Business subscribers have increased 20% since the launch of FWA Biz.

> *We are extremely excited about the vast potential of powering a smart lifestyle for our users, contributing to the ambitious goals of Saudi Vision 2030 in enhancing the quality of life and driving digital transformation.*
>
> **Eng. Abdulrahman bin Hamad Al-Mufadda**
> CTO, Zain KSA

du UAE IS BUILDING SUPER-FAST 5.5G SMART HOMES WITH FWA UPGRADES

du UAE builds futuristic homes with multi-connection and multi-service experiences

50 million
4G users to be migrated

500Mbps – 1Gbps
Super-high downlink in home scenarios

At the Global Mobile Broadband Forum in October 2023, du UAE unveiled the world's first "5.5G Villa" powered by 10Gbps networks. This archetype, developed in collaboration with Huawei, uses an FWA Pro solution to achieve the high-speed, immersive broadband and real-time speed acceleration needed to support multiple concurrent smart device connections. The solution's 500Mbps downlink and 1Gbps uplink more than meet the technical requirements of advanced home user applications like multi-channel 8K video, cloud VR, home security cameras, and cloud gaming.

du is also using Huawei's FWA Lite solution to expand 5G network coverage to 50 million unconnected persons and 4G users in the UAE. The FWA Lite solution reduces the price of 5G CPE (Customer Premise Equipment) so that it costs no more than 4G CPEs.

The UAE's Telecommunications and Digital Government Regulatory Authority (TDRA) has also sought to foster a 5.5G ecosystem alliance in the Middle East and Central Asia. Huawei and multiple partners such as du and GSMA jointly launched a 5.5G OpenLab to verify tech innovation, explore 5.5G business opportunities, and ultimately develop more applications for consumer, home, and industry users. This OpenLab has played a key role in helping du complete the testing and verification of its 5.5G network.

In Q4 2023, du began building a 5.5G network based on Sub-6GHz 3CC (component carrier) carrier aggregation technology that will support a downlink peak rate of 5Gbps for more immersive home applications like glasses-free 3D terminals and content reconstruction. In 2024, du will also use mmWave 4CC carrier aggregation to start small-scale 5.5G site deployment and upgrade. This will allow the operator to further expand network coverage, improve both indoor and outdoor network experience, and prepare for advanced Internet of Vehicles (IoV) and Internet of Things (IoT) applications.

> *From the beginning of the 5G era, FWA has been a transformative catalyst, empowering us to deliver cutting-edge solutions to our valued customers. Our enduring partnership with Huawei has been fruitful consistently, and with the introduction of FWA², we are poised to redefine the boundaries of user experience, offering our subscribers unparalleled internet connectivity indoors.*
>
> **Fahad Al Hassawi**
> CEO, du UAE

> *5.5G is an important bridge on the way from 5G to 6G. Finland has always been a pioneer in the world in mobile technology. The experience upgrade brought by 5.5G technology will help us expand more applications. We look forward to applying the new capabilities of 5.5G to fixed broadband connectivity in enterprises and homes in the near future.*
>
> **Jarkko Laari**
> Director, DNA Radio Networks

EXPERIENCE-BASED PRICING HAS PROMPTED FINLAND TO LAUNCH EUROPE'S FIRST 5.5G NETWORK

Finnish company DNA cites continuous network upgrade and premium user experience as a driver of growth

On December 13, 2023, Finland's DNA became the first carrier to have successfully tested 5.5G technology in its commercial mobile network in Europe. By combining commercial C-band and newly-constructed mmWave spectrums, this network offers at least 9.5Gbps to single users, even at peak times.

This monumental success though was only possible thanks to DNA's early and heavy investment into 5G. In 2019, DNA set out to build a high-quality 5G network focusing on improving user experience, so that subscribers could use speed-based pricing that gradually monetizes network experiences. By June 2023, DNA's 5G network covered nearly five million people across 223 towns – almost 90% of Finland. DNA's 5G users could enjoy an average download rate of over 500Mbps and DNA mobile users DOU (dataflow of usage) reached 48GB, the second highest in the world.

