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Industrial automation systems and integration — Open systems application integration framework —

Part 4: Reference description for Ethernet-based control systems

AMENDMENT 2: Profiles for Modbus TCP, EtherCAT and ETHERNET Powerlink

Systèmes d'automatisation industrielle et intégration — Cadres d'intégration d'application pour les systèmes ouverts —

Partie 4: Description de référence pour les systèmes de contrôle fondés sur Ethernet

AMENDEMENT 2: Profils pour Modbus TCP, EtherCAT et ETHERNET Powerlink

Reference number
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Foreword

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Amendment 2 to ISO 15745-4:2003 was prepared by Technical Committee ISO/TC 184, *Industrial automation systems and integration*, Subcommittee SC 5, *Architecture, communications and integration frameworks*. Amendment 2 to ISO 15745-4:2003 specifies profiles for Modbus TCP[1)], EtherCAT[2)], and ETHERNET Powerlink[3)], and, as such, adds to the number of technology-specific elements and rules in ISO 15745-4 for describing both communication network profiles and communication-related aspects of device profiles, thus further extending the Application Integration Framework in ISO 15745-1.

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Part 4:
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AMENDMENT 2: Profiles for Modbus TCP, EtherCAT and ETHERNET Powerlink

Page 1, Clause 2

Add the following normative references:

"ISO 1000, *SI units and recommendations for the use of their multiples and of certain other units*

ISO 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes*

IEC/PAS 62030, *Digital data communications for measurement and control - Fieldbus for use in industrial control systems - Section 1: MODBUS® Application Protocol Specification V1.1a - Section 2: Real-Time Publish-Subscribe (RTPS) Wire Protocol Specification Version 1.0*

IEC/PAS 62407, *Real-time Ethernet control automation technology (EtherCATTM)*

IEC/PAS 62408, *Real-time Ethernet Powerlink (EPL)*

RFC 1157 SNMP, *Simple Network Management Protocol (SNMP) Management Frameworks"*

Page 2, Clause 4

Add the following abbreviated terms:

"DDXML Device Description eXtensible Markup Language

EPL ETHERNET Powerlink

FMMU Fieldbus Memory Management Unit

MIB Management Information Base

SNMP Simple Network Management Protocol (RFC 1157)"

Page 4, Table 1

Add a row with the entries "DDXML" under the "ProfileTechnology name" column and "Modbus TCP" under the "Technology" column.

Add a row with the entries "EtherCAT" under the "ProfileTechnology name" column and "EtherCAT" under the "Technology" column.

Add a row with the entries "EPL" under the "ProfileTechnology name" column and "ETHERNET Powerlink" under the "Technology" column.

Page 4, Subclause 5.3

Add the following items to the list in the first paragraph:

"— Modbus TCP (see 6.5)

— EtherCAT (see 6.6)

— ETHERNET Powerlink (see 6.7)".

Page 18

Insert the following new subclauses 6.5, 6.6 and 6.7 after subclause 6.4 inserted from Amendment 1 to ISO 15745-4:2003, and before Annex A.

6.5 Modbus TCP

6.5.1 Device profile

6.5.1.1 General

Figure 20 shows the class structure of a Modbus TCP device profile.

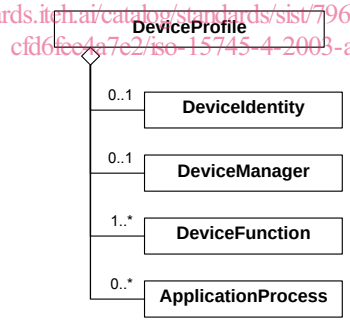

Figure 20 — Modbus TCP device profile class diagram

NOTE The Modbus TCP device profile class diagram shown in Figure 20 defines the main classes. These classes are further decomposed and detailed in Annex E.

The XML schemas representing the Modbus TCP device profile template are defined in E.4.6. The template is based on two parts:

— the DDXML profile header defined in E.3, and

— the DDXML device profile defined in E.4.

6.5.1.2 Device identity

The DeviceIdentity class contains attributes that are independent of the network, of the process and uniquely identify the device.

Figure 21 shows the structure of the Modbus TCP DeviceIdentity class.

