OPEN-AMP MODIFICATIONS BY NXP

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Motivation

- Current RPMsg API is based on processing the transmitted data in the interrupt context
  -> all the processing of received data must be done in the interrupt context, or
  -> message must be copied in a temporary application buffer for later processing

- This is not suitable in RTOS environment

- It is more natural and convenient to have a blocking sequential API

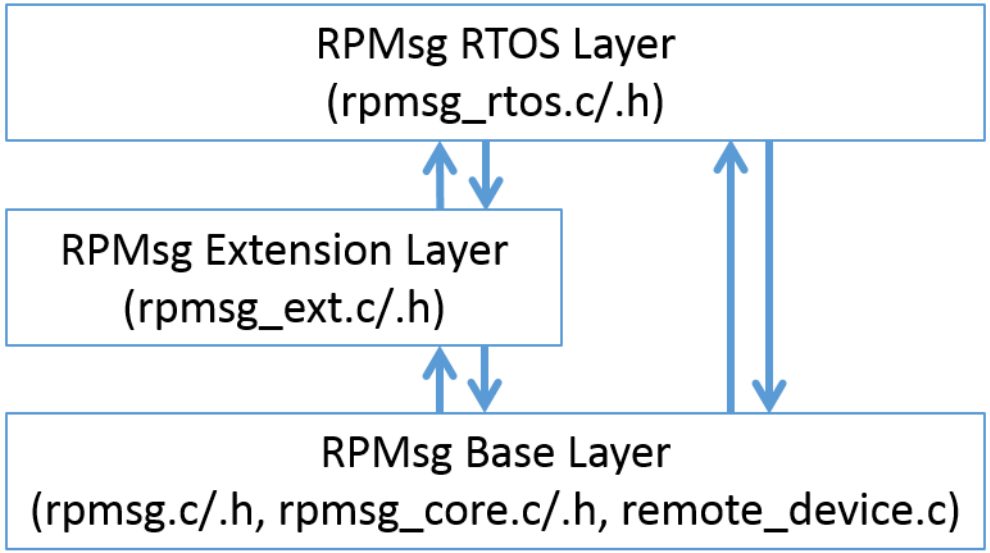
- RTOS-aware extension of RPMsg created

RTOS-aware extension features

- No data processing in the interrupt context
- Blocking receive API
- Zero-copy send and receive API
- Receive with timeout provided by RTOS
- Compatibility with Linux OS upstream kept
- Separation Env and Platform
- FreeRTOS environmental layer
- Baremetal vs. Linux and FreeRTOS vs. Linux communication examples
- Own test code

RTOS-aware extension implementation

- Two layers
  - **RPMsg Extension** layer allows users to allocate and release virtio tx buffers, as well as it implements the zero-copy send functionality, intended for baremetal apps.
  - **RPMsg RTOS layer** addresses RTOS-based application needs (handling received data outside the interrupt context, blocking receive API implementation, zero-copy mechanisms)



RPMsg Extension API

- rpmsg_hold_rx_buffer
- rpmsg_release_rx_buffer
- rpmsg_alloc_tx_buffer
- rpmsg_sendto_nocopy
- rpmsg_send_nocopy

RPMsg RTOS API

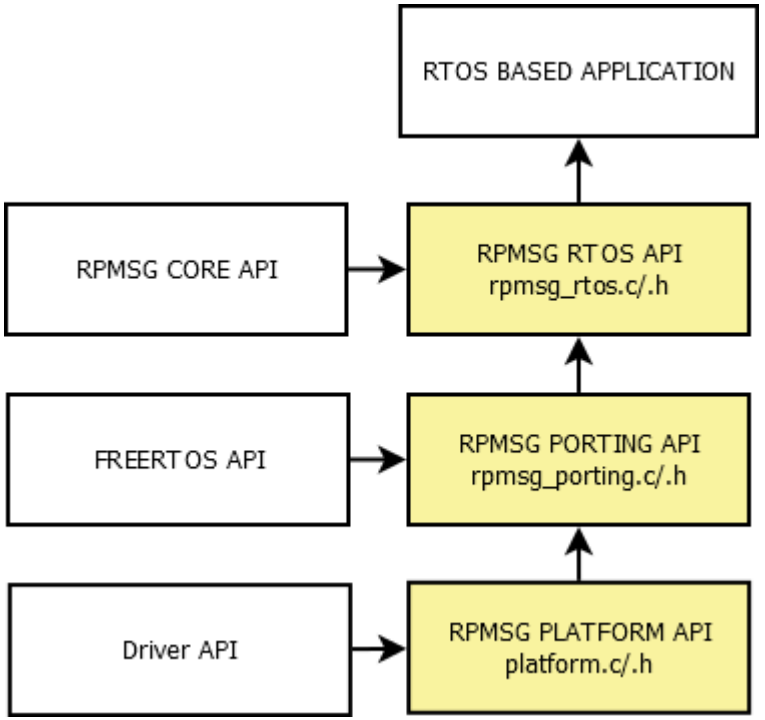
- rpmsg_rtos_init
- rpmsg_rtos_deinit
- rpmsg_rtos_create_ept
- rpmsg_rtos_destroy_ept
- rpmsg_rtos_recv
- rpmsg_rtos_recv_nocopy
- rpmsg_rtos_recv_nocopy_free
- rpmsg_rtos_alloc_tx_buffer
- rpmsg_rtos_send
- rpmsg_rtos_send_nocopy

