

NEXT-GEN LED WALL SYSTEMS USING AMD EMBEDDED PLATFORMS

Scalable, Modular and Deterministic Processing
on One Silicon Platform from Content to Pixel



together we advance_AV

OVERVIEW

LED video walls are becoming the centerpiece of immersive retail and experiential marketing, broadcast studios and XR stages, control rooms, sports arenas, and large-scale DOOH. As pixel pitches shrink, resolutions climb past 8K, frame rates rise, and HDR and AI-driven content personalization become standard, the processing and bandwidth demands grow dramatically. A large LED stage can require billions of pixels per second and well over 100 Gbps of real-time video.

Yet some designs still bolt together separate scalars, FPGAs, codecs, networking, and control chips. AMD collapses that stack onto one programmable roadmap spanning x86 embedded processors, FPGAs, and adaptive SoCs from the media server, through the LED processor, to the tile receiver. Next-generation systems must deliver studio-grade image quality, sub-frame deterministic latency, and frame-accurate synchronization across distributed cabinets, all within the power, thermal, and cost envelopes OEM designs demand.

END-TO-END AMD TECHNOLOGY FOR LED VIDEO WALLS

AMD is uniquely positioned to power every stage of the LED signal chain. AMD Ryzen™ Embedded and AMD EPYC™ Embedded processors drive media servers for content rendering, codec processing, multi-output video, storage, and orchestration. AMD Kintex™ UltraScale+™ FPGAs and AMD Versal™ adaptive SoCs drive the LED processor, with AMD Spartan™ FPGAs and AMD Artix™ FPGAs used in tile receivers, all with deterministic pixel processing, scaling, HDR and per-pixel color, pixel mapping, and high-speed LED transmission.

AMD offers IP cores and integrated blocks for a range of connectivity standards, codecs and Ethernet MACs and together with a strong partner IP ecosystem (JPEG XS, ST 2110/ IPMX, NDI) accelerates development for faster time to market.

Because different workloads need different compute, the AMD heterogeneous portfolio lets OEMs place the right engine at each layer while developing on shared, mature toolchains (AMD Vivado™ Design Suite, AMD Vitis™ unified software platform, AMD ROCm™ software) and up to 10-year embedded lifecycle for x86 and 15+ years for FPGA/ SoC. As resolutions, frame rates, and AI features advance, firmware-defined interfaces and programmable pipelines extend platform life without hardware redesign.



Media Server



LED Processor



Scan Cards in LED Cabinets

KEY BENEFITS

DETERMINISTIC REAL-TIME PROCESSING

Handle billions of pixels per second with sub-frame, genlock-accurate latency for live, broadcast, and XR.

MASSIVE BANDWIDTH & I/O

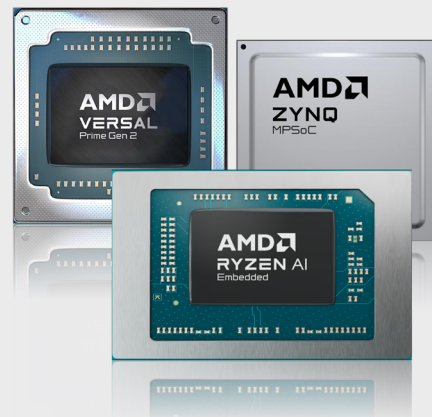
Move >100 Gbps of uncompressed video with up to 400G Ethernet interfaces (e.g. ST 2110).

SCALABLE END-TO-END COMPUTE

One roadmap covers media server, LED processor, and tile receiver, from small fixed installs to 16K+ immersive stages.

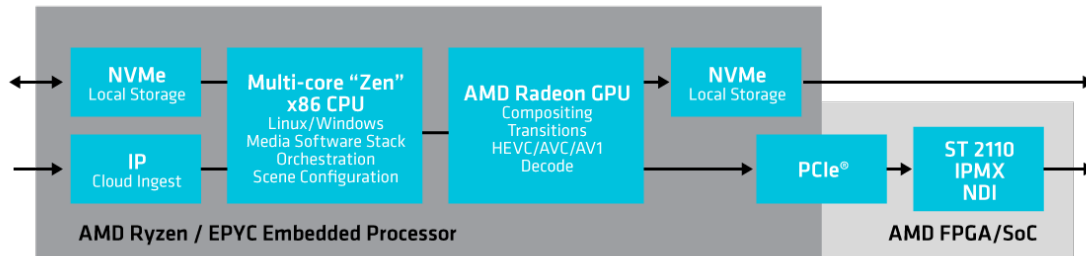
INTEGRATED ACCELERATORS

On-chip NPU/GPU for HDR tone mapping, per-pixel calibration, AI upscaling, and audience analytics, so no discrete accelerators required.



