

## **EPDG Draft Standard 302-F**

# **Ethernet POWERLINK**

## **Part F: Modular Device**

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**(B&R Automation Industrial Automation GmbH)**

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## Pre. 2 History

Vers.	Date	Author		short description
0.0.1	2016-06-27	Kirchmayer	B&R	created
0.0.2	2016-07-12	Kirchmayer	B&R	Document status changed to DSP Value range of ChildIdentList and DownloadChildProgList restricted
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## **Pre. 5      Figures**

There are no figures in the document.

**Pre. 6 Definitions and Abbreviations**

**Pre. 6.1 Definitions**


**Pre. 6.2 Abbreviations**




## **Pre. 7      References**

- [1]    EPSG Draft Standard 301 (EPSC DS 301), Ethernet POWERLINK, Communication Profile Specification
- [2]    EPSG Draft Standard 311 (EPSC DSP 311), Ethernet POWERLINK, XML Device Description

# 1 Introduction

So far from POWERLINK specifications point of view a POWERLINK device is a device with a POWERLINK network interface and objects in the object dictionary to be accessed via PDO or SDO. The device behind the interface was no target of the specification at all.

With the introduction of modular devices the way how the device is composed becomes a focus.

A POWERLINK device may be a single device or it may be composed of two or more modules, i.e. it is a modular device.

This specification extends the POWERLINK specification DS 301 to be able to describe and configure modular devices in the POWERLINK network. Therefore also the device description specification (DS 311) is extended to be able to describe modular devices.

## **2 General**

### **2.1 Definitions**

A modular device consists of a so called head device and one or more attached devices called child devices.

The POWERLINK interface shall always be included in the head device. Furthermore the head device shall have one or more interfaces for attaching child devices.

These child devices may be connected to the head device and also to each other by any bus.

### **2.2 What is not part of this specification?**

The physical and logical connection of the child devices between each other and also to the head device is not part of this specification.

### **2.3 Device Description**

All matters concerning device description are specified in the corresponding device description specification. See EPSG 311 for more details.

The mapping of child objects into the object dictionary of the head device is described in the specification of the device description.

## 3 Additional Object Description

### 3.1 Object 1F82<sub>h</sub>: NMT\_FeatureFlags\_U32

The Feature Flags indicate communication profile specific properties of the device given by its design. The object shall be setup by the device firmware during system initialisation.

Additional bit used:

Octet	Bit	Name	TRUE	FALSE
2	21	Modular Device	device is a modular device	device is not a

Tab. 1 NMT\_FeatureFlags\_U32 additional bit interpretation

## 3.2 Child identification

### 3.2.1 Object 1027<sub>h</sub>: NMT\_ChildIdentList\_AU16

NMT\_ChildIdentList\_AU16 holds the indices of objects in the user specific area holding identification data for child devices. For definition of these objects named NMT\_ChildIdentData\_ADOM.

One NMT\_ChildIdentData\_ADOM object is able to hold information of up to 254 child devices. If the device supports more, the identification data will continue with sub-index 1 of the object given by the next index of this array.

Index	1027 <sub>h</sub>	Object Code	ARRAY
Name	NMT_ChildIdentList_AU16		
Data Type	UNSIGNED16	Category	MN: - CN: M

- **Sub-Index 00<sub>h</sub>: NumberOfEntries**

Sub-Index	00 <sub>h</sub>		
Name	NumberOfEntries		
Value Range	1 .. 254	Access	ro
Default Value	-	PDO Mapping	No

NumberOfEntries is implementation specific.

- **Sub-Index 01<sub>h</sub> .. FE<sub>h</sub>: ChildIdentList**

Sub-Index	01 <sub>h</sub> .. FE <sub>h</sub>		
Name	ChildIdentList		
--	--	Category	M
Value Range	2000 <sub>h</sub> ... 5FFF <sub>h</sub>	Access	ro
Default Value	-	PDO Mapping	No

ChildIdentList holds the index of the object NMT\_ChildIdentData\_ADOM.

### 3.2.2 Object *ChildIdentListIdx*<sup>1</sup>: NMT\_ChildIdentData\_ADOM

NMT\_ChildIdentData\_ADOM holds identification data for child devices. It allows the access to identification data of up to 254 child devices.

<sup>1</sup> *ChildIdentListIdx* represents the value given by the object 1027<sub>h</sub>.

Index	<i>ChildIdentListIdx</i>	Object Type	ARRAY
Name	NMT_ChildIdentData_ADOM		
Data Type	DOMAIN	Category	MN: - CN: M

- **Sub-Index 00<sub>h</sub>: NumberOfEntries**

Sub-Index	00 <sub>h</sub>		
Name	NumberOfEntries		
Value Range	01 <sub>h</sub> .. FE <sub>h</sub>	Access	ro
Default Value	-	PDO Mapping	No

Number of child devices addressed by this object.

