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

**Part 5:
Reference description for HDLC-based
control systems**

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

*Partie 5: Description de référence pour les systèmes de contrôle fondés
sur HDLC*



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

© ISO 2007

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
Introduction.....	v
1 Scope	1
2 Normative references	1
3 Terms and definitions.....	1
4 Abbreviated terms	2
5 Technology specific elements and rules	2
5.1 Integration models and IAS interfaces	2
5.2 Profile templates	2
5.3 Technology specific profiles.....	3
6 Device and communication network profiles for HDLC-based control systems	3
6.1 General	3
6.2 CC-Link	4
Annex A (normative) CC-Link profile templates	16
Annex B (informative) UML terminology and notation	87
Bibliography.....	88

Copyright International Organization for Standardization · All rights reserved
 Provided by IHS under license with ISO
 No reproduction or networking permitted without license from IHS
 Full document details: ISO 15745-5-2007

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 15745-5 was prepared by Technical Committee ISO/TC 184, *Industrial automation systems and integration*, Subcommittee SC 5, *Architecture, communications and integration frameworks*.

ISO 15745 consists of the following parts under the title *Industrial automation systems and integration — Open systems application integration framework*

- *Part 1: Generic reference description*
- *Part 2: Reference description for ISO 11898-based control systems*
- *Part 3: Reference description for IEC 61158-based control systems*
- *Part 4: Reference description for Ethernet-based control systems*
- *Part 5: Reference description for HDLC-based control systems*

Introduction

The application integration framework (AIF) described in ISO 15745 defines elements and rules that facilitate:

- the systematic organization and representation of the application integration requirements using integration models;
- the development of interface specifications in the form of application interoperability profiles (AIPs) that enable both the selection of suitable resources and the documentation of the "as built" application.

ISO 15745-1 defines the generic elements and rules for describing integration models and AIPs, together with their component profiles - process profiles, information exchange profiles, and resource profiles. The context of ISO 15745 and a structural overview of the constituents of an AIP are given in Figure 1 of ISO 15745-1:2003.

This part of ISO 15745 extends the generic AIF described in ISO 15745-1 by defining the technology specific elements and rules for describing both communication network profiles and the communication related aspects of device profiles specific to HDLC¹⁾ -based control systems (CC-Link²⁾). CC-Link is based on HDLC technology.

In particular, this part of ISO 15745 describes technology specific profile templates for the device profile and the communication network profile. Within an AIP, a device profile instance or a communication network profile instance is part of the resource profile defined in ISO 15745-1. The device profile and the communication network profile XML instance files are included in a resource profile XML instance using the ProfileHandle_DataType as specified in ISO 15745-1:2003, 7.2.5.

AIFs specified using the elements and rules of ISO 15745-1 can be easily integrated with the component profiles defined using the elements and rules specified in this part of ISO 15745.

1) HDLC is used in this document as a synonym for ISO/IEC 13239.

2) CC-Link is the trade name of the CC-Link Partner Association (CLPA). This information is given for the convenience of users of ISO 15745 and does not constitute an endorsement by ISO of the trade name holder or any of its products. Compliance to this part of ISO 15745 does not require use of the trade name CC-Link. Use of the trade name CC-Link requires permission of the CLPA.

Document Reference: 15745-5-2007

Industrial automation systems and integration — Open systems application integration framework — Part 5: Reference description for HDLC-based control systems

1 Scope

This part of ISO 15745 defines the technology specific elements and rules for describing both communication network profiles and the communication related aspects of device profiles specific to HDLC-based control systems.

NOTE Generic elements and rules for describing integration models and application interoperability profiles, together with their component profiles (process profiles, information exchange profiles, and resource profiles) are specified in ISO 15745-1.

This part of ISO 15745 is to be used in conjunction with ISO 15745-1 to describe an application integration framework.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 15745-1:2003, *Industrial automation systems and integration – Open systems application integration framework – Part 1: Generic reference description*

ISO/IEC 13239, *Information technology – Telecommunications and information exchange between systems – High-level data link control (HDLC) procedures*

REC-xml-20040204, *Extensible Markup Language (XML) 1.0 Third Edition – W3C Recommendation 04 February 2004*

REC-xmlschema-1-20010502, *XML Schema Part 1: Structures – W3C Recommendation 02 May 2001*

REC-xmlschema-2-20010502, *XML Schema Part 2: Datatypes – W3C Recommendation 02 May 2001*

UML V1.4, *OMG - Unified Modeling Language Specification (Version 1.4, September 2001)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 15745-1 apply.

NOTE The UML terminology and notation used in this part of ISO 15745 is described in Annex A of ISO 15745-1:2003 and Annex B of this part of ISO 15745.

4 Abbreviated terms

AIF	Application Integration Framework
AIP	Application Interoperability Profile
ASCII	American Standard Code for Information Interchange
CSP	CC-Link System Profile (see BAP-05028)
HDLC	High-level Data Link Control (see ISO/IEC 13239)
IAS	Industrial Automation Systems
I/O	Input and Output
LT	CC-Link/LT
OSI	Open System Interconnection
RWr	Remote register for read
RWw	Remote register for write
RX	Remote input
RY	Remote output
SEMI	Semiconductor Equipment and Materials International (in this context refer to SEMI standard, SEMI E54.12-0701)
UML	Unified Modeling Language (see UML V1.4)
XML	eXtensible Markup Language (see REC-xml-20040204)

5 Technology specific elements and rules

5.1 Integration models and IAS interfaces

The AIP developer shall develop the integration model using the rules described in ISO 15745-1, and shall ensure that the HDLC-based device and communication network profiles (whether representing the interface requirements or those derived from existing devices/communication networks) include the necessary IAS interfaces. The IAS interfaces included in the profile shall be identified in the header section (see ISO 15745-1:2003, 7.2.2).

NOTE IAS interfaces are described in ISO 15745-1:2003, Annex B.

