IntervalZero

Product Release Notice

MaxRT eRTOS 1.0

General Availability Release Date

March 10, 2025

Product Overview

MaxRT eRTOS is the first product in the new IntervalZero MaxRT products family. eRTOS provides a standalone, embedded 64-bit Real-Time Operating System (RTOS) with tools and utilities for building and executing real-time programs. eRTOS provides deterministic and high-speed response times for applications that require hard real-time. With eRTOS, you can use a single, low-cost platform to satisfy real-time and embedded application requirements.

Key Features

- MaxRT eRTOS Software Development Kit (SDK) contains headers and libraries for developing, building and debugging applications with Visual Studio 2019 and 2022. The SDK also contains multiple samples and NIC drivers source.
- MaxRT eRTOS Runtime is a deployable target Runtime that does not require anything else to run your real-time applications. The Runtime starts processors and allocates resources without the help of the Windows operating system.
- The eRTOS kernel is based on the RTX64 subsystem, which supports multiple processes and threads running on multiple cores of an SMP system.
- eRTOS is source code compatible with RTX64's Real-time API and will be source code compatible with all the MaxRT family of products (wRTOS and vRTOS).

eRTOS SDK Features

Developing & Debugging Applications

- Supports Visual Studio 2022 and 2019 and contains a VSIX package with templates for building eRTOS applications and DLLs.
- Supports C Runtime for Visual Studio 2019 and 2022.

- Provides sample source for the prebuilt binaries included with the Runtime.
- Provides a Visual Studio-integrated base debugger and launch provider, which Visual Studio uses when debugging real-time applications and applications that use DLLs.
- Supports attaching the Visual Studio debugger to an eRTOS process running on an eRTOS remote system outside the Visual Studio IDE.
- Supports a text-based terminal for debugging applications with eRTOS shell commands, accessible via the target system's serial port.

APIs

- Provides Real-Time functions and data types to support deterministic programming.
- Provides support for Windows-based functions.
- Provides Real-Time NL2 functions and data types supported by the Network Link Layer (NL2).
- Provides TCP/IP functions and structures used by the TCP/IP Stack.
- Provides NIC Driver Real-Time NIC Driver (RTND) functions and data types that a Real-Time NIC Driver must support to be used by the eRTOS Network Link Layer (NL2).
- Provides Ethernet Filter Driver API Reference functions to allow for the creation of filter drivers that the TCP/IP Stack can load.
- Provides support for Winsock functions.
- Provides Internet Protocol Helper (IP Helper) functions, structures, and enumerations for retrieving and modifying network configuration settings for the local computer.

eRTOS Runtime Features

General

- Supports Intel® 6th to 14th generation processors, supporting up to 64 cores.
- Can start multiple processors for SMP scheduling, determines ACPI information, and generates timer interrupts across all cores.
- Contains logic to limit SMI activity from the BIOS.

- Supports x2APIC.
- Supports CAT and MBA processor features.
- Uses GRUB bootloader to load the eRTOS HAL (RTHAL) and Kernel (RTKernel).
- Provides default boot configuration options.
- Provides the ability to configure the Kernel through a configuration file.
- Supports the ability to allocate memory deterministically.
- Supports the ability to scan the system bus for device information.
- Performs TSC frequency calibration and synchronization on SMP systems.
- Contains an AHCI SATA block driver to support a basic FAT32 file system.
- Supports basic registry functions.
- Supports Applications, Dynamic linked libraries, and standard IPC objects like Semaphores, Mutexes, Events, and Shared memory.
- Support for SSE/SSE2/SSE3/SSE4/AVX/AVX2/AVX-512/AMX
- Supports hardware interrupt thread level - IST handling (1, 139, 140, 141, 142, 143):
    - Line-based interrupts (IRQ)
    - Message-based interrupts (MSI/MSI-X)
    - Multi-vector interrupts (MSI/MSI-X)
- Supports Exception Handling:
    - General Exception Handling - Stop at first exception / MPX delay context save/restore
    - Structured Exception Handling
    - Create Trap frame/exception frame
    - Get / Set context
    - Try / Except
    - C/C++ exception
    - Debugger exception dispatch

- Provides USB capabilities through the MCCI USB Host Stack that can be optionally loaded when the eRTOS system boots.
- Supports an eRTOS Console that enables system control when used with a USB keyboard.
- Provides prebuilt sample applications to demonstrate basic eRTOS functionality.

Network Features

- Provides processing and networking capability through an optional Network Link Layer (NL2) and TCP/IP Stack within the eRTOS environment.
    - Network Link Layer (NL2) – a software component that provides real-time applications with abstract APIs to access network services at Layer 2 of the OSI model, independent of the underlying hardware.
    - TCP/IP Stack – a separate protocol stack that sits above the NL2 and provides deterministic processing and networking capability.
- Supports several common network controllers with the Network Link Layer (NL2). See *eRTOS Supported NICs* in the Help for a list of supported devices and their test status.
- Adds TCP/IP Stack utilities, like RtArp, RtIpConfig, RtPing, and RtRoute for diagnosing and/or configuring network connections to other computers.
- Provides Client and Server sample applications for use with the TCP/IP Stack and usage information for each sample.