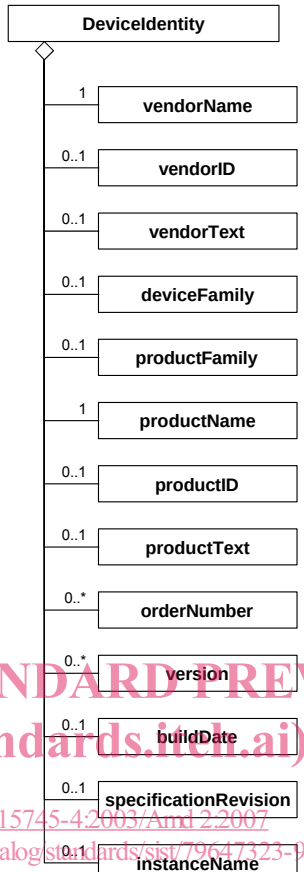

Figure 21 — Modbus TCP DeviceIdentity class diagram

Further details are given in E.4.2.

6.5.1.3 Device manager

The DeviceManager class contains attributes and supports services that enable the monitoring of the device. Communication specific configuration data and mapping information is defined in the communication network specific part structured according to the schema specified in E.5.

Figure 22 shows the structure of the Modbus TCP DeviceManager class.

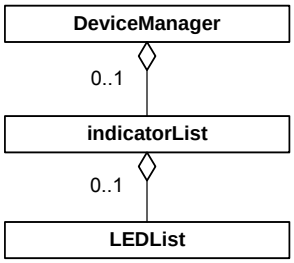

Figure 22 — Modbus TCP DeviceManager class diagram

Further details are given in E.4.3.

6.5.1.4 Device function

The DeviceFunction class describes the intrinsic function of a device in terms of its technology. It contains network independent descriptions/definitions of the technological device functionality.

Figure 23 shows the structure of the Modbus TCP DeviceFunction class.

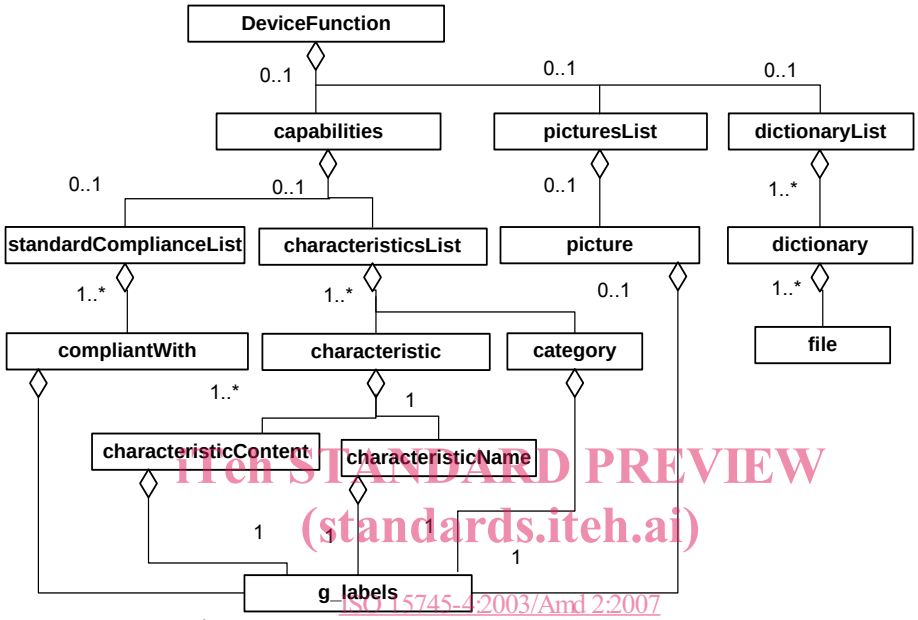

Figure 23 — Modbus TCP DeviceFunction class diagram

Further details are given in E.4.4.

6.5.1.5 Application process

The ApplicationProcess class represents the set of services and parameters, which constitute the behaviour, and the interfaces of the device in terms of the application, independent of the device technology and the underlying communication networks and communication protocols.

Figure 24 shows the structure of the Modbus TCP ApplicationProcess class.