5.2 Profile templates

5.2.1 General

The HDLC-based technology specific profile templates are derived from the generic profile templates specified in ISO 15745-1:2003, clause 7.

5.2.2 Contents and syntax

ISO 15745 specifies profile templates that are XML schemas (REC-xmlschema-1-20010502 and REC-xmlschema-2-20010502) and use a common general structure. The device and communication network profiles based on these templates typically contain:

- information needed to identify the connected device,
- a description of device data that can be accessed via the network,
- a description of the communication capabilities supported by the device,
- additional vendor-specific information.

However, CC-Link technology uses specific legacy ASCII syntax. Hence, for backward compatibility, template definitions (see Annex A) include the following:

- communication network and device profile templates, as defined in ISO 15745-1,
- ISO 15745 template to encapsulate files with legacy ASCII syntax ("wrapper").

5.2.3 Header

The profile template header defined in ISO 15745-1:2003, 7.2.2, is used for HDLC-based technology specific profile templates. Each technology uses one or more names to identify the technology or its particular component(s) (see Table 1). The selected name shall be stored in the ProfileTechnology attribute in the header section.

Table 1 — ProfileTechnology names

ProfileTechnology name	Technology
CC-Link	CC-Link
CSP	CC-Link

5.3 Technology specific profiles

The technology specific communication network profile structure and communication related aspects of device profile structure based on HDLC technology are described in clause 6. The technology included is CC-Link (see 6.2).

The related profile template definitions are specified in Annex A.

6 Device and communication network profiles for HDLC-based control systems

6.1 General

The CC-Link technology specific device and communication network profiles are described in 6.2.

6.2 CC-Link

6.2.1 Device profile

6.2.1.1 General

Figure 1 shows the class structure of the CC-Link device profile.

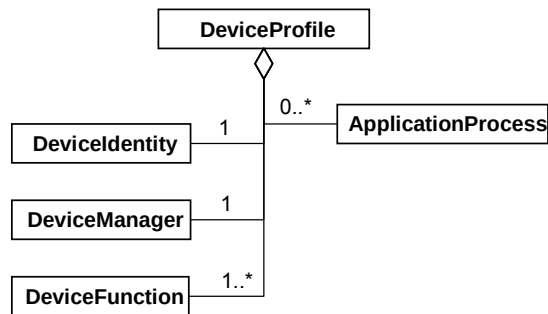


Figure 1 — CC-Link device profile class diagram

The DeviceProfile class of any version of CC-Link except version LT may include the ApplicationProcess class. The DeviceProfile class of CC-Link version LT shall not include the ApplicationProcess class.

The available formats for CC-Link device profiles are described in A.2.

The XML schema representing the CC-Link device profiles template is defined in A.2.1.3. The file name of this XML schema shall be "CC-Link_DeviceProfile.xsd".

The XML schema representing the encapsulation of a CC-Link CSP into the ISO 15745 device profile template is defined in A.2.2.2. The file name of this XML schema shall be "CSP_DeviceProfile_wrapper.xsd". The legacy CSP ASCII syntax itself is described in A.4.

6.2.1.2 Device identity

Figure 2 shows the class structure of the DeviceIdentity class.

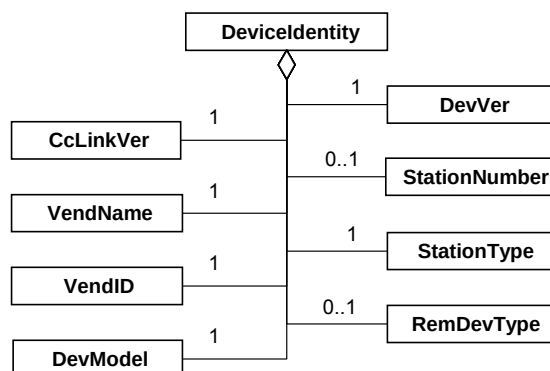


Figure 2 — CC-Link DeviceIdentity class diagram

The DeviceIdentity class shall consist of the child classes shown in Figure 2 and specified in Table 2. Child classes of DeviceIdentity class apply to profile, type, and instance.

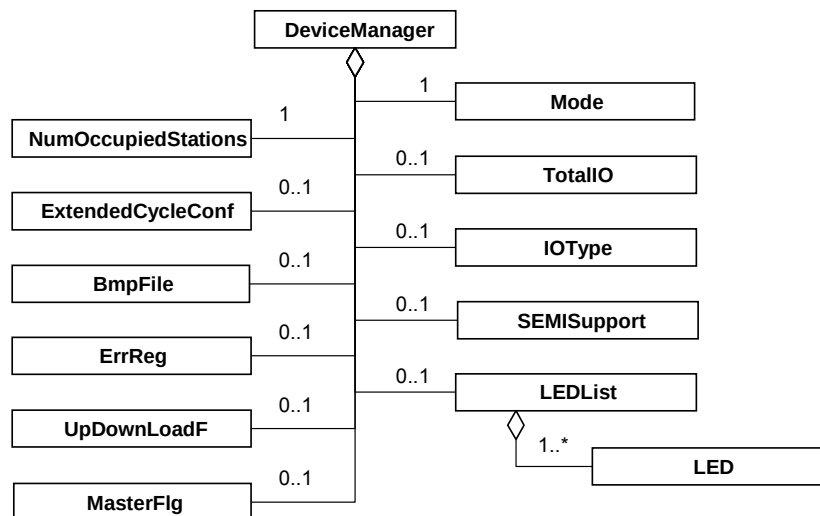
Table 2 — Child classes of DeviceIdentity class

Class	Description
CcLinkVer	CC-Link version used by the device
VendName	vendor name
VendID	vendor code
DevModel	model name
DevVer	version number
StationNumber	Identifier of the device
StationType	type code for slave station
RemDevType	type code for remote device station

6.2.1.3 Device manager

6.2.1.3.1 General

Figure 3 shows the structure of the DeviceManager class.

