

## **5G Applications Help China Fight Against COVID-19**

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With the COVID-19 outbreak hanging over China since the 2020 Chinese New Year, it has become the top priority to go all out to support epidemic prevention and control. A number of new technological means have made a difference in the fight against COVID-19, including the newly commercialized 5G technology, which has played a key role in healthcare, education, media and other fields.

### **1. 5G applications have been carried out in multiple provinces to help fight against COVID-19**

In the face of a full-blown outbreak, 5G operators, equipment manufacturers and industrial application solution providers work hand in hand to combat the outbreak and prevent the spread of COVID-19. So far, more than a dozen of 5G applications have been implemented to contain COVID-19.

In terms of 5G+ telemedicine, West China Hospital, Sichuan University, with the support from China Telecom, has completed a 5G+ teleconsultation system for COVID-19, which enabled teleconsultation services to two acute and critical cases of COVID-19 on the date of completion. The First Affiliated Hospital of Kunming Medical University, together with Yunnan Branch of China Mobile, has launched the 5G-based “Online Platform for Free COVID-19 Diagnosis and Treatment”, which has provided diagnosis and treatment services to a critical case of COVID-19 from Wuhan Hubei. The patient is now in stable condition, with symptoms relieved. Beijing Jincheng Medical Technology Co., Ltd. has provided Wuhan with a CT and X-ray coordination solution based on 5G cloud collaboration to address the shortage of radiologists for accurate identification of CT and other images in the screening of suspected cases of COVID-19. Besides, the company has also offered visual collaboration from inside and outside the isolation wards for confirmed cases in Wuhan, so that experts can conduct telemedicine based on the information sent via 5G networks, including ECG monitoring data and ultrasonic images, thereby improving the capability of medical treatment for emergency and severe cases. Wuhan Union Hospital and Tianyou Hospital Affiliated to Wuhan University of Science & Technology have put into use the 5G cloud-based intelligent robots donated by China Mobile and CloudMinds to undertake such jobs as remote nursing, body temperature taking, disinfection, cleaning and drug delivery, effectively reducing the risk of cross infection and improving ward isolation management. 5G+ infrared IT-based temperature measurement has been applied to traffic hubs in a number of cities to monitor the condition of passengers.

In terms of 5G+ new media, the three leading operators developed an emergency plan for

5G+ cloud live streaming, and through the 5G+ fiber-optic double gigabit network, the construction of Huoshenshan (Fire God Mountain) Hospital and Leishenshan (Thunder God Mountain) Hospital was live-streamed on CCTV portal in high definition around the clock, which were referred to by netizens as the strongest ever “cloud-supervised” projects. Hubei Radio and Television Station, using China Broadcasting Network Corporation’s 5G networks, gave network-wide live broadcast of press conferences on epidemic control in Hubei Province and synced the content to its 120 clients on the cloud as well as over 30 mainstream new media with remote Q&A function enabled. Zhengzhou Branch of China Unicom assisted with the provision of the 5G+4K live streaming of the “Xiaotangshan Hospital” construction in Zhengzhou. China Mobile has been disseminating information on prevention and control of COVID-19 through its 5G full-screen video ringback tone services.

In terms of 5G+ remote education, Zhumadian Branch of China Mobile gives full play to the advantages of 5G networks and information technology to provide software platforms and training services free of charge, such as “Cloud Video Distance Education”, “Live Distance Education” and “Synchronous Classroom”. With the help of these distance classrooms and teaching platforms, city- and county- level primary and secondary schools can organize their teachers and students to “teach and learn from home” with their original classes and grades unchanged, thus avoiding gathering of students during the outbreak and reducing the risk of cross infection.

## **2. 5G applications will help epidemic prevention and control in three aspects**

5G networks feature larger bandwidth, higher rate, lower latency and wider connection compared with 4G ones and can support such three scenarios as enhanced mobile broadband, ultra-highly reliable low latency and massive large connections. A deep integration of 5G into economic and social sectors will breed emerging information products and services, and assist in COVID-19 prevention and control in three aspects.

### **1) A number of 5G applications will empower healthcare, news media and remote education**

In the healthcare world, apart from 5G 4K/8K HD teleconsultation that makes excellent expert resources available at the grassroots level, improves the ability of grassroots and community-based medical organizations to cope with the outbreak and reduces the risk of cross-region people-to-people spread, the application of cloud-based medical and nursing robots, disinfection and cleaning robots, drug delivery robots and temperature-taking patrol robots in 5G smart hospitals will improve ward isolation management; online services such as further consultation of some common diseases and chronic diseases and drug distribution will reduce the risk of cross infection among other patients during offline visits to hospitals. In addition, applications such as VR visits to ICU wards, tele-robot ultrasonography and surgery, health management will also play a role during the outbreak.

