

Getting Started with Multicore SDK (MCSDK) v2.1.0

1 Overview

Multicore Software Development Kit (MCSDK) is a Software Development Kit that provides comprehensive software support for NXP dual/multicore devices. The MCSDK is combined with the Kinetis SDK (KSDK) to make the software framework for easy development of multicore applications.

The following figure highlights the layers and main software components of the MCSDK.

Contents

1	Overview.....	1
2	MCSDK Components.....	2
3	MCSDK demo applications.....	4
4	Revision history.....	5



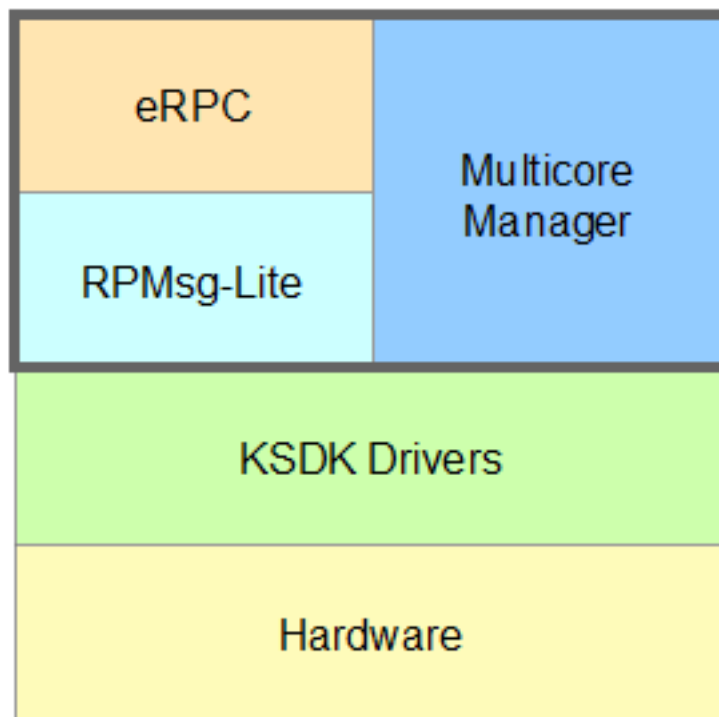


Figure 1. MCSDK layers

All the MCSDK-related files are located in `<ksdk_install_dir>/middleware/multicore_<version>` folder.

For supported toolchain versions, see the *Multicore SDK v2.1.0 Release Notes* (document MCSDK210RN). For the latest version of this and other MCSDK documents, visit www.nxp.com.

2 MCSDK Components

The MCSDK consists of following software components:

- **Embedded Remote Procedure Call (eRPC):**

This component is a combination of a library and code generator tool that implements a transparent function call interface to remote services (running on a different core).

- **Multicore Manager (MCMGR) - not included in this release:**

This library maintains information about all cores and starts up secondary/auxiliary core(s).

- **Remote Processor Messaging - Lite (RPMsg-Lite) - not included in this release:**

Inter Processor Communication library.

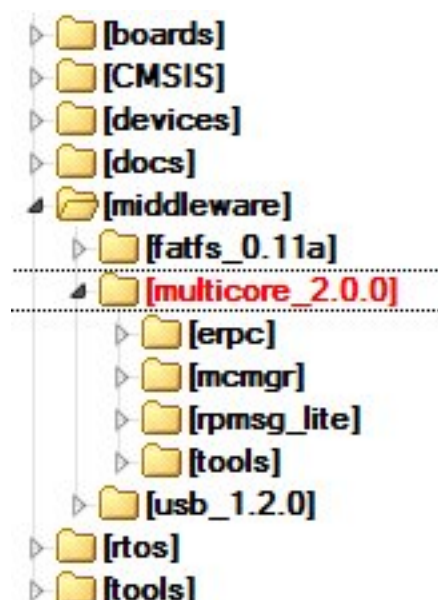


Figure 2. Multicore folder structure

2.1 Embedded Remote Procedure Call

eRPC (Embedded Remote Procedure Call) is the RPC system created by NXP. The RPC is a mechanism used to invoke a software routine on a remote system via a simple local function call.

When a remote function is called by the client, the function's parameters and an identifier for the called routine are marshalled (or serialized) into a stream of bytes. This byte stream is transported to the server through a communications channel (IPC, TPC/IP, UART, etc). The server unmarshalls the parameters, determines which function was invoked, and calls it. If the function returns a value, it is marshalled and sent back to the client.