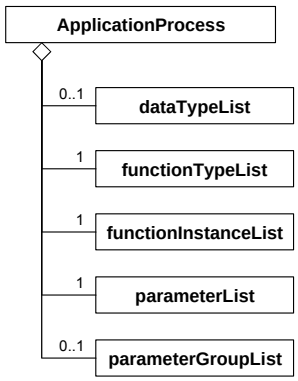

Figure 24 — Modbus TCP ApplicationProcess class diagram

Further details are given in E.4.5.

6.5.2 Communication network profile

6.5.2.1 General

Figure 25 shows the class structure of the Modbus TCP communication network profile. These classes are further decomposed and detailed in Annex E.

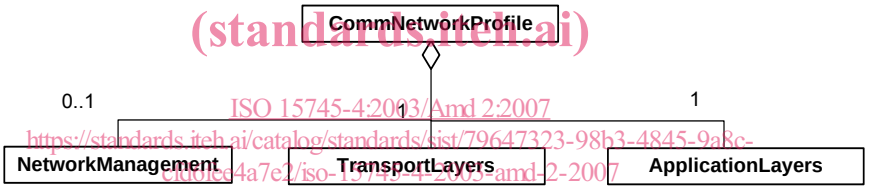

Figure 25 — Modbus TCP communication network profile class diagram

The XML schemas representing the Modbus TCP communication network profile template are defined in E.5.5. Like for the device profile, the template is also based on two parts:

— the DDXML profile header defined in E.3, and

— the DDXML communication network profile defined in E.5.

6.5.2.2 Application layers

The Modbus TCP ApplicationLayers class represents the combined profiles for the upper 3 OSI layers of the Modbus TCP communication network integration model.

Further details are given in E.5.2.

6.5.2.3 Transport layers

The Modbus TCP TransportLayers class represents the combined profiles for the lower 4 OSI layers of the Modbus TCP communication network integration model.

Further details are given in E.5.3.

6.5.2.4 Network management

The Modbus TCP NetworkManagement class represents the network configuration and performance adjustment capabilities of the Modbus TCP communication network integration model.

Further details are given in E.5.4.

6.6 EtherCAT

6.6.1 Device profile

6.6.1.1 General

Figure 26 shows the class structure of an EtherCAT device profile.

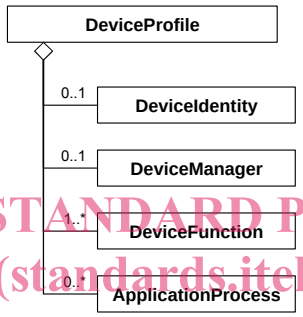

Figure 26 — EtherCAT device profile class diagram

NOTE The EtherCAT device profile class diagram shown in Figure 26 defines the main classes. These classes are further decomposed and detailed in Annex F.

The XML schema representing the EtherCAT device profile template is defined in F.4.6. The template is based on two parts:

— the EtherCAT profile header defined in F.3, and

— the EtherCAT device profile defined in F.4.

6.6.1.2 Device identity

The DeviceIdentity class contains attributes that are independent of the network, of the process and uniquely identify the device.

Figure 27 shows the structure of the EtherCAT DeviceIdentity class.

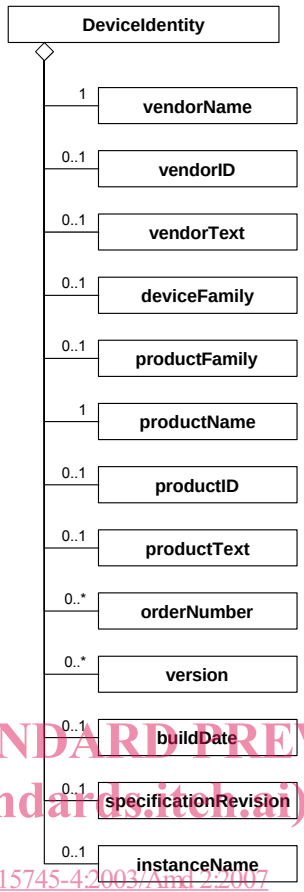

Figure 27 — EtherCAT DeviceIdentity class diagram

Further details are given in F.4.2.

6.6.1.3 Device manager

The DeviceManager class contains attributes and supports services that enable the monitoring of the device. Communication specific configuration data and mapping information is defined in the communication network specific part structured according to the schema specified in F.5.

Figure 28 shows the structure of the EtherCAT DeviceManager class.

