Document Title	List of Basic Software Modules
Document Owner	AUTOSAR GbR
Document Responsibility	AUTOSAR GbR
Document Version	1.1.0
Document Status	Draft
Part of Release	2.1
Revision	0014

Document Change History			
Date	**Version**	**Changed by**	**Change Description**
31.01.2007	1.1.0	AUTOSAR Administration	• ICC2 cluster overview and cluster variant added • Add modules: Generic NM and Lin Transceiver Driver • Change name: Generic NM to CAN Generic NM • Add columns • Mapping to other releases • Legal disclaimer revised • “Advice for users” revised • “Revision Information” added • Release Notes added
28.04.2006	1.0.0	AUTOSAR Administration	Initial release

Release Notes

Errata and known deficiencies

ICC2 clustering not finalized

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1 Abbreviations used in this document

Item	*Explanation*
µC	Microcontroller
CHI	Communication Host Interface
DTC	Diagnostic Trouble Code
ECU	Electronic Control Unit
HAL	Hardware Abstraction Layer
HIS	Hersteller-Initiative Software
LH	Lastenheft
Lld	Low Level Driver
MM	Message Manager
NM	Network Management
NV	Non Volatile
OS	Operating System
PLL	Phase Locked Loop
RB	Robert Bosch
TP	Transport Protocol

2 Cluster Variants

ICC 2 Cluster	Variant	CAN Driver (V2.0.0)	CAN Interface (V1.5.0)	CAN Generic NM (V1.9.1)	CAN NM (V1.9.0)	CAN Tranceiver Driver (V1.0.4)	CAN Transport Layer (V2.0.1)	CAN Transceiver Interface
CAN	VariantPC	VariantPC	Variant1	Variant1	Variant1	Variant1	Variant1	
CAN	VariantLT	VariantPC	Variant2	Variant2	Variant2	Variant2	Variant1	
CAN	VariantPB	VariantPB	Variant3	Variant3	Variant3	Variant3	Variant2	

ICC 2 Cluster	Variant	AUTOSAR COM (V2.0.19)	PDU Router (V2.0.1)
COM services	VariantPC	Variant1	Variant1
COM services	VariantLT	Variant2	
COM services	VariantPB	Variant3	

ICC 2 Cluster	Variant	Development Error Tracer (V2.0.1)	Function Inhibition Manager (V1.0.5	Diagnostic Communication Manager (V2.0.5)	Diagnostic Event Manager (V2.0.1)
Error Handler	VariantPC	N/A	Variant1	VariantA	Variant1
Error Handler	VariantLT	N/A	Variant1	VariantB	Variant1
Error Handler	VariantPB	N/A	Variant2	VariantC	Variant2

ICC 2 Cluster	Variant	SPI Handler Driver (V2.0.9)	Port Driver (V2.0.4)	DIO Driver (V2.0.0)	PWM Driver (V2.0.0)	ICU Driver (V2.1.6)	ADC Driver (V2.0.0)	GPT Driver (V2.0.4)	MCU Driver (V2.0.5)	Internal / external Watchdog Driver (V2.0.3)	RAM Test (V1.0.3)	I/O Hardware Abstraction (V1.0.1)	Watchdog Interface (V2.0.2)
Firmware	VariantPC	VariantPC	VariantPC	VariantPC	VariantPC	VariantPC	VariantPC	VariantPC	VariantPC	VariantPC	VariantPC		
Firmware	VariantLT	VariantLT	VariantPC	VariantLT	VariantPC	VariantPC	VariantPC	VariantPC	VariantPC	VariantLT	VariantLT		
Firmware	VariantPB	VariantPB	VariantPB	VariantLT	VariantPB	VariantPB	VariantPB	VariantPB	VariantPB	VariantPB	VariantLT		

ICC 2 Cluster	Variant	FlexRay Driver (V1.0.31)	FlexRay Interface (V1.2.8)	FlexRay NM (V1.7.5)	FlexRay Tranceiver Driver (V1.0.13)	FlexRay Transport Layer (V2.0.6)
FlexRay	VariantPC			Variant1	Variant1	
FlexRay	VariantLT			Variant2	Variant2	
FlexRay	VariantPB			Variant3	Variant3	