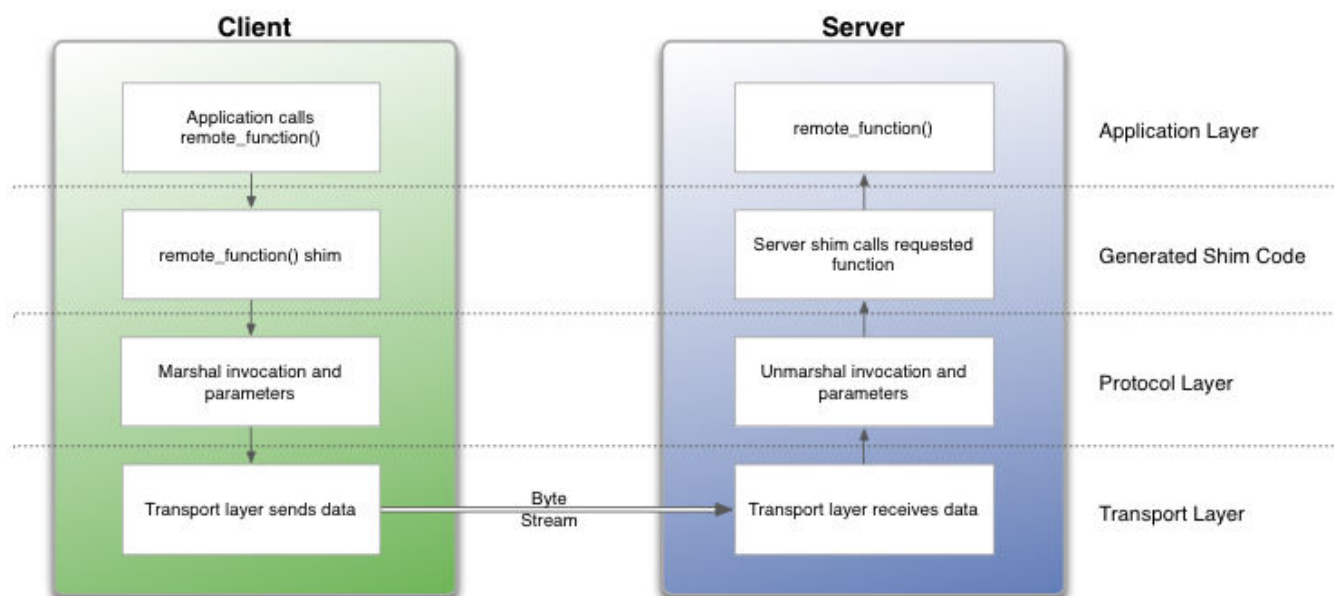


Figure 3. eRPC Block diagram

RPC implementations typically use combination of a tool (erpcgen) and IDL (interface definition language) file to generate source code to handle the details of marshalling a function's parameters and building the data stream.

Main eRPC features:

- Scalable from bare metal to Linux® OS - configurable memory and threading policies.
- Focus on embedded systems - intrinsic support for C, modular, and lightweight implementation.
- Abstracted transport interface - RPMsg is the primary transport for multicore, UART or SPI-based solutions can be used for multichip.

The eRPC library is located in `<ksdk_install_dir>/middleware/multicore_<version>/erpc` folder. For detailed information about the eRPC, see the documentation available in the `<ksdk_install_dir>/middleware/multicore_<version>/erpc/doc` folder.

2.2 Multicore Manager

Note: This component is not included in this release.

The Multicore Manager (MCMGR) software library provides a number of services for multicore systems.

Main MCMGR features:

- Maintains information about all cores in system.
- Loading of code for secondary core (if code is located in RAM).
- Secondary/auxiliary core(s) startup and shutdown.
- Maintains table of address mapping for shared memory regions.

The MCMGR library is located in the `<ksdk_install_dir>/middleware/multicore_<version>/mcmgr` folder. For detailed information about the MCMGR library, see the documentation available in the `<ksdk_install_dir>/middleware/multicore_<version>/mcmgr/doc` folder.

2.3 Remote Processor Messaging Lite (RPMsg-Lite)

Note: This component is not included in this release.

RPMsg-Lite is a lightweight implementation of the RPMsg protocol. The RPMsg protocol defines a standardized binary interface used to communicate between multiple cores in a heterogeneous multicore system. Compared to the legacy OpenAMP implementation, RPMsg-Lite offers a code size reduction, API simplification, and improved modularity.

Main RPMsg protocol features:

- Shared memory interprocessor communication
- Virtio-based messaging bus
- Application-defined messages sent between endpoints
- Portable to different environments/platforms
- Available in upstream Linux OS

The RPMsg-Lite library is located in the `<ksdk_install_dir>/middleware/multicore_<version>/rpmmsg-lite` folder. For detailed information about the RPMsg-Lite, see the *RPMMSG-Lite User's Guide* located in the `<ksdk_install_dir>/middleware/multicore_<version>/rpmmsg-lite/doc` folder.

3 MCSDK demo applications

Multicore and multiprocessor example applications are stored together with other Kinetis SDK examples, in the dedicated multicore subfolder.

Table 1. Multicore example applications

Location	Folder
Multicore example projects	<ksdk_install_dir>/boards/<board_name>/ multicore_examples/<application_name>/<toolchain>
Multiprocessor example projects	<ksdk_install_dir>/boards/<board_name>/ multiprocesor_examples/<application_name>/<toolchain>

See the *Getting Started with Kinetis SDK (KSDK) v.2.0* (document KSDK20GSUG) and *Getting Started with SDK v.2.0 for XXX Derivatives* documents for more information about the KSDK example folder structure and the location of individual files that form the example application projects. These documents also contain information about building, running, and debugging multicore demo applications in individual supported IDEs. Each example application also contains a readme file that describes the operation of the example and required setup steps.

4 Revision history

This table summarizes revisions to this document.

Table 2. Revision history

Revision number	Date	Substantive changes
0	09/2015	Initial release
1	03/2016	Updated for the KSDK 2.0.0 and the MCSDK 1.1.0
2	09/2016	Updated for the MCSDK 2.0.0 and the LPCXpresso54114 support
3	09/2016	Updated for the MCSDK 2.1.0

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