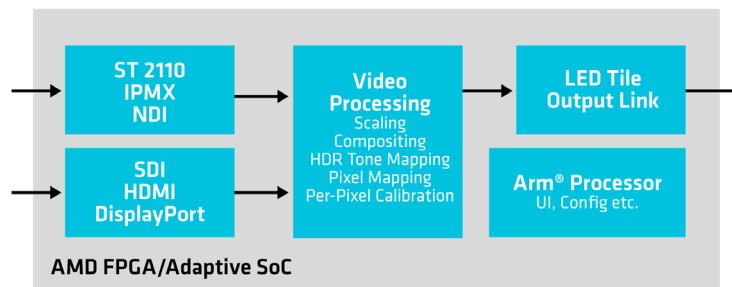
MEDIA SERVER

A media server built on AMD x86 embedded processors (Ryzen Embedded or, for high-density back-end infrastructure, EPYC Embedded) ingests, renders, and orchestrates content for the LED wall. Integrated AMD Radeon™ graphics provide hardware HEVC/AVC/AV1 decode and GPU compositing up to 8K with no discrete card needed, while high-IPC x86 cores handle scene timing, layout, and multi-layer blending. NVMe storage and high-speed Ethernet feed billions of pixels per second to one or more LED processors with frame-accurate, genlocked timing. A standard Linux®/Windows® software stack (GStreamer, FFmpeg, AV-over-IP) lets OEMs deploy, update, and integrate quickly.



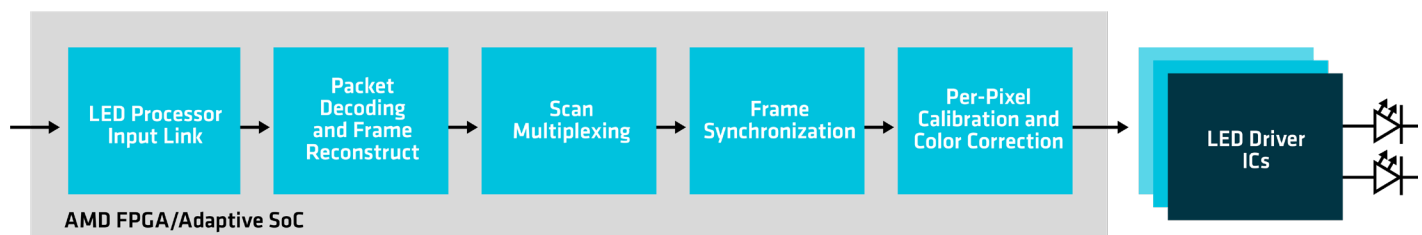
LED PROCESSOR / WALL CONTROLLER

An LED processor built on AMD FPGAs or AMD Versal and AMD Zynq™ UltraScale+ adaptive SoCs performs deterministic, real-time pixel processing between the media server and the LED tiles. Programmable logic ingests HDMI 2.1, DisplayPort 2.1, 12G-SDI, and AV-over-IP, then scales, composites, and color-processes video for gamma correction, SDR-to-HDR tone mapping, white balance, and per-pixel calibration, with microsecond, deterministic latency. Pixel mapping handles rotation, offset, and the irregular geometries real LED walls demand. The integrated Arm® processing system available in SoCs manages UI, configuration, diagnostics, and firmware updates.



LED TILE RECEIVER / SCAN CARD

Inside each cabinet, an AMD FPGA or adaptive SoC drives the LED tile receiver. It receives the processor's video stream, decodes packets, reconstructs frames, and buffers them locally before distributing pixels to the LED driver ICs. Programmable logic performs scan multiplexing (row driving), per-pixel calibration and color correction, and frame synchronization across cabinets, while integrated I/O handles cabinet-level networking, diagnostics, and monitoring. A power-efficient FPGA fabric delivers this deterministic processing at low power per cabinet, critical when a wall contains hundreds of tiles, and firmware updates keep deployed walls current without hardware changes.



AMD SILICON BENEFITS FOR LED WALL SYSTEMS

AMD TECHNOLOGY	OEM BENEFIT
AMD RYZEN AND EPYC EMBEDDED PROCESSORS	• Run the full media-server workload of render, decode, composite, and orchestrate, on one device with integrated graphics, no discrete GPU. • Scale from a V2000 baseline up to Ryzen AI and EPYC Embedded processors for higher performance and high-density infrastructure. • Add on-chip AI (AMD XDNA™ architecture) for audience analytics and content personalization. • Build on standard Linux/Windows software ecosystem for fast time to market. • Ship and support for up to 10 years on one roadmap.
AMD ULTRASCALE+ FPGAS	• Hit deterministic, sub-frame latency for live, broadcast, and XR. • Process billions of pixels per second with real-time scaling, HDR tone mapping, pixel mapping, and per-pixel calibration. • Integrate HDMI 2.1, DisplayPort 2.1, 12G-SDI, and 1-400G Ethernet. • Support AV-over-IP (ST 2110, IPMX, NDI) via firmware with no board respins. • Accelerate development with a wide range of AMD and partner IP. • Lifecycle extended to at least 2045.
AMD ZYNQ AND VERSAL SOCS	• Combine Arm control processing and programmable video on a single chip. • Deliver deterministic capture-to-pixel paths with frame-accurate sync. • Run power-efficient edge processing per cabinet at scale. • Add on-chip AI for upscaling and calibration with no extra silicon.

NEXT STEPS

For more information on Broadcast AV solutions, visit www.amd.com/broadcastav

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