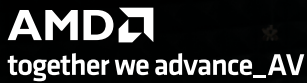


APPLICATION BRIEF

AMD EMBEDDED COMPUTING IN PROFESSIONAL AUDIO SYSTEMS

One Silicon Platform from Microphone to Monitor, with Deterministic Sub-Millisecond Latency



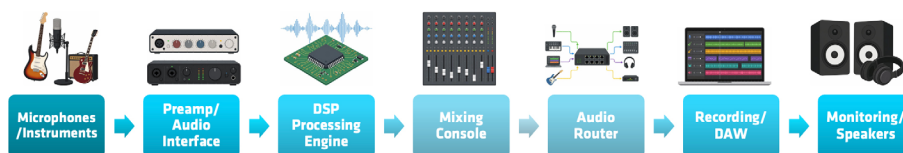
OVERVIEW

Audio is evolving to become software-defined and networked, with more channels, immersive formats, and AV-over-IP everywhere. Yet most designs still bolt together separate DSPs, ASICs, and protocol chips. AMD collapses that stack onto one programmable roadmap spanning adaptive SoCs, FPGAs, and x86, from the mic to the monitor. Modern audio system designs must deliver studio-quality fidelity, ultra-low latency, and deterministic synchronization across distributed environments. What was once limited to high-end studios and broadcast installations is now expanding into live events, installed audio, streaming production, and hybrid workspaces. This growth is driven by the adoption of AV-over-IP standards such as Dante, AES67, ST 2110-30, and emerging IPMX audio profiles, alongside increasing channel counts, immersive audio formats, and AI-assisted workflows.

Next-generation systems demand a more flexible compute platform capable of handling multi-channel audio processing, sample-accurate synchronization, format conversion, AI inference, and software-defined routing, all within strict power, latency, and cost envelopes required by OEM designs.

END-TO-END SILICON FOR PROFESSIONAL AUDIO SYSTEMS

AMD is uniquely positioned to enable modern professional audio platforms with a portfolio spanning adaptive SoCs, FPGAs, and x86 embedded processors. OEMs can consolidate audio processing, network transport, DSP, AI enhancement, and system control onto a single silicon roadmap supported by mature toolchains (AMD Vivado™ Design Suite, AMD Vitis™ Unified Software Platform, and AMD ROCm™ software), shared software stacks, and a 10+ year embedded lifecycle. This unified platform allows audio compute to be distributed across edge devices (microphones, stage boxes), core processing (mixing engines, DSP racks), and control surfaces, while maintaining consistency in development, validation, and deployment. As audio standards evolve, firmware-defined interfaces and programmable pipelines ensure long-term platform scalability without hardware redesign.



KEY BENEFITS

REAL-TIME DSP

Deterministic, multi-channel DSP pipelines supporting EQ, dynamics, mixing, and effects on one device.

ULTRA-LOW LATENCY

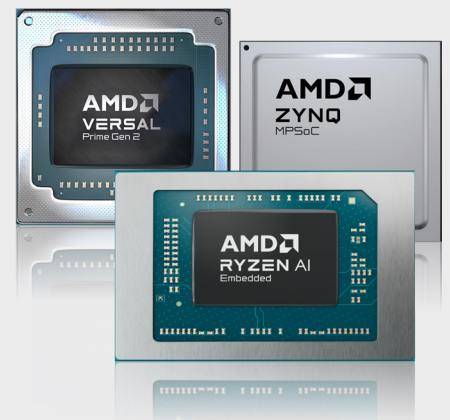
Sub-millisecond round-trip latency for live performance, monitoring, and broadcast environments.

SCALABLE CHANNEL DENSITY

From small 8-channel mixers to large-scale console systems with thousands of channels use the same architecture.

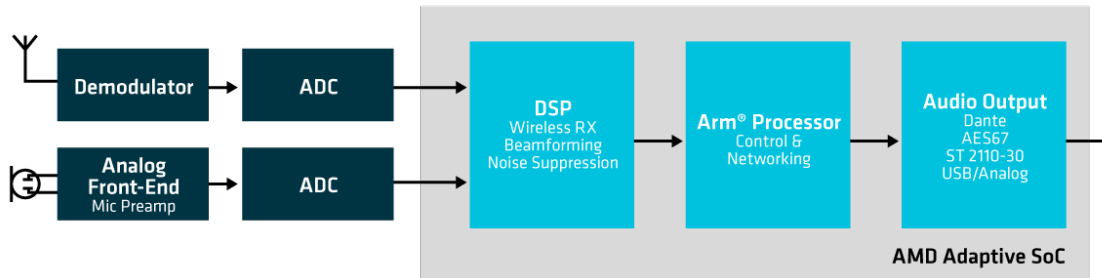
FLEXIBLE AUDIO I/O AND PROTOCOLS

Support Dante, AES67, ST 2110-30, MADI, USB Audio, and analog interfaces through reconfigurable FPGA/SoC architectures.