**Figure 3 — CC-Link DeviceManager class diagram**

The DeviceManager class consists of the child classes shown in Figure 3 and Table 3.

Table 3 — Child classes of DeviceManager class

Class	Version 1.00 / 1.10	Version 1.11	Version 2.00	Version LT
NumOccupiedStations	Mandatory	Mandatory	Mandatory	Mandatory
ExtendedCycleConf	Not applicable	Not applicable	Optional	Not applicable
BmpFile	Mandatory	Mandatory	Mandatory	Not applicable
ErrReg	Optional	Optional	Optional	Not applicable
UpDownloadF	Mandatory	Mandatory	Mandatory	Not applicable
MasterFlg	Optional	Optional	Optional	Not applicable
Mode	Mandatory	Mandatory	Mandatory	Mandatory
TotalIO	Optional	Optional	Optional	Optional
IOType	Optional	Optional	Optional	Optional
SEMISSupport	Not applicable	Optional	Optional	Not applicable
LEDList	Optional	Optional	Optional	Optional
NOTE The four right hand columns indicate whether a certain child class is mandatory, optional, or not applicable for a device profile of a specified CC-Link version.				

6.2.1.3.2 NumOccupiedStations

NumOccupiedStations is the number of occupied stations.

6.2.1.3.3 ExtendedCycleConf

ExtendedCycleConf is the extension level of an amount of I/O points used in the extended cyclic communication.

6.2.1.3.4 BmpFile

BmpFile is the name of the associated bitmap file.

6.2.1.3.5 ErrReg

ErrReg is a register used to store an error code.

6.2.1.3.6 UpDownloadF

UpDownloadF indicates whether an upload and download is applicable or not.

6.2.1.3.7 MasterFlg

MasterFlg indicates whether the device can be a standby master or not.

6.2.1.3.8 Mode

Mode indicates supporting operation modes (see Table A.3).

6.2.1.3.9 TotalIO

TotalIO is the total number of I/O points (see Table A.4).

6.2.1.3.10 IOType

IOType is the type of I/O (see Table A.5).

6.2.1.3.11 SEMISupport

SEMISupport indicates whether the SEMI standard function is supported or not.

6.2.1.3.12 LEDList, LED

The LEDList is a listing of available LEDs. The LED describes the name and the possible state of the LED on the device (see Table A.6).

6.2.1.4 Device function

Figure 4 shows the structure of the DeviceFunction class.

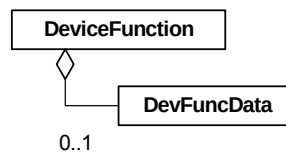


Figure 4 — CC-Link DeviceFunction class diagram

NOTE The definition of the DevFuncData of the DeviceFunction is outside the scope of this part of ISO 15745.

6.2.1.5 Application process**6.2.1.5.1 General**

Figure 5 shows the class structure of the ApplicationProcess class.

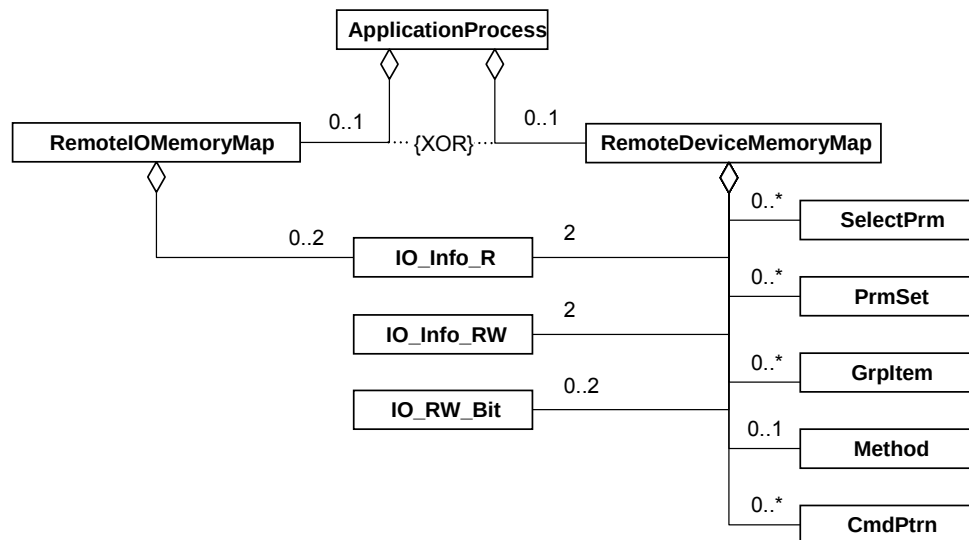


Figure 5 — CC-Link ApplicationProcess class diagram

6.2.1.5.2 RemoteIOMemoryMap

6.2.1.5.2.1 General

RemoteIOMemoryMap is a CSP profile equivalent for a remote I/O device. The CSP profile is described in A.4.

6.2.1.5.2.2 IO_Info_R

Figure 6 shows the class structure of the IO_Info_R class.

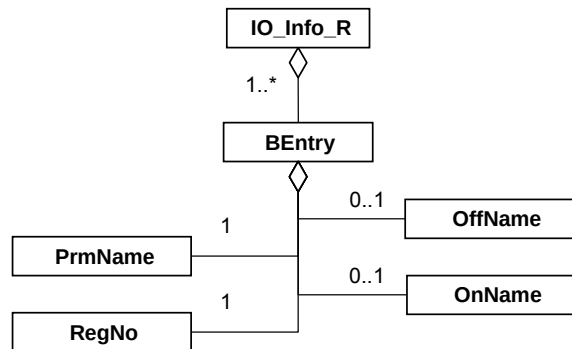


Figure 6 — CC-Link IO_Info_R class diagram

The IO_Info_R represents IO_Info_RX section and IO_Info_RY section of the CSP profile. A BEntry shall contain the child classes shown in Figure 6 and A.2.1.2.4.1.

