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# How 5G Can Transform Remote Connectivity

## A mobile VPN solution promises 10X faster downlink throughput than a conventional VPN

To enable remote students and staff to easily access its intranet, Guangdong University of Foreign Studies in China has deployed a 5G mobile VPN solution provided by China Mobile Guangdong and Huawei. By enabling user traffic to go directly to the intranet (rather than taking a detour via through the Internet), the solution is designed to provide a better and more convenient user experience.

HUAWEI 中国移动 China Mobile

# How 5G can **Transform Remote Connectivity**

CASE STUDY LEAD: **HUAWEI AND CHINA MOBILE GUANGDONG.**

## CHALLENGE

In the education sector, there is growing demand for remote access to online video conferences, online courses and other content. However, when a student or lecturer accesses a campus intranet through conventional VPN solutions, their traffic travels via the Internet and is subject to network congestion during peak hours. With a slow network connection compounded by complex login process, the user's experience and productivity can be severely impacted.

## SOLUTION

Huawei's Mobile VPN solution harnesses China Mobile Guangdong's 5G core network to provide a dedicated and direct connection from the user's device to the campus intranet. The solution employs ULCL (uplink classifier) steering technology at the edge of the core network to enable authorised traffic to travel securely to and from Guangdong University of Foreign Studies' intranet. As well as speeding up the connection, this approach enables the user to access both the public Internet and the university intranet with a single SIM card and device.

## IMPACT & STATISTICS

Huawei says its Mobile VPN solution can increase downlink network throughput tenfold, compared with conventional VPN solutions. It also enables users to seamlessly switch between the Internet and intranet without repeated logins. Furthermore, this approach can be more cost-effective. Guangdong University of Foreign Studies' conventional VPN, which could serve a maximum of 2,000 concurrent users with a bandwidth of 400 Mbps, required an investment of 908,000 yuan over three years for the construction and maintenance of the VPN. By contrast, the mobile VPN cost 805,000 Yuan to serve up to 5,000 concurrent users with a bandwidth of 1 Gbps.

## WIDER IMPLICATIONS

A mobile VPN promises to improve efficiency and productivity across the economy, by enabling remote users to access internal networks as easily and securely as if they were on-premise. Huawei says its Mobile VPN solution is now being used by more than 500 organisations, including educational institutions, public services, healthcare clinics and enterprises within China. It is also trialling the solution with mobile operators in other countries.

## STAKEHOLDERS

Guangdong University of Foreign Studies, China Mobile Guangdong, Huawei technology co. Ltd

## SOURCES & FURTHER INFORMATION

Michael Guo, Huawei,
**guochuanguang@huawei.com**

# How 5G can **Transform Remote Connectivity**

## A mobile VPN solution promises 10X faster downlink throughput than a conventional VPN

There is growing demand for connectivity that enables remote users to securely access an organisation's internal network. Remote workers often use virtual private networks (VPNs) to access organisational intranets, while individuals may use the same technology to securely access public services, telemedicine, online education and other services.

However, conventional VPN solutions have drawbacks. They need to detour traffic through the Internet and users need to switch between the Internet and intranet frequently. During peak hours, user traffic can be hindered by network congestion, which can cause video conferences to freeze and file downloads to slow.

To address these issues, Guangdong University of Foreign Studies (GDUFS), one of the most prestigious universities in China, deployed a mobile VPN solution provided by China Mobile Guangdong and Huawei in August 2021. By enabling user traffic to go directly to the intranet (rather than being routed via the Internet), the solution is designed to provide a better and more convenient user experience. Huawei estimates the downlink network throughput is ten times higher than with conventional VPN solutions.

"Mobile VPN enables efficient sharing of campus intranet resources," says Xie Jianguo, director of the IT centre of GDUFS. "It greatly improves efficiency of the daily work and learning of GDUFS teachers and students," About 20,000 GDUFS students are using the mobile VPN to access online journals, online courses, remote labs, and other digital resources. China Mobile provides new GDUFS students with a SIM card that supports the mobile VPN services by default.

