



Minimalist 5G-Advanced Enriches Entertainment

ZTE has developed a private 5G network system to give entertainment providers and broadcasters much greater flexibility

Highlights

- Both virtual reality experiences and live broadcasting could benefit from flexible high throughput wireless connections
- To meet that demand, ZTE has developed a “minimalist private” 5G-Advanced network that is easy to deploy
- The solution, which doesn’t need a dedicated core network, employs mmWave spectrum to deliver more than 50 Mbps to scores of devices simultaneously
- The minimalist architecture has been employed commercially by venues and at events in China and Malaysia
- ZTE is also working with partners in Belgium and Austria to deploy the architecture in those markets

There is growing demand for immersive experiences in which people wear a virtual reality (VR) headset and roam freely around a dedicated space. For example, the Horizon of Khufu VR Experience, which immerses visitors in ancient Egypt, claims to have drawn more than one million visitors to its various locations around the world. In China alone, there are now more than 5,000 stores offering so-called free roam VR experiences spanning

games, theatre productions, sports events, science and education.

However, many of the free roam VR experiences require visitors to wear a backpack weighing about 5kg, which handles the local image rendering and can get hot to the touch. An alternative approach is to use a low-resolution VR headset without a backpack.

But in this case, the images can be blurred. A third option is to use Wi-Fi to transmit the VR images from a computer to the headset. But relying on Wi-Fi places a severe constraint on the number of simultaneous connections, according to ZTE.

“They do the rendering in a server near the users and the videos are transmitted from the server to the headset through Wi-Fi and Wi-Fi is great, it’s mature, it’s very low cost, but the number of devices connecting to the same Wi-Fi is very limited,” explains Zhang Jiong, marketing director of ZTE RAN product line. “If you have three or four or five people, it’s great. But if you have 10 or 20, the degradation of the performance over the Wi-Fi will be so bad, which is big problem for entertainment providers trying to scale the business up.”

The system uses the existing baseband processing unit in the existing base station and there is a card that can work just to direct the data just to the server without going through the core network or public transmission

Zhang Jiong - Marketing Director of ZTE RAN product line

To address these issues, ZTE has developed a “minimalist private” 5G-Advanced network, which is designed to be deployed easily inside a building being used for a new VR experience. Rather than employing a conventional 5G core network, this minimalist architecture uses the computing power in the base station – the VR traffic is terminated on-site in the baseband unit. As the minimalist 5G architecture doesn’t require a core network, it is relatively low cost to deploy.

“The system uses the existing baseband processing unit in the existing base station and there is a card that can work just to direct the data just to the server without going through the core network or public transmission,” explains Zhang Jiong. “And there is actually a very lightweight proxy - a software module working as a very lightweight core - to make sure the terminals can complete the signalling and procedure.”

High-speed downlink, responsive uplink

To meet the requirements of VR, the private network can be designed to support high throughput speeds in the downlink, as well as low levels of latency in the uplink, to ensure the virtual environment responds immediately to the VR user’s movements. The network can also be configured to prioritise the most important frames in the VR video, while also using orchestration and adaptive bit rate mechanisms to serve multiple users simultaneously and reduce network congestion.

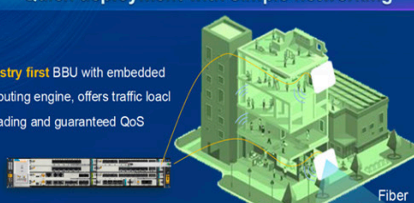
As it employs very high frequency mmWave spectrum, Hans Neff, senior director, CTO Group, ZTE says the system can comfortably transmit 50-100 Mbps between the base station and scores of VR headsets, as long as there is a line of sight. In some cases, the network may employ several base stations to ensure that at least one of them has a clear transmission route to the receiver. At the same time, the minimalist 5G-Advanced network can deliver an end-to-end latency of less than 50 ms, according to ZTE.

With mmWave, “the number of devices is not problem and [the solution] is lightweight,” adds Hans Neff. Rather than wearing a backpack, the visitor just carries a device the size of a smartphone in their pocket or using an armband, which transmits the rendered VR video to the headset. “The quality of the video is fantastic, and the durability and the battery life are also good,” notes Hans Neff.

