Product Brief Inter-Platform Communication Framework (IPCF) for S32K3

Version 1

Rev. 1.0 — 5 December 2025 **Product brief**

1 Software Product Overview

Inter-Platform Communication Framework (IPCF) is a subsystem which enables applications, running on multiple homogenous or heterogenous processing cores, located on the same chip or different chips, running on different operating systems (AUTOSAR, FreeRTOS, baremetal), to communicate over Shared Memory.

IPCF is designed for NXP embedded systems and features low-latency and tiny-footprint. It exposes a zero-copy API that can be directly used by customers for maximum performance, minimum overhead and low CPU load. The driver ensures freedom from interference between local and remote shared memory by executing all writing operations only in local memory domain. Customers can enforce memory protection for their software with XRDC/SMPU peripherals.

Customers can choose to build exactly what they need in terms of HW and OS.

1.1 Use-cases

The following diagram illustrates some use-cases addressed by IPCF.

Figure 1. IPCF use cases on multiple homogenous or heterogenous processing cores

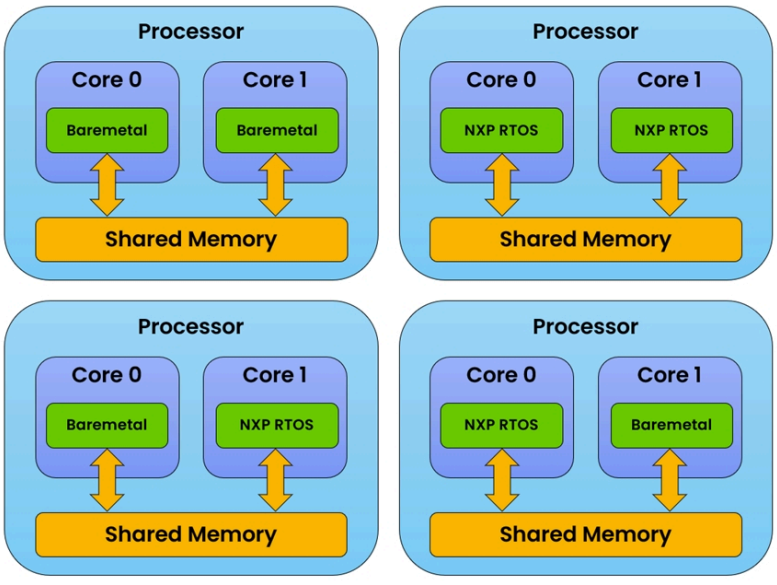
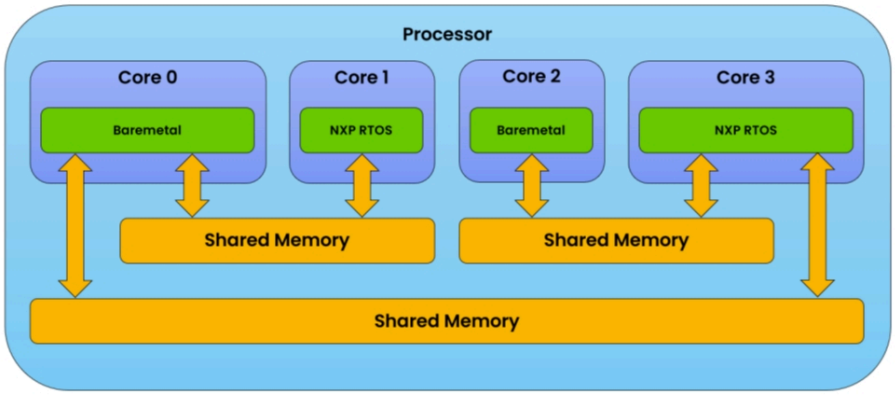


Figure 2. IPCF use case with multiple instances



2 Software Content

IPCF software package contains the communication driver over shared memory supporting AUTOSAR, FreeRTOS, Linux and baremetal.

The driver is accompanied by sample applications which demonstrate a ping-pong message communication (for more details see the samples readme file).

IPCF software package contains driver as plugin for Elektrobit Tresos or NXP S32 Design Studio for quick and easy configuration. This component is installed over NXP S32 Real Time Drivers releases and can be used with all Real Time Drivers components.