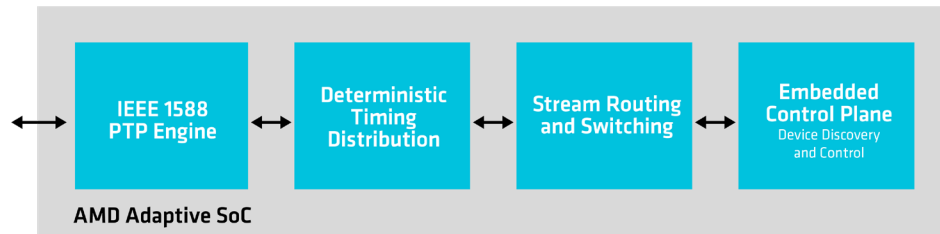
INTELLIGENT MICROPHONE / NETWORKED AUDIO ENDPOINT

A next-generation microphone or stage endpoint built on an AMD adaptive SoC integrates wireless and audio processing in real-time onto a single device. The FPGA fabric enables low-latency wireless microphone reception, signal conditioning, beamforming, or noise suppression, while the embedded Arm processor handles control, networking, and protocol stacking. Firmware-defined outputs allow the same hardware to support analog, USB, Dante, AES67, or ST 2110-30 streaming, enabling OEMs to standardize on a single hardware platform across multiple product SKUs and markets.



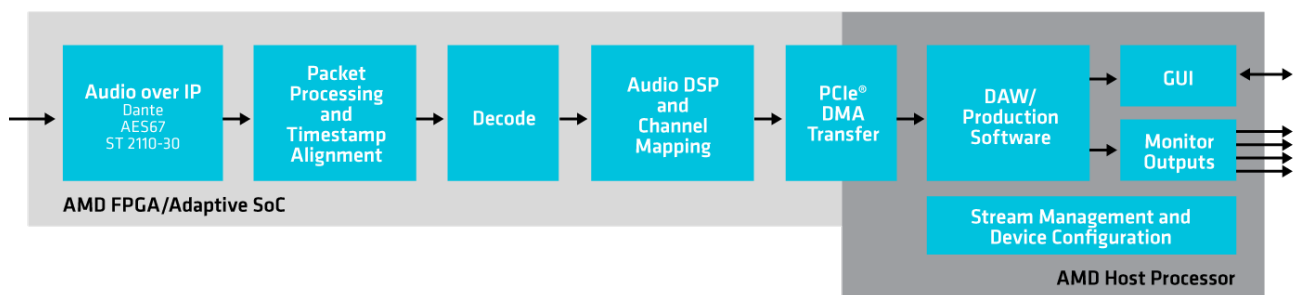
AUDIO SYNCHRONIZATION AND CONTROL ENGINE

An AMD adaptive SoC can serve as a centralized synchronization and control node in distributed audio systems, aligning multiple endpoints using IEEE 1588 PTP with sample-level accuracy. The FPGA fabric ensures deterministic timing distribution, while integrated processors manage routing, device discovery, and control protocols. This architecture enables seamless scaling from small studio setups to large networked audio deployments, ensuring reliable phase alignment across microphones, mixers, processors, and speakers.



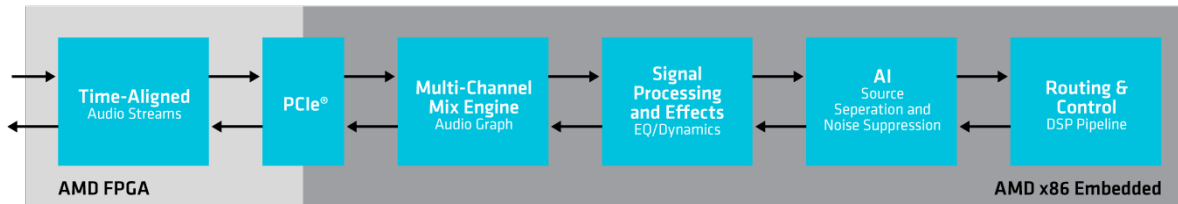
PCIe® AUDIO CAPTURE CARD

A PCIe-based professional audio interface built on AMD FPGA silicon enables direct ingestion of multi-channel audio streams into workstations or media servers. Supporting standards such as Dante, AES67, and ST 2110-30, the FPGA fabric performs protocol handling, stream routing, and optional hardware-accelerated DSP, delivering low-latency audio directly to host memory over PCIe. Paired with AMD Ryzen™ or AMD EPYC™ Embedded processors, this architecture provides a tightly integrated platform for audio production, broadcast mixing, and recording workflows—reducing system complexity while maintaining deterministic performance across high channel counts.