6.2.1.5.3 RemoteDeviceMemoryMap

6.2.1.5.3.1 General

RemoteDeviceMemoryMap is a CSP profile equivalent for a remote device.

6.2.1.5.3.2 IO_Info_R

The class structure of the IO_Info_R class is described in 6.2.1.5.2.2.

6.2.1.5.3.3 IO_Info_RW

Figure 7 shows the class structure of IO_Info_RW class.

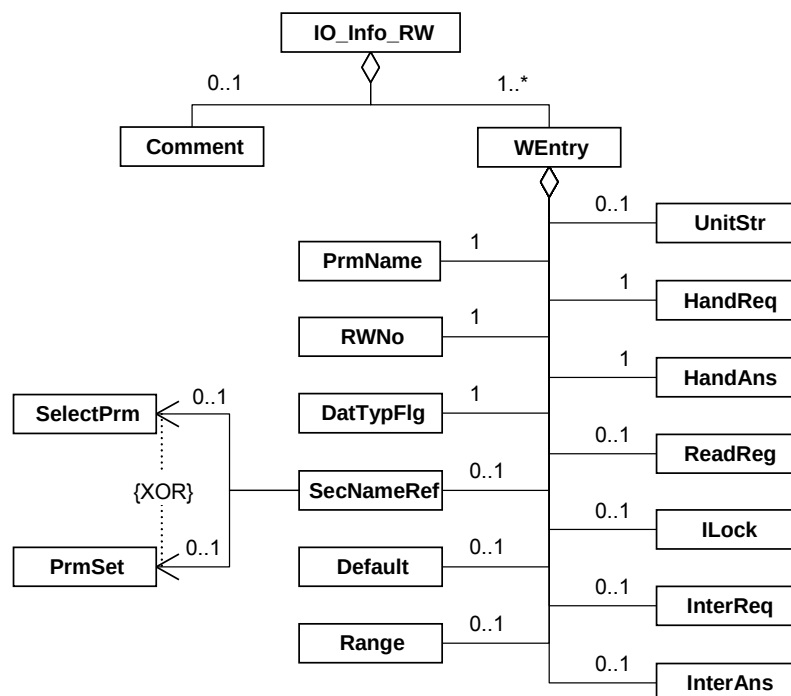


Figure 7 — CC-Link IO_Info_RW class diagram

Comment class is used to annotate. A WEntry contains the child classes shown in Figure 7 and A.2.1.2.4.2. A WEntry represents parameters of a word register.

6.2.1.5.3.4 IO_RW_Bit

Figure 8 shows the class structure of IO_RW_Bit class.

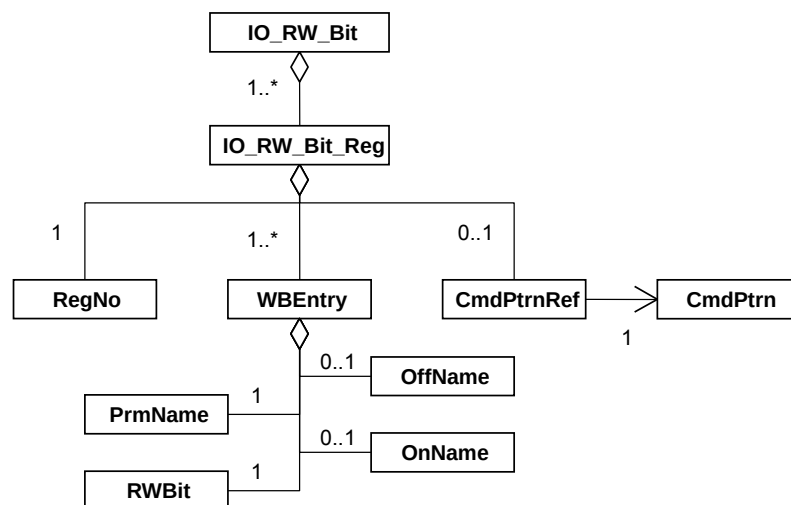


Figure 8 — CC-Link IO_RW_Bit class diagram

IO_RW_Bit_Reg class is a container of the associated subclasses. RegNo class represents register number. WEntry class contains the child classes shown in Figure 8 and A.2.1.2.4.3. WEntry class represents parameters of bits used in a word register. CmdPtrnRef is a reference to CmdPtrn.

6.2.1.5.3.5 SelectPrm

Figure 9 shows the class structure of SelectPrm class.

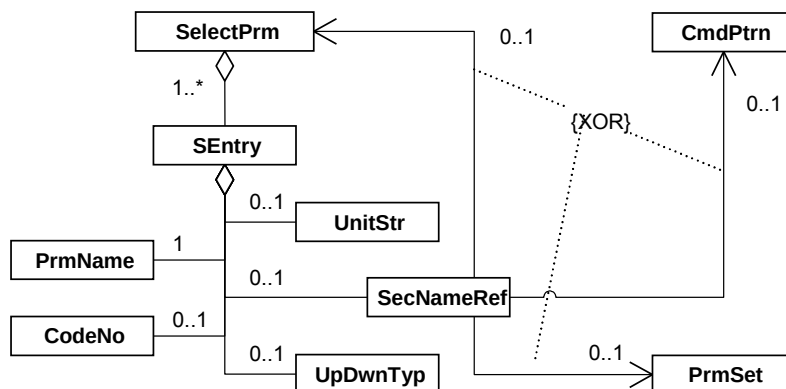


Figure 9 — CC-Link SelectPrm class diagram

SEntry class contains the child classes shown in Figure 9 and A.2.1.2.4.4. A SEntry represents an entry of the "Select parameter section" defined in a CSP profile.

6.2.1.5.3.6 PrmSet

Figure 10 shows the class structure of PrmSet class.