IPCF software package also contains:

- **Release Notes(information about release):**
  - Supported platforms
  - Software dependencies
  - Validated compilers
  - Instructions about installation steps
  - New features
  - Known limitations
  - Licensing and support
- **IPCF Driver User Manual:**
  - Installation instruction for different integration
  - Driver usage, compile and configuration for different OSes and platforms
  - Instructions to compile, build and run the sample application
  - Describe driver APIs
- Safety Package - delivered to customers for PRC and RFP releases
- Quality Package - delivered to customers for PRC and RFP releases

2.1 Architecture

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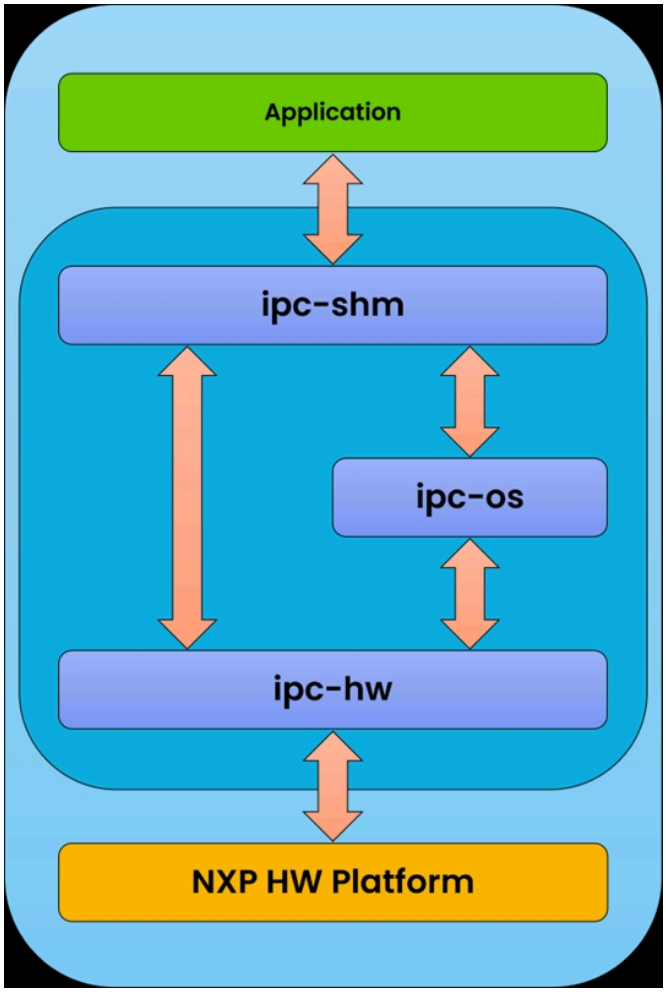
IPCF driver contains next layers:

- Shared memory generic implementation that is HW and OS agnostic
- Queue component implementation used in IPCF driver
- HW abstraction component: abstraction over various HW IP modules (MSCM and MU)
- OS abstraction component: OS agnostic API for common OS services

Figure 3. IPCF System Architecture



2.2 Details

IPCF driver uses for buffer management:

- unmanaged channel data flow: buffer management is disabled, and application owns the entire channel memory; use-case example: video streaming or non-critical data exchange
- managed channel data flow: memory is split in buffer pools and buffer management is controlled by driver; use-case example: CAN forwarding or flash update

IPCF driver supports the following inter-core notification methods:

- intercore interrupts (MSCM)

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- Messaging Unit (MU): Interrupt messaging protocol
- Messaging Unit (MU): General-purpose interrupt messaging protocol
- polling method (sending and receiving is managed by user)

IPCF driver reduces the receive interrupt overhead with interrupt coalescing technique, avoiding storming interrupt. When an receive interrupt is triggered the code disables the interrupt, processes all buffer descriptors in receive FIFO and then reenables the interrupt.

3 Supported Targets

The software described in this document is intended to be used with the following S32X microcontroller devices of NXP Semiconductors:

- Connectivity and Security: S32K3xx

4 Compatibility with other software

The software described in this document is compatible with following software:

Software Product	Version
NXP RTD	Version available in Release Notes
NXP RTOS	Version available in Release Notes
FreeRTOS	Version available in Release Notes

Compilers used to develop and test the software described in this document are:

Compiler	Version
NXP GCC	Version available in Release Notes
Windriver DIAB	Version available in Release Notes
Green Hills MULTI	Version available in Release Notes
IAR	Version available in Release Notes

5 Quality Standards Compliance, Safety Standard Compliance, Security Standard Compliance and Testing Approach

The software described in this document is developed according to NXP Software Development Process, that is Automotive-SPICE: 3.1, IATF 16949:2016, ISO 26262: 2018, ISO 21434:2021 and ISO 9001:2015 compliant.

The compilers used for driver validation are listed in the release notes document.

6 Document information

Revision Number	Date	Substantive change
1.0	December 2025	Initial version for S32K3xx

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Contents

1 Software Product Overview 1
1.1 Use-cases 1
2 Software Content 2
2.1 Architecture 2
2.2 Details 3
3 Supported Targets 4
4 Compatibility with other software 4
5 Quality Standards Compliance, Safety Standard Compliance, Security Standard Compliance and Testing Approach 4
6 Document information 4
Legal information 5

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