<table>
<thead>
<tr>
<th>Date</th>
<th>Release</th>
<th>Changed by</th>
<th>Change Description</th>
</tr>
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</table>
| 2017-12-08 | 4.3.1   | AUTOSAR          | • Node Detection Configuration per channel  
                                           • Det error handling corrected  
                                           • Bug fixes and editorial changes |
| 2016-11-30 | 4.3.0   | AUTOSAR          | • Added Trigger Transmit feature  
                                           • Car Wakeup support completed  
                                           • Immediate TX Transmission corrected  
                                           • Editorial changes |
| 2015-07-31 | 4.2.2   | AUTOSAR          | • Revised Error Classification  
                                           • Added support for Car Wakeup  
                                           • Bug fixes and editorial changes |
| 2014-10-31 | 4.2.1   | AUTOSAR          | • Harmonization of API description  
                                           • Revised Partial Networking Requirements  
                                           • Extended Production Errors  
                                           • Editorial Changes |
| 2014-03-31 | 4.1.3   | AUTOSAR          | • Minor bug fixes  
                                           • Editorial Changes |
| 2013-10-31 | 4.1.2   | AUTOSAR          | • Revised Spontaneous Transmission  
                                           • Editorial changes  
                                           • Removed chapter(s) on change documentation |
| 2013-03-15 | 4.1.1   | AUTOSAR Administration | • Added support for Partial Networking  
                                           • Added updated production errors  
                                           • Editorial changes |
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<th>Changed by</th>
<th>Change Description</th>
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<tr>
<td>2011-12-22</td>
<td>4.0.3</td>
<td>AUTOSAR Administration</td>
<td>• Support coordinated shutdown</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• New traceability mechanism</td>
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<tr>
<td>2010-09-30</td>
<td>3.1.5</td>
<td>AUTOSAR Administration</td>
<td>• ComStack Harmonization</td>
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<td></td>
<td></td>
<td></td>
<td>• Harmonization of NM interfaces</td>
</tr>
<tr>
<td>2010-02-02</td>
<td>3.1.4</td>
<td>AUTOSAR Administration</td>
<td>• Initial Release</td>
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1 Introduction and Functional Overview

This document describes the concept, core functionality, optional features, interfaces and configuration issues of the AUTOSAR UDP Network Management (UdpNm). UdpNm is intended to be an optional feature. It is intended to work together with a TCP/IP Stack, independent of the physical layer of the communication system used. The AUTOSAR UDP Network Management is a hardware independent protocol that can be used on TCP/IP based systems (for limitations refer to chapter 4.1). Its main purpose is to coordinate the transition between normal operation and bus-sleep mode of the network.

In addition to the core functionality optional features are provided e.g. to implement a service to detect all present nodes or to detect if all other nodes are ready to sleep. The UDP Network Management (UdpNm) function provides an adaptation between Network Management Interface (Nm) and a TCP/IP Stack (TCP/IP). For a general understanding of the AUTOSAR Network Management functionality please refer to [9].

Figure 1: Extended AUTOSAR Communication Stack.
2 Acronyms and abbreviations

<table>
<thead>
<tr>
<th>Acronym or Abbreviation</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>API</td>
<td>Application Programming Interface</td>
</tr>
<tr>
<td>BSW</td>
<td>Basic Software</td>
</tr>
<tr>
<td>CWU</td>
<td>Car Wakeup</td>
</tr>
<tr>
<td>EthIf</td>
<td>Ethernet Interface</td>
</tr>
<tr>
<td>DET</td>
<td>Default Error Tracer</td>
</tr>
<tr>
<td>IP</td>
<td>Internet Protocol</td>
</tr>
<tr>
<td>NM</td>
<td>Network Management</td>
</tr>
<tr>
<td>PDU</td>
<td>Protocol Data Unit</td>
</tr>
<tr>
<td>SDU</td>
<td>Service Data Unit</td>
</tr>
<tr>
<td>TCP</td>
<td>Transmission Control Protocol</td>
</tr>
<tr>
<td>TCP/IP</td>
<td>A family of communication protocols used in computer networks</td>
</tr>
<tr>
<td>UDP</td>
<td>User Datagram Protocol</td>
</tr>
<tr>
<td>PNI</td>
<td>Partial Network Information</td>
</tr>
<tr>
<td>UdpNm</td>
<td>UDP Network Management</td>
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</table>

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDU transmission ability is disabled</td>
<td>This means that the NM message transmission has been disabled by the optional service UdpNm_DisableCommunication.</td>
</tr>
<tr>
<td>Repeat Message Request Bit Indication</td>
<td>UdpNm_SoAdIfRxIndication finds the Repeat Message Bit set in the Control Bit Vector of a received NM message.</td>
</tr>
<tr>
<td>NM PDU</td>
<td>Refers to the payload transmitted in a packet. It contains the NM User Data as well as the Control Bit Vector and the Source Node Identifier.</td>
</tr>
<tr>
<td>NM Packet</td>
<td>Refers to an Ethernet Frame containing an IP as well as a UDP header in addition to the data (PDU) transmitted by the NM in the payload section.</td>
</tr>
<tr>
<td>NM Message</td>
<td>Most abstract term referring to any single information item transferred within the methodology of the NM algorithm.</td>
</tr>
<tr>
<td>Bus-Off state</td>
<td>Refers to a situation where no cable is connected to the Ethernet HW.</td>
</tr>
</tbody>
</table>
3 Related documentation

3.1 Input documents

[1] Layered Software Architecture
AUTOSAR_EXP_LayeredSoftwareArchitecture.pdf

AUTOSAR_SRS_BSWGeneral.pdf

[3] Requirements on Network Management
AUTOSAR_SRS_NetworkManagement.pdf

AUTOSAR_SWS_EthernetInterface.pdf

AUTOSAR_SWS_FlexRayNetworkManagement.pdf

AUTOSAR_SWS_CommunicationStackTypes.pdf

AUTOSAR_TPS_ECUConfiguration.pdf

AUTOSAR_SWS_BSW_Scheduler.pdf

AUTOSAR_SWS_NetworkManagementInterface.pdf

[10] Specification of Communication Manager
AUTOSAR_SWS_ComManager.pdf

AUTOSAR_SWS_ECUStateManager.pdf

AUTOSAR_SWS_OS.pdf

AUTOSAR_SWS_DefaultErrorTracer.pdf

AUTOSAR_SWS_StandardTypes.pdf

AUTOSAR_SWS_PlatformTypes.pdf
3.2 Related standards and norms

[22] IEEE
http://www.opengroup.org/onlinepubs/000095399/
[23] ISO 14229 Road Vehicles – Unified Diagnostic Services (UDS)

3.3 Related specification

AUTOSAR provides a General Specification on Basic Software modules [21] (SWS BSW General), which is also valid for UDP Network Management.

Thus, the specification SWS BSW General shall be considered as additional and required specification for UDP Network Management.
4 Constraints and assumptions

4.1 Limitations

1. One instance of UdpNm is associated with only one NM-Cluster in one network. One NM-Cluster can have only one instance of UdpNm in one node.
2. One instance of UdpNm is associated with only one network within the same ECU.
3. UdpNm is only applicable for TCP/IP based systems.

Figure 2 presents an AUTOSAR NM stack within an example ECU belonging to two UDP NM-clusters.

![AUTOSAR NM Stack over UDP](image)

**Figure 2: AUTOSAR NM stack within an example ECU belonging to two UDP NM-clusters**

[SWS_UdpNm_00131] The AUTOSAR UdpNm algorithm shall support up to 250 nodes per NM-Cluster by default.

Note: The AUTOSAR UdpNm algorithm can support an arbitrary number of nodes per NM-cluster (even more than default 250 nodes per cluster, if necessary) – it is only a matter of configuration, since the upper limit is not fixed and depends on the trade off between response time, fault-tolerance and resulted bus load configured for the AUTOSAR UdpNm coordination algorithm. This might depend on the physical layer used.

4.2 Applicability to car domains

N/A
5 Dependencies on other modules

UDP Network Management (UdpNm) uses services of the TCP/IP Stack and provides services to the Generic Network Management Interface (Nm).

5.1 File Structure

5.1.1 Code File Structure

[SWS_UdpNm_00081] The code file structure shall not be fully defined within this specification. However, the code file structure shall include the following files:

- UdpNm_Lcfg.c (for link time configurable parameters)
- UdpNm_PBcfg.c (for post build time configurable parameters)

These files shall contain all link time post build time configurable parameters.

[SRS_BSW_00419, SRS_BSW_00346, SRS_BSW_00158, SRS_BSW_00308]

5.1.2 Header File Structure

[SWS_UdpNm_00044] The UdpNm module shall provide the following H-files:

- UdpNm.h (for declaration of provided interface functions)

Figure 3: Dependencies on other modules.
UdpNm_Cbk.h (for declaration of provided call-back functions)
UdpNm_Cfg.h (for pre-compile time configurable parameters)
][ (SRS_BSW_00345, SRS_BSW_00381, SRS_BSW_00412,
SRS_BSW_00346, SRS_BSW_00158, SRS_BSW_00302)

[SWS_UdpNm_00082] The UdpNm module shall include the following H-files:
ComStack_Types.h
Note: The following header files are indirectly included by
ComStack_Types.h:
   o Std_Types.h (for AUTOSAR standard types )
   o Platform_Types.h (for platform specific types)
   o Compiler.h (for compiler specific language extensions)
UdpNm.h (for declaration of provided interface functions)
Nm_Cbk.h (for UdpNm specific call-backs to the Generic Network
Management Interface)
Det.h (for interface of DET – optional included only if DET is configured)
NmStack_Types.h (for common network management types)
SchM_UdpNm.h (for services of the Basic Software Scheduler)
UdpNm_MemMap.h (for Memory Mapping) ][ (SRS_BSW_00348,
SRS_BSW_00353, SRS_BSW_00361, SRS_BSW_00301)

[SWS_UdpNm_00083] The UdpNM module shall include the following header
files containing configuration data:
SoAd_Cfg.h (for the PDU IDs and socket connections)
Nm_Cfg.h (for the derived configuration items from Nm)
][ (SRS_BSW_00383, SRS_BSW_00301)

[SWS_UdpNm_00311] The UdpNm module shall include PduR_UdpNm.h if
UdpNmComUserDataSupport is enabled. ] ()
## Requirements traceability

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Description</th>
<th>Satisfied by</th>
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</thead>
<tbody>
<tr>
<td>SRS_BSW_00005</td>
<td>Modules of the µC Abstraction Layer (MCAL) may not have hard coded horizontal interfaces</td>
<td>SWS_UdpNm NA_00999</td>
</tr>
<tr>
<td>SRS_BSW_00006</td>
<td>The source code of software modules above the µC Abstraction Layer (MCAL) shall not be processor and compiler dependent.</td>
<td>SWS_UdpNm NA_00999</td>
</tr>
<tr>
<td>SRS_BSW_00010</td>
<td>The memory consumption of all Basic SW Modules shall be documented for a defined configuration for all supported platforms.</td>
<td>SWS_UdpNm NA_00999</td>
</tr>
<tr>
<td>SRS_BSW_00158</td>
<td>All modules of the AUTOSAR Basic Software shall strictly separate configuration from implementation</td>
<td>SWS_UdpNm NA_00999, SWS_UdpNm_00081</td>
</tr>
<tr>
<td>SRS_BSW_00160</td>
<td>Configuration files of AUTOSAR Basic SW module shall be readable for human beings</td>
<td>SWS_UdpNm NA_00999</td>
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<tr>
<td>SRS_BSW_00161</td>
<td>The AUTOSAR Basic Software shall provide a microcontroller abstraction layer which provides a standardized interface to higher software layers</td>
<td>SWS_UdpNm NA_00999</td>
</tr>
<tr>
<td>SRS_BSW_00162</td>
<td>The AUTOSAR Basic Software shall provide a hardware abstraction layer</td>
<td>SWS_UdpNm NA_00999</td>
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<tr>
<td>SRS_BSW_00164</td>
<td>The implementation of interrupt service routines shall be done by the Operating System, complex drivers or modules</td>
<td>SWS_UdpNm NA_00999</td>
</tr>
<tr>
<td>SRS_BSW_00168</td>
<td>SW components shall be tested by a function defined in a common API in the Basis-SW</td>
<td>SWS_UdpNm NA_00999</td>
</tr>
<tr>
<td>SRS_BSW_00170</td>
<td>The AUTOSAR SW Components shall provide information about their dependency from faults, signal qualities, driver demands</td>
<td>SWS_UdpNm NA_00999</td>
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<tr>
<td>SRS_BSW_00172</td>
<td>The scheduling strategy that is built inside the Basic Software Modules shall be compatible with the strategy used in the system</td>
<td>SWS_UdpNm NA_00999</td>
</tr>
<tr>
<td>SRS_BSW_00301</td>
<td>All AUTOSAR Basic Software Modules shall only import the necessary information</td>
<td>SWS_UdpNm_00082, SWS_UdpNm_00083</td>
</tr>
<tr>
<td>SRS_BSW_00302</td>
<td>All AUTOSAR Basic Software Modules shall only export information needed by other</td>
<td>SWS_UdpNm_00044</td>
</tr>
<tr>
<td>SRS_BSW_00305</td>
<td>Data types naming convention</td>
<td>SWS_UdpNm_NA_00999</td>
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<tr>
<td>SRS_BSW_00306</td>
<td>AUTOSAR Basic Software Modules shall be compiler and platform independent</td>
<td>SWS_UdpNm_NA_00999</td>
</tr>
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<td>SRS_BSW_00307</td>
<td>Global variables naming convention</td>
<td>SWS_UdpNm_NA_00999</td>
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<tr>
<td>SRS_BSW_00308</td>
<td>AUTOSAR Basic Software Modules shall not define global data in their header files, but in the C file</td>
<td>SWS_UdpNm_00081</td>
</tr>
<tr>
<td>SRS_BSW_00309</td>
<td>All AUTOSAR Basic Software Modules shall indicate all global data with read-only purposes by explicitly assigning the const keyword</td>
<td>SWS_UdpNm_NA_00999</td>
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<tr>
<td>SRS_BSW_00312</td>
<td>Shared code shall be reentrant</td>
<td>SWS_UdpNm_NA_00999</td>
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<td>SRS_BSW_00314</td>
<td>All internal driver modules shall separate the interrupt frame definition from the service routine</td>
<td>SWS_UdpNm_NA_00999</td>
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<td>SRS_BSW_00321</td>
<td>The version numbers of AUTOSAR Basic Software Modules shall be enumerated according specific rules</td>
<td>SWS_UdpNm_NA_00999</td>
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<tr>
<td>SRS_BSW_00325</td>
<td>The runtime of interrupt service routines and functions that are running in interrupt context shall be kept short</td>
<td>SWS_UdpNm_NA_00999</td>
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<tr>
<td>SRS_BSW_00328</td>
<td>All AUTOSAR Basic Software Modules shall avoid the duplication of code</td>
<td>SWS_UdpNm_NA_00999</td>
</tr>
<tr>
<td>SRS_BSW_00330</td>
<td>It shall be allowed to use macros instead of functions where source code is used and runtime is critical</td>
<td>SWS_UdpNm_NA_00999</td>
</tr>
<tr>
<td>SRS_BSW_00331</td>
<td>All Basic Software Modules shall strictly separate error and status information</td>
<td>SWS_UdpNm_NA_00999</td>
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<tr>
<td>SRS_BSW_00333</td>
<td>For each callback function it shall be specified if it is called from interrupt context or not</td>
<td>SWS_UdpNm_NA_00999</td>
</tr>
<tr>
<td>SRS_BSW_00334</td>
<td>All Basic Software Modules shall provide an XML file that contains the meta data</td>
<td>SWS_UdpNm_NA_00999</td>
</tr>
<tr>
<td>SRS_BSW_00335</td>
<td>Status values naming convention</td>
<td>SWS_UdpNm_NA_00999</td>
</tr>
<tr>
<td>SRS_BSW_00336</td>
<td>Basic SW module shall be able to shutdown</td>
<td>SWS_UdpNm_NA_00999</td>
</tr>
<tr>
<td>SRS_BSW_00341</td>
<td>Module documentation shall contains all needed informations</td>
<td>SWS_UdpNm_NA_00999</td>
</tr>
<tr>
<td>SRS_BSW_00345</td>
<td>BSW Modules shall support pre-</td>
<td>SWS_UdpNm_00044</td>
</tr>
<tr>
<td>Specification</td>
<td>AUTOSAR Basic Software Modules shall provide at least a basic set of module files</td>
<td>SWS_UdpNm_00044, SWS_UdpNm_00081</td>
</tr>
<tr>
<td>---------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>SRS_BSW_00346</td>
<td>A Naming separation of different instances of BSW drivers shall be in place</td>
<td>SWS_UdpNm NA_00999</td>
</tr>
<tr>
<td>SRS_BSW_00347</td>
<td>All AUTOSAR standard types and constants shall be placed and organized in a standard type header file</td>
<td>SWS_UdpNm_00082</td>
</tr>
<tr>
<td>SRS_BSW_00348</td>
<td>All integer type definitions of target and compiler specific scope shall be placed and organized in a single type header</td>
<td>SWS_UdpNm_00082</td>
</tr>
<tr>
<td>SRS_BSW_00353</td>
<td>All mappings of not standardized keywords of compiler specific scope shall be placed and organized in a compiler specific type and keyword header</td>
<td>SWS_UdpNm_00082</td>
</tr>
<tr>
<td>SRS_BSW_00361</td>
<td>Basic Software Modules shall report wake-up reasons</td>
<td>SWS_UdpNm NA_00999</td>
</tr>
<tr>
<td>SRS_BSW_00375</td>
<td>A Basic Software Module can return a module specific types</td>
<td>SWS_UdpNm NA_00999</td>
</tr>
<tr>
<td>SRS_BSW_00377</td>
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<td>SWS_UdpNm_00044</td>
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<td>SRS_BSW_00381</td>
<td>The Basic Software Module specifications shall specify which other configuration files from other modules they use at least in the description</td>
<td>SWS_UdpNm_00083</td>
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<tr>
<td>SRS_BSW_00383</td>
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<tr>
<td>SRS_BSW_00410</td>
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<td>SWS_UdpNm_00044</td>
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<tr>
<td>SRS_BSW_00412</td>
<td>An index-based accessing of the instances of BSW modules shall be done</td>
<td>SWS_UdpNm NA_00999</td>
</tr>
<tr>
<td>SRS_BSW_00413</td>
<td>Interfaces which are provided exclusively for one module shall be separated into a dedicated header file</td>
<td>SWS_UdpNm NA_00999</td>
</tr>
<tr>
<td>SRS_BSW_00415</td>
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<td>SRS_BSW_00416</td>
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<td>SWS_UdpNm NA_00999</td>
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<tr>
<td>SRS_BSW_00417</td>
<td>If a pre-compile time</td>
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<tr>
<td>Requirement</td>
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<td>SRS_BSW_00423</td>
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<tr>
<td>SRS_BSW_00424</td>
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<tr>
<td>SRS_BSW_00426</td>
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<td>SRS_BSW_00427</td>
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<td>SRS_Nm_00046</td>
<td>It shall be possible to trigger the startup of all Nodes at any Point in Time.</td>
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<td>SRS_Nm_00050</td>
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<tr>
<td>SRS_Nm_00052</td>
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<td>There shall be a deterministic time from the point where all nodes agree to go to bus sleep to the point where bus is switched off.</td>
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<tr>
<td>SRS_Nm_00137</td>
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<tr>
<td>SRS_Nm_00142</td>
<td>NM shall guarantee an upper limit for the bus load generated by NM itself.</td>
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</tr>
<tr>
<td>SRS_Nm_00144</td>
<td>NM shall support communication clusters of up to 64 ECUs</td>
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<tr>
<td>SRS_Nm_00147</td>
<td>The NM algorithm shall be processor independent.</td>
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</tr>
<tr>
<td>SRS_Nm_00151</td>
<td>The Network Management algorithm shall allow any node to</td>
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Configuration parameter is implemented as "const" it should be placed into a separate c-file.
<table>
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<tr>
<th>SRS_Nm_00153</th>
<th>The Network Management shall optionally provide a possibility to detect present nodes</th>
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7 Functional specification

7.1 Coordination algorithm

The AUTOSAR UdpNm is based on decentralized direct network management strategy, which means that every network node performs activities self-sufficient depending only on the UDP packets received and/or transmitted within the communication system.

The AUTOSAR UdpNm coordination algorithm is based on periodic NM packets, which are received by all nodes in the cluster via broadcast transmission. Reception of NM packets indicates that sending nodes want to keep the NM-cluster awake. If any node is ready to go to the Bus-Sleep Mode, it stops sending NM packets, but as long as NM packets from other nodes are received, it postpones transition to the Bus-Sleep Mode. Finally, if a dedicated timer elapses because no NM packets are received anymore, every node initiates transition to the Bus-Sleep Mode.