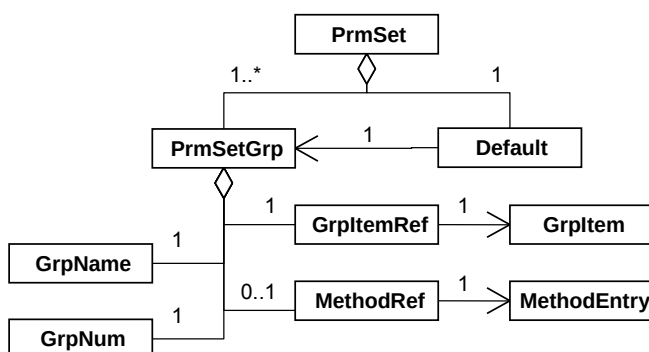


Figure 10 — CC-Link PrmSet class diagram

PrmSetGrp class contains the child classes shown in Figure 10 and A.2.1.2.4.5. PrmSetGrp represents an entry of the parameter set section defined in a CSP profile. The Default class is a reference to the default PrmSetGrp.

6.2.1.5.3.7 GrpItem

Figure 11 shows the class structure of GrpItem class.

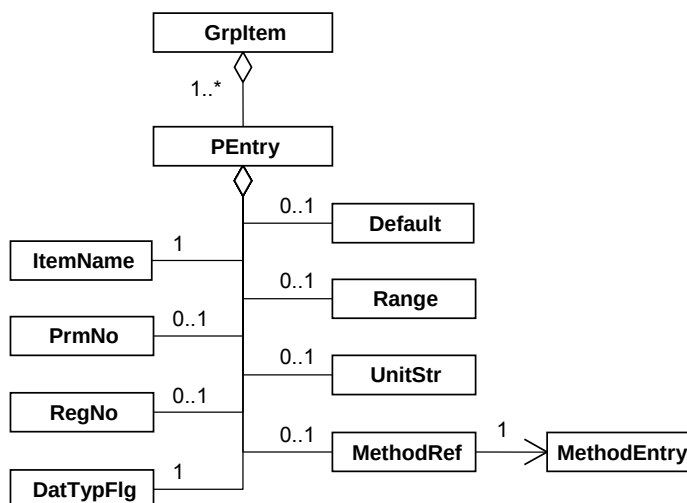


Figure 11 — CC-Link GrpItem class diagram

A PEntry contains the child classes shown in Figure 11 and A.2.1.2.4.6. PEntry represents the items of a parameter entry defined in a CSP profile.

6.2.1.5.3.8 Method

Figure 12 shows the class structure of Method class.

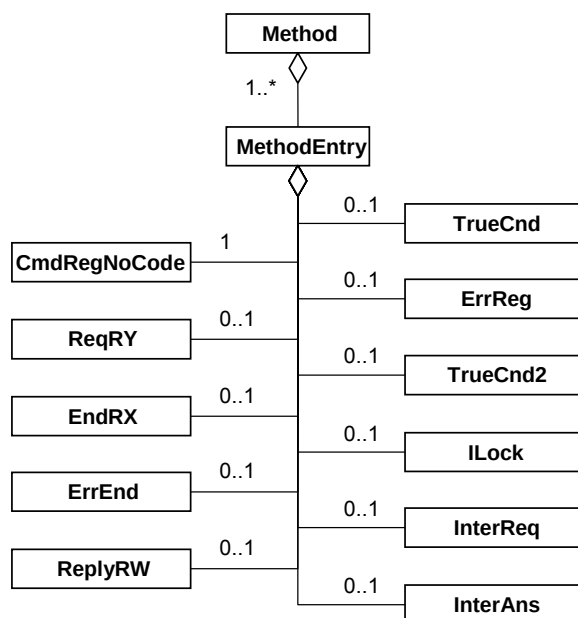


Figure 12 — CC-Link Method class diagram

MethodEntry contains the child classes shown in Figure 12 and A.2.1.2.4.7. A MethodEntry represents a method defined in a CSP profile.

6.2.1.5.3.9 CmdPtrn

Figure 13 shows the class structure of CmdPtrn class.

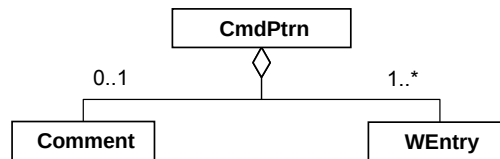


Figure 13 — CC-Link CmdPtrn class diagram

Comment class is used to annotate. A WEntry contains the child classes shown in Figure 7 and A.2.1.2.4.2. A WEntry represents parameters of a word register.

6.2.2 Communication network profile

6.2.2.1 General

Figure 14 shows the class structure of the CC-Link communication network profile.

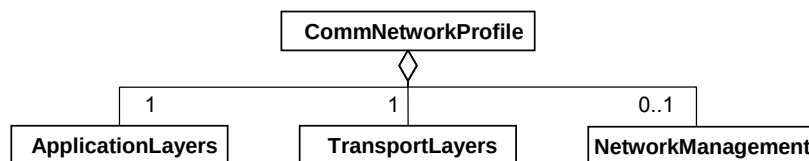


Figure 14 — CC-Link communication network profile class diagram

The available formats for CC-Link communication network profiles are described in A.3.

The XML schema representing the CC-Link communication network profile template is defined in A.3.1.3. The file name of this XML schema shall be "CC-Link_CommNetworkProfile.xsd."

The XML schema representing the encapsulation of a CC-Link CSP file into the ISO 15745 communication network profile template is defined in A.3.2.2. The file name of this XML schema shall be "CSP_CommNetworkProfile_wrapper.xsd."

6.2.2.2 Application layers

The ApplicationLayers class represents the combined profiles for the upper 3 OSI layers of the communication network integration model. It states the supported application service elements and their associate services. ApplicationLayers class consists of the child classes shown in Figure 15 and Table 4.