ICC 2 Cluster	Variant	LIN Interface (V1.0.7)	LIN Driver (V1.0.10)	LIN NM	LIN Transceiver Driver
LIN	VariantPC	Variant1	Variant1		Variant1
LIN	VariantLT	Variant2	Variant1		Variant1
LIN	VariantPB	Variant3	Variant2		Variant1

ICC 2 Cluster	Variant	Internal / External EEPROM Driver (V2.1.5)	Internal / External Flash Driver (V1.1.0)	Flash Check	EEPROM Abstraction (V2.0.6)	CRC Routines (V2.0.0)	Flash EEPROM Emulation (V2.0.6)	NVRAM Manager (V2.0.7)	Memory Abstraction Interface (V2.0.5)
Memory	VariantPC	VariantPC						Variant1	
Memory	VariantLT	VariantLT						Variant1	

ICC 2 Cluster	Variant	Communication Manager (V1.2)	ECU State Manager (V1.4.7)	NM Gateway	Generic NM Interface (V.09)
ModeManagement	VariantPB	Variant1			

ICC 2 Cluster	Variant	Operating System (V2.0.4)	Free Running Timer	BSW Scheduler Module (V0.14)	Synchronization and Time Service
OS	VariantPC			Variant1	

ICC2 Cluster Variant	Description
VariantPC	Precompiletime parameters only
VariantLT	Mixture of Precompiletime and linktime parameters
VariantPB	Mixture of postbuildtime-, linktime- and precompiletime parameters

3 Cluster Overview

AUTOSAR name of function / cluster	Module short name (API service prefix)	Cluster ID (uint8)	Functional description	Current Autosar release	Rationale	AUTOSAR SW Layer	Number of instances	OEM dependency	µC dependency	ECU dependency	Bus dependency	Reason for dependencies
CAN	C2Can	220	Optimised CAN network implementation	2.1	Optimisation of implementation	N/A	1	N/A	High	High	High	Contains Network stack BSW modules.
COM services	C2Com	221	Optimised COM and PDUR implementation	2.1	Optimisation of implementation	N/A	1	N/A	none	medium	medium	Heritage from PduR
Error Handler	C2Err	222	Optimised Error handler implementation	2.1	Optimisation of implementation	N/A	1	N/A	none	medium	none	Heritage from FIM, DCM and DEM
Firmware	C2Fw	223	Optimised Firmware implementation	2.1	Optimisation of implementation	N/A	1	N/A	High	High	N/A	Heritage from SPAL, Watchdog driver, RAM test and I/O HW abstraction
FlexRay	C2Fr	224	Optimised FlexRay network implementation	2.1	Optimisation of implementation	N/A	1	N/A	High	High	High	Contains Network stack BSW modules.
LIN	C2Lin	225	Optimised LIN network implementation	2.1	Optimisation of implementation	N/A	1	N/A	High	none	High	Contains Network stack BSW modules.
Memory	C2Mem	226	Optimised Memory handling implementation	2.1	Optimisation of implementation	N/A	1	N/A	High	High	N/A	Heritage from Flash Driver etc.
ModeManagement	C2MMgt	227	Optimised Mode management implementation	2.1	Optimisation of implementation	N/A	1	N/A	none	High	none	Heritage from Com Manager etc.
OS	C2Os	228	Optimised OS and BSW Scheduler implementation	2.1	Optimisation of implementation	N/A	1	N/A	medium	none	N/A	Heritage from OS.