"Students can access both the Internet and intranet freely without changing their [SIM] cards and numbers," explains Ge Lei, Deputy General Manager of China Mobile Guangdong. "Mobile VPN is faster and more secure, redefining access to the intranet and Internet and empowering the campus digital transformation. Besides this, mobile VPN can be widely used in public services, remote office, and campus management."

Leveraging a mobile VPN to provide access to an intranet can also significantly reduce an organisation's private network construction costs. To provide a conventional VPN, organisations need to purchase and deploy a VPN gateway and then establish a public network data tunnel through the gateway to enable remote access to their intranet.

GDUFS' conventional VPN, which could serve a maximum of 2,000 concurrent users with a bandwidth of 400 Mbps, required an investment of 908,000 yuan in three-year VPN construction and maintenance. By contrast, the mobile VPN costs 805,000 yuan to serve up to 5,000 concurrent users with a bandwidth of 1 Gbps.

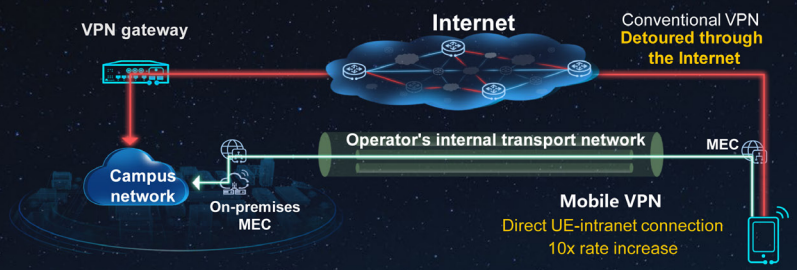
The university is one of 500 enterprises and institutions in China using Huawei's Mobile VPN solution to enable access to campus private networks, public services, healthcare, and remote offices. "The capabilities and experience of enterprise mobile private networks are greatly improved," adds Ge Lei, Deputy General Manager, China Mobile Guangdong. "As users can now securely access the intranet anytime and anywhere, the solution is improving productivity."

# A 5G core network **streamlines connectivity**

The mobile VPN deployed by GDUFS harnesses China Mobile Guangdong's 5G core network to provide a direct connection to the campus intranet. This kind of solution can't be deployed on a Wi-Fi network, as it relies on the mobile operator's user plane functions (UPF) at the edge of cloud-native 5G core network.

Huawei's Mobile VPN solution employs ULCL (uplink classifier) steering technology to physically isolate the traffic from the public Internet (see graphic below). Located on an edge UPF within a 5G core network, the ULCL technology removes the need for an individual to use one SIM card for the public Internet and another SIM card to access a private VPN. The ULCL enables a single cloud server to direct traffic to either the public Internet or a private intranet. Huawei says it is adding the intelligent traffic distribution capability of the ULCL technology on to 4G networks to enable 4G operators to also offer mobile VPN services.