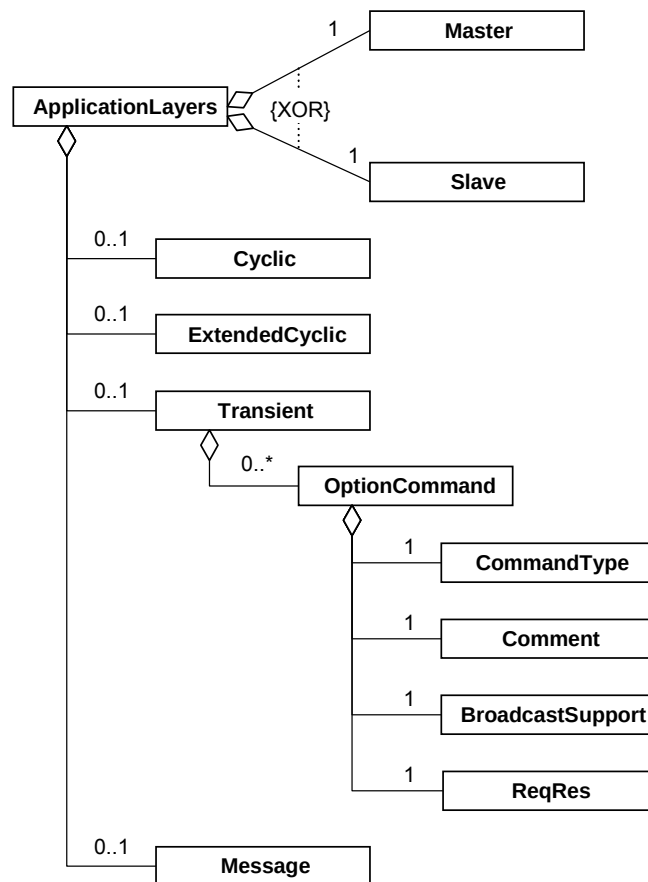


Figure 15 — CC-Link ApplicationLayers class diagram

Table 4 — Constraints for child classes of ApplicationLayers class

Class	Version 1.00 / 1.10	Version 1.11	Version 2.00	Version LT
Master	Mandatory	Mandatory	Mandatory	Mandatory
Slave	Mandatory	Mandatory	Mandatory	Mandatory
Cyclic	Mandatory	Mandatory	Optional	Mandatory
ExtendedCyclic	Not applicable	Not applicable	Mandatory	Not applicable
Transient	Optional	Optional	Optional	Not applicable
Message	Not applicable	Mandatory	Optional	Not applicable
NOTE The four right hand columns indicate whether a certain child class is mandatory, optional, or not applicable in a device profile of a specified CC-Link version.				

The child classes of ApplicationLayers represent the following:

- Master indicates that the device is a master;
- Slave indicates that the device is a slave;

- Cyclic indicates that the device supports cyclic communication;
- ExtendedCyclic indicates that the device supports extended cyclic communication;
- Transient indicates whether or not the device supports transient communication and documents optional commands defined by the vendor;
- Message indicates whether or not the device supports message communication.

6.2.2.3 Transport layers

6.2.2.3.1 General

The TransportLayers class represents the combined profiles for the lower 4 OSI layers of the CC-Link communication network integration model. TransportLayers class consists of the child classes shown in Figure 16.

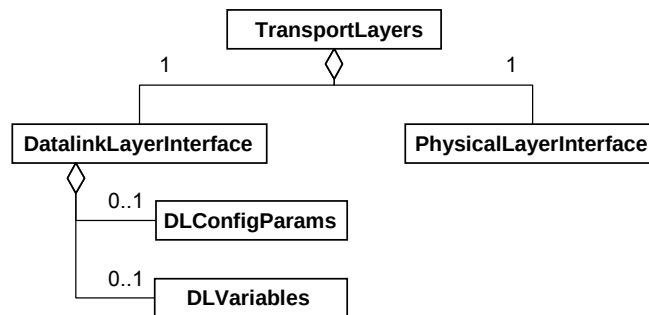


Figure 16 — CC-Link TransportLayers class diagram

6.2.2.3.2 PhysicalLayerInterface

The PhysicalLayerInterface class defines the properties associated with the physical layer of CC-Link.

6.2.2.3.3 DatalinkLayerInterface

The DatalinkLayerInterface class defines the properties associated with the data link layer of CC-Link. The child classes of DatalinkLayerInterface are represented as follows:

- DLConfigParams defines the properties associated with data link layer configuration;
- DLVariables defines the properties associated with data link layer monitoring.

6.2.2.4 Network management

The NetworkManagement class represents the properties relating to the network management of the CC-Link communication network integration model. The NetworkManagement class consists of the child classes shown in Figure 17 and Table 5.