4 Model Overview

AUTOSAR name of function / module	Module short name (API service prefix)	Module ID (uint8)	Functional description	Current Autosar Release	AUTOSAR Service (yes/no)	AUTOSAR SW Layer	ICC 2 Cluster	Number of instances
CAN Driver	Can	80	The CAN Driver provides services for initiating transmissions and callback functions for notifying receive events, independently from the hardware.	2.1	**no**	Communication Drivers	CAN	1 (indexed) or several (code doubled) possible
FlexRay Driver	Fr	81	The FlexRay Driver is used to abstract the hardware related differences of different FlexRay Communication Controllers. All mandatory features according to the FlexRay Protocol Specification of the Communication Controllers are encapsulated and can only b	2.1	**no**	Communication Drivers	FlexRay	1 (indexed) or several (code doubled) possible
LIN Interface	LinIf	62	LIN Master Communication Stack Communication services for LIN communication: - Schedule table handling - Transmission of LIN frames (confirmation with flag and function interface) - Reception of LIN frames (indication with flag and function interface)	2.1	**no**	Communication HW Abstraction	LIN	1
LIN Driver	Lin	82	Low level driver for performing LIN communication via the internal standard asynchronous serial communication interface of the µC (SCI/UART): - Initialization of the SCI hardware - API for generating an original "LIN synch break" On Chip LIN devices are	2.1	**no**	Communication Drivers	LIN	1 (indexed) or several (code doubled) possible
SPI Handler Driver	Spi	83	The SPI Handler/Driver provides services for reading from and writing to devices connected via SPI busses. It provides access to SPI communication to several users (e.g. EEPROM, Watchdog, I/O ASICs). It also provides the required mechanism to configure th	2.1	**no**	Communication Drivers	Firmware	1
Internal / External EEPROM Driver	Eep	90	The EEPROM driver provides services for reading, writing, erasing to/from an EEPROM. It also provides a service for comparing a data block in the EEPROM with a data block in the memory (e.g. RAM).	2.1	**no**	Memory Drivers	Memory	1..*
Internal / External Flash Driver	Fls	92	The flash driver provides services for reading, writing and erasing flash memory and a configuration interface for setting/resetting the write/erase protection if supported by the underlying hardware.	2.1	**no**	Memory Drivers	Memory	1..*
Port Driver	Port	124	This module shall provide the service for initializing the whole PORT structure of the microcontroller.	2.1	**no**	I/O Drivers	Firmware	1
DIO Driver	Dio	120	The DIO Driver provides services for reading and writing to/from • DIO Channels (Pins) • DIO Ports • DIO Channel Groups	2.1	**no**	I/O Drivers	Firmware	1..*
PWM Driver	Pwm	121	The driver provides services for initialization and control of the microcontroller internal PWM stage (pulse width modulation).	2.1	**no**	I/O Drivers	Firmware	1..*
ICU Driver	Icu	122	The ICU driver (Release 1) provides services for signal edge and level notification. Furthermore it provides services to control Wake-up interrupts. The ICU driver (Release 2) provides services for periodic signal time measurement, services for Edge tim	2.1	**no**	I/O Drivers	Firmware	1..*
ADC Driver	Adc	123	Driver for initialization and control of the µC internal ADC (analog to digital converter) There are two variants planned: 1. Basic ADC Driver with basic functionality for body applications 2. Enhanced ADC Driver with additional enhanced functionality for	2.1	**no**	I/O Drivers	Firmware	1..*