In the news media sphere, 5G can flexibly support 4K/8K HD live streaming on a 24/7 basis in key epidemic prevention and control areas, and meet the needs for transmitting videos produced by massive HD cameras or terminal recorders. Furthermore, as wireless transmission is not limited by space, 5G can provide more flexible UHDV postback, enable

production of video footages on the cloud through cloud-based video production software and then conduct content distribution, so that people all over the country who keep an eye on the developments of the epidemic can be kept updated.

In the educational sphere, the combination of 5G with technologies such as ultra-high definition video (UHDV), VR/AR and holography will break new ground in means of education and deliver immersive class experience. Students could have a strong sense of presence through HD screens, HoloLens, VR/AR terminals and other products, as if famous teachers were present in person and the teaching materials and aids were real. Moreover, live videos can be transmitted to more schools, especially those in remote and border areas, thus excellent teaching materials will be available wherever 5G networks can reach.

## **2) 5G intelligent factories and autopilot systems will increase the efficiency of material production and transportation**

During the period of epidemic prevention and control, factories can hardly go into operation as scheduled, resulting in shortages of medical supplies, which accentuate the importance of intelligent and automated factories. Given its ultra-low latency, 5G can meet communication requirements of equipment in factories and provide intelligent production in factories with remote control and other means, thereby sparing operators from entering danger zones. 5G unmanned AGVs (Automatic Guided Vehicles) can be widely applied to various scenarios such as product handling, equipment detection and automatic identification. With the machine vision technology, 5G will support unmanned fine control of product quality, increase testing efficiency and provide some protection for tested objects and testing personnel.

As for transportation of emergency supplies, 5G can help obtain real-time information on driving conditions of vehicles a few hundred kilometers away and the surrounding traffic environment, be applied to transportation of dangerous goods and articles from/to infected areas through command control of start, acceleration and deceleration, steering and other real driving operations, and satisfy the demand for remote manual intervention in case of autopilot failures. In long-distance transportation, 5G-equipped vehicle fleets will support synchronous operations such as acceleration and braking through direct communication between vehicles, in which case nearly no drivers will be needed for the following vehicles as long as the lead vehicle driver drives carefully, thus appropriately reducing the number of drivers required.

## **3) Diversified 5G terminals will bring about new means of epidemic surveillance and patrol in public places**

In densely populated places such as hotels & restaurants, entertainment venues, shopping malls & supermarkets and public transport stations, 5G infrared thermal imaging temperature measurement can be used to scan more than one person at a time. Infrared precision temperature-sensing detectors can detect and record human face images and corresponding body temperatures at a distance of 10m, identify abnormal individuals in time and support contactless temperature-based prescreening, high-precision temperature-based screening and abnormal temperature warning, so as to effectively avoid cross infection and help epidemic prevention and control.

In epidemic monitoring, patrol and publicity, important functions of 5G-networked UAVs such as real-time UHD image transmission and remote low-latency control will enrich the forms in which UAVs are applied. 5G UAVs equipped with a thermal imaging system can conduct aerial real-time monitoring of densely populated open spaces. 5G UAV voice broadcast systems can carry out aerial patrols and broadcasting and warn people around to take precautions if suspected cases are detected. Plant protection UAVs can spray community roads, cultural squares, recreational facilities and rural areas with disinfectants to increase the efficiency of disinfection.

#### **4. Development outlook for application of 5G to combat COVID-19**

In the fight against the COVID-19, 5G has begun to show its paces in healthcare, new media and remote education by supporting services such as high-speed transmission and sharing of medical image data, HD live video streaming of news and remote video teaching, where 5G mostly exerts its large bandwidth capacity. With deeper understanding of 5G and stronger capacities of 5G networks, low latency and high reliability in particular, manipulation applications such as remote device control, remote driving, tele-robot ultrasonography and surgery will be supported and the application of 5G in epidemic prevention and control will be further widened and deepened.

Epidemic prevention and control will bring about explosive growth of telecommuting, distance teaching and other applications, most of which are currently based on 4G and cable networks, indicating problems such as limited bandwidth and latency, and lack of flexibility in network deployment. In addition to addressing the bandwidth, latency and flexibility problems, when combined with the cloud, 5G can also support storage and transmission of mass data images such as VR/AR images and holograms, bring forth new means of telecommuting and distance teaching, create more superior service experiences and reduce terminal costs by placing some of the storage and computing capacity of intelligent terminals onto the cloud. As these applications are widely integrated into life and production, they serve as a foundation for the application of 5G to gain traction.

Meanwhile, the outbreak acts as a transient catalyst for the development of 5G applications. In early days of commercial use, most 5G applications were still in a stage of demonstration and experiment. After the COVID-19 outbreak, applications such as 5G teleconsultation and 5G intelligent medical and nursing robots have evolved from the experimental stage to clinical use and been practically applied in a number of hospitals. Moreover, as part of the epidemic prevention and control efforts, quarantine measures have kept enterprises, schools and factories to from returning to work, providing a rare test bed for remote online 5G applications. These will speed up the maturation of some 5G applications. Looking forward, 5G will be more extensively applied to life, production and social governance along with the gradual perfection of 5G networks and the deepening of innovative practice of 5G applications.