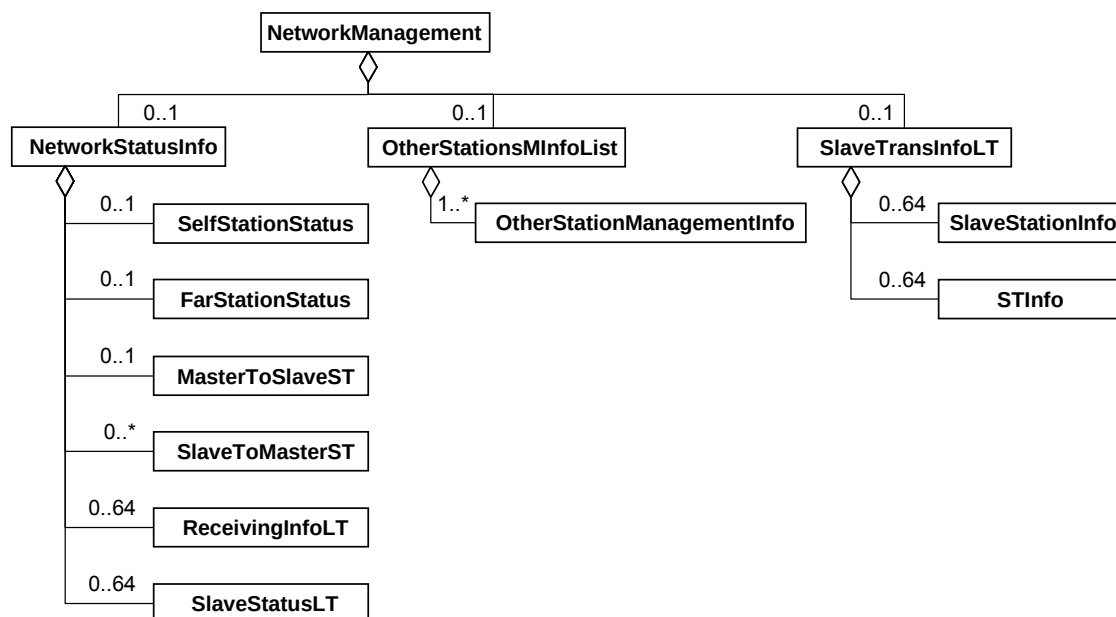


Figure 17 — CC-Link NetworkManagement class diagram

Table 5 — Constraints of the child classes of CC-Link NetworkManagement class

class	Version 1.00 / 1.10	Version 1.11	Version 2.00	Version LT
NetworkStatusInfo	Optional	Optional	Optional	Optional
OtherStationsMInfoList	Optional	Optional	Optional	Not applicable
SlaveTransInfoLT	Not applicable	Not applicable	Not applicable	Optional
NOTE The four right hand columns indicate whether a certain child class is mandatory, optional, or not applicable in a device profile of a specified CC-Link version.				

The child classes of NetworkManagement class are as follows:

- NetworkStatusInfo and the associated child classes define the properties associated with status of CC-Link network;
- OtherStationsMInfoList and OtherStationManagementInfo define the properties associated with the other stations;
- SlaveTransInfoLT and the associated child classes define the properties associated with the transmission information of slave stations.

Annex A **(normative)**

CC-Link profile templates

A.1 General

Configuration tools currently available for CC-Link devices use a specially formatted ASCII file, referred to as the CSP (CC-Link System Profile). The CSP provides information about a device, such as:

- information needed to identify the connected device,
- a description of device data that can be accessed via the network (e.g. configurable parameters),
- a description of the hardwired connection capabilities supported by the device (e.g. connections),
- additional vendor-specific information.

The CSP allows a configuration tool to automate the device configuration process. The CSP requirements provide an open, consistent and compatible approach for performing device configuration

The CSP information is very similar to the information required in both communication network and device profiles, hence, A.2, A.3, and A.4 specify respectively the format for:

- communication network and device profile templates, as defined in ISO 15745-1:2003,
- encapsulation of legacy CSP files in the ISO 15745 templates (“wrappers”), and
- the legacy CSP files format, including common semantics information.

A.2 Device profile template description

A.2.1 Device profile template description – XML based

A.2.1.1 General

The device profile XML file shall comply with the device profile XML schema as specified in A.2.1.3.

Contents of this XML schema are derived from the device profile class diagrams shown in 6.2.1.

A.2.1.2 Semantics of XML schema elements

A.2.1.2.1 ProfileBody

This main element is associated with a set of attributes which provide additional information about the profile file. The attributes are shown in Table A.1. The semantics of the attributes are described in Table A.35.

Table A.1 — Attributes of ProfileBody

Attribute	Description	Constraint
FileComment	File comment	Optional
CreateDate	File creation date	Required
CreateTime	File creation time	Required
ModDate	Last modified date	Optional
ModTime	Last modified time	Optional
Version	CSP file version	Required

A.2.1.2.2 DeviceIdentity**A.2.1.2.2.1 CcLinkVer**

This element specifies a CC-Link version used by the device.

A.2.1.2.2.2 VendName

This element specifies a vendor name of the device (see Table A.37).

A.2.1.2.2.3 VendID

This element specifies a vendor ID of the device (see Vendor identification in Table A.37).

A.2.1.2.2.4 DevModel

This element specifies a model name of the device (see Device model name in Table A.37).

A.2.1.2.2.5 DevVer

This element specifies a version number of the device (see Version in Table A.37).

A.2.1.2.2.6 StationNumber

This element specifies a unique identifier of the device among the devices which are connected to each other in a CC-Link network.

A.2.1.2.2.7 StationType

This element specifies a type of slave station (see Station type in Table A.37).

A.2.1.2.2.8 RemDevType

This element specifies a type of remote device station (see Remote device type in Table A.37 and Table A.38).

A.2.1.2.3 DeviceManager**A.2.1.2.3.1 NumOccupiedStations**

This element specifies the number of network visible stations occupied by a device.

A.2.1.2.3.2 ExtendedCycleConf

This element specifies the multiplicity of an amount of I/O points in the extended cyclic communication. Table A.2 shows the semantics of ExtendedCycleConf.

Table A.2 — ExtendedCycleConf element

Value	Description
0	Single
1	Double
2	Quadruple
3	Octuple

A.2.1.2.3.3 BmpFile

This element specifies an associated bitmap file name.

A.2.1.2.3.4 ErrReg

This element specifies a storage register used to store an error code.

A.2.1.2.3.5 UpDownloadF

The element is a flag which indicates whether the CSP file supports upload/download.

The value 0 means unsupported and the value 1 means supported.

A.2.1.2.3.6 MasterFlg

The element is a flag to indicate whether the device can be a standby master station or not. An intelligent device type slave device can also have the capability of being a standby master.

The value 0 means that the device is not capable of being a standby master station. The value 1 means that the device is capable of being a standby master station.

A.2.1.2.3.7 Mode

This element specifies an operation mode of the device. Table A.3 shows the semantics of Mode.

Table A.3 — Mode element

Value	Description
"Online"	Datalink is working normally.
"LineTest1"	Checking whether the master device communicates normally with all slave devices.
"LineTest2"	Checking whether the master device communicates normally with a specific slave device.
"ParamCheckTest"	Checking the content of the parameters
"HardwareTest"	Checking whether or not hardware works properly.

A.2.1.2.3.8 TotalIO

This element specifies the number of I/O points. Table A.4 shows the semantics of TotalIO.