AUTOSAR name of function / module	Module short name (API service prefix)	Module ID (uint8)	Functional description	Current Autosar Release	AUTOSAR Service (yes/no)	AUTOSAR SW Layer	ICC 2 Cluster	Number of instances
GPT Driver	Gpt	100	Driver for internal general purpose timer Provision of periodic timer interrupts for use in timer services Two modes are provided: - resolution mode (module tries to perform the desired number of alls) - period mode (module tries to maintain the specified	2.1	**no**	Microcontroller Drivers	Firmware	1
MCU Driver	Mcu	101	Driver Responsible to provide the following services: - SW initiated µC reset - selection of µC power mode (STOP, SLEEP, HALT, …) - configuration of Wake-up - Handling of the internal PLL clock unit (Initialization and frequency setting, mode selection, d	2.1	**no**	Microcontroller Drivers	Firmware	1
Internal / external Watchdog Driver	Wdg	102	Mode selection and triggering of µC internal watchdog Contraints: Trigger routine is called by watchdog manager	2.1	**no**	Microcontroller Drivers	Firmware	
RAM Test	RamTst	93	Functional test of µC internal RAM cells - complete test during start-up/shutdown cycle - complete test, triggered by diagnostic command - cyclic test during normal operation mode (block by block or cell by cell)	2.1	**no**	Memory Drivers	Firmware	1
I/O Hardware Abstraction	no prefix (AUTOSAR interface)	254	Abstraction of signal path of the ECU hardware (Layout, µC Pins, µC external devices like I/O ASIC) - Provides signal based interface - static normalization/inversion of values according to their physical representation at the inputs/outputs of the ECU h	2.1	**no, but direct RTE access**	I/O HW Abstraction	Firmware	1
Watchdog Interface	WdgIf	43	The Watchdog Interface provides equal mechanisms to access µC internal and external Watchdog devices. It abstracts from the location of peripheral Watchdog devices (internal or external) and the number of Watchdog devices.	2.1	**no**	Onboard Device Abstraction	Firmware	1
EEPROM Abstraction	Ea	40	The EEPROM Interface provides equal mechanisms to access µC internal and external EEPROM devices. It abstracts from the location of peripheral EEPROM devices (internal or external), the ECU hardware layout and the number of EEPROM devices.	2.1	**no**	Memory HW Abstraction	Memory	1
CAN Interface	CanIf	60	The CAN Hardware Interface provides equal mechanisms to access a CAN bus channel regardless of it's location (µC internal/external). It abstracts from the location of CAN controllers (onchip/onboard), the ECU hardware layout and the number of CAN drivers	2.1	**no**	Communication HW Abstraction	CAN	1
FlexRay Interface	FrIf	61	The FlexRay Interface provides equal mechanisms to access a FlexRay bus channel regardless of it's location (µC internal/external). It abstracts from the location of CAN controllers (onchip/onboard), the ECU hardware layout and the number of CAN drivers.	2.1	**no**	Communication HW Abstraction	FlexRay	1
CRC Routines	Crc	201	calculation of CRC16, CRC32 etc. Optimized for size (runtime calculation) or speed (table based)	2.1	**yes**	System Services - Std Lib	Memory	1
Operating System	Os	1	OSEK operating system plus extensions: - memory protection - Deadline monitoring - schedule tables - enhanced counter structure	2.1	**no, but direct RTE access**	System Services - OS	OS	1
Communication Manager	ComM	12	Controlls the states of all communication channels attached to the ECU	2.1	**no, but direct RTE access**	System Services	ModeManagement	1 (but one state machine for each channel)
ECU State Manager	EcuM	10	ECU power and mode Management - e.g. Start-up, Pre-Start, Normal Operation, Limp Home, Pre-Sleep, Shut down - control of network management - control of watchdog manager - control of NVRAM manager - control of power relevant modules (e.g. bus tranceiver d	2.1	**yes**	System Services	ModeManagement	1

