

Sumavision Technologies

4K UHD live video broadcasting over 5G wireless transmission network

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A. Abstract :

With the high speed and high bandwidth technologies developed nearly years, e.g. 5G, and also subscribers' requirements of high-quality video content via cellphone, pads, laptops or any other tablets devices. Sumavision has great experiences in broadcasting level video processing, and also the lossless seamless signal transferring protection technology.

Sumavision is changing the rules of the game for live news and dynamic sports coverage, with flawless 5G 4K HEVC live streaming and remote production. Together with its cloud-based management and next-gen IP distribution platforms, Sumavision offers the most cost-effective, end-to-end contribution, production and distribution solution. The inventor of channels bonding, Sumavision is synonymous with high-quality live video solutions, transmitted from anywhere in the world during high-speed movement.

B. High-light Scenarios and features:

1) Multi-camera

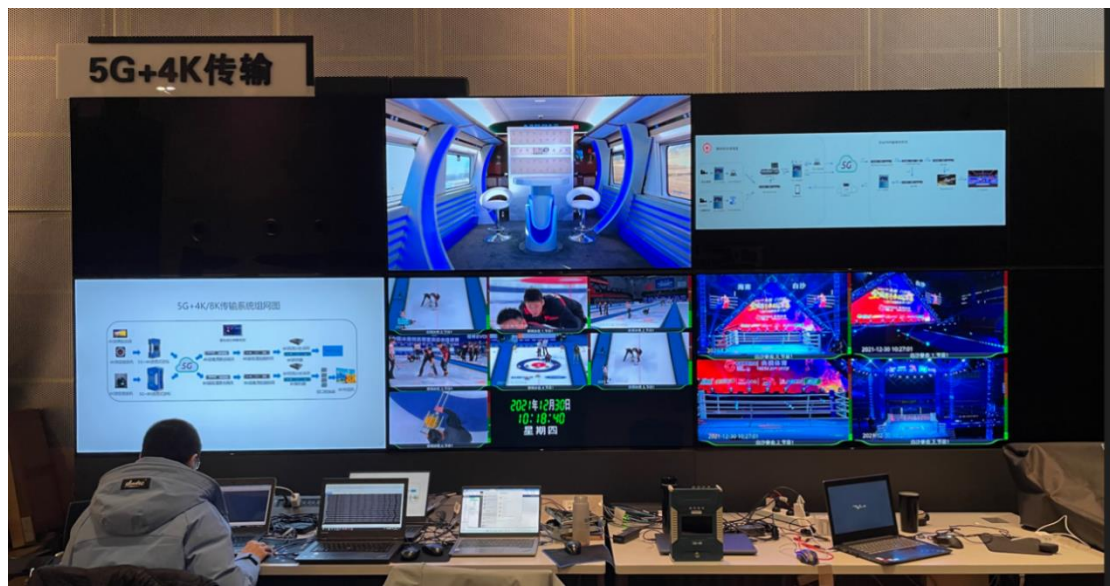


By deploying backpacks in different locations, you can monitor and viewing different live feeds simultaneously, which can help the TV station better coordinate and schedule. We offer our 5G+4K field backpack with the multi-camera and frame synchronization features “armed”, up

to 4 HD- resolution feeds processing in one single portable device, directors or the videographers can switch channel seamlessly. By installing the app on subscribers' tablets or smartphones, users can enjoy the games from different shooting angles and get much more great viewing experiences. The backpack can realize time synchronization between single or multiple devices, and ensuring the fluency of multi-position switching screens.

2) Time Synchronization (Both Internally or across the devices)

Based on FPGA algorithm, the relevant indicator information of TR101-290 of the code stream was analyzed and detected, and the I-frame alignment of the multiple channels was carried out, thus realizing the stable picture without flicker and Mosaic in the whole process of master/standby switchover of ultra-HD signal.



Beside synchronization technologies inner the single backpack/encoder, Suma-TER Sync works by continuously monitoring the end-to-end transit time, and dynamically adjusting the internal decoder buffers to compensate. During Beijing 2022 Olympic Games, Through the 5G transmission system of the headquarters, the front technical team will transmit the real-time video and audio broadcast signals of multiple channels and different angles of the same event to the receiving gateway. After the receiving gateway completes the signal reception and protocol conversion, it will be released to the central video of the Headquarters, CCTV Sports and other new media terminals through the new media integrated publishing platform for the audience to choose and watch according to their preferences.

3) Low-Latency

During the scenario cases in Beijing2022 Olympic Game – High-Speed Train Live Broadcasting,



5G low-delay interactive backpacks are deployed in the high-speed railway studio and the guest connection area respectively, which are used to upload the captured live feeds. The one backpack is used to upload the video signal collected by the local camera to the cloud for synthesis and rendering. Another backpack is used to pull up the synthesized and rendered video signals so that the host and guests can observe their positions relative to each other at very low-latency delay.

The overall system adopts the "MEC cloud + end" transmission architecture, and deploys large resources such as video signal scheduling services and virtual production computing power on the MEC cloud. Only 5G low-delay interactive backpacks are deployed on site, simplifying the equipment in the high-speed railway studio to the extreme, thus eliminating the worries of equipment volume and power consumption. At the same time, it breaks system bottleneck of the one-way transmission architecture of traditional backpack with "one-point-one-receive", supports flexible networking and multi-point two-way interaction functions, and can achieve stable two-way transmission of video signals with low delay and high picture quality under 5G network, fully reflecting the characteristics of lightweight and flexible activation of the system.