DNA's fixed wireless access (FWA) service is a key component of its 5G product offering. FWA is a technology that lets subscribers have access to first-class broadband by using a CPE (customer premise equipment) that converts 5G into Wi-Fi. DNA's FWA service already has 55,000 subscribers who are, according to surveys, highly likely to recommend the service to others. Currently it offers 200Mbps networks speeds that peak at 1Gbps in 80% of all cases. Next, with 5.5G DNA plans to upgrade the FWA experience enabled by adding mmWave frequencies to the current C-band.

DNA has said their 5.5G innovation will not only serve consumer needs. The carrier recently verified Passive IoT technology over their 900MHz networks, which can be used to support digital production, smart warehousing, and logistics. Passive IoT offers better coverage for larger spaces at lower costs and as such is expected to become a key driver of growth for DNA over the next two years.

HANGZHOU IS USING 5G REDCAP TO BUILD SMART TRANSPORTATION

The 19th Asian Games were greener than ever with efficient and affordable lightweight 5G HD cameras

160Mbps
Video monitoring uplink rate

10m@90%
High-precision positioning

20ms@99.99%
Ultra-Reliable Low Latency Communications (URLLC)

Internet of Vehicles (IoV) applications will create hundreds of millions of new wireless device connections over the next five years, and pose tremendous challenges to device and network capabilities. The China Passenger Car Association predicts that China alone will have 20 million new passenger cars hit the road every year for the foreseeable future, and see the introduction of RedCap applications in the field since 2023. They also forecast that the penetration rate of RedCap connected vehicles will reach 30% by 2027.

RedCap is a new cellular IoT technology that leverages the inherent features of 5G—high bandwidth and URLLC—to make connected devices cheaper and easier to deploy by reducing the number of antennas they need. This also helps reduce the cost, power consumption, and complexity of medium- and high-speed 5G IoT applications.

For example, at the Hangzhou 19th Asian Games, China Mobile Zhejiang worked with its industry partners to deploy the city's first batch of RedCap video applications onto vehicles to support lightweight 5G-connected HD cameras. Their solution uses the low latency and high capacity of 5.5G networks together with RedCap's multi-BWP (bandwidth part) feature to provide high uplink rates, low latency, precise positioning, and continuous coverage, improving video-based transportation management. These green, cost-effective, plug-and-play, and lightweight traffic monitoring devices helped the Hangzhou Asian Games be greener and more environmentally friendly while reducing their final carbon emissions.

> *China Mobile was the first to complete a RedCap networking pilot with a mainstream network equipment vendor. We have piloted RepCap in multiple industries including the electric power, manufacturing, and security industries. We will be able to commercially deploy RepCap at scale in 2024.*

Liu Ya
Senior Researcher, Wireless and Device Technology Dept., China Mobile Research Institute

SMARTER WASTE SORTING WITH 5.5G AND AI-POWERED REDCAP CAMERA SYSTEMS

The City of Shenzhen uses smart cameras to improve the end-to-end urban sanitation processes

The Chinese megacity of Shenzhen produces an almost overwhelming 8.26 million tons of waste every year. The city's sanitation system is understandably broad and complex, combining a comprehensive waste classification training program for residents with massive logistics system comprised of more than 20,000 waste drop-off sites, 6,000 collection vehicles, 870 transfer stations, and 136 treatment plants.

Waste collection is generally quite challenging and labor intensive given the wide variety of items that need to be categorized. Previous solutions are also costly and difficult to deploy on road construction as wired video cameras were used with low resolution of images captured. So, China Mobile Shenzhen partnered with Huawei and Shencom to create a new system that used more cost-effective RedCap HD cameras to monitor and manage the city's end-to-end waste classification system. These cameras are based on the Redcap's native strength of a better coverage a lower latency utilizing simplified baseband, RF (radio frequency), and antenna units to reduce their complexity and cost by around 50% to 70%, to support large-scale deployment.

5G RedCap cameras can transmit HD video and environmental data to the cloud in real time over 5.5G networks. An AI-powered video management platform can then analyze the data for around-the-clock intelligent supervision, and process automation of environmental monitoring, to cover every part of the waste collection process, from waste drop-off to collection, transfer, and processing. For example, this system monitors for leaks when waste is being transferred, and immediately alarms the driving sanitation workers to handle any leaks as soon as they occur.

Over 5,000 of these 5G RedCap cameras had been deployed in Shenzhen by the end of 2023. Their intelligent waste sorting and management system covers the whole city and has reduced the sanitation department's labor costs by on average USD63 million/year and supervision costs by about USD1.4 million overall.