If any node in the NM-cluster requires bus-communication, it can keep the NM-cluster awake by transmitting NM packets. For more details concerning the wakeup procedure itself, please refer to [10].

The main concept of the AUTOSAR UdpNm coordination algorithm can be defined by the following two key-requirements:

[SWS_UdpNm_00087] Every network node shall transmit periodic NM PDUs as long as it requires bus-communication; otherwise it shall not transmit NM PDUs. ()

[SWS_UdpNm_00088] If bus communication is released and there are no NM PDUs on the bus for a configurable amount of time, determined by UdpNmTimeoutTime + UdpNmWaitBusSleepTime (both configuration parameters), transition into the Bus-Sleep Mode shall be performed. ()

The overall state machine of the AUTOSAR UdpNm coordination algorithm can be defined as follows:

[SWS_UdpNm_00089] The AUTOSAR UdpNm state machine shall contain states, transitions and triggers required for the AUTOSAR UdpNm coordination algorithm as seen from the point of view of one single node in the NM cluster. ()

Note: A UML state chart of the AUTOSAR UdpNm state machine from the point of view of one single node in the NM cluster can be found in the API specifications chapter 8

7.2 Operational Modes

This chapter describes the operational modes of the AUTOSAR UdpNm coordination algorithm.
The AUTOSAR UdpNm shall contain three operational modes visible at the modules interface:

- Network Mode
- Prepare Bus-Sleep Mode
- Bus-Sleep Mode

Changes of the AUTOSAR UdpNm operational modes shall be signalled to the upper layer by means of call-back functions.

### 7.2.1 Network Mode

The Network Mode shall consist of three internal states:

- Repeat Message State
- Normal Operation State
- Ready Sleep State

When the Network Mode is entered from Bus-Sleep Mode or Prepare Bus-Sleep Mode, by default, the Repeat Message State shall be entered.

When the Network Mode is entered, the NM-Timeout Timer shall be started.

When the Network Mode is entered, the UdpNm shall notify the upper layer by calling Nm_NetworkMode.

Upon successful reception of an NM PDU (call of UdpNm_SoAdIfRxIndication) in Network Mode, the NM-Timeout Timer shall be restarted.

Upon transmission of an NM PDU (call of UdpNm_SoAdIfTxConfirmation with E_OK) in the Network Mode, the NM-Timeout Timer shall be restarted.

Note: As no transmission confirmation is available from the SoAd or the TCP/IP stack it is assumed that each Network Management PDU transmission request results in a successful Network Management PDU transmission.

The NM-Timeout Timer shall be reset every time it is started or restarted.

### 7.2.1.1 Repeat Message State

For nodes that are not in passive mode (refer to chapter 7.7.3) the Repeat Message State ensures, that any transition from Bus-Sleep or Prepare Bus-Sleep to the Network Mode becomes visible for the other nodes on the network. Additionally it
ensures that any node stays active for a minimum amount of time (UdpNmRepeatMessageTime). Optionally it can be used for detection of present nodes.

[SWS_UdpNm_00100] [ When the Repeat Message State is entered from Bus-Sleep Mode, Prepare-Bus-Sleep Mode, Normal Operation State or Ready Sleep State transmission of NM packets shall be (re-) started unless passive mode is enabled. ] ()

[SWS_UdpNm_00101] [ When the NM-Timeout Timer expires in the Repeat Message State, the NM-Timeout Timer shall be restarted. ] ()

[SWS_UdpNm_00102] [ The NM shall stay in the Repeat Message State for a configurable amount of time determined by the UdpNmRepeatMessageTime (configuration parameter); after that time the Repeat Message State shall be left. ] ()

[SWS_UdpNm_00103] [ When Repeat Message State is left, the Normal Operation State shall be entered, if the network has been requested (see SWS_UdpNm_00104). ] ()

[SWS_UdpNm_00106] [ When Repeat Message State is left, the Ready Sleep State shall be entered, if the network has been released (see SWS_UdpNm_00105). ] ()

[SWS_UdpNm_00107] [ If UdpNmNodeDetectionEnabled is set to TRUE UdpNm shall clear the Repeat Message Bit when leaving Repeat Message State. ] ()

[SWS_UdpNm_00137] [ If the service UdpNmRepeatMessageRequest is called in Repeat Message State, Prepare Bus-Sleep Mode or Bus-Sleep Mode, the UdpNm module shall not execute the service and return E_NOT_OK. ] ()

7.2.1.2 Normal Operation State

The Normal Operation State ensures that any node can keep the NM-cluster awake as long as the network functionality is required.

[SWS_UdpNm_00116] [ When the Normal Operation State is entered from Ready Sleep State, transmission of NM PDUs shall be started unless passive mode is enabled or the NM message transmission ability has been disabled. ] ()

[SWS_UdpNm_00117] [ When the NM-Timeout Timer expires in the Normal Operation State, the NM-Timeout Timer shall be restarted. ] ()

[SWS_UdpNm_00118] [ When the network is released and the current state is Normal Operation State, the Normal Operation State shall be left and the Ready Sleep state shall be entered (refer to SWS_UdpNm_00105). ] ()
7.2.1.3 Ready Sleep State

The Ready Sleep State ensures that any node in the NM-cluster waits with transition to the Prepare Bus-Sleep Mode as long as any other node keeps the NM-cluster awake.

[SWS_UdpNm_00108] if UdpNmNodeDetectionEnabled is set to TRUE and Repeat Message Request bit is received in the Normal Operation State, UdpNm shall enter Repeat Message State. (SRS_Nm_00153)

[SWS_UdpNm_00109] if UdpNmNodeDetectionEnabled is set to TRUE and function UdpNm_RepeatMessageRequest is called in the Normal Operation State, UdpNm shall enter Repeat Message State. (SRS_Nm_00153)

[SWS_UdpNm_00110] if UdpNmNodeDetectionEnabled is set to TRUE and function UdpNm_RepeatMessageRequest is called in the Normal Operation State, UdpNm shall set the Repeat Message Bit. (SRS_Nm_00153)

Note: If passive mode is enabled no NM PDUs are transmitted, no action is required.

[SWS_UdpNm_00111] if UdpNmNodeDetectionEnabled is set to TRUE and Repeat Message Request bit is received in the Ready Sleep State, UdpNm shall enter Repeat Message State. (SRS_Nm_00153)

[SWS_UdpNm_00112] if UdpNmNodeDetectionEnabled is set to TRUE and function UdpNm_RepeatMessageRequest is called in the Ready Sleep State, UdpNm shall enter Repeat Message State. (SRS_Nm_00153)

[SWS_UdpNm_00113] if UdpNmNodeDetectionEnabled is set to TRUE and function UdpNm_RepeatMessageRequest is called in the Ready Sleep State, UdpNm shall set the Repeat Message Bit. (SRS_Nm_00153)
7.2.2 Prepare Bus-Sleep Mode

The purpose of the Prepare Bus Sleep state is to ensure that all nodes have time to stop their network activity before the Bus Sleep state is entered. Bus activity is calmed down (i.e. queued messages are transmitted in order to empty all Tx-buffers) and finally there is no activity on the bus in the Prepare Bus-Sleep Mode.

[SWS_UdpNm_00114] [ When Prepare Bus-Sleep Mode is entered, the UdpNm shall notify the upper layer by calling Nm_PrepareBusSleepMode. ] ()

[SWS_UdpNm_00115] [ The NM shall stay in the Prepare Bus-Sleep Mode for a configurable amount of time determined by the UdpNmWaitBusSleepTime (configuration parameter); after that time the Prepare Bus-Sleep Mode shall be left and the Bus-Sleep Mode shall be entered. ] ()

[SWS_UdpNm_00124] [ When successful reception of an NM PDU in the Prepare Bus-Sleep Mode, the Prepare Bus-Sleep Mode shall be left and the Network Mode shall be entered; by default the Repeat Message State is entered (refer to SWS_UdpNm_00095). ] ()

[SWS_UdpNm_00123] [ When the network is requested in the Prepare Bus-Sleep Mode, the Prepare Bus-Sleep Mode shall be left and the Network Mode shall be entered; by default the Repeat Message State is entered (refer to SWS_UdpNm_00095) ] ()

[SWS_UdpNm_00122] [ When the network has been requested (see SWS_UdpNm_00104) in the Prepare Bus-Sleep Mode and the UdpNm module has entered Network Mode and if UdpNmImmediateRestartEnabled (configuration parameter) is TRUE, the UdpNm module shall transmit a Network Management PDU. ] ()

Rationale: Other nodes in the cluster are still in Prepare Bus-Sleep Mode; in the exceptional situation described above transition into the Bus-Sleep Mode shall be avoided and bus-communication shall be restored as fast as possible.

Caused by the transmission offset for Network Management PDUs in UdpNm, the transmission of the first Network Management PDU in Repeat Message State can be delayed significantly. In order to avoid a delayed re-start of the network the transmission of a Network Management PDU can be requested immediately.

Note: If UdpNmImmediateRestartEnabled is TRUE and a wake-up line is used, a burst of Network Management PDUs occurs if all network nodes get a network request in Prepare Bus-Sleep Mode.

7.2.3 Bus-Sleep Mode

The purpose of the Bus-Sleep state is to reduce power consumption in the node, when no messages are to be exchanged.
The communication controller is switched to sleep mode, respective wakeup mechanisms are activated and finally power consumption is reduced to the adequate level in the Bus-Sleep Mode.

If a configurable amount of time determined by the \texttt{UdpNmTimeoutTime} + \texttt{UdpNmWaitBusSleepTime} (both configuration parameters) is identically configured for all nodes in the network management cluster, all nodes in the network management cluster that are coordinated with use of the AUTOSAR NM algorithm perform the transition into the Bus-Sleep Mode at approximately the same time.

Note: The parameters \texttt{UdpNmTimeoutTime} and \texttt{UdpNmWaitBusSleepTime} should have the same values within all network nodes of the NM-cluster. Depending on the specific implementation, transition into the Bus-Sleep Mode takes place approximately at the same time. The time jitter experienced for this transition depends on the following factors:

- internal clock precision (oscillator’s drift),
- NM-task cycle time (if tasks are not synchronized with a global time),
- NM PDUs waiting time in the Tx-queue (if transmission confirmation is made immediately after transmit request).

For a best case estimation only oscillator drift should be taken into account for a configurable amount of time determined by the value \texttt{UdpNmTimeoutTime} + \texttt{UdpNmWaitBusSleepTime} (both configuration parameters).

\[\text{SWS}_\text{UdpNm}_00126]\] When Bus-Sleep Mode is entered, the UdpNm shall notify the upper layer by calling \texttt{Nm_BusSleepMode}; this shall not be the case if Bus-Sleep Mode is entered by default at initialization. \(\) \(\)

\[\text{SWS}_\text{UdpNm}_00127]\] When the UdpNm module receives successfully Network Management PDU in the Bus-Sleep Mode (call of \texttt{UdpNm_SoAdIfRxIndication}), the UdpNm module shall notify the upper layer by calling the callback function \texttt{Nm_NetworkStartIndication}. \(\)

Rationale: To avoid race conditions and state inconsistencies between Network and Mode Management, UdpNm will not automatically perform the transition from Bus-Sleep Mode to Network Mode. UdpNm will only inform the upper layers which have to make the wake-up decision. NM packet reception in Bus-Sleep Mode must be handled depending on the current state of the ECU shutdown or startup process.

\[\text{SWS}_\text{UdpNm}_00128]\] If \texttt{UdpNm PassiveStartUp} is called in the Bus-Sleep Mode or Prepare Bus Sleep Mode, the UdpNm module shall enter the Network Mode; by default the Repeat Message State is entered (refer to \texttt{SWS}_\text{UdpNm}_00095 and \texttt{SWS}_\text{UdpNm}_00104). \(\)

Note: In the Prepare Bus-Sleep Mode and Bus-Sleep Mode is assumed that the network is released, unless bus communication is explicitly requested.
[SWS_UdpNm_00129]: When the network is requested in Bus-Sleep Mode, the UdpNm module shall enter the Network Mode; by default the UdpNm module shall enter the Repeat Message State (refer to SWS_UdpNm_00095 and SWS_UdpNm_00104). ()

7.3 Network states

Network states (i.e. ‘requested’ and ‘released’) are two additional states of the AUTOSAR UdpNm state machine that exist in parallel to the state machine. Network states denote, whether the software components need to communicate on the bus (the network state is then ‘requested’); or whether the software components don’t have to communicate on the bus (the bus network state is then ‘released’); note that if the network is released an ECU may still communicate because some other ECU still request the network.

[SWS_UdpNm_00104] [ The function call UdpNm_NetworkRequest shall request the network. I.e. the UdpNm module shall change network state to ‘requested’. ] ()

[SWS_UdpNm_00105] [ The function call UdpNm_NetworkRelease shall release the network. I.e. the UdpNm module shall change network state to ‘released’. ] ()

7.4 Initialization

[SWS_UdpNm_00141] [ After successful initialization the Network Management state shall be set to BusSleep Mode. ] ()

Note: The UdpNm module should be initialized after SoAd is initialized and before any other network management service is called.

[SWS_UdpNm_00143] [ When initialized, by default, the UdpNm module shall set the network state to ‘released’. ] ()

[SWS_UdpNm_00144] [ When initialized, by default, the UdpNm module shall enter the Bus-Sleep Mode. ] ()

[SWS_UdpNm_00145] [ If AUTOSAR UdpNm is not initialized it shall not prohibit bus traffic. ] ()

[SWS_UdpNm_00060] [ The function UdpNm_Init shall select the active configuration set by means of a configuration pointer parameter being passed (see 8.3.1). ] ()

[SWS_UdpNm_00033] [ After initialization the transmission of NM messages shall be stopped. ] ()
7.5 Execution

7.5.1 Processor architecture

[SWS_UdpNm_00146] The AUTOSAR UdpNm coordination algorithm shall be processor independent, meaning it shall not rely on any processor specific hardware support and thus shall be realizable on any processor architecture that is within the scope of AUTOSAR. ] ()

7.5.2 Timing parameters

[SWS_UdpNm_00246] The configuration parameter UdpNmTimeoutTime shall determine the AUTOSAR UdpNm timing parameter NM-Timeout Time. ] ()

[SWS_UdpNm_00247] The configuration parameter UdpNmRepeatMessageTime shall determine the AUTOSAR UdpNm timing parameter Repeat Message Time. ] ()

[SWS_UdpNm_00248] The configuration parameter UdpNmWaitBusSleepTime shall determine the AUTOSAR UdpNm timing parameter Wait Bus-Sleep Time. ] ()

[SWS_UdpNm_00249] The optional configuration parameter UdpNmRemoteSleepIndTime shall determine the AUTOSAR UdpNm timing parameter Remote Sleep Indication Time. ] ()
7.6 Communication Scheduling

7.6.1 NM Message Transmission

Note: The transmission mechanisms described in this chapter are only relevant if the NM message transmission ability is enabled.

[SWS_UdpNm_00072] The transmission of NM messages shall be configurable by means of UdpNmPassiveModeEnabled (see chapter 10.2).

Note: Passive nodes do not transmit NM messages, i.e. they can not actively influence the shut down decision, but they do receive NM message in order to be able to shut down synchronously.

Note: The transmission mechanisms described in this chapter are only relevant if UdpNmPassiveModeEnabled is FALSE.

[SWS_UdpNm_00237] The UdpNm module shall provide the periodic transmission mode. In this transmission mode the UdpNm module shall send Network Management PDUs periodically.

Note: The periodic transmission mode is used in the "Repeat Message State" and "Normal Operation State".

[SWS_UdpNm_00005] If the Repeat Message State is not entered via UdpNm_NetworkRequest OR UdpNmImmediateNmTransmissions is zero the transmission of NM PDU shall be delayed by UdpNmMsgCycleOffset after entering the repeat message state.

Note: This requirement covers also the case if Repeat Message State is entered from Network Operation State or Ready Sleep State due to Repeat Message Request or Bit (see SWS_UdpNm_00111, SWS_UdpNm_00112, SWS_UdpNm_00119, SWS_UdpNm_00120). This means that in this case the immediate transmission is not used (even if UdpNmImmediateNmTransmissions > 0 and independent from configuration of UdpNmPnHandleMultipleNetworkRequests) i.e. UdpNmMsgCycleOffset will always be applied. This mechanism prevents bursts of NM messages.

[SWS_UdpNm_00334] When entering the Repeat Message State from Bus Sleep Mode or Prepare Bus Sleep Mode because of UdpNm_NetworkRequest() (active wakeup) and if UdpNmImmediateNmTransmissions is greater zero, the NM PDUs shall be transmitted using UdpNmImmediateNmCycleTime as cycle time. The transmission of the first NM PDU shall be triggered as soon as possible. After the transmission the Message Cycle Timer shall be reloaded with UdpNmImmediateNmCycleTime. The UdpNmMsgCycleOffset shall not be applied in this case.
If Normal Operation State is entered from Ready Sleep State the transmission of NM PDUs shall be started immediately.

If UdpNmPnHandleMultipleNetworkRequests is set to TRUE UdpNm NetworkRequest shall trigger a state transition from Network Mode to Repeat Message state. If PDU transmission ability is enabled the NM PDUs shall be transmitted using UdpNmImmediateNmCycleTime as cycle time. The transmission of the first NM PDU shall be triggered as soon as possible. After the transmission the Message Cycle Timer shall be reloaded with UdpNmImmediateNmCycleTime. The UdpNmMsgCycleOffset shall not be applied in this case.

Note: UdpNmImmediateNmTransmissions has to be greater zero in this case due to ECUC_UdpNm_00075.

If NM PDUs shall be transmitted with UdpNmImmediateNmCycleTime (See SWS_UdpNm_00334 and SWS_UdpNm_00454), UdpNm shall ensure that UdpNmImmediateNmTransmissions (including first immediate transmission) with this timing are requested successfully. If a transmission request to SoAd fails (E_NOT_OK is returned), UdpNm shall retry the transmission request in the next main function. Afterwards UdpNm shall continue transmitting NM PDUs using the UdpNmMsgCycleTime.

Note: While transmitting NM PDUs using the UdpNmImmediateNmCycleTime no other Nm PDUs shall be transmitted (i.e. the UdpNmMsgCycleTime transmission cycle is stopped).

If transmission of NM PDUs has been started and the UdpNm Message Cycle Timer expires an NM PDU shall be transmitted through the SoAd by calling SoAd_IfTransmit.

If the UdpNm Message Cycle Timer expires it shall be restarted with UdpNmMsgCycleTime.

If transmission of NM PDUs has been stopped the UdpNm Message Cycle Timer shall be canceled.

If parameter UdpNmRetryFirstMessageRequest (see ECUC_UdpNm_00085) is TRUE and if the first transmit request after transition from Bus Sleep to Repeat Message State is not accepted by SoAd, the message request shall be repeated in the next main function until one transmit request is accepted by SoAd.

Note: This feature can be used in case of partial network wakeup filter to avoid a blocking of all messages in case of passive start-up and first message request is not accepted by SoAd due to EthSM could not enable transmission path fast enough (e.g. in case of asynchronous transceiver handling).
7.6.2 Reception

If an NM message has been successfully received, the SoAd will call UdpNm_SoAdIfRxIndication.

[SWS_UdpNm_00035] Upon a call of UdpNm_SoAdIfRxIndication, the UdpNm module shall copy the data of the Network Management PDU referenced in the function parameter to an internal buffer. ()

[SWS_UdpNm_00037] When an NM PDU has been received, the Nm function Nm_PduRxIndication shall be called, if UdpNmPduRXIndicationEnabled (configuration parameter) is TRUE. ()

7.7 Additional features

7.7.1 Detection of Remote Sleep Indication (optional)

The “Remote Sleep Indication” denotes a situation, where a node in Normal Operation State finds all other nodes in the cluster are ready to sleep. The node still in Normal Operation State will still keep the bus awake.

