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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Enterprise-control system integration – Part 5: Business to manufacturing transactions

Intégration du système de commande d'entreprise – Partie 5: Transactions entre systèmes de gestion de commande d'entreprise et systèmes de fabrication

IEC 62264-5:2011

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FOREWORD

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International Standard IEC 62264-5 has been prepared by subcommittee 65E: Devices and integration in enterprise systems, of IEC technical committee 65: Industrial-process measurement, control and automation.

The text of this standard is based on the following documents:

CDV	Report on voting
65E/100/CDV	65E/156/RVC

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The list of all the parts of the IEC 62264 series, under the general title *Enterprise-Control system integration*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

This part of IEC 62264 is based on the use of IEC 62264 abstract models previously defined in IEC 62264-1 and IEC 62264-2 combined with verbs to define a transaction model for information exchange. It is recognized that other non-IEC 62264-5 transaction protocols are possible and are not deemed invalid as a result of this standard. Transactions occur at all levels within the enterprise and between enterprise partners, and are related to both required and actual activities, but the focus of this part of IEC 62264 is the interface between enterprise/business systems and manufacturing systems.

This standard defines business-to-manufacturing transactions and manufacturing-to-business transactions that may be used in relation to the objects that are exchanged between Level 4 and Level 3, as defined in the object models of IEC 62264-1 and IEC 62264-2. Models are introduced which provide descriptions of the transactions and explanations of the required transaction processing behaviour.

Technology specific implementations to provide this behaviour are not defined in this standard. This part of IEC 62264 has the intent of providing insight into the level of work required to construct transactional exchanges.

ENTERPRISE-CONTROL SYSTEM INTEGRATION –

Part 5: Business to manufacturing transactions

1 Scope

This part of IEC 62264 defines transactions in terms of information exchanges between applications performing business and manufacturing activities associated with Levels 3 and 4. The exchanges are intended to enable information collection, retrieval, transfer and storage in support of Enterprise-Control system integration. This part of IEC 62264 is consistent with the IEC 62264-1 models and terminology and IEC 62264-2 object model attributes. This standard also defines transactions that specify how to exchange the objects defined in IEC 62264-1, Clause 7, IEC 62264-2 and this standard. Other uses of the transaction model are not defined in this part.

The models covered in this standard are: Personnel Model, Equipment Model, Maintenance Model, Material Model, Process Segment Model, Production Capability Model, Product Definition Model, Production Schedule Model, and Production Performance Model.

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.

IEC 62264-1, *Enterprise-control system integration – Part 1: Models and terminology*

IEC 62264-2, *Enterprise-control system integration – Part 2: Object model attributes*

IEC 62264-3, *Enterprise-control system integration – Part 3: Activity models of manufacturing operations management*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply. Terms, definitions and concepts expressed in IEC 62264-1, IEC 62264-2 and IEC 62264-3 apply, except where differences are explicitly stated in this document.

3.1.1
application
ordered set of physical and virtual processes, performed by a set of resources that conduct a set of transactions intended to accomplish a definite objective; information provider or information user performing the activity that is involved in a transaction

3.1.2
identifier
ID
information to identify an object or a property of an object

3.1.3
message
structured information unit conveyed in a one-way transfer of data between one sending application to one or more receiving applications

3.1.4
noun
one of two parts in the content of a message, the one that represents one or more objects, as defined in IEC 62264-1 and IEC 62264-2 object models

3.1.5
transaction
sequence of related messages that are exchanged among applications performing Level 3 or Level 4 activities

3.1.6
verb
one of two parts in the content of a message, the one that defines the action to be performed, or the response to a request

3.1.7
wildcard
information to identify a collection of objects or properties of objects

3.2 Abbreviations

OAGIS – Open Applications Group Interface Standard

SYNC – Synchronized data

4 Transaction messages and verbs

4.1 General

This clause defines a common set of transactions, messages and verbs that shall be used between Level 4 and Level 3 applications to exchange the data defined in the object models of IEC 62264-1, Clause 7 and IEC 62264-2.

A transaction shall consist of a sequence of messages, where each message shall have a structure as defined in 4.2.

Messages shall contain both a verb area and a noun area. Information conveyed in a message shall be contained in the noun area of a message while the actions associated with information shall be contained in the verb area.

The role of an application initiating a transaction shall determine the set of verbs to be used in conducting the transaction. These transaction models are described in 4.2.

Three different transaction models are defined.

a) A PULL transaction model where a user of data requests the data from a provider of the data.

b) A PUSH model where a provider of data requests an action (processing, changing or cancelling) on the data by another user.

c) A PUBLISH transaction model where the owner of data publishes it to users (subscribers) of the data.

NOTE 1 The phrase “owner of data” is used to identify the application that has responsibility for enforcing the consistency of data.

NOTE 2 This standard does not address the case where there may be multiple systems that can act as the owner of data. In these situations, configurations should be set up so that one master owner of the data should be designated, with other systems performing the role of data users.

4.2 Transaction models

There are three classes of actions provided by the verb set: query/reporting, transaction processing, and data synchronization. These are defined by three different transaction models.

a) A PULL model where a user of data requests information from an information provider. This model is used for query/reporting.

   Information provider applications listen for GET messages and respond with SHOW messages to complete the transaction.

   Information user applications send GET messages.

   1) Requests for information are sent through GET messages.
   2) A GET message describes the scope of the requested information.
   3) A SHOW message returns the information.

b) A PUSH model where a sender of information sends new or changed information to the receiver to process requests. This model is used for transaction processing.