China Mobile Shenzhen is continuing to upgrade its 5G/5.5G network to support the large-scale deployment of RedCap devices and invest in its partner ecosystem to further explore new applications of other lightweight 5G devices.

50%–70%
RedCap-enabled camera cost reduction

USD63 million/year
Labor cost reduction in waste sorting

USD1.4 million
Supervision cost reduction in Shenzhen despite increase in volume

> *We've increased the amount of captured recyclable waste by more than 50% over the past three years. We've also captured 200% more kitchen waste. 5G-enabled devices are now deployed at waste drop-off sites, transfer stations, and transfer vehicles across the whole city. These technologies have made waste collection and classification much more cost-effective and efficient.*

Lin Longjian
Director of the Domestic Waste Treatment Supervision Center, Urban Administration Office of Shenzhen Municipality

YTO EXPRESS SUPERCHARGED LOGISTICS WITH 5.5G PASSIVE IOT

Next-generation IoT were deployed for digital warehouse management and smart logistics for the 19th Asian Games

20mins » 1min
Vehicle dispatch time

20times
Vehicle efficiency improvement

USD3,000/month
Vehicle inspection cost reduction (20-vehicle fleet)

"With 5.5G Passive IoT, the logistics management system can automatically detect the status of every logistics vehicle in the area in just minutes."

Zhao Weiwei
YTO Express's Operations Head of the Logistics Service Support Team in the Asian Games Village

Athletes and journalists from around the world flocked to the city of Hangzhou for the 19th Asian Games. One of the Games' many highlights was the high-tech Asian Games Village where local partners used a host of innovative digital applications to make the town more efficient and greener.

YTO Express, the official logistics services sponsor of the 19th Asian Games, was one such partner. YTO Express put 5.5G Passive IoT tags in their logistics vehicles, to have their inventory and operation status automatically identified whenever vehicles passed a charging station equipped with 5.5G base stations. These tags use advanced RF (radio frequency) and 5.5G cellular network to connect to outdoor base stations over 200 meters away. This ultra-long-distance coverage far exceeds that of radio frequency identification (RFID).

The 5.5G Passive IoT tags helped digitalize the entire management, dispatch, and tracking process. Traditional manual dispatch takes 10 to 20 minutes, but with this new system, long-distance vehicle dispatch can be completed in just minutes. This significantly reduced logistics costs and improved the operational efficiency of the vehicles by 20 times, reducing inspection costs by USD3,000 a month (20-vehicle fleet).

The tags can also detect and report the battery temperature of electric vehicles on the move with an identification accuracy rate up to 99%. It allows staff to view the surface temperature of each vehicle's on-board battery in real time on a digital management platform. The system also issues warnings whenever temperatures begin to exceed safety limits so staff can quickly troubleshoot any problems.

BUILDING THE WORLD'S FIRST FLEXIBLE CAR PRODUCTION LINE WITH 5.5G'S ULTRA-LOW LATENCY

EA Automation's advanced robotics and industrial controls are driving efficiency to new levels

Traditionally, methods like lean management and automation have been the gold standard for enterprises seeking efficiency improvement and cost reductions. As more companies go digital though, many solutions that were once considered unfeasible or impractical are becoming possible.

Exquisite Automotive Systems (EA Automation or EA), for example, has joined forces with China Unicom Hebei and Huawei to create the world's first flexible 5.5G production line in their Baoding factory in Hebei province. This project takes advantage of 5.5G's stable millisecond-level latency (URLLC) to achieve super-fine industrial control of the line's robotic arms.

Traditional production lines use wired networks for serial connections and control of terminal equipment. These lines are plagued by network failures that only increase in frequency due to wear and tear. The resulting production disruptions were at one point causing 60 hours of downtime a year at the Baoding plant.

On their new upgraded production line though, all equipment will be wirelessly connected, allowing production modules to be flexibly combined. It takes minimum 4ms to transmit instructions from the control system to terminals over the fast, stable, and highly reliable 5.5G network. The lack of dragging cables and worn pins also speeds up tool switchovers. With the solution,

60 hours » 5.26 mins
Service interruption time per year

USD 112 million
Annual Value of increased output

90%
Faster tool switchover

wireless connections have been extended from auxiliary production to core production systems, allowing robotic arms to receive new production instructions in real time. The product line's annual service interruption time has been shortened to 5.26 minutes, increasing the factory's maximum annual output by nearly 10,000 vehicles. This significantly reduces network maintenance frequency, increasing flexible production efficiency and capacity. It is estimated to the annual value of escalated production output would be USD112 million.