Table A.4 — TotalIO element

Value	Description
0	Dependent on the number of occupied stations
1	8 points
2	32 points
3	16 points

A.2.1.2.3.9 IOType

The element specifies the type of I/O. Table A.5 shows the semantics of IOType.

Table A.5 — IOType element

Value	Description
0	The device uses both inputs and outputs and the same numbers are used for both inputs and outputs (starting from RX0 and RY0, respectively)
1	Input
2	Output
3	The device uses both inputs and outputs but the same numbers are not used for input (RX) and output (RY).

A.2.1.2.3.10 SEMISupport

This element whose type is Boolean specifies whether the SEMI standard function is supported or not. The value TRUE represents that the SEMI function is supported and the value FALSE represents the function is not supported.

A.2.1.2.3.11 LEDList, LED

Table A.6 describes the attributes of the LED class.

NOTE The semantics of the values are defined in BAP-05027. The semantics of the values for Version LT are defined in BAP-05031.

Table A.6 — Attributes of LED class

Attribute	Description	Values
Name	Name of LED	"PW" "RUN" "ERR." "MST" "S MST" "LOCAL" "CPU R/W" "SW" "M/S" "PRM" "TIME" "LINE" "L RUN" "L ERR." "SD" "RD"
State	State of LED	"ON" "OFF" "BLINK"

A.2.1.2.4 ApplicationProcess

A.2.1.2.4.1 BEntry

BEntry elements are specified in Table A.7.

Table A.7 — BEntry elements

Element	Description
PrmName	Name of the signal
RegNo	Register number
OffName	Label of the parameter of which value is 0
OnName	Label of the parameter of which value is 1

A.2.1.2.4.2 WEntry

WEntry elements are specified in Table A.8.

Table A.8 — WEntry elements

Element	Description
PrmName	Name of the signal
RWNo	Register number
DatTypFlg	Data type
SecNameRef	Reference to SelectPrm, PrmSet or nothing
Default	Default value
Range	Range of the value of the parameter
UnitStr	The unit of the parameter
HandReq	RY Handshake device name and its status
HandAns	RX Handshake device name and its status
ReadReg	Read word register
ILock	Interlock
InterReq	Inter-sequence request register
InterAns	Inter-sequence answer register

A.2.1.2.4.3 WEntry

WEntry elements are specified in Table A.9.

Table A.9 — WEntry elements

Element	Description
PrmName	Name of the signal
RWBit	Bit register number
OffName	Label of the parameter of which value is 0
OnName	Label of the parameter of which value is 1

A.2.1.2.4.4 SEntry

SEntry elements are specified in Table A.10.

Table A.10 — SEntry elements

Element	Description
PrmName	Name of the signal
CodeNo	Code number
UnitStr	The unit of the parameter
SecNameRef	Reference to SelectPrm, PrmSet, CmdPtrn or nothing
UpDwnTyp	Upload/download type

A.2.1.2.4.5 PrmSetGrp

PrmSetGrp elements are specified in Table A.11.

Table A.11 — PrmSetGrp elements

Element	Description
GrpName	Group name
GrpNum	Number of group items
GrpItemRef	Reference to GrpItem
MethodRef	Reference to MethodEntry

A.2.1.2.4.6 PEntry

PEntry elements are specified in Table A.12.

Table A.12 — PEntry elements

Element	Description
ItemName	Item name
PrmNo	Parameter number
RegNo	Register number
DatTypFlg	Data type
Default	Default value
Range	Setting range
UnitStr	The unit of the parameter
MethodRef	Reference to MethodEntry

A.2.1.2.4.7 MethodEntry

MethodEntry elements are specified in Table A.13.

Table A.13 — MethodEntry elements

Element	Description
CmdRegNoCode	Command setting register and command code
ReqRY	Command operation request
EndRX	Command operation complete
ErrEnd	Command operation abnormal complete
ReplyRW	Reply code storage register
TrueCnd	Condition to be used for evaluating a replied value
ErrReg	Error code storage register
TrueCnd2	Condition to be used for further evaluation of the device condition
ILock	Interlock
InterReq	Inter-sequence request register
InterAns	Inter-sequence answer register

A.2.1.3 XML schema : CC-Link_DeviceProfile.xsd

```

<?xml version="1.0" encoding="UTF-8"?>
<xsd:schema
  targetNamespace="http://www.cc-link.org/ISO15745/DeviceProfile"
  elementFormDefault="qualified" attributeFormDefault="unqualified"
  xmlns="http://www.cc-link.org/ISO15745/DeviceProfile"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <xsd:element name="ISO15745Profile">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element ref="ProfileHeader"/>
        <xsd:element ref="ProfileBody"/>
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>

  <xsd:annotation>
    <xsd:documentation>* HEADER SECTION *</xsd:documentation>
  </xsd:annotation>

  <xsd:element name="ProfileHeader">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="ProfileIdentification" type="xsd:string"/>
        <xsd:element name="ProfileRevision" type="xsd:string"/>
        <xsd:element name="ProfileName" type="xsd:string"/>
        <xsd:element name="ProfileSource" type="xsd:string"/>
        <xsd:element name="ProfileClassID" type="ProfileClassID_DataType" fixed="Device"/>
        <xsd:element name="ProfileDate" type="xsd:date" minOccurs="0"/>
        <xsd:element name="AdditionalInformation" type="xsd:anyURI" minOccurs="0"/>
        <xsd:element name="ISO15745Reference" type="ISO15745Reference_DataType"/>
        <xsd:element name="IASInterfaceType" type="IASInterface_DataType" minOccurs="0"
maxOccurs="unbounded"/>
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>

  <xsd:annotation>
    <xsd:documentation>* HEADER DATA TYPES *</xsd:documentation>
  </xsd:annotation>

  <xsd:simpleType name="ProfileClassID_DataType">
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="AIP" />
    </xsd:restriction>
  </xsd:simpleType>

```