4) Aggregation and Channel Bonding

In November 2022, Beijing Marathon, Sumavision used backpack to transmit the live broadcast content to the CCTV central studio for live broadcasting. In the transmitting process from each shooting cameras to CCTV central studio, Sumavision's backpack support different wireless transmission, and also support fast handover cellular-network, like to switch 4G and 5G signals when the vehicles which carrying cameras and backpacks moving along the racing route. And with CSF channel binding technology, the solutions can achieve large bit rate video signal transmission, to ensure stable transmission. On the other hand, combined with 5G technology, it can even stably transmit 4K video signals of the studio in a fast moving scene, which further reflects our excellent network security technology.



Think about frustrations for viewers: buffering, blocks or fuzzy pictures, and terrible small “loading circle”....

To help broadcaster solving these problems and make our viewers happy , Sumavision has good experience issues, especially in poor networks, or limited bandwidth , or fast moving shooting conditions, like running? skating? Car racing? Or on a 350km/hour high speed-train!

CSF (Channel Sharing Function) is Sumavision Patent protocol that tightly integrated with our backpack encoders. It supports up to 8 transmission channels bound and aggregation.

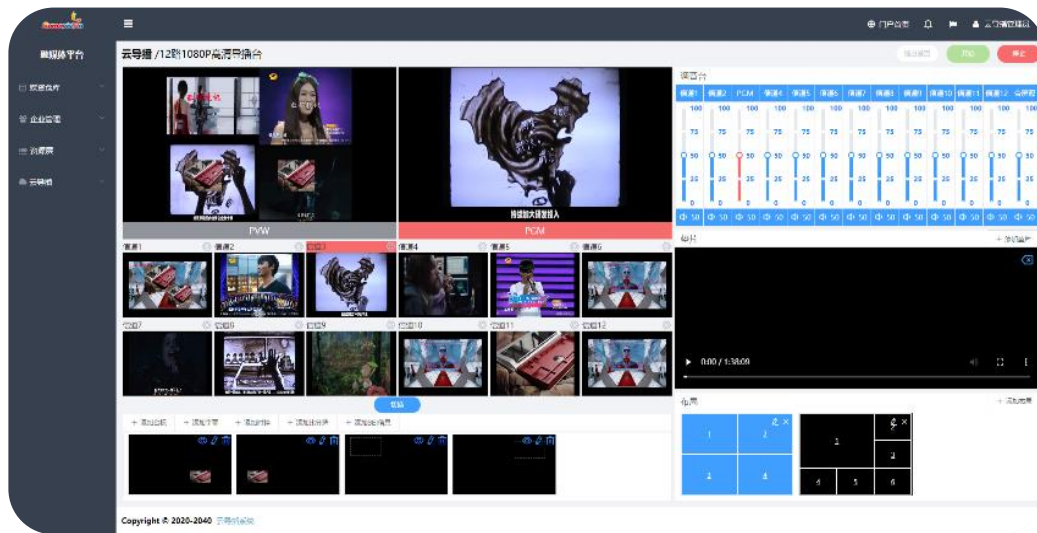
As for the bitrate control, a build-in algorithm, namely SCAE (Sumavision Channel Adaptive Encoding), automatically recognizes the changing of bandwidth and notifies the video encoder to allow it to modify the output bit rate of video and ensure the quality of output video stream at the same time. This enables you to limit your output bitrate to reasonable values and help you improve your transmission performance under worse or weakness of network connection.

5) Remote Production System (RPS)

5G remote production of Xi 'an National Games, live streaming of multi-view games and cloud-side production



At present, it is usually necessary to rent point-to-point dedicated link for frame level synchronous multiplexing in remote production at home and abroad, so as to ensure the production requirements of public signals for high picture quality and low delay signals. In this project, frame-level synchronous multi-channel transmission of remote production is realized based on 5G slice network, which ensures the safety and speed of signal transmission of this remote production and eliminates the expensive cost of renting traditional point-to-point dedicated lines



In the remote production process, the video signals collected in the front production area are sent back to the main production area of IBC by SRT (Secure and Reliable Transmission Protocol) encoding modes respectively. The SRT high-code signal is used for the production of the event. EFP switching station is used for the production and switching of high-code signals, and the convergence media switching station is used for the quick switching of real-time low-bitrate video streams, audio connecting and on-site monitoring. In IBC, the director sends GPI trigger level signals to EFP switch station using the financial media switch station. By invoking special effects such as quick shot and macro, the director links EFP switch station to complete the automatic switch of high-bitrate signals, and finally outputs the live signals that meet the broadcasting level signal for the event.

C. Conclusions:

4K/8K 5G backpacks adopt multi-channel aggregated transmission technology, collect the transmitted data on site, and distribute it to the 5G base stations of several operators' uplinks. In the transmission process, the peak bandwidth pressure of a single transmission channel is reduced, and transmission continuity and stability are improved.

Through the use of 5G backpack, reporters and cameras constitute the lightest video live connection unit, equipment configuration is simplified, reduce the burden of field operators, wireless transmission, flexible movement, while ensuring real-time picture transmission continuous stability

High quality video content 5G signals are transmitted back to the new media integrated release platform for data distribution in the IP domain. The advantages of sharing and timeliness are evident.