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April 1\textsuperscript{st}, 2010
Renesas Electronics Corporation

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R8C Family
How to Implement Timeout Feature in MR8C4

Introduction
In the attempt to achieve a small memory footprint for MR8C/4, service calls with timeout feature were excluded from MR8C/4.
This document discusses on the workaround method for incorporating of timeout feature when using MR8C/4.

Target Device
Applicable MCU: R8C Family

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1. **Guide in using this Document**

This document provides user a workaround method to incorporate the timeout feature when using MR8C/4.

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<td>A step by step implementation of the workaround method</td>
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2. Explanation on Timeout Feature

Timeout feature is conventionally made available to service calls that might enter the WAITING state.

When a service call’s process is not completed within a specified time, the timeout feature cancels any further processing and returns from the service call immediately. In this case, the service call returns an E_TMOUT error. Since there are no side effects due to service calls returning an error, the system state, upon returning from the timed-out service call remains unchanged.

In the process of porting MR30 to MR8C/4, all of the service calls with timeout feature are removed. Figure 1 provides the listing.

<table>
<thead>
<tr>
<th>Task Dependent Synchronization Function</th>
<th></th>
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<tbody>
<tr>
<td>tslp_tsk</td>
<td>Puts task to sleep (with timeout)</td>
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<tr>
<td>twai_sem</td>
<td>Acquires semaphore resource (with timeout)</td>
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<td>twai_flg</td>
<td>Waits for eventflag (with timeout)</td>
</tr>
<tr>
<td>tsnd_dtq</td>
<td>Sends to data queue (with timeout)</td>
</tr>
<tr>
<td>trcv_dtq</td>
<td>Receives from data queue (with timeout)</td>
</tr>
</tbody>
</table>

Figure 1   Listing of Removed Service Calls with Timeout Features

3. Workaround Method

The workaround method leverage on the option of forcibly release tasks from WAITING when they are enqueued in some waiting queue for a particular resource (e.g. semaphore) or event (e.g. Flag). A timer will be required to keep track of the timeout duration set by user and forcibly release the task when the duration is reached.

Figure 2 illustrates an example of incorporating the timeout feature for the service call “wai_sem” with reference to the sample program “MR8C4_Timeout”.

To provide portability, it will be useful to provide both task and alarm handler with the same ID number as shown in Figure 3.
This workaround method comes with the following pros and cons:

**Pros**
- Allow user to implement timeout feature without much complexity
- Allow constant monitoring of resource or event till timeout duration is reached

**Cons**
- Require additional service calls (e.g. irel_wai), Time Management Function (e.g. AlmTask1) and function call (e.g. tmwai_sem)
- Require one timer to be used as system clock since Time Management Function is utilized.
4. Reference Documents

User’s Manual

- MR8C/4 V1.00 User’s Manual

The latest version can be downloaded from the Renesas Technology website
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## Revision Record

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