ZTE 5G-A Minimalist Private Network Introduction


Quick deployment with simple networking

- Industry first BBU with embedded computing engine, offers traffic load offloading and guaranteed QoS



Fiber

Continuous and scalable coverage



50m+ coverage range

- Industry first mmWave micro base station

Volume (L)	2
Weight (Kg)	2

Deterministic service experience

Frame-level identification


- High priority frame
- Priority determination
- IP-frame based scheduling

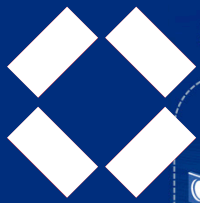
Multi-users orchestration

- Frame integrity optimization
- Intelligent multi-frame scheduling

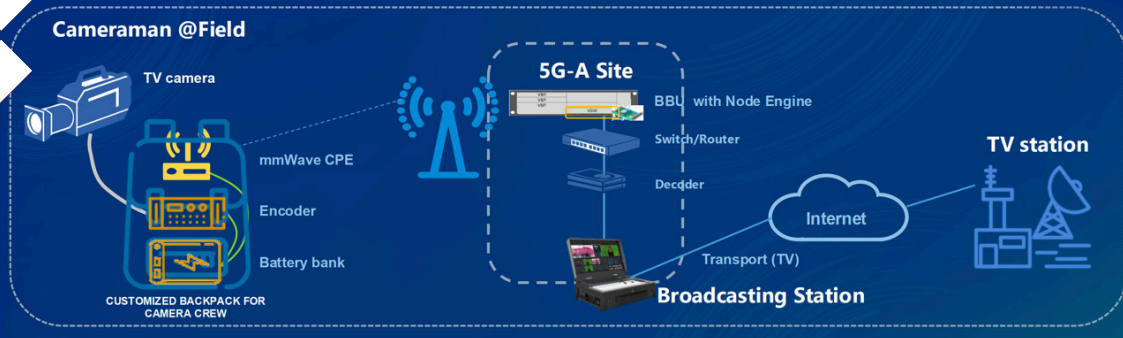
Adaptive bit rate

- Flexibly adjust XR service bit rate reported by network in real time to reduce network congestion





5G-A Minimalist Private Network Solution for wireless live broadcast



ZTE, Qualcomm and China Mobile showcased the minimalist 5G architecture at the China International Digital Interactive Entertainment Exhibition (known as China Joy) in Shanghai in July 2024. The solution has since been deployed commercially by the Beijing SoReal experience, where ZTE says it is delivering 4K video streams at 90 frames per seconds and with a round trip latency of less than 15 ms. A 550 square metre VR theatre in Chengdu has also deployed the system. In this case, the network is delivering downlink streams of more than 80 Mbps to 40 users simultaneously, while achieving a round trip latency of less than 20ms, ZTE says.

Giving camera operators greater flexibility

A minimalist 5G-Advanced network is also well-suited to supporting live broadcasts, according to ZTE. In this sector, there is a growing need for flexible low-cost solutions that can help broadcasters deliver compelling live footage from multiple angles and multiple vantage points in a wide range of locations, from public parks and streets to stadiums and concert halls. An easy-to-deploy wireless solution could support both outdoor shoots with short and unpredictable timeframes, and indoor shoots in which camera positions frequently need adjustment.

In this use case, each camera operator wears a backpack with a video encoder, a battery bank and a 5G mmWave modem. The backpack then transmits the live images to the base station, from where they can be relayed on to the Internet or to the TV station: the private network can be configured to support high throughput speeds in the uplink.

ZTE supplied a minimalist network to support coverage of the 2024 China Spring Festival Gala. The system enabled a five-hour broadcast with no packet loss, while supporting video streams of 2 Gbps per camera, according to ZTE. The resulting high quality coverage attracted 432 million views, which was a 48% increase in viewership on the previous year.

A ZTE minimalist 5G-Advanced network was also used to enable live coverage of Malaysia's national games. The system, which allowed wireless cameras to be placed anywhere in the stadium, was set up in a single day, according to ZTE.

Hans Neff says ZTE is also working with partners in Belgium and Austria to deploy its minimalist private 5G-Advanced network in those markets. The availability of mmWave spectrum varies country by country – in some markets, these high frequency bands can be used directly by businesses to support private networks. In other markets, mmWave spectrum may have been licensed by mobile network operators, which would then need to make it available to a VR venue owner or a live broadcaster.

ZTE anticipates strong growth in demand for minimalist 5G-Advanced solution from both the VR experience sector and broadcast in the industry. In the case of the former, a key factor will be the speed at which new VR content is developed. In the case of the latter, the shift to high-resolution video is likely to drive the need for better connectivity. "it is a nice coincidence in that 4K recording and 8K recording are just coming into place, which means a renewal of the environment," notes Hans Neff.

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For more information, visit: www.zte.com.cn

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