MICROSAR OSEK Direct Network Management

Technical Reference

Vector Specifics

Version 3.00.00

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Document Information

History

Author	Date	Version	Remarks
Markus Drescher	2015-03-17	2.00.00	Creation out of original Technical Reference
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Reference Documents

No.	Source	Title	Version
[1]	OSEK	nm253.pdf	V2.5.3
[2]	Vector	TechnicalReference_NmOsek.pdf	see delivery
[3]	Vector	TechnicalReference_Nm.pdf	see delivery

Caution
We have configured the programs in accordance with your specifications in the questionnaire. Whereas the programs do support other configurations than the one specified in your questionnaire, Vector’s release of the programs delivered to your company is expressly restricted to the configuration you have specified in the questionnaire.

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1 Introduction

This document describes the Vector-specific functionality and API of the MICROSAR BSW module NmOsek as specified in [1].

2 Functional Description

2.1 Features

The features described in the following sections cover the Vector-specific functionality specified for the NmOsek.

2.2 States

There are no additional states due to any Vector requirements.

2.3 PDU Message Layout

The PDU Message Layout can be configured by choosing a certain NMOSEK_TYPE in the configuration tool DaVinci Configurator in the NmOsek configuration.

There are two layouts supported:

- NMOSEK_TYPE_VECTOR_OSEK
- NMOSEK_TYPE_VECTOR2_OSEK

The only difference between the two layouts is how the Operation Code is encoded.

Both PDU Message Layouts are described in the following table:

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 7	User data 5 / Unused							
Byte 6	User data 4 / Unused							
Byte 5	User data 3 / Unused							
Byte 4	User data 2 / Unused							
Byte 3	User data 1 / Unused							
Byte 2	User data 0 / Unused							
Byte 1	Operation Code							
Byte 0	Destination Identifier							

Table 2-1 PDU NM Message Layout

In dependency of the Type setting, the Operation Code is differently encoded.

Table 2-2 presents the layout of the Operation Code for NMOSEK_TYPE_VECTOR_OSEK, whereas Table 2-3 presents the layout of the Operation Code for NMOSEK_TYPE_VECTOR2_OSEK.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
reserved	reserved	Sleep Acknowledge	Sleep Indication	reserved	LimpHome	Ring	Alive

Table 2-2 Operation Code encoding for NMOSEK_TYPE_VECTOR_OSEK

For NMOSEK_TYPE_VECTOR_OSEK, exactly one of the LimpHome, Ring and Alive Bits is set to 1, the others are set to 0. That means that the lower four bits have the values 0x01 (ALIVE), 0x02 (RING), 0x04 (LIMPHOME). The higher four bits have a value of either

0x00, 0x10 or 0x30. A setting where only the Sleep Acknowledge bit is set to 1 and the Sleep Indication bit is set to 0 does not exist.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
reserved	reserved	reserved	reserved	reserved	Bit 2	Bit 1	Bit 0

Table 2-3 Operation Code encoding for NMOSEK_TYPE_VECTOR2_OSEK

As it can be seen in Table 2-3, NMOSEK_TYPE_VECTOR2_OSEK only uses the three least significant bits of the Operation Code byte. The encoding of the OpCode is realized according to chapter 7.0.3.1 of [1]. The following values of the Operation Code byte are possible:

Value (hex)	Value (bin)	Message Type	Sleep Indication bit	Sleep Acknowledge bit
0x00	00000000b	LIMPHOME	0	0
0x01	00000001b	RING	0	0
0x02	00000010b	ALIVE	0	0
0x03	00000011b	RING	1	1
0x04	00000100b	LIMPHOME	1	0
0x05	00000101b	RING	1	0
0x06	00000110b	ALIVE	1	0
0x07	00000111b	RING	1	1

Table 2-4 Values of OpCode for NMOSEK_TYPE_VECTOR2_OSEK

Note that NmOsek does not use the value of 0x03 for transmission of a RING message with Sleep Indication Bit and Sleep Acknowledge bit set to 1 but 0x07 for NMOSEK_TYPE_VECTOR2_OSEK.

The availability of the User data bytes depend on the configuration settings. The following rules have to be considered for the PDU Message Layout:

- User data may start after Byte 1(if User Data Support is enabled).
- Reserved bits are filled with 0.

The NM PDU elements are given in Table 2-5. For details about these bytes please refer to the OSEK specification [1].