[SWS_UdpNm_00149] Detection of remote sleep indication shall be statically configurable with use of the UdpNmRemoteSleepIndEnabled switch (configuration parameter). ()

[SWS_UdpNm_00150] If no NM PDUs are received in the Normal Operation State for a configurable amount of time determined by the UdpNmRemoteSleepIndTime (configuration parameter), the NM shall notify the Generic Network Management Interface that all other nodes in the cluster are ready to sleep (the so-called ‘Remote Sleep Indication’) by calling Nm_RemoteSleepIndication. ()

[SWS_UdpNm_00151] If Remote Sleep Indication has been previously detected and if an NM PDU is received in the Normal Operation State or Ready Sleep State again, the NM shall notify the Generic Network Management Interface that some nodes in the cluster are not ready to sleep anymore (the so-called ‘Remote Sleep Cancellation’) by calling Nm_RemoteSleepCancelation. ()

[SWS_UdpNm_00152] If Remote Sleep Indication has been previously detected and if Repeat Message State is entered from Normal Operation State, the NM shall notify the Generic Network Management Interface that some nodes in the cluster are
not ready to sleep anymore (the so-called ‘Remote Sleep Cancellation’) by calling Nm_RemoteSleepCancelation. ] ()

[SWS_UdpNm_00154] [ The NM shall reject a check of Remote Sleep Indication in Bus-Sleep Mode, Prepare Bus-Sleep Mode and Repeat Message State; the service shall not be executed and E_NOT_OK shall be returned. ] ()

7.7.2 User Data (optional)

[SWS_UdpNm_00158] [ Support of NM user data shall be statically configurable using the UdpNmUserDataEnabled switch (configuration parameter). ] ()

[SWS_UdpNm_00159] [ When UdpNm_SetUserData is called, the NM user data for NM packets transmitted next on the bus shall be set; operation of setting the NM user data shall guarantee data consistency. ] ()

[SWS_UdpNm_00160] [ When UdpNm_GetUserData is called, the NM user data contained in the payload of the most recently received NM PDU shall be provided; operation of providing the NM user data shall guarantee data consistency. ] ()

Note: If NM user data is configured it will be sent for sure in the Repeat Message State. In Ready Sleep State the user data will not be sent.

[SWS_UdpNm_00312] [ If UdpNmComUserDataSupport is enabled the API UdpNm_SetUserData shall not be available. ] ()

[SWS_UdpNm_00317] [ If UdpNmComUserDataSupport is enabled and NM-PDU is not configured for triggered transmission in SoAd (SoAdBswModules/SoAdIfTriggerTransmit = FALSE), the UdpNm shall collect the NM User Data from the referenced NM I-PDU by calling PduR_UdpNmTriggerTransmit and combine the user data with the further NM bytes each time before it requests the transmission of the corresponding NM message. ] (SRS_Nm_02503)

Note: In case of triggered transmission no data is needed at the transmission request, just the length is needed. The data will be collected within UdpNm_TriggerTransmit (see chapter 8.4.3 UdpNm_TriggerTransmit).

[SWS_UdpNm_00464] [ If UdpNmComUserDataSupport is enabled and if UdpNm is in RepeatMessage state or NormalOperation state and if UdpNm_Transmit is called, UdpNm shall request an additional transmission of the NM PDU with the current user data. ] (SRS_Nm_02503)

7.7.3 Passive Mode (optional)

In Passive Mode the node is only receiving NM messages but not transmitting any NM messages.
[SWS_UdpNm_00161] Passive Mode shall be statically configurable with use of the UdpNmPassiveModeEnabled switch (configuration parameter). ()

[SWS_UdpNm_00162] Passive Mode shall be statically configured consistent for all instances within one ECU. ()

[SWS_UdpNm_00163] If Passive Mode is used (configuration parameter UdpNmPassiveModeEnabled) the following options must not be used:

- Bus Synchronization (configuration parameter UdpNmBusSynchronizationEnabled)
- Remote Sleep Indication (configuration parameter UdpNmRemoteSleepIndEnabled)
- Node Detection (configuration parameter UdpNmNodeDetectionEnabled)

7.7.4 State change notification (optional)

[SWS_UdpNm_00166] All changes of the AUTOSAR UdpNm states shall be notified to the upper layer by calling Nm_StateChangeNotification if the callback Nm_StateChangeNotification is enabled (configuration parameter UdpNmStateChangeIndEnabled is TRUE). ()

7.7.5 Communication Control (optional)

[SWS_UdpNm_00168] Communication Control shall be statically configurable with use of the UdpNmComControlEnabled switch (configuration parameter). ()

[SWS_UdpNm_00170] The optional service UdpNm_DisableCommunication shall disable the NM PDU transmission ability. ()

Note: The NM coordination algorithm cannot work correctly if NM PDU transmission ability is disabled. Therefore it has to be ensured that the ECU is not shutdown as long as the NM PDU transmission ability is disabled.

If UdpNm_NetworkRelease is called and NM PDU transmission ability has been disabled, ECU will shut down. This ensures that ECU can shut down also in case of race conditions (e.g. diagnostic session left shortly before enabling communication) or a wrong usage of communication control.

[SWS_UdpNm_00172] The optional service UdpNm_DisableCommunication shall return E_NOT_OK, if the current mode is not Network Mode. ()
When the Network Management PDU transmission ability is disabled, the UdpNm module shall stop the UdpNm Message Cycle Timer in order to stop the transmission of Network Management PDUs. ] ()

When the NM PDU transmission ability is disabled, the NM-Timeout Timer shall be stopped. ] ()

When the NM PDU transmission ability is disabled, the detection of Remote Sleep Indication Timer shall be suspended. ] ()

When the Network Management PDU transmission ability is enabled, the transmission of NM PDUs shall be started latest within the next NM main function. ] (SRS_Nm_02512)

When the NM PDU transmission ability is enabled, the NM-Timeout Timer shall be restarted. ] ()

When the NM PDU transmission ability is enabled, the detection of Remote Sleep Indication Timer shall be resumed. ] ()

The optional service UdpNm_RequestBusSynchronization shall return E_NOT_OK if the NM PDU transmission ability is disabled. ] ()

7.7.6 NM Coordinator synchronization support (optional)

When having more than one coordinator connected to the same bus a special bit in the CBV, the NmCoordinatorSleepReady bit is used to indicate that the main coordinator requests to start shutdown sequence. The main functionality of the algorithm is described in the Nm module.

If the UdpNm called NM_CoordReadyToSleepIndication and is still in Network Mode it shall notify the Nm by calling Nm_CoordReadyToSleepCancellation on the first reception of a NM message with the NmCoordinatorSleepReady bit (see CBV) set to 0 ] ()

If UdpNm has entered Network mode or called Nm_CoordReadyToSleepCancellation before it shall notify the NM by calling Nm_CoordReadyToSleepIndication on the first reception of NM message with the NmCoordinatorSleepReady bit (see CBV) set to 1 ] ()

If UdpNmCoordinatorSyncSupport is set to TRUE and the API UdpNm_SetSleepReadyBit is called UdpNm shall set the "NM Coordinator
Sleep Ready Bit" bit to passed value and trigger a single Network Management PDU. [ ()

[SWS_UdpNm_00322] [ The API UdpNm_SetSleepReadyBit() and the feature "Coordinated Bus Shutdown" shall only be available if UdpNmCoordinatorSyncSupport is set to TRUE.] ()

7.8 Partial Networking

7.8.1 Rx Handling of NM PDUs

[SWS_UdpNm_00328] If the UdpNmPnEnabled is FALSE, the UdpNm shall perform the normal Rx Indication handling and the partial networking extensions shall be disabled.] ()

[SWS_UdpNm_00329] If UdpNmPnEnabled is TRUE, the PNI bit in the received NM-PDU is 0 and UdpNmAllNmMessagesKeepAwake is TRUE, the UdpNm module shall perform the normal Rx Indication handling omitting the extensions for partial networking.] ()

[SWS_UdpNm_00462] If UdpNmPnEnabled is TRUE, the PNI bit in the received NM-PDU is 0 and UdpNmAllNmMessagesKeepAwake is FALSE, the UdpNm module shall ignore the received NM-PDU. ] ()

[SWS_UdpNm_00331] If UdpNmPnEnabled is TRUE and the PNI bit in the received NM-PDU is 1, UdpNm module shall process the Partial Networking Information of the NM-PDU as described in chapter 7.8.3 to 7.8.5.] ()

7.8.2 Tx Handling of NM PDUs

[SWS_UdpNm_00332] If UdpNmPnEnabled is TRUE the UdpNm module shall set the value of the transmitted PNI bit in the CBV to 1.] ()

Note: The usage of the CBV is mandatory in case Partial Networking is used.

[SWS_UdpNm_00333] If UdpNmPnEnabled is FALSE the UdpNm module shall set the value of the transmitted PNI bit in the CBV always to 0.] ()

7.8.3 NM PDU Filter Algorithm

[SWS_UdpNm_00335] The range (in bytes) that contains the PN request information (PN Info Range) in the received NM-PDU is defined by UdpNmPnInfoOffset (in bytes) starting from byte 0 and UdpNmPnInfoLength (in bytes). This range is called PN Info Range.] ()

Example:
- UdpNmPnInfoOffset = 3
- UdpNmPnInfoLength = 2
Only Byte 3 and Byte 4 of the NM message contains PN request information

[SWS_UdpNm_00336] Every bit of the PN Info Range represents one Partial Network. If the bit is set to 1 the Partial Network is requested. If the bit is set to 0 there is no request for this PN. ()

[SWS_UdpNm_00337] By means of the configuration parameter UdpNmPnFilterMaskByte the UdpNm is able to detect which PN is relevant for the ECU and which not. Each bit of UdpNmPnFilterMaskByte has the following meaning:
0 The PN request is irrelevant for the ECU. The communication stack of the ECU is not kept awake if this bit is set in a received NM-PDU.
1 The PN request is relevant for the ECU. The communication stack of the ECU is kept awake if this bit is set in a received NM-PDU. ()

[SWS_UdpNm_00338] Each PN filter mask byte shall be mapped (bitwise AND) to the corresponding byte in the PN info range of the NM message. ()

[SWS_UdpNm_00339] If at least one bit within the PN Info Range of the received NM-PDU matches with a bit in the NM filter mask the PN request information is relevant for the ECU. ()

[SWS_UdpNm_00460] If no relevant PN is requested in the received NM-PDU and UdpNmAllNmMessagesKeepAwake is FALSE the PDU shall be dropped from further processing. ()

[SWS_UdpNm_00461] If no relevant PN is requested in the received NM-PDU and UdpNmAllNmMessagesKeepAwake is TRUE the PDU shall not be dropped from further Rx Indication handling. ()

7.8.4 Aggregation of Internal and External Requested Partial Networks

Note: This feature is used by every ECU that has to switch I-PDU-Groups because of the activity of partial networks. (e.g. to prevent false timeouts) I-PDU-Groups shall be switched on if the corresponding PN is requested internally or externally. I-PDU-Groups shall not be switched off until all internal and external requests for the corresponding PN are released.

The logic for switching the IPDU-Groups is implemented by ComM. The UdpNm only provides the information if a PN is requested or not. The COM module is used to transfer the data to the upper layers.

To switch the I-PDU-Groups synchronously on all direct connected ECUs, UdpNm shall provide the information of a request change to the upper layer at (almost) the same time on every ECU. This is why the reset timer is restarted on every received and every sent NM message (see below).

The aggregated state of the internal/external requested PNs is called External
Internal Requests Aggregated (EIRA).

[SWS_UdpNm_00344] If UdpNmPnEiraCalcEnabled is TRUE, the UdpNm shall provide the possibility to store external and internal requested PNs combined over all relevant channels (all UdpNm Channels where UdpNmPnEnabled is TRUE). At initialization the values of all PNs shall be set to 0 (not requested) ] ()

[SWS_UdpNm_00347] If
- UdpNmPnEiraCalcEnabled is TRUE
- a NM-PDU is received
- PNs are requested within this message (bits are set to 1)
- And the requested PNs are set to 1 within the [configured PN filter mask] then UdpNm shall store the request information (value 1) for these PNs ] ()

[SWS_UdpNm_00348] If
- UdpNmPnEiraCalcEnabled is TRUE
- NM-PDU is being requested to send by UdpNM
- PNs are requested within this message (bits are set to 1)
- And the requested PNs are set to 1 within the [configured PN filter mask] then UdpNm shall store the request information (value 1) for these PNs. ] ()

[SWS_UdpNm_00345] If UdpNmPnEiraCalcEnabled is TRUE, the UdpNm module shall provide a possibility to monitor each PN, if this PN is still externally or internally requested on at least one of the relevant channels. ] ()

Note: This means, only one timer is required to handle one PN on multiple connected physical channels. For example: only 8 EIRA reset timers are required to handle the requests of a Gateway with 6 physical channels and 8 partial networks. This is possible because the switch of PN PDU-Groups is done global for the ECU and not dependent of the physical channel.

[SWS_UdpNm_00349] If UdpNmPnEiraCalcEnabled is TRUE and a PN is requested by message reception or sending (see SWS_UdpNM_00347 and SWS_UdpNm_00348) the monitoring for this PN shall be restarted with respect to UdpNmPnResetTime. ] ()

Note: UdpNmPnResetTime shall be configured to a value greater than UdpNmMsgCycleTime. If UdpNmPnResetTime is configured to a value smaller than UdpNmMsgCycleTime and only one ECU requests the PN, the request state toggles in the EIRA because request state is rested before the requesting ECU is able to send the next NM message.
Note: UdpNmPnResetTime shall be configured to a value smaller than UdpNmTimeoutTime to avoid that the timer could elapse after NM already changed to Prepare Bus Sleep.

[SWS_UdpNm_00351] [ If UdpNmPnEiraCalcEnabled is TRUE and a PN is not requested again within UdpNmPnResetTime the corresponding stored value for this PN shall be set to 0 (not requested) ] ()

[SWS_UdpNm_00352] [ If UdpNmPnEiraCalcEnabled is TRUE and the stored value for a PN is set to requested or back to not requested (see SWS_UdpNm_00347, SWS_UdpNm_00348 and SWS_UdpNm_00351) UdpNm shall inform upper layers by calling PduR_UdpNmRxIndication() for the configured EIRA PDU (i.e., changed EIRA information shall be passed to COM). ] ()

[SWS_UdpNm_00372] If UdpNmPnEiraCalcEnabled is TRUE and UdpNmPnEraCalcEnabled is TRUE, the PN status information has to be stored separately for both, the EIRA and ERA information (compare SWS_UdpNM_00344 and SWS_UdpNM_00355) ] ()

7.8.5 Aggregation of External Requested Partial Networks

Note: This feature is used by the Gateways to collect only the external PN requests. The external PN requests are mirrored back to the requesting bus and provided to other (required) physical channels of a central gateway.

In case of a sub gateway the requests bit must not be mirrored back to the requesting physical channel in order to avoid static waking between central- and sub gateways. This logic shall be implemented by the ComM.

The UdpNm module provides the information if the PN is externally requested or not. The COM module is used for data transmission to the upper layer. The aggregated state of the external requested PNs is called “External Requests Aggregated” (ERA).

[SWS_UdpNm_00355] If UdpNmPnEraCalcEnabled is TRUE, the UdpNM shall provide the possibility to store external requested PNs on each relevant channel. At initialization the values of all PNs shall be set to 0 (not requested) ] ()

[SWS_UdpNm_00357] If
- UdpNmPnEraCalcEnabled is TRUE
- a NM-PDU is received
- PNs are requested within this message (bits are set to 1)
- and the requested PNs are set to 1 within the [configured PN filter mask] then UdpNm shall store the request information (value 1) for these PNs ] ()
If UdpNmPnEraCalcEnabled is TRUE, the UdpNm module shall provide a possibility to monitor each relevant channel and for each PN if this PN is still externally requested.}

**Note:** This means, a separate timer is required to handle one PN on multiple physical channels.

For example: 48 ERA reset timers are required to handle the requests of a gateway with 6 physical channels and 8 partial networks. It is not possible to combine the reset timer like EIRA timers, because the external request mustn't be mirrored back to the requesting bus by a sub gateway. Thus it is required to detect the physical channel that is the source of the request bit.

If UdpNmPnEraCalcEnabled is TRUE and a PN is requested by message reception (see SWS_UdpNM_00357) the monitoring for this PN shall be restarted with respect to the UdpNmPnResetTime.

**Note:** UdpNmPnResetTime shall be configured to a value greater than UdpNmMsgCycleTime. If UdpNmPnResetTime is configured to a value smaller than UdpNmMsgCycleTime and only one ECU requests the PN, the request state toggles in the ERA because request state is rested before the requesting ECU is able to send the next NM-PDU.

If UdpNmPnEraCalcEnabled is TRUE and PN is not requested again within UdpNmPnResetTime then the corresponding stored value for this PN shall be set to not requested (value 0).

If UdpNmPnEraCalcEnabled is TRUE and the stored value for a PN changes to requested or back to not requested (see SWS_UdpNm_00357 and SWS_UdpNm_00360), the UdpNm module shall inform the upper layers by calling PduR_UdpNmRxIndication() for the configured ERA PDU (i.e., changed ERA information shall be passed to the COM module).

If UdpNmPnEiraCalcEnabled and UdpNmPnEraCalcEnabled is TRUE, the PN status information has to be stored separately for both EIRA and ERA information (compare SWS_UdpNm_00355).

### 7.8.6 Spontaneous Transmission of NM-PDUs via UdpNm_NetworkRequest

If UdpNm_NetworkRequest is called, UdpNmPnHandleMultipleNetworkRequests is set to TRUE and UdpNm is in Ready Sleep State, Normal Operation State or Repeat Message State, UdpNm shall change to or restart the Repeat Message State.
Note: If `UdpNmPNHandleMultipleNetworkRequests` is set to TRUE the `UdpNm` feature 'Immediate Transmission' is mandatory.

Note: The PN Control Module (e.g. ComM) is responsible to call `UdpNm_NetworkRequest` if the PN request bits changes.

### 7.9 Payload (PDU) Structure

The figure below shows an example for n bytes PDU length:

<table>
<thead>
<tr>
<th>Byte 0</th>
<th>Bit 7</th>
<th>Source Node Identifier (default)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Byte 1</td>
<td>Bit 6</td>
<td>Control Bit Vector (default)</td>
</tr>
<tr>
<td>Byte 2</td>
<td>Bit 5</td>
<td>User data 0</td>
</tr>
<tr>
<td>Byte 3</td>
<td></td>
<td>User data 1</td>
</tr>
<tr>
<td>Byte 4</td>
<td></td>
<td>User data 2</td>
</tr>
<tr>
<td>Byte 5</td>
<td></td>
<td>User data 3</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td>...</td>
</tr>
<tr>
<td>Byte n</td>
<td></td>
<td>User data n-2</td>
</tr>
</tbody>
</table>

#### Figure 4: NM packet payload (NM PDU) default format.

Note:
The length of the Network Management PDU is defined by the PduLength parameter in the "global" ECUC module ([EcuC003_Conf], see Ecu Configuration specification). The difference between number of enabled system bytes and length is the amount of user data bytes.

[SWS_UdpNm_00074] The location of the source node identifier shall be configurable by means of `UDPNM_PDU_NID_POSITION` to Byte 0, Byte 1, or off (default: Byte 0).

[SWS_UdpNm_00075] The location of the control Bit vector shall be configurable by means of `UDPNM_PDU_CBV_POSITION` to Byte 0, Byte 1, or off (default: Byte 1).

[SWS_UdpNm_00076] The length of an NM packet shall not exceed the MTU(Maximum Transmission Unit) of the underlying physical transport layer.

The figure below describes the format of the Control Bit Vector:

<table>
<thead>
<tr>
<th>CBV</th>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Res</td>
<td>PNI</td>
<td>Res</td>
<td>Active Wakeup Bit</td>
<td>NM Coordinator Sleep Ready</td>
<td>Res</td>
<td>R3.2 NM Coordinator ID (High Bit)</td>
<td>Repeat Message Request</td>
</tr>
</tbody>
</table>

#### Figure 5: Control Bit Vector.
The Control Bit Vector shall consist of:

- **Bit 0**: Repeat Message Request
  - 0: Repeat Message State not requested
  - 1: Repeat Message State requested

- **Bit 3**: NM Coordinator Sleep Bit
  - 0: Start of synchronized shutdown is not requested by main coordinator
  - 1: Start of synchronized shutdown is requested by main coordinator

- **Bit 4**: Active Wakeup Bit
  - 0: Node has not woken up the network (passive wakeup)
  - 1: Node has woken up the network (active Wakeup)

- **Bit 6**: Partial Network Information Bit (PNI)
  - 0: NM message contains no Partial Network request information
  - 1: NM message contains Partial Network request information

- **Bit 1, 2, 5, 7**: Reserved for future extensions
  - 0: Disabled / Reserved for future usage

Note: The Control Bit Vector is initialized with 0x00 during initialization (also refer to SWS_UdpNm_00085).

The source node identifier shall be set with the configuration parameter UDPNM_NODE_ID unless UDPNM_PDU_NID_POSITION is set to off.

If the UdpNm module leaves the NetworkMode and UdpNmActiveWakeupBitEnabled is TRUE, the UdpNm module shall clear the ActiveWakeupBit in the CBV.

### 7.10 Functional requirements on UdpNm API

If UdpNmNodeDetectionEnabled and UdpNmRepeatMsgIndEnabled are set to TRUE and Repeat Message Request bit is received, UdpNm module shall call the callback function Nm_RepeatMessageIndication. (SRS_Nm_00153)
If UdpNmUserDataEnabled is enabled and UDPNM_USER_DATA_LENGTH is set to 0x00 an error during configuration or compilation time shall be raised.

7.11 Car Wakeup

The position of the Car Wakeup bit in the NM-PDU is defined by the configuration parameters UdpNmCarWakeUpBytePosition and UdpNmCarWakeUpBitPosition.