RPMsg porting sub-layers

The RPMsg porting layers have been also modified and consolidated in order to

- Strictly separate platform-related (multicore device) and environment-related (Bare Metal, RTOS) layers.
- Update the environment layer API by functions requested by the RTOS layer. The following *env* functions have been introduced:
  - *int env_create_queue(void queue, int length, int element_size)*
  - *void env_delete_queue(void queue)*
  - *int env_put_queue(void queue, void msg, int timeout_ms)*
  - *int env_get_queue(void queue, void msg, int timeout_ms)*

RPMsg porting sub-layers

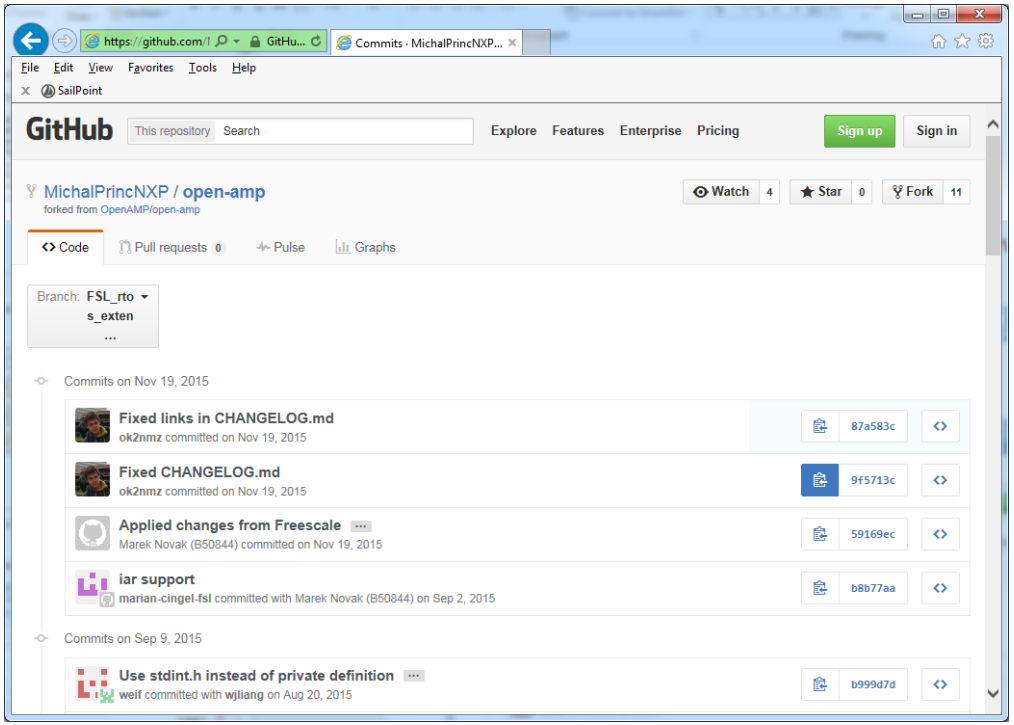


Currently, the environment layer is implemented for Bare Metal and FreeRTOS. To support other RTOSes, it is necessary to create (clone) the rpmsg_porting.c/.h sub-layer using the desired RTOS API, put this code into the /porting/env/<rtos name> folder, and to include this path into the list of the project include paths.