NM PDU Element	Description
Destination Identifier	Recipient node identifier / successor in the logical ring that shall send the next NM Message
Operation Code	Operation Code that contains the NM message type
Sleep Indication	The Sleep Indication bit indicates whether the node is ready to sleep (1) or not (0) (ALIVE, RING, LIMPHOME messages)
Sleep Acknowledge	The Sleep Acknowledge bit – if set to 1 – indicates that the node has detected that all other nodes in the logical ring are ready to sleep and that the node therefore instructs all participants in the logical ring to start the bus shutdown (only RING messages).

NM PDU Element	Description
	Otherwise, it is set to 0 (ALIVE, RING, LIMPHOME messages).
User Data	User Data Bytes that can either be set for the TX NM PDU by using Com Signals if 'Com User Data Support' is turned ON in the Nm module or can also be set by using Nm_SetUserData() if 'User Data Enabled' is turned ON in the Nm module User data bytes can be retrieved by using Nm_GetUserData() / Nm_GetPduData() in the context of the callback function Nm_PduRxIndication()

Table 2-5 NM PDU Elements

2.4 State Change Notifications

The 'State Change Notifications' are required if TX messages need to be enabled in dependency to state transitions of NmOsek. This can for instance be used if the NM PDU shall be sent on the bus before any other PDU of the ECU.

If the Vector MICROSAR BswM is available that functionality is implemented in this module and has to be configured in the BSW Management in DaVinci Configurator. If not the application needs to implement this function (see 'UL_Nm_StateChangeNotification' in [3] for the function prototype). Please note that the following contents of this section is only background information if BswM is used and no extra functionality needs to be implemented in the application.

Since Nm_StateChangeNotification is an AUTOSAR function with the Nm_StateType, there is a mapping between the OSEK NM states and the AUTOSAR Nm_StateType states (see section 2.2 of [2] for details).

The states in Nm_StateType have some implications on RX/TX messages. The implications for these messages are listed in Table 2-6. They are valid if 'First Message Shall Be Nm Message' is turned OFF.

Application messages are grouped into categories by the means of I-PDU Groups in the Com module.

So the related TX I-PDU-Group(s) need(s) to be changed according to the current state.

State	RX Application Messages	TX Application Messages
NM_STATE_BUS_SLEEP	OFF	OFF
NM_STATE_PREPARE_BUS_SLEEP	ON	OFF
NM_STATE_READY_SLEEP	ON	ON

State	RX Application Messages	TX Application Messages
NM_STATE_NORMAL_OPERATION	ON	ON
NM_STATE_REPEAT_MESSAGE	ON	ON
NM_STATE_SYNCHRONIZE	(unused)	
NM_STATE_OFFLINE	(unused)	
NM_STATE_CHECK_WAKEUP	(unused)	
NM_STATE_WAIT_NETWORK_STARTUP	(unused)	
NM_STATE_WAIT_NETWORK_GW_MSG_ACTIVE	(unused)	
NM_STATE_WAIT_NETWORK_GW_AND_EVENT_MSG_ACTIVE	(unused)	
NM_STATE_BUS_OFF	ON	OFF

Table 2-6 State from Nm_StateType and its implications on RX/TX Messages

If one is interested in the notifications that may occur for Nm_StateChangeNotification(), refer to Figure 2-1.

Please note that this figure does not depict any triggers or effects. As it can be seen in the legend, each state has the same color as in Table 2-6. The implications of each state for RX/TX messages is depicted in the Legend.