If the Car Wakeup bit within any received NM-PDU is 1, UdpNmCarWakeUpRxEnabled is TRUE, and UdpNmCarWakeUpFilterEnabled is FALSE UdpNm shall call Nm_CarWakeUpIndication and perform the standard Rx indication handling.

If UdpNm_GetPduData is called in the context of Nm_CarWakeUpIndication and if UdpNmNodeDetectionEnabled or UdpNmUserDataEnabled or UdpNmNodeIdEnabled is set to TRUE, UdpNm shall return the PDU data of the PDU that causes the call of Nm_CarWakeUpIndication.

Note: This is required to enable ECU to identify detail about the sender of the Car Wakeup request.

If UdpNmCarWakeUpFilterEnabled is TRUE, the Car Wakeup bit within any received NM-PDU is 1, UdpNmCarWakeUpRxEnabled is TRUE and the Node ID in the received NM-PDU is equal to UdpNmCarWakeUpFilterNodeId the UdpNm module shall call Nm_CarWakeUpIndication and perform the standard Rx Indication handling.

Note: The Car Wakeup filter is necessary to realize sub gateways that only consider the Car Wakeup of the central Gateway to avoid wrong wakeups.

7.12 Error Classification

This section describes how the UdpNm module has to manage the error classes that may occur during the life cycle of this basic software.
The general requirements document of AUTOSAR [2] specifies that all basic software modules must distinguish (according to the product life cycle) two error types:

**Development errors**: these errors should be detected and fixed during the development phase. In most cases, these errors are software errors. The detection errors that should only occur during development can be switched off for production code (by static configuration, namely preprocessor switches).

**Production errors**: these errors are hardware errors and software exceptions that cannot be avoided and are expected to occur in the production (i.e. series) code. This kind of error is commonly known as a run-time error.

[SWS_UdpNm_00223]  On errors and exceptions, the UdpNm module shall not modify its current module state. ] ()

### 7.12.1 Development Errors

[SWS_UdpNm_00018]  The following errors shall be detectable by the UdpNm depending on its build version (development/production mode).

<table>
<thead>
<tr>
<th>Type or error</th>
<th>Relevance</th>
<th>Related error code</th>
<th>Error Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>API service used without module initialization</td>
<td>Development</td>
<td>UDPNM_E_UNINIT</td>
<td>0x01</td>
</tr>
<tr>
<td>API service called with wrong channel handle</td>
<td>Development</td>
<td>UDPNM_E_INVALID_CHANNEL</td>
<td>0x02</td>
</tr>
<tr>
<td>API service called with wrong PDU ID.</td>
<td>Development</td>
<td>UDPNM_E_INVALID_PDUID</td>
<td>0x03</td>
</tr>
<tr>
<td>UdpNm initialization has failed, e.g. selected configuration set doesn’t exist</td>
<td>Development</td>
<td>UDPNM_E_INIT_FAILED</td>
<td>0x04</td>
</tr>
<tr>
<td>Null pointer has been passed as an argument</td>
<td>Development</td>
<td>UDPNM_E_PARAM_POINTER</td>
<td>0x12</td>
</tr>
</tbody>
</table>

] ()

### 7.12.2 Run Time Errors

The UdpNm module, currently does not specify any Run Time Error.
7.12.3 Transient Faults
The UdpNm module, currently does not specify any Transient Faults

7.12.4 Production Errors
The UdpNm module, currently does not specify any Production Errors

7.12.5 Extended Production Errors
The UdpNm module, currently does not specify any Extended Production Errors

7.12.6 Error detection
For details refer to the chapter 7.3 “Error Detection” in SWS_BSWGeneral.

7.12.7 Error notification

[SWS_UdpNm_00189] Development errors shall not be returned by API functions; in case of a development error, the respective API function will return E_NOT_OK, if applicable. ] ()

[SWS_UdpNm_00190] Production errors shall not be returned by API functions; in case of a production error, the respective API function will return E_NOT_OK, if applicable. ] ()

[SWS_UdpNm_00191] If not initialized, the NM shall reject every API service apart from UdpNm_Init; the called function shall not be executed, but instead of that it shall report UDPNM_E_UNINIT to the Default Error Tracer (if development error detection is enabled) and it shall return E_NOT_OK to the calling function ] ()

[SWS_UdpNm_00192] When NM API service with an invalid network handle is called, the called function shall not be executed, but instead of that it shall report UDPNM_E_INVALID_CHANNEL to the Default Error Tracer (if development error detection is enabled) otherwise it shall return E_NOT_OK to the calling function] ()

Note: The network handle is invalid if it is different from allowed configured values.

[SWS_UdpNm_00463] When UdpNm Callback Notifications with an invalid Pdu ID are called, the called function shall not be executed and E_NOT_OK shall be returned if possible. If Development Error Detection is enabled then additionally UdpNm shall report UDPNM_E_INVALID_PDUID to the Default Error Tracer. ] ()
[SWS_UdpNm_00314] If UdpNmComUserDataSupport is enabled and the UdpNm User Data length does not match with the length of the referenced I-PDU an error shall be reported at generation time.

Note: NULL Pointer checking is specified within BSW General [22]

7.13 Scheduling of the main function

For details refer to the chapter 8.5 “Scheduled functions” in SWS_BSWGeneral.

7.14 Application notes

7.14.1 Wakeup notification

Wakeup notification is defined in detail in the ECU State Manager specification [11].

7.14.2 Coordination of coupled networks

[SWS_UdpNm_00185] Support of bus synchronization on demand shall be statically configurable with use of the UdpNmBusSynchronizationEnabled switch (configuration parameter).

Note: Since the shutdown of UdpNm can be done at any time, the call of the API Nm_SynchronizationPoint is not supported.

7.14.3 Debugging Concept

For details refer to the chapter 7.1.17 “Debugging support” in SWS_BSWGeneral.

7.15 Version check

For details refer to the chapter 5.1.8 “Version Check” in SWS_BSWGeneral.

7.16 Parameter check

[SWS_UdpNm_00196] If detection of development errors is enabled by UDPNM_DEV_ERROR_DETECT (configuration parameter), validity checks for all input parameters shall be performed for each UDP NM API service call.
Parameter type checking shall be performed at compile time; if types do not match, the compilation process shall be stopped and respective compilation warnings or errors shall be returned as far as supported by the compiler.

Parameter value check (for parameters of the constant value) shall be performed at configuration time; if the value is invalid, the configuration process shall be stopped and the respective configuration error shall be reported.

Parameter value check (for parameters of the variable value) shall be performed at execution time; if the value is invalid, execution of a service shall be denied and the respective development error shall be reported.
8 API specification

[SWS_UdpNm_00244] [ The UdpNm module shall reject the execution of a service called with an invalid parameter and shall inform the DET. ] ()

AUTOSAR UdpNm API consists of services, which are UDP specific and can be called whenever they are required; each service apart from UdpNm_Init refers to one NM channel only.

8.1 Imported Types

The following types of Std_Types.h are imported:

- boolean
- uint8
- uint16
- uint32

<table>
<thead>
<tr>
<th>Module</th>
<th>Imported Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>ComStack_Types</td>
<td>NetworkHandleType</td>
</tr>
<tr>
<td></td>
<td>PduIdType</td>
</tr>
<tr>
<td></td>
<td>PduInfoType</td>
</tr>
<tr>
<td>Nm</td>
<td>Nm_ModeType</td>
</tr>
<tr>
<td></td>
<td>Nm_StateType</td>
</tr>
<tr>
<td>Std_Types</td>
<td>Std_ReturnType</td>
</tr>
<tr>
<td></td>
<td>Std_VersionInfoType</td>
</tr>
</tbody>
</table>

8.2 Type Definitions

8.2.1 UdpNm_ConfigType

This type shall contain the parameters of the container UdpNm_GlobalConfig and its sub containers.

[SWS_UdpNm_00308] [ ]

| Name:                  | UdpNm_ConfigType               |
| Type:                  | Structure                      |
| Element:               | void                           |
|                        | implementation specific        |
|                        | This type shall contain the parameters of the container UdpNm_GlobalConfig and its sub containers. |
| Description:           | --                            |
8.3 Function definitions

8.3.1 UdpNm_Init

[SWS_UdpNm_00208]

<table>
<thead>
<tr>
<th>Service name</th>
<th>UdpNm_Init</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syntax</td>
<td>void UdpNm_Init(</td>
</tr>
<tr>
<td></td>
<td>const UdpNm_ConfigType* UdpNmConfigPtr</td>
</tr>
<tr>
<td>Service ID[hex]:</td>
<td>0x01</td>
</tr>
<tr>
<td>Sync/Async:</td>
<td>Synchronous</td>
</tr>
<tr>
<td>Reentrancy:</td>
<td>Non Reentrant</td>
</tr>
<tr>
<td>Parameters (in):</td>
<td>UdpNmConfigPtr</td>
</tr>
<tr>
<td>Parameters (inout):</td>
<td>None</td>
</tr>
<tr>
<td>Parameters (out):</td>
<td>None</td>
</tr>
<tr>
<td>Return value:</td>
<td>None</td>
</tr>
<tr>
<td>Description:</td>
<td>Initialize the complete UdpNm module, i.e. all channels which are activated at configuration time are initialized. A UDP socket shall be set up with the TCP/IP stack. Caveats: This function has to be called after initialization of the TCP/IP stack.</td>
</tr>
</tbody>
</table>

[SWS_UdpNm_00210] If an error has to be indicated to the DET the value 0x00 shall be used as the instance id. ] ()

Rationale: the value 0x00 is not error value but instance ID

8.3.2 UdpNm_PassiveStartUp

[SWS_UdpNm_00211]

**Service name:** UdpNm_PassiveStartUp

**Syntax:**
```
Std_ReturnType UdpNm_PassiveStartUp(
    NetworkHandleType nmChannelHandle
)
```

**Service ID[hex]:** 0x0e

**Sync/Async:** Asynchronous

**Reentrancy:** Reentrant (but not for the same NM-Channel)

**Parameters (in):**
- nmChannelHandle: Identification of the NM-channel

**Parameters (inout):** None

**Parameters (out):** None

**Return value:**
- Std_ReturnType
  - E_OK: No error
  - E_NOT_OK: Passive startup of network management has failed

**Description:**
Passive startup of the AUTOSAR UdpNm. It triggers the transition from Bus-Sleep Mode or Prepare Bus Sleep Mode to the Network Mode in Repeat Message State.

**Caveats:**
- UdpNm is initialized correctly.

**Configuration:**
Mandatory

---

[SW_UdpNm_00147] | If UdpNm_PassiveStartUp is called in the Network Mode, the UdpNm module shall not execute this service and shall return E_NOT_OK. |

---

**8.3.3 UdpNm_NetworkRequest**

**Service name:** UdpNm_NetworkRequest

**Syntax:**
```
Std_ReturnType UdpNm_NetworkRequest(
    NetworkHandleType nmChannelHandle
)
```

**Service ID[hex]:** 0x02

**Sync/Async:** Asynchronous

**Reentrancy:** Reentrant (but not for the same NM-Channel)

**Parameters (in):**
- nmChannelHandle: Identification of the NM-channel

**Parameters (inout):** None

**Parameters (out):** None

**Return value:**
- Std_ReturnType
  - E_OK: No error
  - E_NOT_OK: Requesting of network has failed

**Description:**
Request the network, since ECU needs to communicate on the bus. Network state shall be changed to 'requested'

**Caveats:**
- UdpNm is initialized correctly.

**Configuration:**
Optional (Only available if UdpNmPassiveModeEnabled == false)
8.3.4 UdpNm_NetworkRelease

[SWS_UdpNm_00214] [  

<table>
<thead>
<tr>
<th>Service name:</th>
<th>UdpNm_NetworkRelease</th>
</tr>
</thead>
</table>
| Syntax:      | Std_ReturnType UdpNm_NetworkRelease(  
|              |   NetworkHandleType nmChannelHandle  ) |
| Service ID[hex]: | 0x03 |
| Sync/Async:  | Asynchronous |
| Reentrancy:  | Reentrant (but not for the same NM-Channel) |
| Parameters (in): | nmChannelHandle Identification of the NM-channel |
| Parameters (inout): | None |
| Parameters (out): | None |
| Return value: | Std_ReturnType  
|              |   E_OK: No error  
|              |   E_NOT_OK: Releasing of network has failed |
| Description: | Release the network, since ECU doesn't have to communicate on the bus.  
|              | Network state shall be changed to 'released'.  
|              | Caveats:  
|              | UdpNm is initialized correctly.  
|              | Configuration:  
|              | Optional (Only available if UdpNmPassiveModeEnabled == false) |

] ()

8.3.5 UdpNm_DisableCommunication

[SWS_UdpNm_00215] [  

<table>
<thead>
<tr>
<th>Service name:</th>
<th>UdpNm_DisableCommunication</th>
</tr>
</thead>
</table>
| Syntax:      | Std_ReturnType UdpNm_DisableCommunication(  
|              |   NetworkHandleType nmChannelHandle  ) |
| Service ID[hex]: | 0x0c |
| Sync/Async:  | Asynchronous |
| Reentrancy:  | Reentrant (but not for the same NM-Channel) |
| Parameters (in): | nmChannelHandle Identification of the NM-channel |
| Parameters (inout): | None |
| Parameters (out): | None |
| Return value: | Std_ReturnType  
|              |   E_OK: No error  
|              |   E_NOT_OK: Disabling of NM PDU transmission ability has failed |
| Description: | Disable the NM PDU transmission ability due to a ISO14229 Communication Control (0x28) service  
|              | Caveats:  
|              | UdpNm is initialized correctly.  
|              | Configuration:  
|              | Optional (Only available if UdpNmComControlEnabled == true) |

] (SRS_Nm_02512)
8.3.6 UdpNm_EnableCommunication

[SWS_UdpNm_00216] [ The optional service UdpNm_EnableCommunication shall enable the NM PDU transmission ability if the NM PDU transmission ability is disabled. ] ()

[SWS_UdpNm_00176] [ The optional service UdpNm_EnableCommunication shall return E_NOT_OK if the NM PDU transmission ability is already enabled when the service is called. ] ()

[SWS_UdpNm_00305] [ The service UdpNm_EnableCommunication shall return E_NOT_OK, if the current mode is not Network Mode. ] ()

[SWS_UdpNm_00306] [ If the module operates in passive mode (UdpNmPassiveModeEnabled is TRUE) the service UdpNm_EnableCommunication shall have no effects and shall directly return E_NOT_OK. ] ()

8.3.7 UdpNm_SetUserData

[SWS_UdpNm_00217] [ ]
### Service name: UdpNm_SetUserData

**Syntax:**
```c
Std_ReturnType UdpNm_SetUserData(
    NetworkHandleType nmChannelHandle,
    const uint8* nmUserDataPtr
)
```

- **Service ID[hex]:** 0x04
- **Sync/Async:** Synchronous
- **Reentrancy:** Non Reentrant

**Parameters (in):**
- `nmChannelHandle`: Identification of the NM-channel
- `nmUserDataPtr`: Pointer where the user data for the next transmitted NM message shall be copied from.

**Parameters (inout):** None

**Parameters (out):** None

**Return value:**
- `Std_ReturnType`
  - `E_OK`: No error
  - `E_NOT_OK`: Setting of user data has failed

**Description:**
Set user data for all NM messages transmitted on the bus after this function has returned without error.

**Caveats:**
UdpNm is initialized correctly.

**Configuration:**
Optional (Only available if UdpNmUserDataEnabled == true and UdpNmPassiveModeEnabled == false).

---

### 8.3.8 UdpNm_GetUserData

[SWS_UdpNm_00218] [ ]

**Service name:** UdpNm_GetUserData

**Syntax:**
```c
Std_ReturnType UdpNm_GetUserData(
    NetworkHandleType nmChannelHandle,
    uint8* nmUserDataPtr
)
```

- **Service ID[hex]:** 0x05
- **Sync/Async:** Synchronous
- **Reentrancy:** Non Reentrant

**Parameters (in):**
- `nmChannelHandle`: Identification of the NM-channel

**Parameters (inout):** None

**Parameters (out):**
- `nmUserDataPtr`: Pointer where user data out of the most recently received NM message shall be copied to.

**Return value:**
- `Std_ReturnType`
  - `E_OK`: No error
  - `E_NOT_OK`: Getting of user data has failed

**Description:**
Get user data from the most recently received NM message.

**Caveats:**
UdpNm is initialized correctly.

**Configuration:**
Optional (Only available if UdpNmUserDataEnabled == true).
8.3.9 UdpNm_GetNodeIdentifier

[SWS_UdpNm_00219] [ ]

<table>
<thead>
<tr>
<th>Service name:</th>
<th>UdpNm_GetNodeIdentifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syntax:</td>
<td>Std_ReturnType UdpNm_GetNodeIdentifier(</td>
</tr>
<tr>
<td></td>
<td>NetworkHandleType nmChannelHandle,</td>
</tr>
<tr>
<td></td>
<td>uint8* nmNodeIdPtr</td>
</tr>
<tr>
<td>Service ID[hex]:</td>
<td>0x06</td>
</tr>
<tr>
<td>Sync/Async:</td>
<td>Synchronous</td>
</tr>
<tr>
<td>Reentrancy:</td>
<td>Reentrant</td>
</tr>
<tr>
<td>Parameters (in):</td>
<td>nmChannelHandle Identification of the NM-channel</td>
</tr>
<tr>
<td>Parameters (inout):</td>
<td>None</td>
</tr>
<tr>
<td>Parameters (out):</td>
<td>nmNodeIdPtr Pointer where the source node identifier from the most recently received NM PDU shall be copied to.</td>
</tr>
<tr>
<td>Return value:</td>
<td>Std_ReturnType E_OK: No error E_NOT_OK: Getting of the node identifier out of the most recently received NM PDU has failed or is not configured for this network handle.</td>
</tr>
<tr>
<td>Description:</td>
<td>Get node identifier from the most recently received NM PDU.</td>
</tr>
<tr>
<td>Caveats:</td>
<td>UdpNm is initialized correctly.</td>
</tr>
</tbody>
</table>

] ()

[SWS_UdpNm_00132] [ ] The service call UdpNm_GetNodeIdentifier shall provide the node identifier out of the most recently received Network Management PDU if UdpNmNodeIdEnabled is set to TRUE. ] ()

8.3.10 UdpNm_GetLocalNodeIdentifier

[SWS_UdpNm_00220] [ ]

<table>
<thead>
<tr>
<th>Service name:</th>
<th>UdpNm_GetLocalNodeIdentifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syntax:</td>
<td>Std_ReturnType UdpNm_GetLocalNodeIdentifier(</td>
</tr>
<tr>
<td></td>
<td>NetworkHandleType nmChannelHandle,</td>
</tr>
<tr>
<td></td>
<td>uint8* nmNodeIdPtr</td>
</tr>
<tr>
<td>Service ID[hex]:</td>
<td>0x07</td>
</tr>
<tr>
<td>Sync/Async:</td>
<td>Synchronous</td>
</tr>
<tr>
<td>Reentrancy:</td>
<td>Reentrant</td>
</tr>
<tr>
<td>Parameters (in):</td>
<td>nmChannelHandle Identification of the NM-channel</td>
</tr>
<tr>
<td>Parameters (inout):</td>
<td>None</td>
</tr>
<tr>
<td>Parameters (out):</td>
<td>nmNodeIdPtr Pointer where node identifier of the local node shall be copied to.</td>
</tr>
<tr>
<td>Return value:</td>
<td>Std_ReturnType E_OK: No error E_NOT_OK: Getting of the node identifier of the local node has failed or is not configured for this network handle.</td>
</tr>
<tr>
<td>Description:</td>
<td>Get node identifier configured for the local node.</td>
</tr>
<tr>
<td>Caveats:</td>
<td>UdpNm is initialized correctly.</td>
</tr>
</tbody>
</table>

] ()
The service call UdpNm_GetLocalNodeIdentifier shall provide the node identifier configured for the local host node if UdpNmNodeIdEnabled is set to TRUE.

### 8.3.11 UdpNm_RepeatMessageRequest

**Service name:** UdpNm_RepeatMessageRequest  
**Syntax:**  
stdReturnType UdpNm_RepeatMessageRequest(  
    NetworkHandleType nmChannelHandle  
)  
**Service ID[hex]:** 0x08  
**Sync/Async:** Asynchronous  
**Reentrancy:** Reentrant (but not for the same NM-Channel)  
**Parameters (in):** nmChannelHandle — Identification of the NM-channel  
**Parameters (inout):** None  
**Parameters (out):** None  
**Return value:** Std_ReturnType  
E_OK: No error  
E_NOT_OK: Setting of Repeat Message Request Bit has failed or is not configured for this network handle.  
**Description:** Set Repeat Message Request Bit for all NM messages transmitted on the bus after this function has returned without error.  
**Caveats:**  
UdpNm is initialized correctly.

