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

Part 4:

**Reference description for Ethernet-based
control systems**

*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*



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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 part of ISO 15745 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 15745-4 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 general 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

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 Ethernet¹-based control systems (ADS-net², FL-net³ and EtherNet/IPTM⁴). EtherNet/IPTM technology uses a profile of IEC 61158 which is specified in IEC 61784-1.

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.

¹ Ethernet is used in this document as a synonym for ISO/IEC 8802-3.

² ADS-net is a trade name used to describe JIS-TR B0012 (Autonomous Decentralized System network). This information is given for the convenience of users of ISO 15745 and does not constitute an endorsement by ISO of the trademark, or any related products. Compliance to this standard does not require use of the trade name ADS-net.

³ FL-net is a trade name used to describe JEM 1479. This information is given for the convenience of users of ISO 15745 and does not constitute an endorsement by ISO of the trademark, or any related products. Compliance to this standard does not require use of the trade name FL-net.

⁴ EtherNet/IPTM is a trade name of ControlNet International, Ltd. and Open DeviceNet Vendor Association, Inc. This information is given for the convenience of users of ISO 15745 and does not constitute an endorsement by ISO of the trademark holder or any of its products. Compliance to this standard does not require use of the trade name EtherNet/IPTM. Use of the trade name EtherNet/IPTM requires permission of either ControlNet International, Ltd. or Open DeviceNet Vendor Association, Inc.

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

Part 4: Reference description for Ethernet-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 Ethernet-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 639-2:1998, *Codes for the representation of names of languages – Part 2: Alpha-3 code*

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

ISO/IEC 7498-4:1989, *Information processing systems – Open Systems Interconnection – Basic Reference Model – Part 4: Management framework*

ISO/IEC 8802-3:2000, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications*

ISO/IEC 10646-1:2000, *Information technology – Universal Multiple-Octet Coded Character Set (UCS) – Part 1: Architecture and Basic Multilingual Plane*

IEC 61158 (all parts), *Digital data communications for measurement and control – Fieldbus for use in industrial control systems*

IEC 61784-1:2003, *Digital data communications for measurement and control – Part 1: Profile sets for continuous and discrete manufacturing relative to fieldbus use in industrial control systems*

IEEE Std 754-1985 (R1990), *IEEE Standard for Binary Floating Point Arithmetic*

JEM 1479:2002, *Protocol specification – Factory automation control Link Network (FL-net)*

JIS-TR B0012: 2000, *Autonomous Decentralized System Network (ADS-net)*

REC-xml-20001006, *Extensible Markup Language (XML) 1.0 Second Edition* – W3C Recommendation 6 October 2000

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

RFC 768:1980, *User Datagram Protocol* – Internet Engineering Task Force (IETF), Request for Comments (RFC)

RFC 791:1981, *Internet Protocol* – Internet Engineering Task Force (IETF), Request for Comments (RFC)

RFC 793:1981, *Transmission Control Protocol* – Internet Engineering Task Force (IETF), Request for Comments (RFC)

RFC 894:1984, *A standard for the Transmission of IP Datagrams over Ethernet Networks* – Internet Engineering Task Force (IETF), Request for Comments (RFC)

RFC 1738:1994, *Uniform Resource Locators (URL)* – Internet Engineering Task Force (IETF), Request for Comments (RFC)

RFC 1759:1995, *Printer MIB* – Internet Engineering Task Force (IETF), Request for Comments (RFC)

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

3 Terms and definitions

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

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

4 Abbreviated terms

AIF	Application Integration Framework
AIP	Application Interoperability Profile
ASCII	American Standard Code for Information Interchange
CIP ^{TM5}	Common Industrial Protocol
EDS	Electronic Data Sheet
IAS	Industrial Automation Systems
IP	Internet Protocol (see RFC 791 and RFC 894)
MAC	Media Access Control
MCG	MultiCast Group

⁵ CIPTM is a trade name of ControlNet International, Ltd. and Open DeviceNet Vendor Association, Inc. This information is given for the convenience of users of ISO 15745 and does not constitute an endorsement by ISO of the trademark holder or any of its products. Compliance to this standard does not require use of the trade name CIPTM. Use of the trade name CIPTM requires permission of either ControlNet International, Ltd. or Open DeviceNet Vendor Association, Inc.