Availability

- GitHub open-amp repo fork / FSL_rtos_extension branch

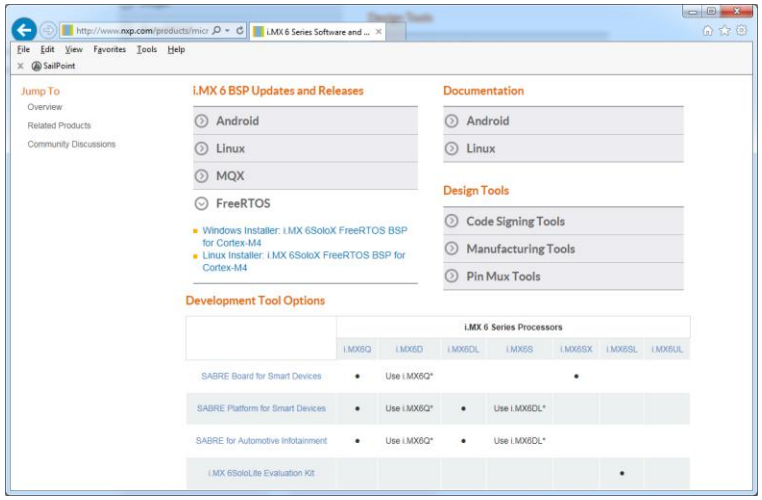
https://github.com/MichalPrincNXP/open-amp/tree/FSL_rtos_extension