### 8.3.12 UdpNm_GetPduData

**Service name:** UdpNm_GetPduData  
**Syntax:**  
stdReturnType UdpNm_GetPduData(  
    NetworkHandleType nmChannelHandle,  
    uint8* nmPduDataPtr  
)  
**Service ID[hex]:** 0x0a  
**Sync/Async:** Synchronous  
**Reentrancy:** Reentrant  
**Parameters (in):** nmChannelHandle — Identification of the NM-channel  
**Parameters (inout):** None  
**Parameters (out):** nmPduDataPtr — Pointer where NM PDU shall be copied to.  
**Return value:** Std_ReturnType  
E_OK: No error  
E_NOT_OK: Getting of NM PDU Data has failed or is not configured for this network handle.  
**Description:** Get the whole PDU data out of the most recently received NM message.  
**Caveats:**  
UdpNm is initialized correctly.
The service call `UdpNm_GetPduData` shall provide whole payload (Source Node ID, Control Bit Vector and User Data) of the most recently received Network Management PDU if `UdpNmNodeDetectionEnabled` or `UdpNmUserDataEnabled` or `UdpNmNodeIdEnabled` is set to TRUE.

### 8.3.13 UdpNm_GetState

**Service name:** UdpNm_GetState

**Syntax:**

```c
Std_ReturnType UdpNm_GetState(  
    NetworkHandleType nmChannelHandle,  
    Nm_StateType* nmStatePtr,  
    Nm_ModeType* nmModePtr  
)
```

**Service ID[hex]:** 0x0b

**Sync/Async:** Synchronous

**Reentrancy:** Reentrant

**Parameters (in):** `nmChannelHandle` Identification of the NM-channel

**Parameters (inout):** None

**Parameters (out):**

- `nmStatePtr` Pointer where state of the network management shall be copied to.
- `nmModePtr` Pointer where the mode of the network management shall be copied to.

**Return value:** `Std_ReturnType`

- `E_OK`: No error
- `E_NOT_OK`: Getting of NM state has failed

**Description:**

Returns the state and the mode of the network management.

**Caveats:**

UdpNm is initialized correctly.

**Configuration:**

Mandatory

### 8.3.14 UdpNm_GetVersionInfo

**Service name:** UdpNm_GetVersionInfo

**Syntax:**

```c
void UdpNm_GetVersionInfo(  
    Std_VersionInfoType* versioninfo  
)
```

**Service ID[hex]:** 0x09

**Sync/Async:** Synchronous

**Reentrancy:** Reentrant

**Parameters (in):** None

**Parameters (inout):** None

**Parameters (out):** `versioninfo` Pointer to where to store the version information of this module.

**Return value:** None

**Description:**

This service returns the version information of this module.
If DET is enabled for the UdpNm module, the function UdpNm_GetVersionInfo shall raise UDPNM_E_PARAM_POINTER, if the argument versioninfo is a NULL pointer and return without any action.

8.3.15 UdpNm_RequestBusSynchronization

If DET is enabled for the UdpNm module, the function UdpNm_RequestBusSynchronization shall trigger transmission of a single Network Management PDU if UdpNmPassiveModeEnabled is FALSE.

Rationale: This service is typically used for supporting the NM gateway extensions.

8.3.16 UdpNm_CheckRemoteSleepIndication

If UdpNm_RequestBusSynchronization is called in Bus-Sleep Mode and Prepare Bus-Sleep Mode the UdpNm module shall not execute the service and shall return E_NOT_OK.
Service name: UdpNm_CheckRemoteSleepIndication

Syntax: Std_ReturnType UdpNm_CheckRemoteSleepIndication(
    NetworkHandleType nmChannelHandle,
    boolean* NmRemoteSleepIndPtr
)

Service ID[hex]: 0x11
Sync/Async: Synchronous
Reentrancy: Reentrant (but not for the same NM-Channel)
Parameters (in): nmChannelHandle: Identification of the NM-channel
Parameters (inout): None
Parameters (out): NmRemoteSleepIndPtr: Pointer where check result of remote sleep indication shall be copied to.
Return value: Std_ReturnType: E_OK: No error, E_NOT_OK: Checking of remote sleep indication bits has failed

Description: Check if remote sleep indication takes place or not.
Caveats: UdpNm is initialized correctly.
Configuration: Optional (only available if UdpNmRemoteSleepIndEnabled == true)

The service call UdpNm_CheckRemoteSleepIndication shall provide the information about current status of Remote Sleep Indication (i.e. already detected or not).

8.3.17 UdpNm_SetSleepReadyBit

Service name: UdpNm_SetSleepReadyBit

Syntax: Std_ReturnType UdpNm_SetSleepReadyBit(
    NetworkHandleType nmChannelHandle,
    boolean nmSleepReadyBit
)

Service ID[hex]: 0x16
Sync/Async: Synchronous
Reentrancy: Non Reentrant
Parameters (in): nmChannelHandle: Identification of the NM-channel
nmSleepReadyBit: Value written to ReadySleep Bit in CBV
Parameters (inout): None
Parameters (out): None
Return value: Std_ReturnType: E_OK: No error, E_NOT_OK: Writing of remote sleep indication bit has failed

Description: Set the NM Coordinator Sleep Ready bit in the Control Bit Vector

8.3.18 UdpNm_Transmit

Service name: UdpNm_Transmit

Syntax: Std_ReturnType UdpNm_Transmit(
    NetworkHandleType nmChannelHandle,
    uint32T* msgPtr,
    boolean msgInclude
)

Service ID[hex]: 0x23
Sync/Async: Synchronous
Reentrancy: Non Reentrant
Parameters (in): nmChannelHandle: Identification of the NM-channel
msgPtr: Pointer to message data
msgInclude: Boolean indicating if message shall be included in packet
Parameters (inout): None
Parameters (out): None
Return value: Std_ReturnType: E_OK: No error, E_NOT_OK: Writing of remote sleep indication bit has failed

Description: Transmit message via UDP network
Caveats: UdpNm is initialized correctly.
Configuration: Required (only available if UdpNmRemoteTransmitEnabled == true)

The service call UdpNm_Transmit shall allow the sending of messages via the UDP network.
### Service name: UdpNm_Transmit

**Syntax:**
```c
Std_ReturnType UdpNm_Transmit(
    PduIdType TxPduId,
    const PduInfoType* PduInfoPtr
)
```

**Service ID[hex]:** 0x49

**Sync/Async:** Synchronous

**Reentrancy:** Reentrant for different PduIds. Non reentrant for the same PduId.

**Parameters (in):**
- **TxPduId**: Identifier of the PDU to be transmitted
- **PduInfoPtr**: Length of and pointer to the PDU data and pointer to MetaData.

**Parameters (out):** None

**Return value:**
- **Std_ReturnType E_OK**: Transmit request has been accepted.
- **E_NOT_OK**: Transmit request has not been accepted.

**Description:** Requests transmission of a PDU.

---

### Call-back notifications

#### 8.4 Call-back notifications

##### 8.4.1 UdpNm_SoAdIfTxConfirmation

**Service name:** UdpNm_SoAdIfTxConfirmation

**Syntax:**
```c
void UdpNm_SoAdIfTxConfirmation(
    PduIdType TxPduId,
    Std_ReturnType result
)
```

**Service ID[hex]:** 0x40

**Sync/Async:** Synchronous

**Reentrancy:** Reentrant for different PduIds. Non reentrant for the same PduId.

**Parameters (in):**
- **TxPduId**: ID of the PDU that has been transmitted.
- **result**: E_OK: The PDU was transmitted. E_NOT_OK: Transmission of the PDU failed.

**Parameters (out):** None

**Return value:** None

**Description:** The lower layer communication interface module confirms the transmission of a PDU, or the failure to transmit a PDU.

---

Note: The callback function UdpNm_SoAdIfTxConfirmation is called by the SoAd and is implemented by the UdpNm module.

Note: The callback function UdpNm_SoAdIfTxConfirmation is either called on interrupt level (interrupt mode) or on task level (Polling Mode) with respect to the
context.

The value passed to UdpNm via the API parameter TxPduId shall refer to the NM channel handle, i.e. a mapping from Pduld to NM channel handle is not necessary.

[SWS_UdpNm_00316] If UdpNmComUserDataSupport is enabled the UdpNm shall call PduR_UdpNmTxConfirmation within the message transmission confirmation function UdpNm_SoAdIfTxConfirmation called by the SoAd and with result passed by SoAd } ()

8.4.2 UdpNm_SoAdIfRxIndication

[SWS_UdpNm_00231] [SWS_UdpNm_91001] [SWS_UdpNm_00231]

<table>
<thead>
<tr>
<th>Service name:</th>
<th>UdpNm_SoAdIfRxIndication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syntax:</td>
<td>void UdpNm_SoAdIfRxIndication(</td>
</tr>
<tr>
<td></td>
<td>PduIdType RxPduId,</td>
</tr>
<tr>
<td></td>
<td>const PduInfoType* PduInfoPtr</td>
</tr>
<tr>
<td>Service ID[hex]:</td>
<td>0x42</td>
</tr>
<tr>
<td>Sync/Async:</td>
<td>Synchronous</td>
</tr>
<tr>
<td>Reentrancy:</td>
<td>Reentrant for different PduIds. Non reentrant for the same PduId.</td>
</tr>
<tr>
<td>Parameters (in):</td>
<td>RxPduId: ID of the received PDU.</td>
</tr>
<tr>
<td></td>
<td>PduInfoPtr: Contains the length (SduLength) of the received PDU, a pointer to a buffer (SduDataPtr) containing the PDU, and the MetaData related to this PDU.</td>
</tr>
<tr>
<td>Parameters (inout):</td>
<td>None</td>
</tr>
<tr>
<td>Parameters (out):</td>
<td>None</td>
</tr>
<tr>
<td>Return value:</td>
<td>None</td>
</tr>
<tr>
<td>Description:</td>
<td>Indication of a received PDU from a lower layer communication interface module.</td>
</tr>
</tbody>
</table>

The callback function UdpNm_SoAdIfRxIndication called by the SoAd and implemented by the UdpNm module. It is called in case of a receive indication event of the SoAd.

The value passed to UdpNm via the API parameter udpNmRxPduld shall refer to the UdpNm channel handle, i.e. a mapping from Pduld to UdpNm channel handle is not necessary.

8.4.3 UdpNm_TriggerTransmit

[SWS_UdpNm_91001] [SWS_UdpNm_00231] [SWS_UdpNm_91001] [SWS_UdpNm_00231] [SWS_UdpNm_91001] [SWS_UdpNm_00231] [SWS_UdpNm_91001] [SWS_UdpNm_00231] [SWS_UdpNm_91001] [SWS_UdpNm_00231] [SWS_UdpNm_91001]
Service name: UdpNm_TriggerTransmit

Syntax:
Std_ReturnType UdpNm_TriggerTransmit(
    PduIdType TxPduId,
    PduInfoType* PduInfoPtr
)

Service ID[hex]: 0x41

Sync/Async: Synchronous

Reentrancy: Reentrant for different PduIds. Non reentrant for the same PduId.

Parameters (in):
TxPduId ID of the SDU that is requested to be transmitted.

Parameters (inout):
PduInfoPtr Contains a pointer to a buffer (SduDataPtr) to where the SDU data shall be copied, and the available buffer size in SduLength. On return, the service will indicate the length of the copied SDU data in SduLength.

Parameters (out): None

Return value:
E_OK: SDU has been copied and SduLength indicates the number of copied bytes.
E_NOT_OK: No SDU data has been copied. PduInfoPtr must not be used since it may contain a NULL pointer or point to invalid data.

Description:
Within this API, the upper layer module (called module) shall check whether the available data fits into the buffer size reported by PduInfoPtr->SduLength. If it fits, it shall copy its data into the buffer provided by PduInfoPtr->SduDataPtr and update the length of the actual copied data in PduInfoPtr->SduLength. If not, it returns E_NOT_OK without changing PduInfoPtr.

⌋ ()

[SWS_UdpNm_00377] If UdpNmComUserDataSupport is enabled the UdpNm shall collect the NM User Data from the referenced NM I-PDU by calling PduR_UdpNmTriggerTransmit and combine the user data with the further NM bytes within the call of UdpNm_TriggerTransmit. ] (SRS_Nm_02503)

[SWS_UdpNm_00378] The function UdpNm_TriggerTransmit shall copy the NM PDU data of the according NM PDU requested by TxPduId. ] ()

Note: The function UdpNm_TriggerTransmit might be called by the SoAd in an interrupt context.

8.5 Scheduled Functions

8.5.1 UdpNm_MainFunction_<InstanceId>

[SWS_UdpNm_00234]
Service name: UdpNm_MainFunction<Instance_Id>

Syntax:

```c
void UdpNm_MainFunction<Instance_Id>(
    void
)
```

Service ID[hex]: 0x13

Description:
Main function of the UdpNm which processes the algorithm described in this document. E.g.:

- UdpNm_MainFunction_0() represents the UdpNm instance for the UDP channel 0
- UdpNm_MainFunction_1() represents the UdpNm instance for the UDP channel 1
- ...

Inform the DET (if enabled) if function call has failed because of the following reasons:
UdpNm was not initialized (UDPNM_E_UNINIT)

If an error has to be indicated to the DET the <Instance Id> shall be used as the instance id.

Caveats:
UdpNm is initialized correctly, i.e. the function shall be robust if one or more channels are not initialized

Configuration:
Mandatory

8.6 Expected Interfaces

In this chapter all interfaces required from other modules are listed.

8.6.1 Mandatory Interfaces

This chapter defines all interfaces which are required to fulfill the core functionality of the module.

<table>
<thead>
<tr>
<th>API function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nm_BusSleepMode</td>
<td>Notification that the network management has entered Bus-Sleep Mode.</td>
</tr>
<tr>
<td>Nm_NetworkMode</td>
<td>Notification that the network management has entered Network Mode.</td>
</tr>
<tr>
<td>Nm_NetworkStartIndication</td>
<td>Notification that a NM-message has been received in the Bus-Sleep Mode, what indicates that some nodes in the network have already entered the Network Mode.</td>
</tr>
<tr>
<td>Nm_PrepareBusSleepMode</td>
<td>Notification that the network management has entered Prepare Bus-Sleep Mode.</td>
</tr>
<tr>
<td>SoAd_IlTransmit</td>
<td>Requests transmission of a PDU.</td>
</tr>
</tbody>
</table>
8.6.2 Optional Interfaces

This chapter defines all interfaces which are required to fulfill an optional functionality of the module.

<table>
<thead>
<tr>
<th>API function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Det_ReportError</td>
<td>Service to report development errors.</td>
</tr>
<tr>
<td>Nm_CarWakeUpIndication</td>
<td>This function is called by a &lt;Bus&gt;Nm to indicate reception of a CWU request.</td>
</tr>
<tr>
<td>Nm_CoordReadyToSleepCancellation</td>
<td>Cancels an indication, when the NM Coordinator Sleep Ready bit in the Control Bit Vector is set back to 0.</td>
</tr>
<tr>
<td>Nm_CoordReadyToSleepIndication</td>
<td>Sets an indication, when the NM Coordinator Sleep Ready bit in the Control Bit Vector is set.</td>
</tr>
<tr>
<td>Nm_PDUrxIndication</td>
<td>Notification that a NM message has been received.</td>
</tr>
<tr>
<td>Nm_RemoteSleepCancellation</td>
<td>Notification that the network management has detected that not all other nodes on the network are longer ready to enter Bus-Sleep Mode.</td>
</tr>
<tr>
<td>Nm_RemoteSleepIndication</td>
<td>Notification that the network management has detected that all other nodes on the network are ready to enter Bus-Sleep Mode.</td>
</tr>
<tr>
<td>Nm_RepeatMessageIndication</td>
<td>Service to indicate that an NM message with set Repeat Message Request Bit has been received.</td>
</tr>
<tr>
<td>Nm_StateChangeNotification</td>
<td>Notification that the state of the lower layer &lt;BusNm&gt; has changed.</td>
</tr>
<tr>
<td>Nm_TxTimeoutException</td>
<td>Service to indicate that an attempt to send an NM message failed.</td>
</tr>
<tr>
<td>PduR_UdpNmRxIndication</td>
<td>Indication of a received PDU from a lower layer communication interface module.</td>
</tr>
<tr>
<td>PduR_UdpNmTriggerTransmit</td>
<td>Within this API, the upper layer module (called module) shall check whether the available data fits into the buffer size reported by PduInfoPtr-&gt;SduLength. If it fits, it shall copy its data into the buffer provided by PduInfoPtr-&gt;SduDataPtr and update the length of the actual copied data in PduInfoPtr-&gt;SduLength. If not, it returns E_NOT_OK without changing PduInfoPtr.</td>
</tr>
<tr>
<td>PduR_UdpNmTxConfirmation</td>
<td>The lower layer communication interface module confirms the transmission of a PDU, or the failure to transmit a PDU.</td>
</tr>
</tbody>
</table>

8.6.3 Configurable interfaces

Not applicable

8.7 Service Interfaces

Not applicable
8.8 UML State chart diagram

The following figure shows an UML state diagram with respect to the API specification. Mode change related transitions are denoted in green, error handling related transitions in red and optional node detection related transitions in blue.

Figure 6: State chart diagram.
9 Sequence diagrams and Transition Tables

9.1 UdpNmTransmission

Figure 7: Sequence diagram – PDU transmission.

9.2 UdpNm Reception

<table>
<thead>
<tr>
<th>Call direction</th>
<th>Action/Decision</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SoAd→UdpNm</td>
<td>UdpNm_SoAdIfRxIndication()</td>
<td></td>
</tr>
</tbody>
</table>
Figure 8: Sequence diagram – PDU reception.
10 Configuration specification

In general, this chapter defines configuration parameters and their clustering into containers. In order to support the specification chapter 10.1 describes fundamentals. It also specifies a template (table) to be use for the parameter specification. Chapter 10.1 is intended to remain in the specification document to ensure comprehensiveness.

Chapter 10.2 specifies the structure (containers) and the parameters of module UdpNm.

Chapter 10.3 specifies published information of module UdpNm.

10.1 How to read this chapter

For details refer to the chapter 10.1 “Introduction to configuration specification” in SWS_BSWGeneral.

10.2 Containers and configuration parameters

The configuration parameters as defined in this chapter are used to create a data model for an AUTOSAR tool chain. The realization in the code is implementation specific.

The configuration parameters as defined in this chapter are used to create a data model for an AUTOSAR tool chain. The realization in the code is implementation specific.

The configuration parameters are divided into parameters used to enable features, parameters affecting all instances of the UdpNm and parameters affecting the respective instances of the UdpNm.