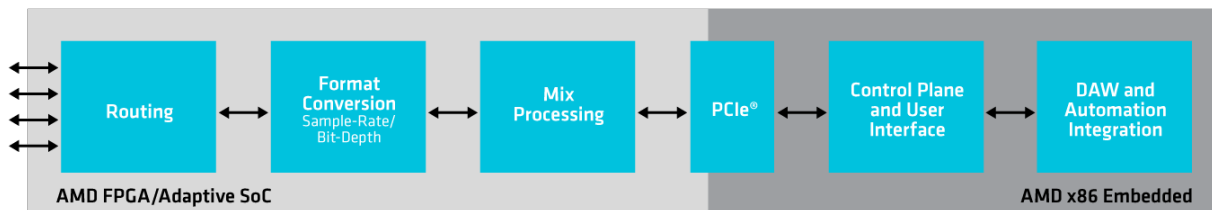
AUDIO DSP ENGINE / MIXING SERVER

The DSP engine is the computational core of modern professional audio systems, performing real-time mixing, signal processing, and effects across hundreds or thousands of channels. AMD Ryzen and AMD EPYC Embedded processors provide the multi-threaded performance required for complex audio graphs, while on-chip AI can accelerate tasks such as source separation and noise suppression where you need them. FPGA-based I/O ensures time-aligned ingress and egress of audio streams, enabling deterministic processing pipelines with sub-millisecond latency. This unified architecture allows OEMs to consolidate DSP, routing, and control into a single platform, reducing system complexity and improving scalability.



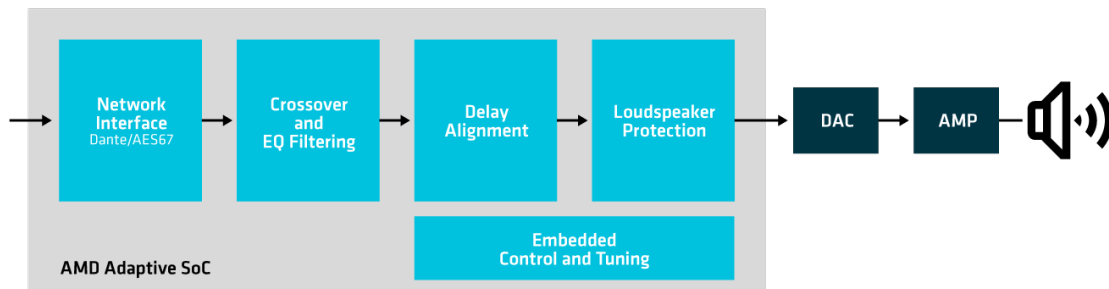
AUDIO CONSOLE / ROUTING MATRIX

The audio console serves as the central control and routing hub, managing signal flow between inputs, processing engines, and outputs. AMD FPGAs and SoCs enable high-channel-count routing, format conversion, and mix processing with deterministic latency. AMD x86 embedded processors provide the control plane, user interface, and integration with DAWs and automation systems. Support for virtualization and containerized workloads enables scalable, software-defined audio consoles capable of adapting to diverse production environments.



SPEAKER PROCESSING / AMPLIFICATION SYSTEM

A speaker processor based on AMD adaptive SoCs performs crossover, EQ, delay alignment, and loudspeaker protection in real time in one device. The FPGA fabric ensures phase-coherent signal paths and precise timing alignment across multi-driver systems, while integrated processors manage tuning, networking, and system control. By combining signal processing and network interfacing in a single device, OEMs can build compact, power-efficient amplification and monitoring solutions that scale from studio monitors to large venue PA systems.



PROFESSIONAL AUDIO

AMD TECHNOLOGY	OEM BENEFIT
AMD RYZEN & AMD EPYC EMBEDDED PROCESSORS	• Run hundreds of channels on one server, replacing multiple DSP boxes. • Reprogram DSP in software to serve many product tiers from one design. • Mix, EQ, and apply effects in real time without dedicated DSP chips. • Handle many simultaneous audio streams without dropouts. • Ship and support products for 10+ years on one roadmap.
AMD ULTRASCALE+™ FPGAs	• Hit deterministic latency targets audiences can rely on live. • Add or switch protocols (Dante, AES67, and more) without board respins. • Keep audio phase-perfect with sample-accurate clock sync. • Process more channels in parallel while staying under a millisecond.
AMD ZYNQ™ AND AMD VERSAL™ SoCs	• Build complete endpoints (mic, interface, or speaker) on a single chip. • Combine Arm® control and programmable audio to cut BOM and board space. • Deliver a consistent low-latency path from capture to playback. • Add on-chip AI for noise suppression and echo cancellation with no extra silicon.

NEXT STEPS

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

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