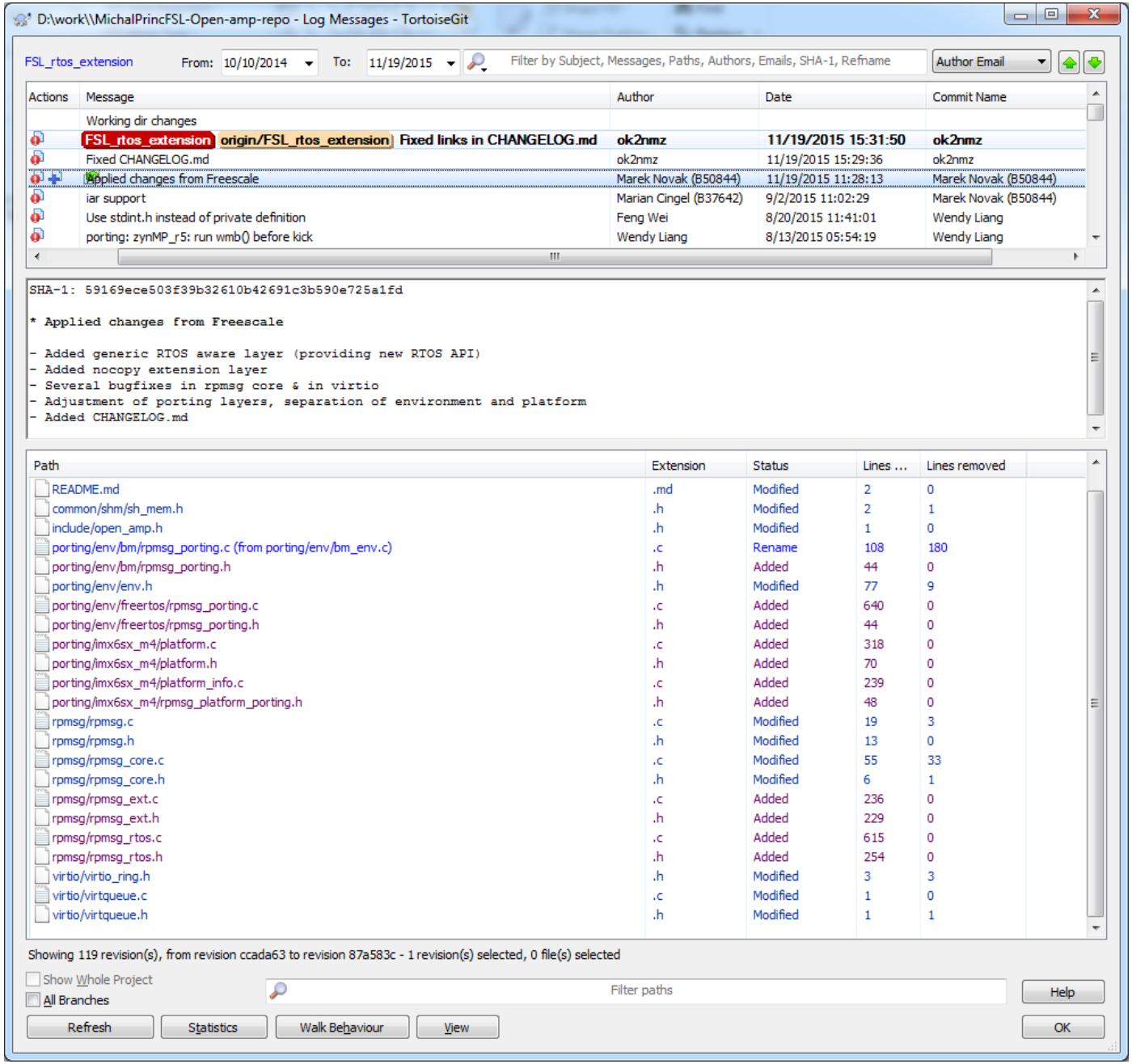


Availability

- i.MX 6 Series BSP Release – first NXP release that includes the RPMSG port for i.MX6SoloX

  http://www.nxp.com/products/microcontrollers-and-processors/arm-processors/i.mx-applications-processors-based-on-arm-cores/i.mx-6-processors/i.mx6qp/i.mx-6-series-software-and-development-tool-resources:IMX6_SW#bsp




D:\work\\MichalPrincFSL-Open-amp-repo - Log Messages - TortoiseGit
FSL_rtos_extension
From: 10/10/2014
To: 11/19/2015
Filter by Subject, Messages, Paths, Authors, Emails, SHA-1, Refname
Author Email
Actions
Message
Author
Date
Commit Name
Working dir changes
FSL_rtos_extension origin/FSL_rtos_extension Fixed links in CHANGELOG.md ok2nmz 11/19/2015 15:31:50 ok2nmz
Fixed CHANGELOG.md ok2nmz 11/19/2015 15:29:36 ok2nmz
Applied changes from Freescale Marek Novak (B50844) 11/19/2015 11:28:13 Marek Novak (B50844)
iar support Marian Cingel (B37642) 9/2/2015 11:02:29 Marek Novak (B50844)
Use stdint.h instead of private definition Feng Wei 8/20/2015 11:41:01 Wendy Liang
porting: zynMP_r5: run wmb() before kick Wendy Liang 8/13/2015 05:54:19 Wendy Liang
SHA-1: 59169ece503f39b32610b42691c3b590e725a1fd
* Applied changes from Freescale
- Added generic RTOS aware layer (providing new RTOS API)
- Added nocopy extension layer
- Several bugfixes in rpmsg core & in virtio
- Adjustment of porting layers, separation of environment and platform
- Added CHANGELOG.md
Path
Extension
Status
Lines ...
Lines removed
README.md .md Modified 2 0
common/shm/sh_mem.h .h Modified 2 1
include/open_amp.h .h Modified 1 0
porting/env/bm/rpmsg_porting.c (from porting/env/bm_env.c) .c Rename 108 180
porting/env/bm/rpmsg_porting.h .h Added 44 0
porting/env/env.h .h Modified 77 9
porting/env/freertos/rpmsg_porting.c .c Added 640 0
porting/env/freertos/rpmsg_porting.h .h Added 44 0
porting/imx6sx_m4/platform.c .c Added 318 0
porting/imx6sx_m4/platform.h .h Added 70 0
porting/imx6sx_m4/platform_info.c .c Added 239 0
porting/imx6sx_m4/rpmsg_platform_porting.h .h Added 48 0
rpmsg/rpmsg.c .c Modified 19 3
rpmsg/rpmsg.h .h Modified 13 0
rpmsg/rpmsg_core.c .c Modified 55 33
rpmsg/rpmsg_core.h .h Modified 6 1
rpmsg/rpmsg_ext.c .c Added 236 0
rpmsg/rpmsg_ext.h .h Added 229 0
rpmsg/rpmsg_rtos.c .c Added 615 0
rpmsg/rpmsg_rtos.h .h Added 254 0
virtio/virtio_ring.h .h Modified 3 3
virtio/virtqueue.c .c Modified 1 0
virtio/virtqueue.h .h Modified 1 1
Showing 119 revision(s), from revision ccada63 to revision 87a583c - 1 revision(s) selected, 0 file(s) selected
Show Whole Project
All Branches
Filter paths
Help
Refresh
Statistics
Walk Behaviour
View
OK

What is still missing, plans

- Versioning
- Compiler support (packed structure macros, etc.)
- Test suite available for customers (reusing Unity test project, https://github.com/ThrowTheSwitch/Unity)
- Primary IPC for new NXP multicore SoCs (porting effort)
- Support RPMsg “standardization” within the MCA
- Security aspects of the RPMsg communication (handling virtio buffers in SHMEM)

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