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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 25105.1-2025

Replacing GB/T 25105.1-2014

**Industrial communication networks - Fieldbus specifications -
Type 10: PROFINET IO specifications - Part 1: Application layer
service definition**

(English Translation)

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting.

This document is part 1 of GB/T 25105 "Industrial Communication Network Fieldbus Specification Type 10.PROFINET IO Specification" GB/T 25105 has published the following parts.

- Part 1: Application layer service definition;
- Part 2: Application layer protocol specification;
- Part 3: PROFINET IO communication profile.

This document replaces GB/T 25105.1-2014 "Industrial Communication Network Fieldbus Specification Type 10.PROFINET IO Specification" Part 1: Application layer service definition. Compared with GB/T 25105.1-2014, in addition to structural adjustments and editorial changes, the main technical the changes are as follows.

- Increased system redundancy (see 7.1.6, 7.3.1);
- Added time-sensitive networks (see 6.3.3, 6.3.6, 6.3.7, 6.3.11, 6.3.16~6.3.18, 7.3.3, 7.3.9), including remote servers Service interface, communication interface management, time perception system, network configuration protocol, etc.;
- Added dynamic frame packing (see 7.3.3, Appendix E).

The following minimal editorial changes were made to this document.

- Change the standard name to "Industrial Communication Network Fieldbus Specification Type 10.PROFINETIO Specification Part 1 Part 1: Application layer service definition.

This document is equivalent to IEC 61158-5-10:2023 "Industrial Communication Network Fieldbus Specification Part 5-10.Application Layer Services Definition Type Part 10.

Introduction

The GB/T 25105 series of standards consists of the following parts.

--- Part 1: Application layer service definition. The purpose is to provide a time-sensitive and non-critical communication platform for applications in an automation environment.

Time-critical message communication provides common elements and PROFINET IO fieldbus-specific information, defined in an abstract way the PROFINET IO fieldbus application layer provides externally visible services. It includes. abstract model of application resources (objects);

primitive actions and events of the service; parameters associated with each primitive action and event.

--- Part 2: Application layer protocol specification. The purpose is to define the PROFINET IO fieldbus application layer in an abstract way the externally visible behavior of the application layer protocol data unit transmitted between communication application entities.

The input syntax, the application context state machine of the application service behavior, and the application relationship state machine of the communication behavior.

--- Part 3: PROFINET IO communication profile. The purpose is to define a family of communication profiles for real-time Ethernet (RTE) (CPF3). CPF3 specifies a set of real-time Ethernet communication profiles and a set of IEC 61158 series (type

10) ISO/IEC/IEEE8802-3 and other standard related network components. For RTE communication rules, relevant RTE performance indicators and the relationship between performance indicators.

Industrial Communication Network Fieldbus Specification Type 10.

PROFINET IO Specification Part 1: Application Layer Service Definition

1.1 General

The Fieldbus Application Layer (FAL) provides user programs with a means to access the Fieldbus communication environment. In this respect, the FAL can be viewed as for "windows between corresponding applications".

This document provides basic time-critical and non-time-critical messaging between applications in an automation environment.

The term "time-critical" is used to indicate the existence of a time window within which the A time window is a time window in which one or more specified actions are required to be completed with a certain level of certainty.

If these actions are not performed properly, there is a risk that the application requesting these actions will fail, and even cause danger to instruments, equipment and possible personal injury.

This document defines the externally visible functions provided by the PROFINET IO fieldbus application layer in an abstract way from the following aspects.

Serve.

- a) define an abstract model of application resources (objects) that users can utilize by using FAL services;
- b) primitive actions and events of services;
- c) The parameters associated with each primitive action and event and the form it takes.

The interrelationships between these actions and events and their effective sequence.

The purpose of this document is to define a number of services provided to.

- a) FAL user at the interface between the user and application layers of the fieldbus reference model;
- b) System management at the interface between the application layer and system management of the fieldbus reference model.

This part is based on the OSI basic reference model (see ISO/IEC 7498-1) and the OSI application layer structure (see ISO/IEC 9545).

The structure and services of the PROFINET IO fieldbus application layer.

FAL services and protocols are provided by the FAL Application Entity (AE) contained in the application process. FALAE consists of a set of object-oriented the ASE is composed of an application service element (ASE) and a layer management entity (LME) that manages the AE. The ASE provides access to a set of related application process objects.

(APO) class to operate the communication service. One element in FALASE is the management ASE, which provides a common service set for Management of FAL class instances.

Although these services specify how to issue and transmit requests and responses from the application's perspective, they do not include how the request and response applications handle that is, it does not specify the behavior of the application, but only specifies what kind of requests and responses can be sent/received.

In this way, FAL users are given greater flexibility in standardizing the behavior of such objects. In addition to these services, this document defines Some support services are accessed by the FAL to control certain aspects of its operation.