AUTOSAR name of function / module	Module short name (API service prefix)	Module ID (uint8)	Functional description	Current Autosar Release	AUTOSAR Service (yes/no)	AUTOSAR SW Layer	ICC 2 Cluster	Number of instances
Development Error Tracer	Det	15	Supports software debugging. Provides interface for reporting development errors: Dbg_ReportError(Module-ID, API-ID, Error-ID) Behind this API errors can be traced, logged, counted etc.	2.1	**yes**	System Services	Error Handler	1
Function Inhibition Manager	FiM	11	Control of functionality - control (enable/disable) functionalities of SW components based on the following inhibit conditions: - faults - signal qualities - ECU and vehicle states - diagnostic tester commands - EOL configuration (function	2.1	**yes**	System Services	Error Handler	1
CAN Generic NM	CNm	30	Network management - determination of CAN network configuration at start-up - monitoring of CAN network configuration during operation - provision of CAN network status information - one instance per network system required	2.1	**no**	Communication Services	CAN	1 per connected network cluster
CAN NM	CanNm	31	Network management for CAN in interrupt mode CAN specific synchronisation and monitoring algorithms - synchronised transition to bus sleep - determination of network configuration at start-up - monitoring of network configuration during operation - error	2.1	**no**	Communication Services	CAN	1 per connected CAN cluster
FlexRay NM	FrNm	32	Network management for FlexRay - synchronised transition to bus sleep - determination of network configuration at start-up - monitoring of network configuration during operation - error recovery after bus-off - provision of network status information - bu	2.1	**no**	Communication Services	FlexRay	1 per connected FlexRay cluster
AUTOSAR COM	Com	50	Management of internal and external messages - Provision of signal oriented data interface for the application - Communication control (start/stop) - Sending of messages according to Transmission type (cyclic, event triggered) - Checking of minimum dista	2.1	**no, but direct RTE access**	Communication Services	COM services	1
PDU Router	PduR	51	Functionality 1: Deploys IPDUs of OSEK COM to different communication systems. The IPDU identifier decides on the network system type (e.g. CAN, LIN) and if a transport layer has to be used or not. The PDU Router abstracts from different underlying commu	2.1	**no**	Communication Services	COM services	1
CAN Tranceiver Driver	CanTrcv	70	Driver for external CAN transceiver - Control of wake-Up/sleep - Network diagnostic (short circuit, open line, ...) - ...	2.1	**no**	Communication HW Abstraction	CAN	1 per connected CAN cluster
FlexRay Tranceiver Driver	FrTrcv	71	Driver for external FlexRay transceiver - Control of wake-Up/sleep - Network diagnostic (short circuit, open line, ...) - ...	2.1	**no**	Communication HW Abstraction	FlexRay	1 per connected FlexRay cluster
CAN Transport Layer	CanTp	35	Transport protocol on CAN according to ISO 15765-2 TPL - segmentation of data in transmit direction - collection of data in receive direction - control of data flow - detection of errors (message loss/doubling/sequence)	2.1	**no**	Communication Services	CAN	1 per connected CAN cluster

AUTOSAR name of function / module	Module short name (API service prefix)	Module ID (uint8)	Functional description	Current Autosar Release	AUTOSAR Service (yes/no)	AUTOSAR SW Layer	ICC 2 Cluster	Number of instances
FlexRay Transport Layer	FrTp	36	Transport protocol on FlexRay using the dynamic part of the communication round - segmentation of data in transmit direction - collection of data in receive direction - control of data flow - detection of errors (message loss/doubling/sequence)	2.1	**no**	Communication Services	FlexRay	1 per connected FlexRay cluster
Diagnostic Communication Manager	Dcm	53	Diagnostic communication according to UDP - ISO14229 - functional interface for diagnostic services - handling of specific diagnostic requests (enable/disable normal message transmission, tester present) - reply of negative responses - exception handling	2.1	**yes**	Communication Services	Error Handler	1
Diagnostic Event Manager	Dem	54	Management of error data - Structuring of error data which shall be saved to the NVRAM - Non volatile setting, counting, resetting and reading of errors - Sampling and saving of general system environment data (not error specific) - error specific environ	2.1	**yes**	Communication Services	Error Handler	1
Flash EEPROM Emulation	Fee	21	Emulates EEPROM functionality using the flash memory	2.1	**no**	Memory Services	Memory	1
NVRAM Manager	NvM	20	Management of non volatile data - immediate/queued/delayed writing - data shadowing in RAM - data encryption in NVRAM - checksum calculation and validation - distribution of write access ('walking blocks') - redundant data storage - read and write protect	2.1	**yes**	Memory Services	Memory	1
BSW Scheduler Module	SchM	130	Provide scheduling of all BSW modules, e.g. assigns priority and memory protection to each BSW module used in an ECU.	2.1		System Services	OS	1
Memory Abstraction Interface	MemIf	22	Abstracts the memory interface for different memory devices.	2.1		Memory Services	Memory	1
Watchdog Manager	WdgM	13	Supervision of application functions - checking aliveness of applications (e.g. collecting flags, hand shaking and protocols, question - answer) - selection of watchdog mode - triggering of internal and/or external watchdogs (via driver)	2.1	**yes**	System Services	Watchdog manager	1
IPDU Multiplexer	IpduM	52	Handles multiplexing of PDU's	2.1			IPDUM Cluster	1
Generic NM Interface	Nm	29	Network management - provision of common, network independent API - agreement on network cluster wide shut down of communication system ? - determination of network configuration at start-up ? - monitoring of network configuration during operation ? - pro	2.1			ModeManagement	1