## Mobile VPN: optimal choice for campus private network

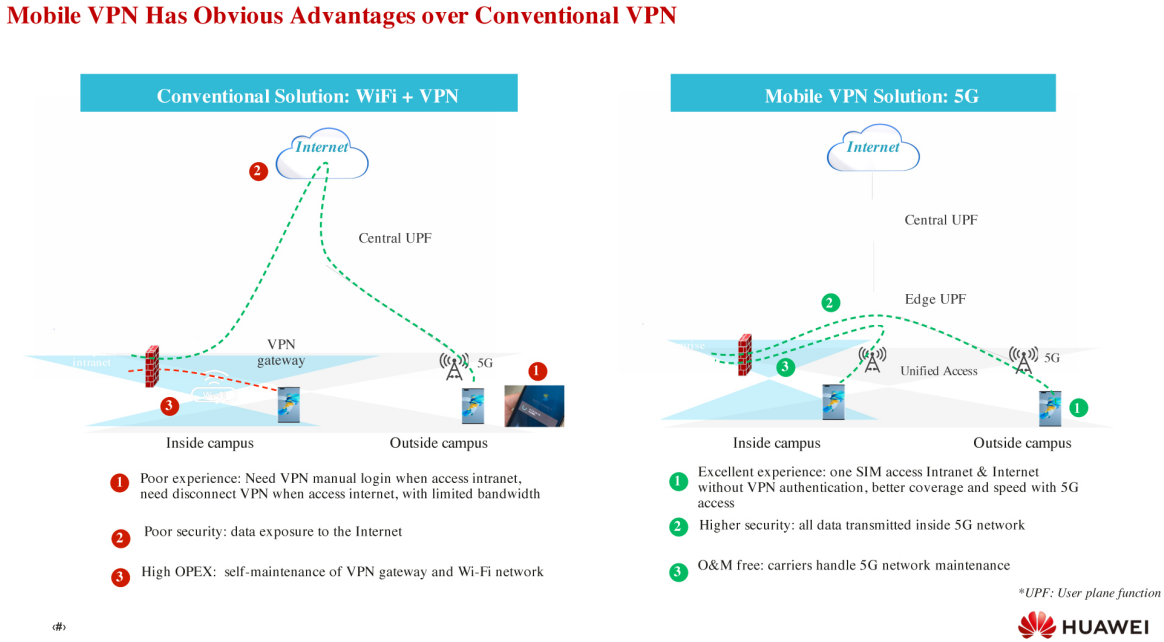



| Conventional VPN | | Mobile VPN |
|---|---|---|
| **Complicated access** X<br>Complex remote VPN login | | **Simplified access** ✓<br>No repeated logins when switching between the Internet and intranet |
| **Poor experience** X<br>Low network speed and detoured traffic path | VS. | **Optimal experience** ✓<br>High network speed and direct connection |
| **Unreliable connection** X<br>High risk of data breach on the Internet | | **Reliable connection** ✓<br>Direct and secured UE-intranet connection |

"The new technology can smartly identify which network you are trying to access with one unified phone or SIM card and distribute your data and your requirement for the network through one edge UPF to the enterprise intranet or to the Internet," says Ge Lei. "You can use one SIM card to connect both the private network and also the public network. I think that's the key value here."

The mobile VPN solution enables students and lecturers at Guangdong University of Foreign Studies to have a consistent experience regardless of whether they are located inside or outside the campus (see graphic below). The unified network enables the end-user to access entertainment services, web browsing and the university intranet through a single device.

Compared with using a VPN over Wi-Fi, a mobile VPN is more secure – all the traffic is transmitted within the operator's protected cellular network. The operator also handles all the network maintenance, removing the need for the organisation to maintain the VPN gateway and Wi-Fi network.



Huawei says its Mobile VPN solution is helping China's operators to bolster their presence and their revenues in the consumer market. For example, the improved user experience may entice existing students to subscribe to mobile VPN campus cards as a value-added service, which costs 10 yuan a month. That should help operators increase the average revenue per user (ARPU) in the B2C market.

"Operators' revenue from Mobile VPN consists of the mobile VPN construction fee (involving shared UPFs and private lines) charged to industry customers and the mobile VPN use fee charged to end users who have subscribed to the Mobile VPN service package," explains Ge Lei.

China Mobile Guangdong's Mobile VPN offering, which serves more than 180,000 end users, is profitable. The operator is now exploring implementing a national roaming solution to ensure that campus services can be accessed in roaming scenarios.

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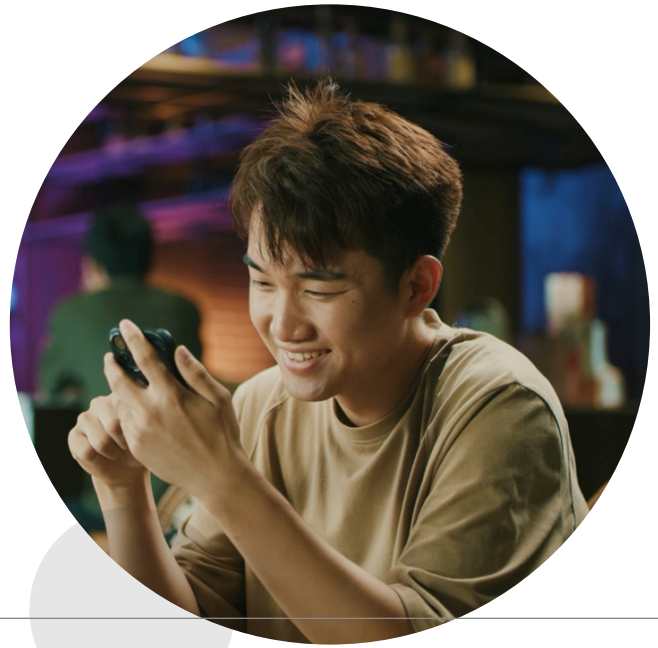
**Ge Lei** - Deputy General Manager, China Mobile Guangdong