Moving forward, EA will continue working with partners to innovate in "5G + Industrial Internet", and incubate more high-end, 5G-powered, and general-purpose manufacturing applications, in order to drive digital transformation and 5G's large-scale commercial use in industry.

> *Digitalization is a must for transformation and upgrade in manufacturing enterprises. We will seize the opportunities presented by enterprise transformation and upgrade, and leverage digital technologies to continually improve our smart manufacturing capabilities, and contribute to the transformation and upgrade of the wider manufacturing industry.*

Yuan Zhanjiang
Deputy General Manager of Industry Intelligence Department, EA Automation

MAKING TRAFFIC SAFER AND SMOOTHER WITH 5.5G SENSING

China Mobile's collaborative sensing of people, vehicles, and roads is creating smart transportation

No matter how smart your vehicle is, that doesn't mean mishaps won't ever happen. On busy city roads, even experienced human drivers struggle with jaywalking pedestrians, stray animals, and zigzagging motorbikes. Drivers often have a split second to react to hazards and sudden changes in conditions. In recent years, traditional sensing technologies have been successfully helping reduce accidents by issuing warnings or sometimes even engaging the brakes when they detect a hazard. But these tools still have many limitations. Like people, they struggle with blind spots, low light, and inclement weather. Traditional traffic sensing is also expensive to deploy, so far only found in a few countries' expressways and overpasses.

China Mobile Zhejiang attempted to improve traffic safety at the 19th Asian Games in Hangzhou by launching an integrated 5.5G sensing solution that enables deeper collaboration between vehicles and roads. The carrier deployed base stations at important intersections around the Hangzhou Asian Games Village that can communicate with 5.5G-enabled vehicles.

The sensors in these vehicles detect their surroundings using wireless signals, which could not be achieved with traditional sensing solutions that suffer from high backhaul latency and costly signal resources. This innovative new solution instead harnesses a flexible sensing signal that uses a localized architecture to enable broadband and narrowband convergence. This not only improves the precision of the sensors in terms of distance, angle, and speed, but also reduces latency by 30% to 55%, and the overhead cost of sensing signal resources by 40%.

Thanks to this solution, connected vehicles in the Asian Games Village were able to detect and issue warnings for beyond-line-of-sight risks caused by people and vehicles, as well as lane change detection. The solution also delivers real-time positioning and speed tracking, and still operates in challenging weather or poor lighting conditions. The technology effectively compensates for the limited intelligent sensing range of a single vehicle by tracking data from the road itself in real time and promptly feeding this information back to traffic centers and vehicle-mounted cameras.

This marks the first complete Internet of Vehicles (IoV) application in a real-world urban road environment. Over the last year, the solution has reduced traffic jams by 20% and traffic accidents by 60% on average, in locations where it has been deployed. The solution also leverages the enhanced coverage of 5.5G networks to improve road traffic management capabilities and traffic efficiency, which also reduces the demand for onsite law enforcement.

40%
Wireless signal sensing overhead reduction

30% – 55%
Latency reductions

20%
Traffic jams prevented

60%
Traffic accidents avoided

5.5G AND AI AID AUTONOMOUS VEHICLES FOR FASTER DISTRIBUTION AND SAFER DRIVING

Neolix is building V2X-ready network construction standards and computing models with the help of autonomous driving networks

100 autonomous vehicles

Simultaneously transmitting data over 5.5G

1 week »» 1 day

L4 autonomous driving data transmission and model training

Neolix, a smart logistics solution provider, has long been a leader in autonomous driving technologies. In 2023 they decided to take their fleet of express delivery cars to the next level by partnering with China Mobile Beijing and Huawei to launch the first "Jingzhi 5.5G" network brand, which helps to pave the way for autonomous vehicle adoption at scale. Neolix's Level 4 autonomous vehicles have been hit on the road, independently performing doorstep package pick-up and sales.

