COREAVI

Platform for Safety Critical Applications (PSCA)

WIND AN INTEL COMPANY

T2081/T1042 + E9171 + VxWorks 653

COTS-D

CoreAVI and Wind River® have teamed to deliver a complete safety certifiable COTS embedded solution, also known as a Platform for Safety Critical Applications (PSCA), to dramatically lower the risks when developing certified systems. CoreAVI is the single source for this PSCA Solution, delivering a VxWorks® board support package (BSP), integrated graphics/video drivers, and the COTS-D hardware IP solution for the NXP® T2081/T1042 Single Board Computer and GPM0002 AMD Embedded Radeon™ E9171 GPU. All included elements come with COTS DO-178C/ED-12C DAL A certification evidence while all hardware components come with COTS DO-254/ED-80 certification evidence to support system level IDAL A needs. By providing all components through a single source, this solution lowers risk, lowers cost, and shortens schedules for safety certifiable avionics mission computers and cockpit display systems.

The T2081/T1042 is supported by Wind River VxWorks 653 Platform, used by over 220 customers in over 430 integrated modular avionics (IMA) projects in over 80 global aircraft. VxWorks 653 fully utilizes the hardware virtualization assist of the T2081/T1042 and enables combinations of ARINC 653, POSIX, VxWorks, and Linux on a shared T2081/T1042 platform. Additionally, VxWorks 653 is supported by a COTS certification evidence DVD containing over 40,000 files to achieve DO-178C/ED-12C DAL A avionics certification, and includes support for multi-core processing as detailed in the FAA CAST-32A position paper. VxWorks 653 is also aligned with the Future Airborne Capability Environment (FACE™) Operating Systems Segment (OSS) Safety Base Profile, enabling both ARINC 653 and POSIX FACE applications.

This PSCA Solution provided by CoreAVI includes:

- NXP T2081/T1042 3U VPX Single Board Computer (SBC) COTS-D Design IP and COTS DO-254/ED-80 certification evidence
- GPM0002 AMD Embedded Radeon E9171 GPU XMC Module COTS-D Design IP and COTS DO-254/ED-80 certification evidence
- VxWorks 653 BSP with COTS RTCA DO-178C/ED-12C certification evidence
- OpenGL®, Vulkan®, and video driver libraries with DO-178C/ED-12C certification evidence

Application Processor

The application is hosted on a COTS-D safety certifiable NXP Power Architecture T2081/T1042-based SBC designed specifically for avionics and defense applications requiring the best performance per watt. The SBC functions are supported with a BSP for Wind River VxWorks 653. The BSP is available off-the-shelf from CoreAVI with COTS certification evidence to support DO-178C/ED-12C DAL A certifications.

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Graphics Acceleration Processor

Graphics acceleration and interface expansion is achieved though the COTS-D GPM0002 E9171 XMC module which can be installed directly onto the SBC. The AMD Embedded Radeon E9171 is the latest Embedded Radeon GPU from AMD offering twice the dedicated video memory and more than 2x the performance of the previous generation E8860 in a similar power envelope and driving up to five simultaneous displays. The E9171 also upgrades the previous generation GPU H.264 video decode and encode to full 4K at 60 Hz resolution and adds High Efficiency Video Coding (HEVC), H.265. Figure 1 details the elements of the T2081/T1042 + E9171 PSCA Solution. The colour blue indicates all items that are part of CoreAVI's complete certifiable solution.

The GPU is supported with VkCoreGL™ SC1 OpenGL SC 1.0.1 and VkCoreGL SC2 OpenGL SC 2.0 driver libraries on top of Vulkan, all with COTS certification evidence to support DO-178C/ED-12C DAL A certifications. This architecture enables the quick low risk porting of existing applications with the ability to accelerate and add new system functionality through the Vulkan interface to the GPU hardware. CoreAVI's VkCoreGL SC1 OpenGL driver libraries are FACE-aligned, supporting their safety critical profile including the EXT_EGL_Compositor extension. The GPU may be used by multiple applications using CoreAVI's HyperCore GPU virtualization manager module.

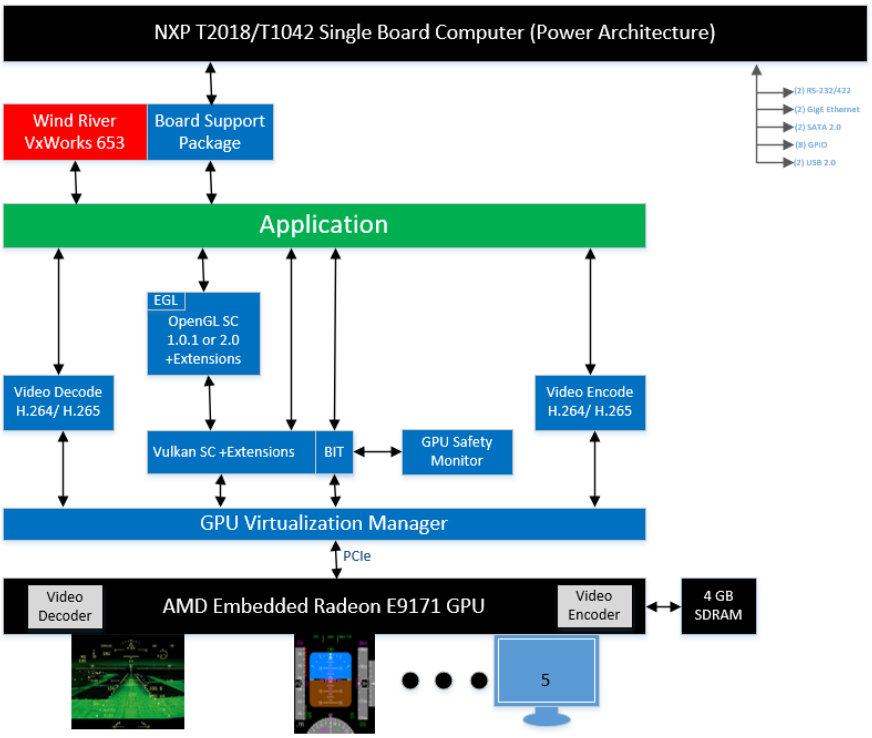

Figure 1: T2081/T1042 + E9171 PSCA Solution Overview

Many systems have safety requirements to prevent the display of Hazardously Misleading Information. The E9171 is supported by CoreAVI's TrueCore GPU safety monitor to detect situations within the GPU that may cause Hazardously Misleading Information.

Video decoding of H.264 and H.265 video streams into OpenGL textures is supported by CoreAVI's DO-178C/ ED-12C DAL A certifiable DecodeCore driver library.

Video encoding of frame buffers, displayed data, and SBC hosted video to H.264 and H.265 streams is supported with CoreAVI's DO-178C/ED-12C DAL A certifiable EncodeCore driver library.

Contact CoreAVI for more information: sales@coreavi.com