

MQX™ RTOS 4.0.2.2 Patch Release Notes

1 Overview

This patch release is based on the MQX™ RTOS 4.0.2 release and provides the solutions to software issues identified in the released version.

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2 Release Contents

This table lists the release contents.

Table 1. Release Contents

| File Names |
|---|
| mqx/source/include/lwmem.h |
| mqx/source/include/mqx_prv.h |
| mqx/source/io/lpm/lpm_smc.c |
| mqx/source/kernel/idletask.c |
| mqx/source/kernel/lwmem.c |
| mqx/source/kernel/mqx.c |
| mqx/source/psp/coldfire/cw_comp.h |
| mqx/source/psp/coldfire/iar_comp.h |
| mqx/source/psp/cortex_a/core/A5/dispatch_sch.S |
| mqx/source/psp/cortex_m/compiler/cw_asm_mac.h |
| mqx/source/psp/cortex_m/compiler/cw_comp.h |
| mqx/source/psp/cortex_m/compiler/gcc_cs_asm_mac.h |
| mqx/source/psp/cortex_m/compiler/gcc_cs_comp.h |
| mqx/source/psp/cortex_m/compiler/gcc_cw_asm_mac.h |
| mqx/source/psp/cortex_m/compiler/gcc_cw_comp.h |
| mqx/source/psp/cortex_m/compiler/iar_asm_mac.h |
| mqx/source/psp/cortex_m/compiler/iar_comp.h |
| mqx/source/psp/cortex_m/compiler/rv_asm_mac.h |
| mqx/source/psp/cortex_m/compiler/rv_comp.h |
| mqx/source/psp/cortex_m/compiler/rv_ds5_comp.h |
| mqx/source/psp/cortex_m/core/M4/dispatch.S |
| mqx/source/psp/cortex_m/kinetis.h |
| rtcs/source/tcpip/tcp_send.c |
| rtcs/source/tcpip/tcpip.c |

3 Patch Description

This patch provides the software workarounds for the following issues identified in MQX 4.0.2 release:

- MQX 4.0.2.2
 - ENGR00278434
 - Vybrid ARM Cortex®-A5: The float context is not properly saved when a task is blocked.
 - Affected BSPs: TWR-VF65GS10, AutoEVB Vybrid
 - ENGR00273581
 - A memory allocation problem occurs when the system is out of memory.
 - Affected all BSPs

- ENGR00276466
 - Events are sometimes triggered immediately after they are added.
 - Affected all BSPs
- ENGR00279275
 - RTCS connect failures via Dell router
 - Affected all BSPs
- MQX 4.0.2.1
 - ENGR00270143
 - Software workaround for Errata e7166, which is relevant for Mask 3N96B silicon.
 - Affected BSPs: TWR-K60F120M and TWR-K70F120M

Note

The cumulative patch and .zip file include all changes listed above.

3.1 ENGR00278434

This issue relates to Vybrid Cortex-A5 and causes a floating point context not to be properly saved when a task is blocked.

Resolution

This is resolved by fixing an issue with the store functionality of the FPU registers in **dispatch.s**.

3.2 ENGR00279275

This issue relates to setting the PSH flag in all packets, which causes TCP connection problem on some routers and firewalls.

Resolution

The PSH flag is not set together with the SYN flag for TCP packets.

3.3 ENGR00273581

An issue occurs in light weight memory allocator routines when the system is out of memory. If the memory pool is exhausted and simultaneously several tasks are allocating memory, it is possible for a NULL pointer dereference to cause the system to crash.

Resolution

A bug is solved in the **lwmem** allocator. The mechanism for finding the free memory block is changed.

3.4 ENGR00276466

This issue relates to the RTCS event handling mechanism. When the event queue is empty and events are added only sporadically, events are immediately triggered. This is a bug and may cause some RTCS components, such as PPP, not to function properly.

Resolution

This issue is solved by adding code to handle this particular case. This means that when a command from a message adds an event to an empty queue, the time delta is set to zero.

3.5 ENGR00270143

This issue relates to the software workaround for Errata e7166 relevant to the Mask 3N96B silicon.

Errata: SOC: SDHC, NFC, USBOTG, and cache modules are not clocked correctly in low-power modes.

Errata Description: SDHC, NFC, USBOTG, and Cache controller modules are connected to a single master port on the crossbar switch through a multiplexer. While the modules are still clocked in Wait mode, the multiplexer clock, which is connecting the modules to the crossbar switch, shuts off at entry into low-power modes. This prevents the three modules either to complete bus transactions during a low-power mode entry, or to start new bus transactions when the system enters Wait mode (even though the modules themselves remain clocked in Wait mode). Because the cache tag clock and data RAM clock are gated off in Wait mode, cache contents may be corrupted at low-power entry.

Software workaround provided: To resolve the Cache Controller issue, all bus master operations for each module should be complete before requesting system entry into any low-power mode.

To prevent cache corruption at low-power mode entry in idle task and low power manager, the WFI instruction is encapsulated in a special code sequence.

The code sequence is executed from a memory location that is not cached (SRAM_L is recommended). Additionally, the code sequence must execute without interruption from the start of the code sequence to the WFI. If an interrupt occurs between the start of the sequence and the WFI instruction, MQX dispatcher code ensures that the code sequence is restarted from the beginning.

Note

This patch workaround does not resolve potential issues with SDHC, NFC, and USBOTG peripherals. Before calling the WFI instruction, ensure that all operations on these modules are complete.

4 Applying Patches

The patch is provided in a **.zip package** and a **patch file** format.

The .zip package should be used for an installation of the MQX 4.0.2 source files which have not been previously modified because extracting .zip to the MQX source may overwrite those changes.

The patch file can be used for an installation of the MQX 4.0.2 source files which have been previously modified because the patch file checks the original file content before it is applied. If the original file content is modified, the patch does not overwrite the changes.

The instructions to apply either the .zip package or the patch file are described below:

These are the steps to apply the **.zip package**:

1. Extract the content of the zip file to the MQX 4.0.2 installation. The default installation directory is C:\Freescale\Freescale_MQX_4_0.
2. See the *Getting Started with Freescale MQX™ RTOS* (document MQXGSRTOS) to compile MQX.

These are the steps to apply the **patch file**:

1. Copy the patch files to the MQX installation folder (by default C:\Freescale\Freescale_MQX_4_0)
- 2.a Update from 4.0.2; In the MQX installation folder, execute these command:

```
patch -p1 --ignore-whitespace -i mqx_patch-4.0.2.2.AllInOne
```

- 2.b Update from 4.0.2.1; In the MQX installation folder, execute the following command:

```
patch -p1 --ignore-whitespace -i mqx_patch-4.0.2.2.Incremental
```

Note:

Use GIT patch or similar patch program. To enable the use of the patch command using UnxUtils, download the UnxUtils package, decompress it and add the following path "<file location>\usr\local\wbin" to your Windows "Path" variable.

3. See the *Getting Started with Freescale MQX™ RTOS* (document MQXGSRTOS) to compile MQX.

5 Known Issues

- The transition from low-power run to lower-power stop was not possible after a third iteration in the example code. The issue is unrelated to this patch and will be fixed in future MQX releases.

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