The new solution uses a 2.6GHz + 4.9GHz dual-band 5.5G network to achieve a peak uplink rate of 1Gbps and a stable low latency of 20ms. This network is able to efficiently transmit stable, real-time HD video from autonomous vehicles.

Each of Neolix's L4 vehicles has 11 cameras and 2 lidars, and generates up to 30TB of raw data each day. Level 4 autonomous vehicles, nearly the most advanced ones in a scale that goes up to 5, can drive without a driver in certain areas. These vehicles generate a colossal 500GB data a day at minimum. All of data then need access to huge amounts of computing power to be processed for AI training. Previously, the transmission and processing of this data took at least a week, but Neolix is now leveraging the joint innovation carried out in the Beijing Ascend Innovation Center to combine the power of 5.5G networks and Ascend processors for AI training.

Using this new 5.5G network, Neolix is able to transmit data from up to 100 vehicles at the same time. The massive volumes of data uploaded are automatically cleaned and labeled by the AI servers deployed at the network edge. The data is then transmitted to the cloud for automatic AI training, and the training result is used to quickly iterate the autonomous driving model. Neolix has shortened the training and development process for L4 autonomous driving models to just one day, making it possible to complete real-time planning and decision-making on the vehicle side, while also improving vehicle speeds and operational safety. For example, when a vehicle's view of a traffic light is blocked due to inclement weather, a remote-control center is now able to immediately take over and execute real-time safety maneuvers.

Neolix is also exploring further use in smart manufacturing and unmanned delivery combining AI and 5.5G. Over the next three to five years, 100,000 autonomous vehicles are expected to hit the road for larger-scale implementation of unmanned delivery, creating an industry worth billions of dollars.

> *We are so happy to team up with China Mobile Beijing and Huawei to build this fully automated closed-loop data system across the cloud, the edge, and our devices. The system provides solid technical support for large-scale autonomous vehicle deployment.*
>
> **Yu Enyuan**
> Founder and CEO, Neolix

5.5G BRINGS RELIABLE NETWORKS, SMART CARS, AND INTELLIGENT ROADS

Shanghai has built the first 5.5G-powered V2X showcase

Since 2023, China Mobile Shanghai has joined hands with partners such as China Mobile Shanghai Industry Research Institute and Huawei to build the world's first 5.5G V2X (Vehicle-to-everything) showcase road. The operator teamed up with industry partners in various fields such as vehicle, road, network, cloud, and map, and jointly incubated more than 10 application scenarios such as assisted driving, self-driving, and smart cockpit. This marks a solid first step in building urban 5.5G Internet of Vehicles.

Thanks to this supportive environment, during MWC Shanghai in June 2023, Shanghai Mobile and Huawei took the lead in piloting a platform in Shanghai's Jinqiao Town (an affluent suburb). The platform comprehensively collects traffic information with 5.5G's unique sensing capability, and share the information to connected vehicles in real time through 5.5G uu air interface. Field test results show that the average latency is less than 20ms (accounting for more than 99% of the total), which can fully meet the network performance requirements of assisted driving and conditionally meet those of autonomous driving. Based on the verification results, Shanghai released China's first 5G IoV network standard in August 2023. Currently, it has been used to guide the deployment of IoV pilot showcase in more areas and of 5G private networks for high-level self-driving.

Jinqiao 5.5G IoV showcase route is now exploring various applications. Leveraging city-level ubiquitous coverage and higher vehicle-end penetration of 5.5G IoV network, traffic information such as traffic lights and tidal lanes is delivered to vehicles, providing a better assisted driving experience. 5.5G integrates the unique network and roadside sensing capabilities at a lower construction cost. Drivers can receive information such as traffic accident, pedestrian intrusion, and non-motorized transport in real time, which improves the safety and performance of assisted driving functions, and makes road travel smoother.

In addition, 5.5G's large bandwidth provides better and reliable uplink speed for services such as unmanned distribution and cleaning. Meanwhile, the ubiquitous, large downlink supports a smart car cockpit that is gradually moving towards large-screen and multi-screens, enabling immersive experience such as vehicle-mounted XR, HD video, and video conferencing.

5.5G makes full use of the ubiquitous connections of existing 5G networks to provide IoV communication capabilities, lowers the threshold for vehicle-road collaboration investment and helps the IoV industry achieve large-scale construction and sustainable operation at the city level.

Digital now

Scan to download the brochure

HUAWEI