Solution Brief

Video Production and Broadcasting

Intel Processor-Powered Software-Defined Live Broadcast in 4K HDR at the Olympic Games Paris 2024

Collaboration between the Olympic Broadcasting Services, Panasonic and Intel advances capabilities for live event video production using the Virtualized Outside Broadcast Van (vOB) reference architecture.

Panasonic

"The demand for flexible, hybrid video production is driving a need for the sports broadcasting industry to collaborate, to provide scalable production architecture. The integration between KAIROS and Intel will facilitate organisations transitioning to the new production reality."

– Andre Meterian,
Panasonic Connect Europe
Broadcast & ProAV Director,
Olympic Games Paris 2024
Manager for Panasonic

Broadcasters seeking to reduce costs benefit from the flexibility to tailor their operating approach to the needs of specific usages. The Olympic Games present a showcase opportunity to optimize cost efficiencies while broadcasting massive amounts of live content from multiple remote venues. The vOB reference architecture enabled by Olympic Broadcasting Services, Panasonic and Intel makes software-defined broadcasting of live events possible at geographically distributed sites.

Using this mechanism, broadcasters can cover dispersed live events without the expense and complexity of dispatching a fleet of physical broadcast vans. As the Official Processor Partner of the Olympic and Paralympic Games, Intel has been working with Olympic Broadcasting Services and the software ecosystem to enable broadcasting applications and workloads for the vOB architecture. A series of successes has demonstrated increasing maturity over multiple generations of the technology:

- **Olympic Winter Games Beijing 2022: Proof of concept**. At Beijing 2022, a proof-of-concept implementation in 1080p SDR demonstrated the viability of the vOB solution for broadcasting live events.
- **Winter Youth Olympic Games Gangwon 2024: Production deployment.** At Gangwon 2024, the solution exhibited full end-to-end production using Intel processor-powered software-defined broadcasting.
- **Olympic Games Paris 2024: Production in UHD**. At Paris 2024, the vOB architecture will be used to broadcast a number of events in 4K HDR.

This workflow is performed on a single platform architecture based on Intel® Xeon® processors, leveraging IP protocols for audio and video. Ongoing development of software-defined broadcasting technology now makes it possible to execute all stages of the pipeline — including live video production, encoding, tagging and highlight creation — on commercial off-the-shelf (COTS) hardware using best-in-class software. A key aspect of this success has been to provide fidelity with traditional broadcast appliances, delivering the user experience that broadcast engineers and operators expect with the novel architecture.

Panasonic KAIROS technology

With the introduction of the second generation of its groundbreaking KAIROS IT/IP platform for live video production, Panasonic continues to improve and adds new features, I/Os and capabilities. KAIROS is a unique video platform that offers unprecedented flexibility and performance to users using CPU and GPU processing based on COTS systems. It delivers non-compressed video processing with super-low latency, ideally suited to many applications, for

example being used as a broadcast switcher or presentation switcher. It allows for advanced and intricate compositions thanks to the simple, user-friendly "layer" and "scene" approach of the GUI.

> *"More than 11,000 hours is expected to be produced from the Olympic Games, including behind-the-scenes material and more athlete-centric coverage, both pre-and post-competition! The demand is to offer the broadcasting coverage with smarter, more agile and highly efficient solutions while reducing physical space and increasing flexibility. I am excited that the sport action will be brought to the audience using KAIROS, our IT/IP platform."*
>
> – Andre Meterian,
> Panasonic Connect Europe Broadcast & ProAV Director,
> Olympic Games Paris 2024 Manager for Panasonic

Fully supporting the SMPTE ST 2110 standard, KAIROS is the ideal tool to bridge baseband video such as SDI and HDMI signals with IP signals, in a comprehensive and fully customizable system. As KAIROS is a software-based solution, utilizing the performance and flexibility of general-purpose compute on Intel Xeon processors, it delivers outstanding performance and user experience, with full flexibility to support non-traditional formats and ratios.

Virtualized outside broadcast van model

The vOB project provides a fully virtualized architecture based on a common platform using COTS hardware managed under broadcast and software-defined network orchestrators, using open-standard application programming interfaces. The standards-based platform enables multiple best-in-class software applications from one or more vendors of choice to be deployed on the same physical platform. This approach facilitates simple scalability of physical hardware resources to match the complexity and compute requirements for various broadcast events. Key benefits of the vOB architecture include the following:

- **Reduce carbon footprint** by avoiding the need to send broadcast vans, equipment and personnel to event venues, particularly for international events.
- **Decrease logistical and operational complexity** compared to traditional broadcast infrastructure, including planning, transportation and setup.
- **Provide an open architecture** that replaces proprietary monolithic broadcasting equipment with virtualized and containerized services designed to run on COTS hardware and cloud infrastructure.
- **Increase flexibility** by enabling a single system to fulfill multiple roles across a variety of live sports and other events, allowing testing and commissioning outside of restrictive timelines.
- **Shrink the overall broadcast footprint** at the venues and the International Broadcast Centre (IBC).

Intel technology building blocks

Intel compute technologies have been instrumental in the development of the vOB reference architecture. The ability to move and share large volumes of data including uncompressed audio and video signals over IP-connected, general-purpose servers based on Intel® architecture has helped make the transition to virtualized production possible. Increased processing capacity in successive platform generations with the latest Intel Xeon Scalable processors, Intel Data Center GPUs, and Field Programmable Gate Arrays technologies — coupled with higher memory speeds and bandwidth — help meet low-latency industry requirements for live video production.

Intel invests heavily in open source software solutions to enable this shift, including the open source Intel® Media Transport Library which supports several IP-based protocols, including ST 2110, for transport of compressed and uncompressed video formats.

Conclusion

The vOB reference architecture plays a growing role in the future of broadcasting, including for the global audience of live events at the Olympic Games. With software-defined production based on COTS Intel architecture, this model offers new sustainability, simplicity and flexibility for broadcasters to be more agile and cost-efficient as they deliver content that displays the pinnacle of human athletic achievement.

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