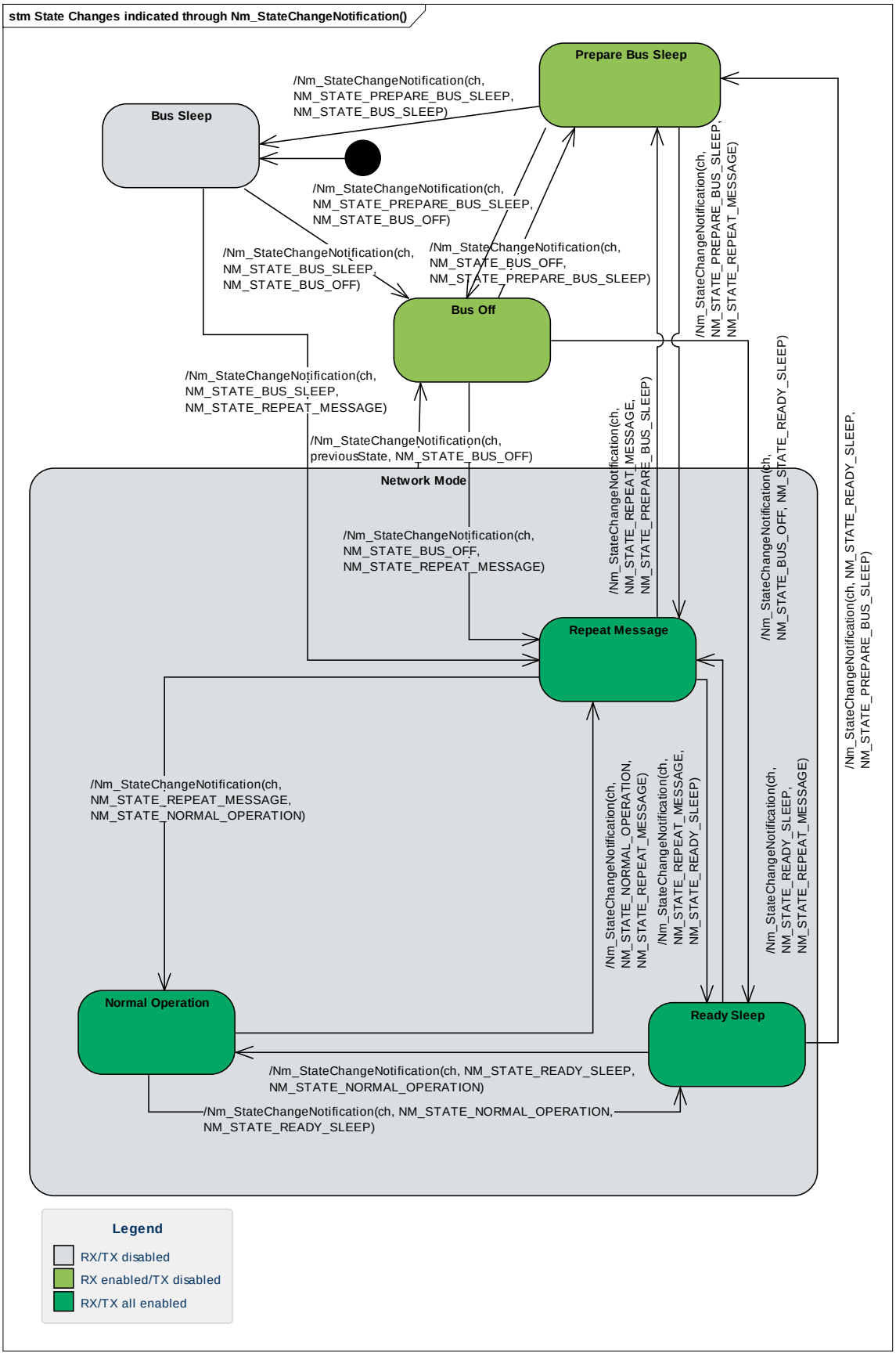

Figure 2-1 State transitions indicated by Nm_StateChangeNotification() (without triggers and effects)

Please note that the states for NmOsek (Bus Sleep, Repeat Message, …) are the ones according to the Nm_StateType enumeration, not the OSEK NM internal ones. For a mapping, see also section 2.2 of [2] for details.

Note
The Nm itself does not activate/deactivate the RX/TX messages. In the following figures, it is only indicated as information. In reality, the RX/TX messages shall be enabled due to the call of the configured ‘State Change Indication Callback’ in the Nm module.

2.5 BusOff Occurrence and Recovery Notification

Check your ECU requirements whether OSEK NM needs the configuration setting ‘BusOff Notification Enabled’ to be turned ON in NmOsek in the configuration settings. To conform with [1] it is recommended to turn this setting ON.

For details about the BusOff Occurrence and Recovery Notifications, refer to the same chapter in [2].

3 Glossary and Abbreviations

3.1 Glossary

Term	Description
DaVinci Configurator	Generation tool for MICROSAR components

Table 3-1 Glossary

3.2 Abbreviations

Abbreviation	Description
API	Application Programming Interface
AUTOSAR	Automotive Open System Architecture
BSW	Basic Software
BswM	AUTOSAR BSW Mode Manager
ECU	Electronic Control Unit
I-PDU	Interaction Layer PDU
MICROSAR	Microcontroller Open System Architecture (the Vector AUTOSAR solution)
NM	Network Management
Nm	AUTOSAR Network Management Interface
NmOsek	Network Management Osek (this component)
OSEK	Offene Systeme und deren Schnittstellen für die Elektronik im Kraftfahrzeug (Open Systems and the Corresponding Interfaces for Automotive Electronics.)
PDU	Protocol Data Unit
RX	Reception
TX	Transmission

Table 3-2 Abbreviations

4 Contact

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