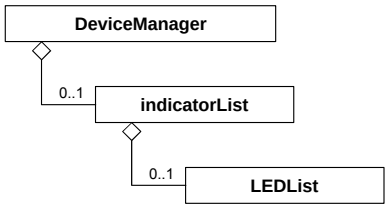

Figure 28 — EtherCAT DeviceManager class diagram

Further details are given in F.4.3.

6.6.1.4 Device function

The DeviceFunction class describes the intrinsic function of a device in terms of its technology. It contains network independent descriptions/definitions of the technological device functionality.

Figure 29 shows the structure of the EtherCAT DeviceFunction class.

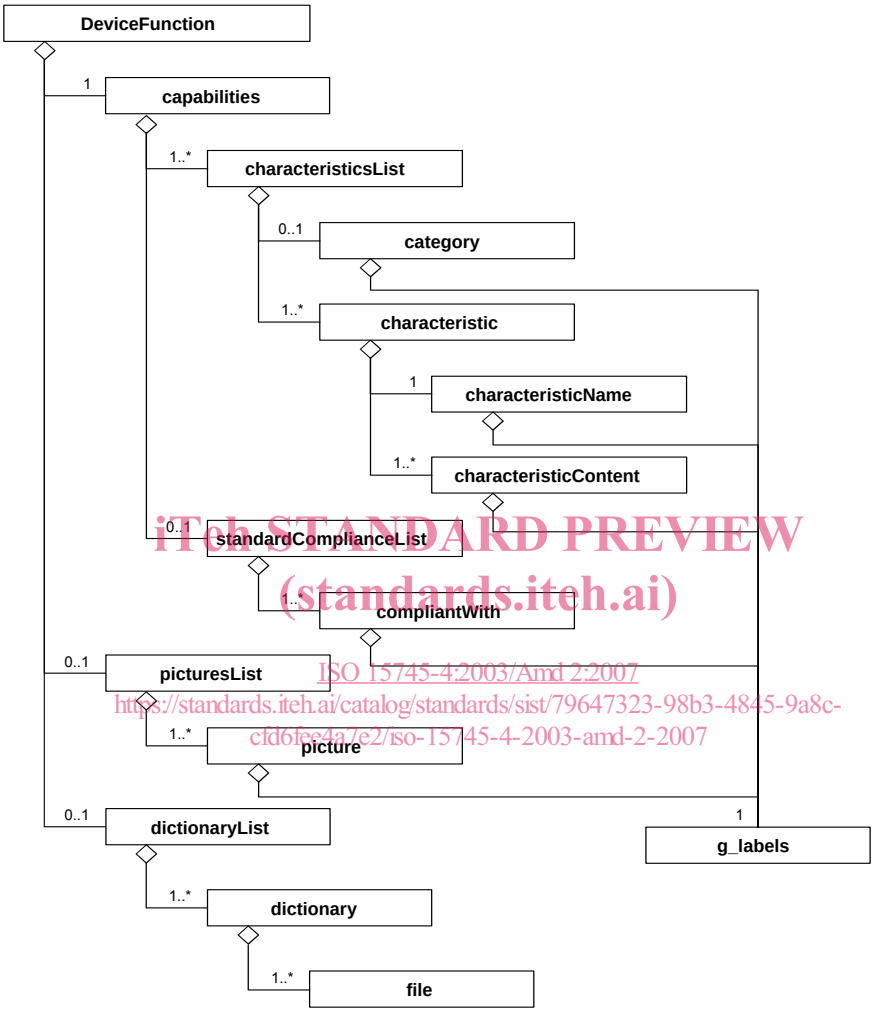

Figure 29 — EtherCAT DeviceFunction class diagram

Further details are given in F.4.4.

6.6.1.5 Application process

The ApplicationProcess class represents the set of services and parameters, which constitute the behaviour, and the interfaces of the device in terms of the application, independent of the device technology and the underlying communication networks and communication protocols.

Figure 30 shows the structure of the EtherCAT ApplicationProcess class.

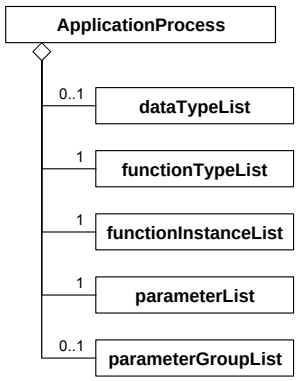

Figure 30 — EtherCAT ApplicationProcess class diagram

Further details are given in F.4.5.