- **Sub-Index 01<sub>h</sub> .. FE<sub>h</sub>: ChildIdent**

Sub-Index	01 <sub>h</sub> .. FE <sub>h</sub>		
Name	ChildIdent		
--	--	Category	M
Value Range	DOMAIN	Access	ro
Default Value	-	PDO Mapping	No

ChildIdent sub-indices provide access to the identification data of child devices.

Each sub-index in the array corresponds to the child device with the module number equal to the sub-index (plus all the number of entries of the objects listed in NMT\_ChildIdentList\_AU16 (1027<sub>h</sub>) before).

- **Value Interpretation**

VendorId_U32	ProductCode_U32	RevisionNo_U32	SerialNo_U32	ApplSwDate_U32	ApplSwTime_U32	...
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Tab. 2ChildIdent value interpretation

ChildIdent is composed of at least 24 octets. The vendor may define more (vendor specific) data after this. However the size of the domain shall not exceed 128 bytes.

*NOTE: This is to avoid problems with clients which cannot handle very large domains.*

VendorId\_U32, ProductCode\_U32, RevisionNo\_U32 and SerialNo\_U32 are equivalent to the sub-indices of object 1018<sub>h</sub> (NMT\_IdentityObject\_REC). ApplSwDate\_U32 and ApplSwTime\_U32 are equivalent to the sub-indices of object 1F52<sub>h</sub> (PDL\_LocVerApplSw\_REC).

In case of a not plugged child device the values shall be all 0.

### 3.3 Child program download

#### 3.3.1 Object 1F55<sub>h</sub>: **PDL\_DownloadChildProgList\_AU16**

PDL\_DownloadChildProgList\_AU16 holds the indices of objects in the user specific area holding the firmware of child devices. For definition of these objects named PDL\_DownloadChildProgData\_ADOM.

One PDL\_DownloadChildProgData\_ADOM object is able to hold the firmware of up to 254 child devices. If the device supports more, the firmware will continue with sub-index 1 of the object given by the next index of this array.

Index	1F55 <sub>h</sub>	Object Code	ARRAY
Name	PDL_DownloadChildProgList_AU16		
Data Type	UNSIGNED16	Category	MN: - CN: M

- **Sub-Index 00<sub>h</sub>: NumberOfEntries**

Sub-Index	00 <sub>h</sub>		
Name	NumberOfEntries		
Value Range	1 .. 254	Access	ro
Default Value	-	PDO Mapping	No

NumberOfEntries is implementation specific.

- **Sub-Index 01<sub>h</sub> .. FE<sub>h</sub>: DownloadChildProgList**

Sub-Index	01 <sub>h</sub> .. FE <sub>h</sub>		
Name	DownloadChildProgList		
--	--	Category	M
Value Range	2000 <sub>h</sub> ... 5FFF <sub>h</sub>	Access	ro
Default Value	-	PDO Mapping	No

DownloadChildProgList holds the index of the object PDL\_DownloadChildProgData\_ADOM.

### 3.3.2 Object *ChildProgListIdx*<sup>2</sup>: **PDL\_DownloadChildProgData\_ADOM**

PDL\_DownloadChildProgData\_ADOM holds programs for child devices. It allows the access to up to 254 programs.

Index	<i>ChildProgListIdx</i>	Object Type	ARRAY
Name	PDL_DownloadChildProgData_ADOM		
Data Type	DOMAIN	Category	MN: - CN: M

- **Sub-Index 00<sub>h</sub>: NumberOfEntries**

Sub-Index	00 <sub>h</sub>		
Name	NumberOfEntries		
Value Range	01 <sub>h</sub> .. FE <sub>h</sub>	Access	ro
Default Value	-	PDO Mapping	No

Number of child devices addressed by this object.

- **Sub-Index 01<sub>h</sub> .. FE<sub>h</sub>: ChildProgram**

Sub-Index	02 <sub>h</sub> .. FE <sub>h</sub>		
Name	ChildProgram		
--	--	Category	M
Value Range	DOMAIN	Access	cond
Default Value	-	PDO Mapping	No

ChildProgram sub-indices provide access to the firmware of child devices.

If the device supports reading of the program the access shall be rw otherwise wo.

Each sub-index in the array corresponds to the child device with the module number equal to the sub-index (plus all the number of entries of the objects listed in PDL\_DownloadChildProgList\_AU16 (1F55<sub>h</sub>) before).

<sup>2</sup> *ChildProgListIdx* represents the value given by the object 1F55<sub>h</sub>.

## **4 Additional Device Description Entries**

There are no additional device description entries necessary.