[SWS_UdpNm_00026] [All configuration items shall be located outside the kernel of the module.] ()

[SWS_UdpNm_00201] [The Global Scope specifies configuration parameter that shall be defined in the module’s configuration header file UdpNm_Cfg.h.] ()

[SWS_UdpNm_00202] [The container UdpNm_ChannelConfig specifies configuration parameter that shall be located in a data structure of type UdpNm_ConfigType.] ()

[SWS_UdpNm_00203] [Runtime configurable parameters listed in container UdpNm_ChannelConfig shall be configurable for each NM-cluster separately.] ()
### 10.2.1 UdpNm

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00088 :</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Module Name</strong></td>
<td>UdpNm</td>
</tr>
<tr>
<td><strong>Module Description</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>Post-Build Variant Support</strong></td>
<td>true</td>
</tr>
<tr>
<td><strong>Supported Config Variants</strong></td>
<td>VARIANT-LINK-TIME, VARIANT-PRE-COMPILE</td>
</tr>
</tbody>
</table>

**Included Containers**

<table>
<thead>
<tr>
<th>Container Name</th>
<th>Multiplicity</th>
<th>Scope / Dependency</th>
</tr>
</thead>
<tbody>
<tr>
<td>UdpNmGlobalConfig</td>
<td>1</td>
<td>This container contains all global configuration parameters of UDP NM configured from the CanTrcv Module perspective.</td>
</tr>
</tbody>
</table>

### 10.2.2 UdpNmGlobalConfig

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00001 :</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Container Name</strong></td>
<td>UdpNmGlobalConfig</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>This container contains all global configuration parameters of UDP NM configured from the CanTrcv Module perspective.</td>
</tr>
</tbody>
</table>

**Configuration Parameters**

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00006 :</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>UdpNmBusSynchronizationEnabled</td>
</tr>
<tr>
<td><strong>Parent Container</strong></td>
<td>UdpNmGlobalConfig</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Pre-processor switch for enabling bus synchronization support. This feature is required for gateway nodes only. It must not be defined if UdpNmPassiveModeEnabled==true. This parameter shall be derived from NmBusSynchronizationEnabled.</td>
</tr>
<tr>
<td><strong>Multiplicity</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>EcucBooleanParamDef</td>
</tr>
<tr>
<td><strong>Default value</strong></td>
<td>--</td>
</tr>
<tr>
<td><strong>Post-Build Variant Value</strong></td>
<td>false</td>
</tr>
</tbody>
</table>

**Value Configuration Class**

<table>
<thead>
<tr>
<th>Pre-compile time</th>
<th>Link time</th>
<th>Post-build time</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

**Scope / Dependency**

| scope: local |

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00013 :</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>UdpNmComControlEnabled</td>
</tr>
<tr>
<td><strong>Parent Container</strong></td>
<td>UdpNmGlobalConfig</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Pre-processor switch for enabling the Communication Control support.</td>
</tr>
<tr>
<td><strong>Multiplicity</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>EcucBooleanParamDef</td>
</tr>
<tr>
<td><strong>Default value</strong></td>
<td>--</td>
</tr>
<tr>
<td><strong>Post-Build Variant Value</strong></td>
<td>false</td>
</tr>
</tbody>
</table>

**Value Configuration Class**

<table>
<thead>
<tr>
<th>Pre-compile time</th>
<th>Link time</th>
<th>Post-build time</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>
| Scope / Dependency | scope: local  
dependency: calculationFormula = If (UdpNmPassiveModeEnabled == False) then Equal(NmComControlEnabled) else Equal(False) |
|--------------------|--------------------------------------------------|

**SWS Item**  
**ECUC_UdpNm_00055:**  
**Name** UdpNmComUserDataSupport  
**Parent Container** UdpNmGlobalConfig  
**Description** Enable/disable the user data support.  
**Multiplicity** 1  
**Type** EcucBooleanParamDef  
**Default value** --  
**Post-Build Variant Value** false  
**Value Configuration Class**  
<table>
<thead>
<tr>
<th>Pre-compile time</th>
<th>X</th>
<th>All Variants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link time</td>
<td>--</td>
<td>--------------</td>
</tr>
<tr>
<td>Post-build time</td>
<td>--</td>
<td>--------------</td>
</tr>
</tbody>
</table>

**Scope / Dependency**  
scope: local  
dependency: If UdpNmPassiveModeEnabled == True then UdpNmComUserDataSupport = False

**SWS Item**  
**ECUC_UdpNm_00040:**  
**Name** UdpNmCoordinatorEnabled  
**Parent Container** UdpNmGlobalConfig  
**Description** Enable/disable the NM Coordination algorithm to being able to initiate the synchronization algorithm.  
TRUE: Option is enabled  
FALSE: The parameter shall be FALSE by default and shall only be allowed to be TRUE if the parameter UdpNmRemoteSleepIndEnabled is TRUE.  
**Multiplicity** 1  
**Type** EcucBooleanParamDef  
**Default value** --  
**Post-Build Variant Value** false  
**Value Configuration Class**  
<table>
<thead>
<tr>
<th>Pre-compile time</th>
<th>X</th>
<th>All Variants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link time</td>
<td>--</td>
<td>--------------</td>
</tr>
<tr>
<td>Post-build time</td>
<td>--</td>
<td>--------------</td>
</tr>
</tbody>
</table>

**Scope / Dependency**  
scope: local

**SWS Item**  
**ECUC_UdpNm_00041:**  
**Name** UdpNmCoordinatorId  
**Parent Container** UdpNmGlobalConfig  
**Description** Set the NM coordination ID for this gateway.  
0x00: passive coordinator only  
0x01 - 0x03: coordinator priority  
Only valid, if UdpmCoordinatorEnabled is TRUE.  
**Multiplicity** 1  
**Type** EcuIntegerParamDef  
**Range** 0 .. 3  
**Default value** --  
**Post-Build Variant Value** false  
**Value Configuration Class**  
<table>
<thead>
<tr>
<th>Pre-compile time</th>
<th>X</th>
<th>All Variants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link time</td>
<td>--</td>
<td>--------------</td>
</tr>
<tr>
<td>Post-build time</td>
<td>--</td>
<td>--------------</td>
</tr>
</tbody>
</table>
### SWS Item ECUC_UdpNm_00059:
**Name**: UdpNmCoordinatorSyncSupport  
**Parent Container**: UdpNmGlobalConfig  
**Description**: Enables/disables the coordinator synchronization support.  
**Multiplicity**: 1  
**Type**: EcucBooleanParamDef  
**Post-Build Variant Value**: false  
**Value Configuration Class**

<table>
<thead>
<tr>
<th>Pre-compile time</th>
<th>Link time</th>
<th>Post-build time</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

**Scope / Dependency**

scope: local  
dependency: UdpNmCoordinatorSyncSupport has to be set to FALSE if UdpNmPassiveModeEnabled is set to TRUE.

### SWS Item ECUC_UdpNm_00002:
**Name**: UdpNmDevErrorDetect  
**Parent Container**: UdpNmGlobalConfig  
**Description**: Switches the development error detection and notification on or off.  
- true: detection and notification is enabled.  
- false: detection and notification is disabled.  
**Multiplicity**: 1  
**Type**: EcucBooleanParamDef  
**Post-Build Variant Value**: false  
**Value Configuration Class**

<table>
<thead>
<tr>
<th>Pre-compile time</th>
<th>Link time</th>
<th>Post-build time</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

**Scope / Dependency**

scope: local

### SWS Item ECUC_UdpNm_00009:
**Name**: UdpNmImmediateRestartEnabled  
**Parent Container**: UdpNmGlobalConfig  
**Description**: Pre-processor switch for enabling the immediate transmission of a NM PACKET upon bus-communication request in Prepare-Bus-Sleep mode. Must not be defined if UdpNmPassiveModeEnabled == true.  
**Multiplicity**: 1  
**Type**: EcucBooleanParamDef  
**Post-Build Variant Value**: false  
**Value Configuration Class**

<table>
<thead>
<tr>
<th>Pre-compile time</th>
<th>Link time</th>
<th>Post-build time</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>
## Scope / Dependency

**scope: local**

## SWS Item

**ECUC_UdpNm_00007** : (Obsolete)

**Name**: UdpNmNodeDetectionEnabled

**Parent Container**: UdpNmGlobalConfig

**Description**: Pre-processor switch for enabling the node detection support. This parameter shall be derived from NmNodeDetectionEnabled. This parameter shall only be enabled if UdpNmNodeIdEnabled == true.

If(UdpNmPduCbvPosition != UDPNM_PDU_OFF) then Equal(NmNodeDetectionEnabled) else Equal(False).

**Tags**: atp.Status=obsolete

**Multiplicity**: 0..1

**Type**: EcucBooleanParamDef

**Default value**: --

**Post-Build Variant Value**: false

**Value Configuration Class**

<table>
<thead>
<tr>
<th>Pre-compile time</th>
<th>Link time</th>
<th>Post-build time</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

**Scope / Dependency**

**scope: local**

dependency: Not available if UdpNmPassiveModeEnabled

## SWS Item

**ECUC_UdpNm_00008** : (Obsolete)

**Name**: UdpNmNodeIdEnabled

**Parent Container**: UdpNmGlobalConfig

**Description**: Pre-processor switch for enabling the source node identifier. This parameter shall be derived from NmNodeIdEnabled.

**Tags**: atp.Status=obsolete

**Multiplicity**: 0..1

**Type**: EcucBooleanParamDef

**Default value**: --

**Post-Build Variant Value**: false

**Value Configuration Class**

<table>
<thead>
<tr>
<th>Pre-compile time</th>
<th>Link time</th>
<th>Post-build time</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

**Scope / Dependency**

**scope: local**

## SWS Item

**ECUC_UdpNm_00014** :

**Name**: UdpNmNumberOfChannels

**Parent Container**: UdpNmGlobalConfig

**Description**: Number of NM channels allowed within one ECU.

**Multiplicity**: 1

**Type**: EcucIntegerParamDef

**Range**: 1 .. 255

**Default value**: --

**Post-Build Variant Value**: false

**Value Configuration Class**

<table>
<thead>
<tr>
<th>Pre-compile time</th>
<th>Link time</th>
<th>Post-build time</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>
### Scope / Dependency

```
scope: local
```

#### SWS Item

**ECUC_UdpNm_00010**: UdpNmPassiveModeEnabled

- **Name**: UdpNmPassiveModeEnabled
- **Parent Container**: UdpNmGlobalConfig
- **Description**: Pre-processor switch for enabling support of the Passive Mode.
- **Multiplicity**: 1
- **Type**: EcucBooleanParamDef
- **Default value**: --
- **Post-Build Variant Value**: false

**Pre-build time**

**Value Configuration Class**

<table>
<thead>
<tr>
<th>Class</th>
<th>Variant</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-compile</td>
<td>X</td>
<td>All Variants</td>
</tr>
<tr>
<td>Link time</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Post-build</td>
<td>--</td>
<td></td>
</tr>
</tbody>
</table>

#### SWS Item

**ECUC_UdpNm_00011**: UdpNmPduRxIndicationEnabled

- **Name**: UdpNmPduRxIndicationEnabled
- **Parent Container**: UdpNmGlobalConfig
- **Description**: Pre-processor switch for enabling the PDU Rx Indication. This parameter shall be derived from NmPduRxIndicationEnabled.
- **Multiplicity**: 1
- **Type**: EcucBooleanParamDef
- **Default value**: --
- **Post-Build Variant Value**: false

**Pre-build time**

**Value Configuration Class**

<table>
<thead>
<tr>
<th>Class</th>
<th>Variant</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-compile</td>
<td>X</td>
<td>All Variants</td>
</tr>
<tr>
<td>Link time</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Post-build</td>
<td>--</td>
<td></td>
</tr>
</tbody>
</table>

#### SWS Item

**ECUC_UdpNm_00066**: UdpNmPnEiraCalcEnabled

- **Name**: UdpNmPnEiraCalcEnabled
- **Parent Container**: UdpNmGlobalConfig
- **Description**: Specifies if UdpNm calculates the PN request information for internal and external requests. (EIRA) true: PN request are calculated false: PN request are not calculated
- **Multiplicity**: 0..1
- **Type**: EcucBooleanParamDef
- **Default value**: false
- **Post-Build Variant Value**: false

**Pre-build time**

**Value Configuration Class**

<table>
<thead>
<tr>
<th>Class</th>
<th>Variant</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-compile</td>
<td>X</td>
<td>VARIANT-PRE-COMPILE</td>
</tr>
<tr>
<td>Link time</td>
<td>X</td>
<td>VARIANT-LINK-TIME</td>
</tr>
<tr>
<td>Post-build</td>
<td>--</td>
<td></td>
</tr>
</tbody>
</table>

**Link time**

**Value Configuration Class**

<table>
<thead>
<tr>
<th>Class</th>
<th>Variant</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-compile</td>
<td>X</td>
<td>VARIANT-PRE-COMPILE</td>
</tr>
<tr>
<td>Link time</td>
<td>X</td>
<td>VARIANT-LINK-TIME</td>
</tr>
<tr>
<td>Post-build</td>
<td>--</td>
<td></td>
</tr>
</tbody>
</table>
### Specification of UDP Network Management

**AUTOSAR CP Release 4.3.1**

#### Scope / Dependency
- **Scope:** local
- **Dependency:** only available if UdpNmPnEnabled == true for at least one UdpNm Channel

#### SWS Item: ECUC_UdpNm_00065
- **Name:** UdpNmPnResetTime
- **Parent Container:** UdpNmGlobalConfig
- **Description:**
  Specifies the runtime of the reset timer in seconds. This reset time is valid for the reset of PN requests in the EIRA and in the ERA. The value shall be the same for every channel. Thus it is a global config parameter.
- **Multiplicity:** 0..1
- **Type:** EcucFloatParamDef
- **Range:** [0.001 .. 65.535]
- **Default value:** --

**Post-Build Variant**
- **Multiplicity:** false
- **Value Configuration Class**
  - Pre-compile time: X VARIANT-PRE-COMPILE
  - Link time: X VARIANT-LINK-TIME
  - Post-build time: --

**Value Configuration Class**
- **Pre-compile time:** X All Variants
- **Link time:** --
- **Post-build time:** --

#### SWS Item: ECUC_UdpNm_00005
- **Name:** UdpNmRemoteSleepIndEnabled
- **Parent Container:** UdpNmGlobalConfig
- **Description:**
  Pre-processor switch for enabling remote sleep indication support. This feature is required for gateway nodes only. It must not be defined if UdpNmPassiveModeEnabled==true. This parameter shall be derived from NmRemoteSleepIndEnabled.
- **Multiplicity:** 1
- **Type:** EcucBooleanParamDef
- **Default value:** --

**Post-Build Variant Value**
- **false**

**Value Configuration Class**
- **Pre-compile time:** X All Variants
- **Link time:** --
- **Post-build time:** --

#### SWS Item: ECUC_UdpNm_00015 (Obsolete)
- **Name:** UdpNmRepeatMsgIndEnabled
- **Parent Container:** UdpNmGlobalConfig
- **Description:** Enable/disable the notification that a RepeatMessageRequest bit has been received.
- **Tags:** atp.Status=obsolete
- **Multiplicity:** 0..1
- **Type:** EcucBooleanParamDef
- **Default value:** --

**Post-Build Variant Value**
- **false**

**Value Configuration Class**
- **Pre-compile time:** X All Variants
- **Link time:** --
### Specification of UDP Network Management

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<table>
<thead>
<tr>
<th><strong>Post-build time</strong></th>
<th>--</th>
</tr>
</thead>
</table>

**Scope / Dependency**
- scope: local
- dependency: calculationFormula = If (UdpNmPassiveModeEnabled == False) then Equal(NmRepeatMsgIndEnabled) else Equal(False)

<table>
<thead>
<tr>
<th><strong>SWS Item</strong></th>
<th>ECUC_UdpNm_00012 :</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>UdpNmStateChangeIndEnabled</td>
</tr>
<tr>
<td><strong>Parent Container</strong></td>
<td>UdpNmGlobalConfig</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Pre-processor switch for enabling the UDP NM state change notification. This parameter shall be derived from NmStateChangeIndEnabled.</td>
</tr>
<tr>
<td><strong>Multiplicity</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>EcucBooleanParamDef</td>
</tr>
<tr>
<td><strong>Default value</strong></td>
<td>--</td>
</tr>
<tr>
<td><strong>Post-Build Variant Value</strong></td>
<td>false</td>
</tr>
<tr>
<td><strong>Value Configuration Class</strong></td>
<td>Pre-compile time</td>
</tr>
<tr>
<td></td>
<td>Link time</td>
</tr>
<tr>
<td></td>
<td>Post-build time</td>
</tr>
<tr>
<td><strong>Scope / Dependency</strong></td>
<td>scope: local</td>
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</tbody>
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<table>
<thead>
<tr>
<th><strong>SWS Item</strong></th>
<th>ECUC_UdpNm_00004 :</th>
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</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>UdpNmUserDataEnabled</td>
</tr>
<tr>
<td><strong>Parent Container</strong></td>
<td>UdpNmGlobalConfig</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Pre-processor switch for enabling user data support. This parameter shall be derived from NmUserDataEnabled.</td>
</tr>
<tr>
<td><strong>Multiplicity</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>EcucBooleanParamDef</td>
</tr>
<tr>
<td><strong>Default value</strong></td>
<td>--</td>
</tr>
<tr>
<td><strong>Post-Build Variant Value</strong></td>
<td>false</td>
</tr>
<tr>
<td><strong>Value Configuration Class</strong></td>
<td>Pre-compile time</td>
</tr>
<tr>
<td></td>
<td>Link time</td>
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<td>Post-build time</td>
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<td><strong>Scope / Dependency</strong></td>
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<thead>
<tr>
<th><strong>SWS Item</strong></th>
<th>ECUC_UdpNm_00003 :</th>
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<tbody>
<tr>
<td><strong>Name</strong></td>
<td>UdpNmVersionInfoApi</td>
</tr>
<tr>
<td><strong>Parent Container</strong></td>
<td>UdpNmGlobalConfig</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Pre-processor switch for enabling version info API support.</td>
</tr>
<tr>
<td><strong>Multiplicity</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>EcucBooleanParamDef</td>
</tr>
<tr>
<td><strong>Default value</strong></td>
<td>false</td>
</tr>
<tr>
<td><strong>Post-Build Variant Value</strong></td>
<td>false</td>
</tr>
<tr>
<td><strong>Value Configuration Class</strong></td>
<td>Pre-compile time</td>
</tr>
<tr>
<td></td>
<td>Link time</td>
</tr>
<tr>
<td></td>
<td>Post-build time</td>
</tr>
</tbody>
</table>
### SWS Item

**ECUC_UdpNm_00062**

**Name**

UdpNmPnEiraRxNSduRef

**Parent Container**

UdpNmGlobalConfig

**Description**

Reference to a Pdu in the COM-Stack. Only one SduRef is required for UdpNm because the EIRA is the aggregation over all Ethernet Channels.

**Multiplicity**

0..1

**Type**

Reference to [Pdu]

<table>
<thead>
<tr>
<th>Post-Build Variant Config Class</th>
<th>Pre-compile time</th>
<th>Link time</th>
<th>Post-build time</th>
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</thead>
<tbody>
<tr>
<td>Pre-compile time</td>
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<td>X</td>
<td>--</td>
</tr>
<tr>
<td>Link time</td>
<td>X</td>
<td>X</td>
<td>--</td>
</tr>
<tr>
<td>Post-build time</td>
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</table>

<table>
<thead>
<tr>
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<th>Link time</th>
<th>Post-build time</th>
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</thead>
<tbody>
<tr>
<td>Pre-compile time</td>
<td>X</td>
<td>X</td>
<td>--</td>
</tr>
<tr>
<td>Link time</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>Post-build time</td>
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</table>
### Scope / Dependency

<table>
<thead>
<tr>
<th>Scope / Dependency</th>
</tr>
</thead>
<tbody>
<tr>
<td>scope: local</td>
</tr>
<tr>
<td>dependency: only available if UdpNmPnEnabled == true for at least one UdpNm Channel</td>
</tr>
</tbody>
</table>

### Included Containers

<table>
<thead>
<tr>
<th>Container Name</th>
<th>Multiplicity</th>
<th>Scope / Dependency</th>
</tr>
</thead>
<tbody>
<tr>
<td>UdpNmChannelConfig</td>
<td>1..*</td>
<td>This container contains the channel-specific configuration parameters of the UdpNm.</td>
</tr>
<tr>
<td>UdpNmPnInfo</td>
<td>0..1</td>
<td>PN information configuration</td>
</tr>
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</table>
### 10.2.3 UdpNmChannelConfig

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00017 :</th>
</tr>
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<tbody>
<tr>
<td><strong>Container Name</strong></td>
<td>UdpNmChannelConfig</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>This container contains the channel-specific configuration parameters of the UdpNm.</td>
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**Configuration Parameters**

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00074 :</th>
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</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>UdpNmActiveWakeupBitEnabled</td>
</tr>
<tr>
<td><strong>Parent Container</strong></td>
<td>UdpNmChannelConfig</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Enables/Disables the handling of the Active Wakeup Bit in the UdpNm module.</td>
</tr>
<tr>
<td><strong>Multiplicity</strong></td>
<td>0..1</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>EcucBooleanParamDef</td>
</tr>
<tr>
<td><strong>Default value</strong></td>
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<tr>
<td><strong>Post-Build Variant Multiplicity</strong></td>
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</tr>
<tr>
<td><strong>Post-Build Variant Value</strong></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Multiplicity Configuration Class</th>
<th>Pre-compile time</th>
<th>X</th>
<th>VARIANT-PRE-COMPILE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Link time</strong></td>
<td>X</td>
<td>VARIANT-LINK-TIME</td>
<td></td>
</tr>
<tr>
<td><strong>Post-build time</strong></td>
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<td></td>
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</table>

<table>
<thead>
<tr>
<th>Value Configuration Class</th>
<th>Pre-compile time</th>
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<th>VARIANT-PRE-COMPILE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Link time</strong></td>
<td>X</td>
<td>VARIANT-LINK-TIME</td>
<td></td>
</tr>
<tr>
<td><strong>Post-build time</strong></td>
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<td></td>
</tr>
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</table>

**Scope / Dependency**

- scope: local
- dependency: This parameter is only valid if UdpNmPassiveModeEnabled is False.