6.6.2 Communication network profile

6.6.2.1 General

Figure 31 shows the class structure of the EtherCAT communication network profile. These classes are further decomposed and detailed in Annex F.

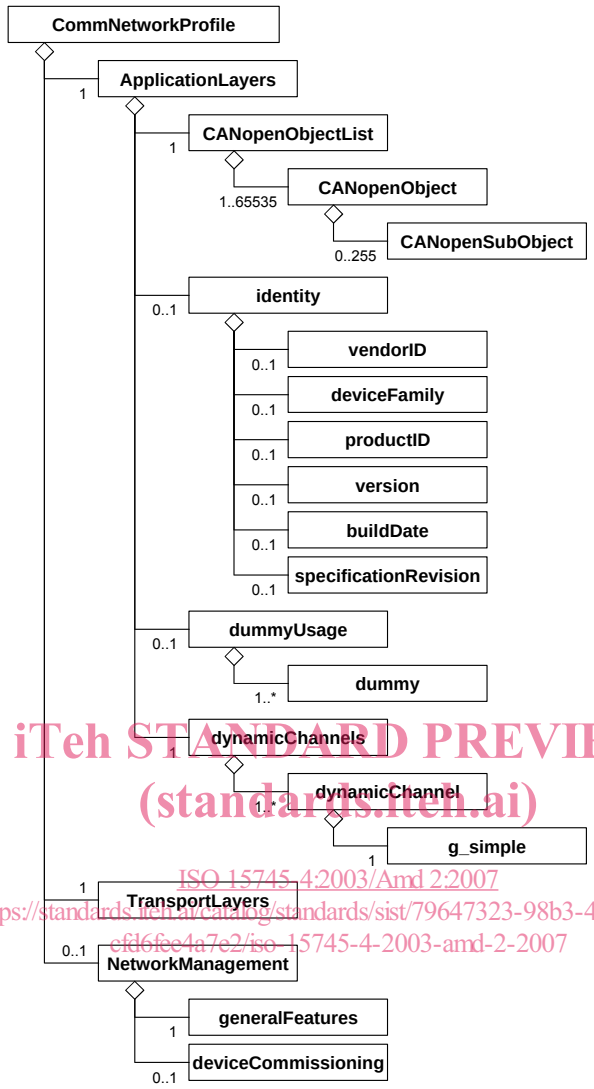

Figure 31 — EtherCAT communication network profile class diagram

The XML schema representing the EtherCAT communication network profile is defined in F.5.5.

6.6.2.2 Application layers

The EtherCAT ApplicationLayers class represents the combined profiles for the upper 3 OSI layers of the EtherCAT communication network integration model.

Further details are given in F.5.2.

6.6.2.3 Transport layers

The EtherCAT TransportLayers class represents the combined profiles for the lower 4 OSI layers of the EtherCAT communication network integration model.

Further details are given in F.5.3.

6.6.2.4 Network management

The EtherCAT NetworkManagement class represents the network configuration and performance adjustment capabilities of the EtherCAT communication network integration model.

Further details are given in F.5.4.

6.7 ETHERNET Powerlink

6.7.1 Device profile

6.7.1.1 General

Figure 32 shows the class structure of an ETHERNET Powerlink device profile.

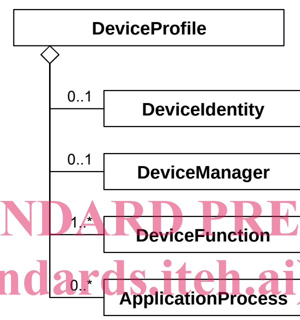

Figure 32 — ETHERNET Powerlink device profile class diagram

NOTE The ETHERNET Powerlink device profile class diagram shown in Figure 32 defines the main classes. These classes are further decomposed and detailed in Annex G.

The XML schema representing the ETHERNET Powerlink device profile template is defined in G.4.6. The template is based on two parts:

— the EPL profile header defined in G.3, and

— the EPL device profile defined in G.4.

6.7.1.2 Device identity

The DeviceIdentity class contains attributes that are independent of the network, of the process and uniquely identify the device.

Figure 33 shows the structure of the ETHERNET Powerlink DeviceIdentity class.