# **Demand from** public services, healthcare and enterprises

During the Win-Win Huawei Innovation Week, which ran from July 18 to 21, 2022 in Shenzhen, China, Huawei and China Mobile Guangdong showcased the Mobile VPN solution as an innovative application in the private network field. "This proves that the solution is solid enough to be promoted on a large scale, accelerating the digital transformation of campuses," adds Ge Lei. "Thanks to the large user base, Mobile VPN will unleash great economic value, and is unequivocally the optimal choice to meet 5G private network requirements."

Huawei is working with all the operators in China to offer the Mobile VPN solution – the goal is to enable an organisation's entire staff or user base to benefit from the technology, without having to switch to a different operator. Huawei is also trialling the Mobile VPN solution with operators outside China.

Huawei says the solution is in demand in education, public services, culture and tourism, healthcare, and other sectors where people look to securely access intranets anytime, anywhere. In the public sector, it can be used to securely deliver government and municipal services to citizens, support remote video conferences and important health- or emergency-related communications.

In the healthcare sector, a mobile VPN can be used to enable patients' mobile devices to securely transmit large volumes of data back to hospital intranets in real time, potentially improving the efficiency of a treatment. The technology can also be used to enable video consultations between medics and remote patients.

Enterprises are using the Mobile VPN solution to enable remote staff to access both the Internet and intranet with lower latency and higher speeds, thereby improving work efficiency. The technology can be used, for example, to enable secure video conferences, workflow processing, online engineering design and simulation, and file transfers, among other applications.

> Mobile VPN is faster and more secure, it can meet a user's requirement to securely access the Internet and campus intranet at the same time.

**Ge Lei** - Deputy General Manager, China Mobile Guangdong

"Within the next year, Mobile VPN will be widely used in education, public services, healthcare, remote office, and campus management," concludes Ge Lei. "Mobile VPN is faster and more secure, it can meet a user's requirement to securely access the Internet and campus intranet at the same time."

## About the GSMA

The GSMA is a global organisation unifying the mobile ecosystem to discover, develop and deliver innovation foundational to positive business environments and societal change. Our vision is to unlock the full power of connectivity so that people, industry, and society thrive. Representing mobile operators and organisations across the mobile ecosystem and adjacent industries, the GSMA delivers for its members across three broad pillars: Connectivity for Good, Industry Services and Solutions, and Outreach. This activity includes advancing policy, tackling today's biggest societal challenges, underpinning the technology and interoperability that make mobile work, and providing the world's largest platform to convene the mobile ecosystem at the MWC and M360 series of events.

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## GSMA 5G Transformation Hub

The GSMA 5G Transformation Hub is a source of information on some of the most innovative 5G solutions in the world. This portal contains case studies detailing design, benefits, key players, measured value and the future impact of scaling up these 5G solutions worldwide. The 5G Era is now firmly established and this family of standardised GSM technologies, including mmWave, are being rolled out successfully across the globe. The GSMA 5G Transformation Hub, launched at MWC Barcelona in 2022, provides details of how 5G is best placed to deliver real value for a range of key sectors including manufacturing, energy, transportation, media and live entertainment, smart cities and construction.. Many more case studies will be added, in the coming months, covering even more industries and the GSMA is asking Members to nominate innovative 5G case studies to add to this global digital showcase. The 5G Transformation Hub and this particular Case Study are both sponsored by Qualcomm.

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