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00089 :</th>
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<tbody>
<tr>
<td><strong>Name</strong></td>
<td>UdpNmAllNmMessagesKeepAwake</td>
</tr>
<tr>
<td><strong>Parent Container</strong></td>
<td>UdpNmChannelConfig</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Specifies if UdpNm drops irrelevant NM PDUs. false: Only NM PDUs with a PNI bit = true and containing a PN request for this ECU triggers the standard RX indication handling true: Every NM PDU triggers the standard RX indication handling</td>
</tr>
<tr>
<td><strong>Multiplicity</strong></td>
<td>0..1</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>EcucBooleanParamDef</td>
</tr>
<tr>
<td><strong>Default value</strong></td>
<td>false</td>
</tr>
<tr>
<td><strong>Post-Build Variant Multiplicity</strong></td>
<td>false</td>
</tr>
<tr>
<td><strong>Post-Build Variant Value</strong></td>
<td>false</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Multiplicity Configuration Class</th>
<th>Pre-compile time</th>
<th>X</th>
<th>VARIANT-PRE-COMPILE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Link time</strong></td>
<td>X</td>
<td>VARIANT-LINK-TIME</td>
<td></td>
</tr>
<tr>
<td><strong>Post-build time</strong></td>
<td>--</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Value Configuration Class</th>
<th>Pre-compile time</th>
<th>X</th>
<th>VARIANT-PRE-COMPILE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Link time</strong></td>
<td>X</td>
<td>VARIANT-LINK-TIME</td>
<td></td>
</tr>
<tr>
<td><strong>Post-build time</strong></td>
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<td></td>
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</tbody>
</table>
### Specification of UDP Network Management

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| Scope / Dependency | scope: local  
dependency: only available if UdpNmPnEnabled == true |
|--------------------|------------------------------------------------------|

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00087</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>UdpNmCarWakeUpBitPosition</td>
</tr>
<tr>
<td>Parent Container</td>
<td>UdpNmChannelConfig</td>
</tr>
<tr>
<td>Description</td>
<td>Specifies the Bit position of the CWU within the NM PDU.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0..1</td>
</tr>
<tr>
<td>Type</td>
<td>EcucIntegerParamDef</td>
</tr>
<tr>
<td>Range</td>
<td>0 .. 7</td>
</tr>
<tr>
<td>Default value</td>
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</tr>
<tr>
<td>Post-Build Variant Multiplicity</td>
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</tr>
<tr>
<td>Post-Build Variant Value</td>
<td>X VARIANT-PRE-COMPILE</td>
</tr>
<tr>
<td>Multiplicity Configuration Class</td>
<td>Pre-compilation Time</td>
</tr>
<tr>
<td>Link time</td>
<td>X VARIANT-LINK-TIME</td>
</tr>
<tr>
<td>Post-build time</td>
<td>--</td>
</tr>
<tr>
<td>Value Configuration Class</td>
<td>Pre-compilation Time</td>
</tr>
<tr>
<td>Link time</td>
<td>X VARIANT-LINK-TIME</td>
</tr>
<tr>
<td>Post-build time</td>
<td>--</td>
</tr>
</tbody>
</table>
| Scope / Dependency | scope: local  
dependency: only available if UdpNmCarWakeUpRxEnabled == TRUE |

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00086</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>UdpNmCarWakeUpBytePosition</td>
</tr>
<tr>
<td>Parent Container</td>
<td>UdpNmChannelConfig</td>
</tr>
<tr>
<td>Description</td>
<td>Specifies the Byte position of the CWU within the NM PDU.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0..1</td>
</tr>
<tr>
<td>Type</td>
<td>EcucIntegerParamDef</td>
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<tr>
<td>Range</td>
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</tr>
<tr>
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<tr>
<td>Post-Build Variant Value</td>
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<tr>
<td>Multiplicity Configuration Class</td>
<td>Pre-compilation Time</td>
</tr>
<tr>
<td>Link time</td>
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<td>Post-build time</td>
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<td>Value Configuration Class</td>
<td>Pre-compilation Time</td>
</tr>
<tr>
<td>Link time</td>
<td>X VARIANT-LINK-TIME</td>
</tr>
<tr>
<td>Post-build time</td>
<td>--</td>
</tr>
</tbody>
</table>
### Scope / Dependency
- **Scope:** local
- **Dependency:** only available if UdpNmCarWakeUpRxEnabled == TRUE
- UdpNmCarWakeupBytePosition ≥ number of enabled system bytes (CBV, NID)

### SWS Item
- **Item:** ECUC_UdpNm_00077
- **Name:** UdpNmCarWakeUpFilterEnabled
- **Parent Container:** UdpNmChannelConfig

#### Description
If CWU filtering is supported, only the CWU bit within the NM PDU with source node identifier UdpNmCarWakeUpFilterNodeId is considered as CWU request.

#### Multiplicity
- 0..1

#### Type
- EcucBooleanParamDef

#### Default value
- false

#### Post-Build Variant Value
- false

#### Multiplicity Configuration Class
- **Pre-compile time:** X VARIANT-PRE-COMPILE
- **Link time:** X VARIANT-LINK-TIME
- **Post-build time:** --

#### Value Configuration Class
- **Pre-compile time:** X VARIANT-PRE-COMPILE
- **Link time:** X VARIANT-LINK-TIME
- **Post-build time:** --

### SWS Item
- **Item:** ECUC_UdpNm_00078
- **Name:** UdpNmCarWakeUpFilterNodeId
- **Parent Container:** UdpNmChannelConfig

#### Description
Source node identifier for CWU filtering. If CWU filtering is supported, only the CWU bit within the NM PDU with source node identifier UdpNmCarWakeUpFilterNodeId is considered as CWU request.

#### Multiplicity
- 0..1

#### Type
- EcucIntegerParamDef

#### Default value
- 0 .. 255

#### Post-Build Variant Value
- false

#### Multiplicity Configuration Class
- **Pre-compile time:** X VARIANT-PRE-COMPILE
- **Link time:** X VARIANT-LINK-TIME
- **Post-build time:** --

#### Value Configuration Class
- **Pre-compile time:** X VARIANT-PRE-COMPILE
- **Link time:** X VARIANT-LINK-TIME
- **Post-build time:** --
### Specification of UDP Network Management

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#### Scope / Dependency

<table>
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<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00076 :</th>
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</thead>
<tbody>
<tr>
<td>Name</td>
<td>UdpNmCarWakeUpRxEnabled</td>
</tr>
<tr>
<td>Parent Container</td>
<td>UdpNmChannelConfig</td>
</tr>
<tr>
<td>Description</td>
<td>Enables or disables support of CarWakeUp bit evaluation in received NM PDUs. FALSE - CarWakeUp not supported. TRUE - CarWakeUp supported.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
<tr>
<td>Type</td>
<td>EcucBooleanParamDef</td>
</tr>
<tr>
<td>Default value</td>
<td>false</td>
</tr>
<tr>
<td>Post-Build Variant Value</td>
<td>false</td>
</tr>
<tr>
<td>Value Configuration Class</td>
<td>Pre-compile time X VARIANT-PRE-COMPILE</td>
</tr>
<tr>
<td></td>
<td>Link time X VARIANT-LINK-TIME</td>
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<td>Post-build time --</td>
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#### Scope / Dependency

<table>
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<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00079 :</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>UdpNmImmediateNmCycleTime</td>
</tr>
<tr>
<td>Parent Container</td>
<td>UdpNmChannelConfig</td>
</tr>
<tr>
<td>Description</td>
<td>Defines the immediate NM PDU cycle time in seconds which is used for UdpNmImmediateNmTransmissions NM PDU transmissions.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0..1</td>
</tr>
<tr>
<td>Type</td>
<td>EcucFloatParamDef</td>
</tr>
<tr>
<td>Range</td>
<td>[0.001 .. 65.535]</td>
</tr>
<tr>
<td>Default value</td>
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</tr>
<tr>
<td>Post-Build Variant Value</td>
<td>false</td>
</tr>
<tr>
<td>Value Configuration Class</td>
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<td></td>
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#### Scope / Dependency

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<th>ECUC_UdpNm_00075 :</th>
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</thead>
<tbody>
<tr>
<td>Name</td>
<td>UdpNmImmediateNmTransmissions</td>
</tr>
<tr>
<td>Parent Container</td>
<td>UdpNmChannelConfig</td>
</tr>
<tr>
<td>Description</td>
<td>Defines the number of immediate NM PDUs which shall be transmitted. If the value is zero no immediate NM PDUs are transmitted. The cycle time of immediate NM PDUs is defined by UdpNmImmediateNmCycleTime.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
<tr>
<td>Type</td>
<td>EcucIntegerParamDef</td>
</tr>
<tr>
<td>Range</td>
<td>0 .. 255</td>
</tr>
<tr>
<td>Default value</td>
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<tr>
<td>Post-Build Variant Value</td>
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<td>Value Configuration Class</td>
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<td>Link time X VARIANT-LINK-TIME</td>
</tr>
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<td></td>
<td>Post-build time --</td>
</tr>
</tbody>
</table>
### SWS Item ECUC_UdpNm_00032
**Name** UdpNmMainFunctionPeriod
**Parent Container** UdpNmChannelConfig
**Description** Call cycle of UdpNm_MainFunction_x for the respective instance in [s].
**Multiplicity** 1
**Type** EcucFloatParamDef
**Range** [0 .. INF]
**Default value** --
**Post-Build Variant Value** false
**Value Configuration Class**
- **Pre-compile time** X VARIANT-PRE-COMPILE
- **Link time** X VARIANT-LINK-TIME
- **Post-build time** --

### SWS Item ECUC_UdpNm_00029
**Name** UdpNmMsgCycleOffset
**Parent Container** UdpNmChannelConfig
**Description** Time offset in the periodic transmission node. It determines the start delay of the transmission.
<NmTimeoutTime>
This parameter is only valid if UdpNmPassiveModeEnabled is disabled.
**Multiplicity** 1
**Type** EcucFloatParamDef
**Range** [0 .. 65.535]
**Default value** --
**Post-Build Variant Value** true
**Value Configuration Class**
- **Pre-compile time** X VARIANT-PRE-COMPILE
- **Link time** X VARIANT-LINK-TIME
- **Post-build time** --

### SWS Item ECUC_UdpNm_00028
**Name** UdpNmMsgCycleTime
**Parent Container** UdpNmChannelConfig
**Description** Period of a NM-message. It determines the periodic rate and is the basis for transmit scheduling. NmTimeoutTime = n * UdpNmMsgCycleTime
This parameter is only valid if UdpNmPassiveModeEnabled is disabled.
**Multiplicity** 1
**Type** EcucFloatParamDef
**Range** [0.001 .. 65.535]
**Default value** --
**Post-Build Variant Value** false
**Value Configuration Class**
- **Pre-compile time** X VARIANT-PRE-COMPILE
- **Link time** X VARIANT-LINK-TIME
- **Post-build time** --
## Scope / Dependency
scope: local

### SWS Item
**ECUC_UdpNm_00030** : (Obsolete)

### Name
UdpNmMsgTimeoutTime

### Parent Container
UdpNmChannelConfig

### Description
Transmission Timeout of NM-message. If there is no transmission confirmation by the UDP Interface within this timeout, the UDPNM module shall give an error notification.

This parameter is only valid if UdpNmPassiveModeEnabled is disabled.

UdpNmMsgTimeoutTime should be a multiple of UdpNmMsgCycleTime.

**Tags:**
atp.Status=obsolete
atp.StatusRevisionBegin=4.3.1

### Multiplicity
0..1

### Type
EcucFloatParamDef

### Range
[0.001 .. 65.535]

### Default value
--

### Post-Build Variant Value
false

### Value Configuration Class
- Pre-compile time: X VARIANT-PRE-COMPILE
- Link time: X VARIANT-LINK-TIME
- Post-build time: --

### Scope / Dependency
scope: local

### Scope / Dependency
dependency: Not available if UdpNmPassiveModeEnabled

### SWS Item
**ECUC_UdpNm_00090** :

### Name
UdpNmNodeDetectionEnabled

### Parent Container
UdpNmChannelConfig

### Description
Pre-processor switch for enabling the node detection support. This parameter shall be derived from NmNodeDetectionEnabled. This parameter shall only be enabled if UdpNmNodeDetectEnabled == true.

If(UdpNmPduCbvPosition != UDPNM_PDU_OFF) then Equal(NmNodeDetectionEnabled) else Equal(False).

### Multiplicity
1

### Type
EcucBooleanParamDef

### Default value
--

### Post-Build Variant Value
false

### Value Configuration Class
- Pre-compile time: X VARIANT-PRE-COMPILE
- Link time: X VARIANT-LINK-TIME
- Post-build time: --

### Scope / Dependency
scope: local

dependency: Not available if UdpNmPassiveModeEnabled

### SWS Item
**ECUC_UdpNm_00031** :

### Name
UdpNmNodeId

### Parent Container
UdpNmChannelConfig

### Description
Node identifier of local node. This parameter is only valid if UdpNmPassiveModeEnabled is set to OFF and UdpNmNodeDetectionEnabled is set to ON.

### Multiplicity
1

### Type
EcucIntegerParamDef

### Range
0 .. 255

### Default value
--

### Post-Build Variant Value
false

### Value Configuration Class
- Pre-compile time: X VARIANT-PRE-COMPILE
- Link time: X VARIANT-LINK-TIME
**Post-build time**: --

**Scope / Dependency**: scope: local

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00091</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>UdpNmNodeIdEnabled</td>
</tr>
<tr>
<td><strong>Parent Container</strong></td>
<td>UdpNmChannelConfig</td>
</tr>
</tbody>
</table>

**Description**: Pre-processor switch for enabling the source node identifier. This parameter shall be derived from NmNodeIdEnabled.

**Multiplicity**: 1

**Type**: EcucBooleanParamDef

**Post-Build Variant Value**: false

**Value Configuration Class**
- **Pre-compile time**: X VARIANT-PRE-COMPILE
- **Link time**: X VARIANT-LINK-TIME
- **Post-build time**: --

**Scope / Dependency**: scope: local

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00026</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>UdpNmPduCbvPosition</td>
</tr>
<tr>
<td><strong>Parent Container</strong></td>
<td>UdpNmChannelConfig</td>
</tr>
</tbody>
</table>

**Description**: Defines the position of the control bit vector within the NM PACKET. The value of the parameter represents the location of the control bit vector in the NM PACKET (UDPNM_PDU_BYTE_0 means byte 0, UDPNM_PDU_BYTE_1 means byte 1, UDPNM_PDU_OFF means the control bit vector is not part of the NM PACKET).

See also UdpNmPduNidPosition

if (UdpNmPduCbvPosition != UDPNM_PDU_OFF && UdpNmPduNidPosition != UDPNM_PDU_OFF) then UdpNmPduCbvPosition != UdpNmPduNidPosition

if (UdpNmPduCbvPosition != UDPNM_PDU_OFF && UdpNmPduNidPosition == UDPNM_PDU_OFF) then UdpNmPduCbvPosition = UDPNM_PDU_BYTE0

**Multiplicity**: 1

**Type**: EcucEnumerationParamDef

**Range**
- UDPNM_PDU_BYTE_0 --
- UDPNM_PDU_BYTE_1 --
- UDPNM_PDU_OFF --

**Post-Build Variant Value**: false

**Value Configuration Class**
- **Pre-compile time**: X VARIANT-PRE-COMPILE
- **Link time**: X VARIANT-LINK-TIME
- **Post-build time**: --
**Scope**
- **Dependency**: scope: local

**SWS Item**  **ECUC_UdpNm_00025** :

<table>
<thead>
<tr>
<th>Name</th>
<th>UdpNmPduNidPosition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parent Container</strong></td>
<td>UdpNmChannelConfig</td>
</tr>
</tbody>
</table>

**Description**
- Defines the position of the source node identifier within the NM PACKET.
- ImplementationType: UdpNm_PduPositionType

- The value of the parameter represents the location of the source node identifier in the NM PACKET (UDPNM_PDU_BYTE_0 means byte 0, UDPNM_PDU_BYTE_1 means byte 1, UDPNM_PDU_OFF means source node identifier is not part of the NM PACKET)

- See also UdpNmPduCbvPosition

```java
if (UDPNM_PDU_NID_POSITION != UDPNM_PDU_OFF && UDPNM_PDU_CBV_POSITION != UDPNM_PDU_OFF) then
  UDPNM_PDU_NID_POSITION != UDPNM_PDU_CBV_POSITION

if (UDPNM_PDU_NID_POSITION != UDPNM_PDU_OFF && UDPNM_PDU_CBV_POSITION == UDPNM_PDU_OFF) then
  UDPNM_PDU_IN

UDPNM_PDU_OFF = UDPNM_PDU_BYTE0
```

**Multiplicity**
- 1

**Type**
- EcucEnumerationParamDef

**Range**
- UDPNM_PDU_BYTE_0  Byte 0 is used.
- UDPNM_PDU_BYTE_1  Byte 1 is used.
- UDPNM_PDU_OFF  Node Identification is not used.

**Post-Build Variant Value**
- false

**Value Configuration Class**
- **Pre-compile time**  X  VARIANT-PRE-COMPILE
- **Link time**  X  VARIANT-LINK-TIME
- **Post-build time**  --

---

**SWS Item**  **ECUC_UdpNm_00061** :

<table>
<thead>
<tr>
<th>Name</th>
<th>UdpNmPnEnabled</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parent Container</strong></td>
<td>UdpNmChannelConfig</td>
</tr>
</tbody>
</table>

**Description**
- Enables or disables support of partial networking.
- false: Partial networking Range not supported
- true: Partial networking supported

**Multiplicity**
- 0..1

**Type**
- EcucBooleanParamDef

**Default value**
- false

**Post-Build Variant Value**
- false

**Value Configuration Class**
- **Pre-compile time**  X  VARIANT-PRE-COMPILE
- **Link time**  X  VARIANT-LINK-TIME
- **Post-build time**  --
## Specification of UDP Network Management

**AUTOSAR**

**CP** Release 4.3.1

### Scope / Dependency

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>scope: local</td>
<td>dependency: only available if UdpNmPnEnabled == true</td>
</tr>
</tbody>
</table>

### SWS Item

**ECUC_UdpNm_00060**:

**Name**: UdpNmPnEraCalcEnabled

**Parent Container**: UdpNmChannelConfig

**Description**: Specifies if UdpNm calculates the PN request information for external requests. (ERA)

- false: PN request are not calculated
- true: PN request are calculated.

**Multiplicity**: 0..1

**Type**: EcucBooleanParamDef

**Default value**: false

**Post-Build Variant Multiplicity**: false

**Post-Build Variant Value**: false

**Multiplicity Configuration Class**

- **Pre-compile time**: X VARIANT-PRE-COMPILE
- **Link time**: X VARIANT-LINK-TIME
- **Post-build time**: --

**Value Configuration Class**

- **Pre-compile time**: X VARIANT-PRE-COMPILE
- **Link time**: X VARIANT-LINK-TIME
- **Post-build time**: --

### Scope / Dependency

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>scope: local</td>
<td>dependency: only available if UdpNmPnEnabled == true</td>
</tr>
</tbody>
</table>

### SWS Item

**ECUC_UdpNm_00063**:

**Name**: UdpNmPnHandleMultipleNetworkRequests

**Parent Container**: UdpNmChannelConfig

**Description**: false: UdpNm_NetworkRequest is ignored in NO.

- true: UdpNm_NetworkRequest triggers a change from NO to RM.

**Multiplicity**: 0..1

**Type**: EcucBooleanParamDef

**Default value**: false

**Post-Build Variant Multiplicity**: false

**Post-Build Variant Value**: false

**Multiplicity Configuration Class**

- **Pre-compile time**: X VARIANT-PRE-COMPILE
- **Link time**: X VARIANT-LINK-TIME
- **Post-build time**: --

**Value Configuration Class**

- **Pre-compile time**: X VARIANT-PRE-COMPILE
- **Link time**: X VARIANT-LINK-TIME
- **Post-build time**: --
### SWS Item ECUC_UdpNm_00023:

**Name**  
UdpNmRemoteSleepIndTime

**Parent Container**  
UdpNmChannelConfig

**Description**  
Timeout for Remote Sleep Indication.  
It defines the time in [s] how long it shall take to recognize that all other nodes are ready to sleep.

Typically it should be equal to: \( n \times UdpNmMsgCycleTime \), where \( n \) denotes the number of NM packets that are normally sent before Remote Sleep Indication is detected.

The value of \( n \) decremented by one determines the amount of lost NM packets that can be tolerated by the Remote Sleep Indication procedure.

**Multiplicity**  
1

**Type**  
EcucFloatParamDef

**Range**  
\([0.001 \ldots 65.535]\)

**Default value**  
--

**Post-Build Variant Value**  
false

**Value Configuration Class**

<table>
<thead>
<tr>
<th>Pre-compile time</th>
<th>Link time</th>
<th>Post-build time</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>X</td>
<td>--</td>
</tr>
</tbody>
</table>

**Scope / Dependency**  
scope: local  
dependency: only available if UdpNmPnEnabled == true

---

### SWS Item ECUC_UdpNm_00022:

**Name**  
UdpNmRepeatMessageTime

**Parent Container**  
UdpNmChannelConfig

**Description**  
Timeout for Repeat Message State.  
It defines the time in seconds how long the NM shall stay in the Repeat Message State.

**Multiplicity**  
1

**Type**  
EcucFloatParamDef

**Range**  
\([0 \ldots 65.535]\)

**Default value**  
--

**Post-Build Variant Value**  
false

**Value Configuration Class**

<table>
<thead>
<tr>
<th>Pre-compile time</th>
<th>Link time</th>
<th>Post-build time</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>X</td>
<td>--</td>
</tr>
</tbody>
</table>

**Scope / Dependency**  
scope: local
## Specification of UDP Network Management

**AUTOSAR CP Release 4.3.1**

### Scope / Dependency

**scope: local**

**dependency: UdpNmRepeatMessageTime = n * UdpNmMsgCycleTime;**

**UdpNmRepeatMessageTime > UdpNmImmediateNmTransmissions * UdpNmImmediateNmCycleTime**

Typically it should be equal to: \( n \times UdpNmMsgCycleTime \), where \( n \) denotes the number of NM PDUs that are normally sent in the Repeat Message State.

The value of \( n \) decremented by one determines the amount of lost NM PDUs that can be tolerated by the node detection procedure. The value 0 denotes that no Repeat Message State is configured. It means that Repeat Message State is transient what implicates that it is left immediately after entrance and in result no start-up stability is guaranteed and no node detection procedure is possible.

### SWS Item

**ECUC_UdpNm_00092** :

- **Name**: UdpNmRepeatMsgIndEnabled
- **Parent Container**: UdpNmChannelConfig
- **Description**: Enable/disable the notification that a RepeatMessageRequest bit has been received.
- **Multiplicity**: 1
- **Type**: EcucBooleanParamDef
- **Default value**: false

**Value Configuration Class**

<table>
<thead>
<tr>
<th>Pre-compile time</th>
<th>Link time</th>
<th>Post-build time</th>
</tr>
</thead>
<tbody>
<tr>
<td>VARIANT-PRE-COMPILE</td>
<td>VARIANT-LINK-TIME</td>
<td>--</td>
</tr>
</tbody>
</table>

### SWS Item

**ECUC_UdpNm_00085** :

- **Name**: UdpNmRetryFirstMessageRequest
- **Parent Container**: UdpNmChannelConfig
- **Description**: Specifies if first message request in UdpNm is repeated until accepted by SoAd.
- **Multiplicity**: 0..1
- **Type**: EcucBooleanParamDef
- **Default value**: false

**Post-Build Variant Value**: false

**Multipliity Configuration Class**

<table>
<thead>
<tr>
<th>Pre-compile time</th>
<th>Link time</th>
<th>Post-build time</th>
</tr>
</thead>
<tbody>
<tr>
<td>VARIANT-PRE-COMPILE</td>
<td>VARIANT-LINK-TIME</td>
<td>--</td>
</tr>
</tbody>
</table>

**Value Configuration Class**

<table>
<thead>
<tr>
<th>Pre-compile time</th>
<th>Link time</th>
<th>Post-build time</th>
</tr>
</thead>
<tbody>
<tr>
<td>VARIANT-PRE-COMPILE</td>
<td>VARIANT-LINK-TIME</td>
<td>--</td>
</tr>
</tbody>
</table>
| **Scope / Dependency** | scope: local  
dependency: UdpNmRetryFirstMessageRequest = false if UdpNmPassiveModeEnabled == true |
|------------------------|--------------------------------------------------|

### SWS Item ECUC_UdpNm_00020:

**Name** UdpNmTimeoutTime
**Parent Container** UdpNmChannelConfig
**Description** Network Timeout for NM packets.
It denotes the time in [s] how long the NM shall stay in the Network Mode before transition into Prepare Bus-Sleep Mode shall take place.
It shall be equal for all nodes in the cluster.
It shall be greater than UdpNmMsgCycleTime.
Typically, it should be equal to: $x \times$ UdpNmMsgCycleTime, where $n$ denotes the number of NM PACKET cycle times in the Ready Sleep State before transition into the Bus-Sleep Mode is initiated.
The value of $n$ decremented by one determines the amount of lost NM packets that can be tolerated by the coordination algorithm.

<table>
<thead>
<tr>
<th><strong>Multiplicity</strong></th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>EcucFloatParamDef</td>
</tr>
<tr>
<td><strong>Range</strong></td>
<td>[0.002 .. 65.535]</td>
</tr>
<tr>
<td><strong>Default value</strong></td>
<td>--</td>
</tr>
<tr>
<td><strong>Post-Build Variant Value</strong></td>
<td>false</td>
</tr>
</tbody>
</table>

**Value Configuration Class**
- **Pre-compile time** X VARIANT-PRE-COMPILE
- **Link time** X VARIANT-LINK-TIME
- **Post-build time** --

### SWS Item ECUC_UdpNm_00021:

**Name** UdpNmWaitBusSleepTime
**Parent Container** UdpNmChannelConfig
**Description** Timeout for bus calm down phase.
It denotes the time in [s] how long the NM shall stay in the Prepare Bus-Sleep Mode before transition into Bus-Sleep Mode shall take place.
It shall be equal for all nodes in the cluster.
It shall be long enough to empty all Tx-buffer empty.

<table>
<thead>
<tr>
<th><strong>Multiplicity</strong></th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>EcucFloatParamDef</td>
</tr>
<tr>
<td><strong>Range</strong></td>
<td>[0.001 .. 65.535]</td>
</tr>
<tr>
<td><strong>Default value</strong></td>
<td>--</td>
</tr>
<tr>
<td><strong>Post-Build Variant Value</strong></td>
<td>false</td>
</tr>
</tbody>
</table>

**Value Configuration Class**
- **Pre-compile time** X VARIANT-PRE-COMPILE
- **Link time** X VARIANT-LINK-TIME
- **Post-build time** --
### Scope / Dependency

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00018 :</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>UdpNmComMNetworkHandleRef</td>
</tr>
<tr>
<td>Parent Container</td>
<td>UdpNmChannelConfig</td>
</tr>
</tbody>
</table>

**Description**

This reference points to the unique channel defined by the ComMChannel and provides access to the unique channel index value in ComMChannelId.

**Multiplicity**

1

**Type**

Symbolic name reference to [ ComMChannel ]

**Post-Build Variant Value**

true

**Value Configuration Class**

<table>
<thead>
<tr>
<th>Pre-compile time</th>
<th>X</th>
<th>VARIANT-PRE-COMPILE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link time</td>
<td>X</td>
<td>VARIANT-LINK-TIME</td>
</tr>
<tr>
<td>Post-build time</td>
<td>--</td>
<td></td>
</tr>
</tbody>
</table>

### Scope / Dependency

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00073 :</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>UdpNmPnEraRxNSduRef</td>
</tr>
<tr>
<td>Parent Container</td>
<td>UdpNmChannelConfig</td>
</tr>
</tbody>
</table>

**Description**

Reference to a Pdu in the COM-Stack. The SduRef is required for every UdpNm Channel, because ERA is reported per channel.

**Multiplicity**

0..1

**Type**

Reference to [ Pdu ]

**Post-Build Variant Value**

true

**Value Configuration Class**

<table>
<thead>
<tr>
<th>Pre-compile time</th>
<th>X</th>
<th>VARIANT-PRE-COMPILE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link time</td>
<td>X</td>
<td>VARIANT-LINK-TIME</td>
</tr>
<tr>
<td>Post-build time</td>
<td>--</td>
<td></td>
</tr>
</tbody>
</table>

### Included Containers

<table>
<thead>
<tr>
<th>Container Name</th>
<th>Multiplicity</th>
<th>Scope / Dependency</th>
</tr>
</thead>
<tbody>
<tr>
<td>UdpNmRxPdu</td>
<td>1..*</td>
<td>This container describes the UdpNm RX PDU's.</td>
</tr>
<tr>
<td>UdpNmTxPdu</td>
<td>0..1</td>
<td>This container describes the UdpNm TX PDU's.</td>
</tr>
<tr>
<td>UdpNmUserDataTxPdu</td>
<td>0..1</td>
<td>Preprocessor switch for enabling the Tx path of Com User Data. Use case: Setting of NMUserData via SWC.</td>
</tr>
</tbody>
</table>
## 10.2.4 UdpNmRxPdu

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00038</th>
</tr>
</thead>
<tbody>
<tr>
<td>Container Name</td>
<td>UdpNmRxPdu</td>
</tr>
<tr>
<td>Description</td>
<td>This container describes the UdpNm RX PDU's.</td>
</tr>
</tbody>
</table>

### Configuration Parameters

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00043</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>UdpNmRxPduId</td>
</tr>
<tr>
<td>Parent Container</td>
<td>UdpNmRxPdu</td>
</tr>
<tr>
<td>Description</td>
<td>ID of the RxPdu that will be used by a RxIndication of the lower layer.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
<tr>
<td>Type</td>
<td>EcuIntegerParamDef (Symbolic Name generated for this parameter)</td>
</tr>
<tr>
<td>Range</td>
<td>0 .. 4294967296</td>
</tr>
<tr>
<td>Default value</td>
<td>--</td>
</tr>
<tr>
<td>Post-Build Variant Value</td>
<td>true</td>
</tr>
</tbody>
</table>

### Value Configuration Class

<table>
<thead>
<tr>
<th>Pre-compile time</th>
<th>Link time</th>
<th>Post-build time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-compile time</td>
<td>X</td>
<td>All Variants</td>
</tr>
<tr>
<td>Link time</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Post-build time</td>
<td>--</td>
<td></td>
</tr>
</tbody>
</table>

### Scope / Dependency

scope: local

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00039</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>UdpNmRxPduRef</td>
</tr>
<tr>
<td>Parent Container</td>
<td>UdpNmRxPdu</td>
</tr>
<tr>
<td>Description</td>
<td>The reference to a PDU in the global PDU structure described in the AUTOSAR ECU Configuration Specification. This reference will be used by the UdpNm module to derive the PDU Id.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
<tr>
<td>Type</td>
<td>Reference to [Pdu]</td>
</tr>
<tr>
<td>Post-Build Variant Value</td>
<td>false</td>
</tr>
</tbody>
</table>

### Value Configuration Class

<table>
<thead>
<tr>
<th>Pre-compile time</th>
<th>Link time</th>
<th>Post-build time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-compile time</td>
<td>X</td>
<td>VARIANT-PRE-Compile</td>
</tr>
<tr>
<td>Link time</td>
<td>X</td>
<td>VARIANT-LINK-TIME</td>
</tr>
<tr>
<td>Post-build time</td>
<td>--</td>
<td></td>
</tr>
</tbody>
</table>

### Scope / Dependency

scope: local

No Included Containers
### 10.2.5 UdpNmTxPdu

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00036 :</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Container Name</strong></td>
<td>UdpNmTxPdu</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>This container describes the UdpNm TX PDU's.</td>
</tr>
</tbody>
</table>

**Configuration Parameters**

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00042 :</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>UdpNmTxConfirmationPduId</td>
</tr>
<tr>
<td><strong>Parent Container</strong></td>
<td>UdpNmTxPdu</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Id of the TxPdu that will be used by a TxConfirmation from the lower layer.</td>
</tr>
<tr>
<td><strong>Multiplicity</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>EcuIntegerParamDef (Symbolic Name generated for this parameter)</td>
</tr>
<tr>
<td><strong>Range</strong></td>
<td>0 .. 4294967296</td>
</tr>
<tr>
<td><strong>Default value</strong></td>
<td>--</td>
</tr>
<tr>
<td><strong>Post-Build Variant Value</strong></td>
<td>true</td>
</tr>
<tr>
<td><strong>Value Configuration Class</strong></td>
<td>Pre-compile time X All Variants</td>
</tr>
<tr>
<td></td>
<td>Link time --</td>
</tr>
<tr>
<td></td>
<td>Post-build time --</td>
</tr>
<tr>
<td><strong>Scope / Dependency</strong></td>
<td>scope: local</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00037 :</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>UdpNmTxPduRef</td>
</tr>
<tr>
<td><strong>Parent Container</strong></td>
<td>UdpNmTxPdu</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>The reference to a PDU in the global PDU structure described in the AUTOSAR ECU Configuration Specification. This reference will be used by the UdpNm module to derive the PDU Id.</td>
</tr>
<tr>
<td><strong>Multiplicity</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>Reference to [ Pdu ]</td>
</tr>
<tr>
<td><strong>Post-Build Variant Value</strong></td>
<td>true</td>
</tr>
<tr>
<td><strong>Value Configuration Class</strong></td>
<td>Pre-compile time X VARIANT-PRE-COMPILE</td>
</tr>
<tr>
<td></td>
<td>Link time X VARIANT-LINK-TIME</td>
</tr>
<tr>
<td></td>
<td>Post-build time --</td>
</tr>
<tr>
<td><strong>Scope / Dependency</strong></td>
<td>scope: local</td>
</tr>
</tbody>
</table>

**No Included Containers**
### 10.2.6 UdpNmUserDataTxPdu

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00056 :</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Container Name</strong></td>
<td>UdpNmUserDataTxPdu</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Preprocessor switch for enabling the Tx path of Com User Data. Use case: Setting of NMUserData via SWC.</td>
</tr>
</tbody>
</table>

#### Configuration Parameters

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00058 :</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>UdpNmTxUserDataPduId</td>
</tr>
<tr>
<td><strong>Parent Container</strong></td>
<td>UdpNmUserDataTxPdu</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>This parameter defines the Handle ID of the NM User Data I-PDU.</td>
</tr>
<tr>
<td><strong>Multiplicity</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>EcuIntegerParamDef (Symbolic Name generated for this parameter)</td>
</tr>
<tr>
<td><strong>Range</strong></td>
<td>0 .. 65535</td>
</tr>
<tr>
<td><strong>Default value</strong></td>
<td>--</td>
</tr>
<tr>
<td><strong>Post-Build Variant Value</strong></td>
<td>false</td>
</tr>
</tbody>
</table>

#### Value Configuration Class

<table>
<thead>
<tr>
<th>Pre-compile time</th>
<th>Link time</th>
<th>Post-build time</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

#### Scope / Dependency

- **scope: local**

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00057 :</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>UdpNmTxUserDataPduRef</td>
</tr>
<tr>
<td><strong>Parent Container</strong></td>
<td>UdpNmUserDataTxPdu</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Reference to the NM User Data I-PDU in the global PDU collection.</td>
</tr>
<tr>
<td><strong>Multiplicity</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>Reference to [ Pdu ]</td>
</tr>
<tr>
<td><strong>Post-Build Variant Value</strong></td>
<td>false</td>
</tr>
</tbody>
</table>

#### Value Configuration Class

<table>
<thead>
<tr>
<th>Pre-compile time</th>
<th>Link time</th>
<th>Post-build time</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>X</td>
<td>--</td>
</tr>
</tbody>
</table>

#### Scope / Dependency

- **scope: local**

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No Included Containers
10.2.7 UdpNmPnInfo

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00067 :</th>
</tr>
</thead>
<tbody>
<tr>
<td>Container Name</td>
<td>UdpNmPnInfo</td>
</tr>
<tr>
<td>Description</td>
<td>PN information configuration</td>
</tr>
</tbody>
</table>

**Configuration Parameters**

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00069 :</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>UdpNmPnInfoLength</td>
</tr>
<tr>
<td>Parent Container</td>
<td>UdpNmPnInfo</td>
</tr>
<tr>
<td>Description</td>
<td>Specifies the length of the PN request information in the NM message.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
<tr>
<td>Type</td>
<td>EcuIntegerParamDef</td>
</tr>
<tr>
<td>Range</td>
<td>1 .. 7</td>
</tr>
<tr>
<td>Default value</td>
<td>1</td>
</tr>
<tr>
<td>Post-Build Variant Value</td>
<td>false</td>
</tr>
<tr>
<td>Value Configuration Class</td>
<td>Pre-compile time X VARIANT-PRE-COMPILE</td>
</tr>
<tr>
<td></td>
<td>Link time X VARIANT-LINK-TIME</td>
</tr>
<tr>
<td></td>
<td>Post-build time --</td>
</tr>
<tr>
<td>Scope / Dependency</td>
<td>scope: local dependency: only available if UdpNmPnEnabled == true for at least one UdpNm Channel.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00068 :</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>UdpNmPnInfoOffset</td>
</tr>
<tr>
<td>Parent Container</td>
<td>UdpNmPnInfo</td>
</tr>
<tr>
<td>Description</td>
<td>Specifies the offset of the PN request information in the NM message.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
<tr>
<td>Type</td>
<td>EcuIntegerParamDef</td>
</tr>
<tr>
<td>Range</td>
<td>1 .. 7</td>
</tr>
<tr>
<td>Default value</td>
<td>1</td>
</tr>
<tr>
<td>Post-Build Variant Value</td>
<td>false</td>
</tr>
<tr>
<td>Value Configuration Class</td>
<td>Pre-compile time X VARIANT-PRE-COMPILE</td>
</tr>
<tr>
<td></td>
<td>Link time X VARIANT-LINK-TIME</td>
</tr>
<tr>
<td></td>
<td>Post-build time --</td>
</tr>
<tr>
<td>Scope / Dependency</td>
<td>scope: local dependency: only available if UdpNmPnEnabled == true for at least one UdpNm Channel.</td>
</tr>
</tbody>
</table>

**Included Containers**

<table>
<thead>
<tr>
<th>Container Name</th>
<th>Multiplicity</th>
<th>Scope / Dependency</th>
</tr>
</thead>
<tbody>
<tr>
<td>UdpNmPnFilterMaskByte</td>
<td>0..7</td>
<td>PN information configuration</td>
</tr>
</tbody>
</table>
Figure 12: Diagram: UdpNmPNCfig
10.2.8 UdpNmPnFilterMaskByte

<table>
<thead>
<tr>
<th>SWS Item</th>
<th>ECUC_UdpNm_00070 :</th>
</tr>
</thead>
<tbody>
<tr>
<td>Container Name</td>
<td>UdpNmPnFilterMaskByte</td>
</tr>
<tr>
<td>Description</td>
<td>PN information configuration</td>
</tr>
<tr>
<td>Configuration Parameters</td>
<td></td>
</tr>
</tbody>
</table>

**SWS Item** ECUC_UdpNm_00071 :
**Name** UdpNmPnFilterMaskByteIndex
**Parent Container** UdpNmPnFilterMaskByte
**Description** Index of the filter mask byte. Specifies the position within the filter mask byte array.
**Multiplicity** 1
**Type** EcuIntegerParamDef
**Range** 0 .. 6
**Default value** --
**Post-Build Variant Value** true
**Value Configuration Class**
- Pre-compile time: VARIANT-PRE-COMPILE
- Link time: VARIANT-LINK-TIME
- Post-build time: --
**Scope / Dependency** scope: local
dependency: only available if UdpNmPnEnabled == true for at least one UdpNm Channel. UdpNmPnFilterMaskByteIndex < UdpNmPnInfoLength

**SWS Item** ECUC_UdpNm_00072 :
**Name** UdpNmPnFilterMaskByteValue
**Parent Container** UdpNmPnFilterMaskByte
**Description** Parameter to configure the filter mask byte.
**Multiplicity** 1
**Type** EcuIntegerParamDef
**Range** 0 .. 255
**Default value** 0
**Post-Build Variant Value** false
**Value Configuration Class**
- Pre-compile time: VARIANT-PRE-COMPILE
- Link time: VARIANT-LINK-TIME
- Post-build time: --
**Scope / Dependency** scope: local
dependency: only available if UdpNmPnEnabled == true for at least one UdpNm Channel; UdpNmPnFilterMaskByteIndex < UdpNmPnInfoLength

No Included Containers

10.3 Published parameters

For details refer to the chapter 10.3 “Published Information” in SWS_BSWGeneral.
11 Not applicable requirements

[SWS_UdpNm NA_00999] [ This specification item references requirements that are not applicable to this specification. ] (SRS_BSW_00170, SRS_BSW_00375, SRS_BSW_00416, SRS_BSW_00168, SRS_BSW_00423, SRS_BSW_00424, SRS_BSW_00425, SRS_BSW_00426, SRS_BSW_00427, SRS_BSW_00429, SRS_BSW_00432, SRS_BSW_00336, SRS_BSW_00417, SRS_BSW_00161, SRS_BSW_00162, SRS_BSW_00005, SRS_BSW_00415, SRS_BSW_00164, SRS_BSW_00325, SRS_BSW_00160, SRS_BSW_00413, SRS_BSW_00347, SRS_BSW_00305, SRS_BSW_00307, SRS_BSW_00335, SRS_BSW_00410, SRS_BSW_00314, SRS_BSW_00328, SRS_BSW_00312, SRS_BSW_00006, SRS_BSW_00377, SRS_BSW_00306, SRS_BSW_00309, SRS_BSW_00330, SRS_BSW_00331, SRS_BSW_00172, SRS_BSW_00010, SRS_BSW_00333, SRS_BSW_00321, SRS_BSW_00341, SRS_BSW_00334, SRS_Nm_00151, SRS_Nm_00046, SRS_Nm_00050, SRS_Nm_00052, SRS_Nm_02509, SRS_Nm_00153, SRS_Nm_00054, SRS_Nm_00142, SRS_Nm_00144, SRS_Nm_00147, SRS_Nm_00154)