   Receiver applications listen for PROCESS, CHANGE or CANCEL messages.

   Sender applications send PROCESS, CHANGE and CANCEL messages.

   1) New information is pushed to the receiver through a PROCESS message. Responses may be returned to the sender through an ACKNOWLEDGE message.
   2) Changes to information are pushed to the receiver through a CHANGE message. Responses may be returned to the sender through a RESPOND message.
   3) Information to be removed is pushed to the receiver through a CANCEL message.

c) A PUBLISH model where the provider of data publishes it to users (subscribers) of the data. This model is used for data synchronization.

   Subscriber applications receive SYNC messages.

   Publisher applications send SYNC messages.

   1) The publisher sends SYNC messages containing new, changed or deleted information to subscribers.
   2) A subscriber receives SYNC messages containing new, changed or deleted information.

   The timing of the publication and scope of the published information is not defined in a message. It is determined by an out-of-band agreement between the publisher and subscriber, therefore there is no SUBSCRIBE message defined in this standard.

   Example: An out-of-band agreement means that the agreement is not defined in the transaction protocol. For example: an agreement between a publisher and subscriber may be set up through configuration parameters in the applications, or an agreement may be set up dynamically through a web service agreement, or an agreement may be set up through a third party application.

A single application may support one or more transaction models and the application may take on multiple roles (sender, receiver, provider and user).

NOTE 1 The transactions are based on the assumption that the exchanged information (noun) is contained in a message of some form. The exact form of the messages is not defined in this standard; for example, the messages could be tab delimited files, XML files, electronic mail messages, or data in a named pipe. The exact form of the transport mechanism for the sending, receiving, listening and publishing of messages is not defined in this standard.

NOTE 2 The transaction message models do not imply any specific architecture or mechanism for transporting the messages.

The transactions assume the ability to send an empty or nearly empty message that identifies either a specific object (typically by ID), a list of specific objects (by a list of IDs), or a class of objects (by wildcard or property value definition).

Figure 1 illustrates the exchange of messages in a typical transaction, where a message is sent from the user of information with an identification of an object (GET Equipment), and a message is returned from the information provider with the object's information (SHOW Equipment).

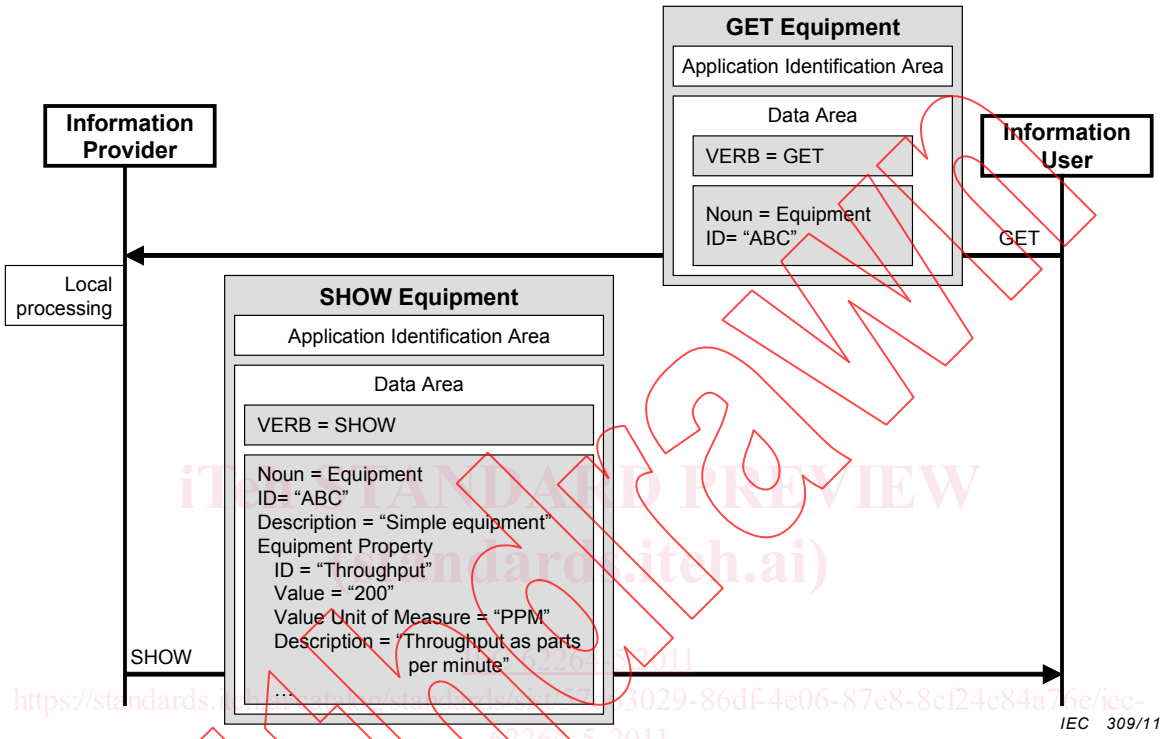

Figure 1 – Typical exchanged messages in a transaction

4.3 Message structure

4.3.1 General structure

Every message shall contain all the information required to identify the source of the message and the type of the message. There shall be two main areas in a message, as shown in Figure 2, an *application identification area* and a *data area*. Within the *data area* there shall be a *verb area* and a *noun area*.

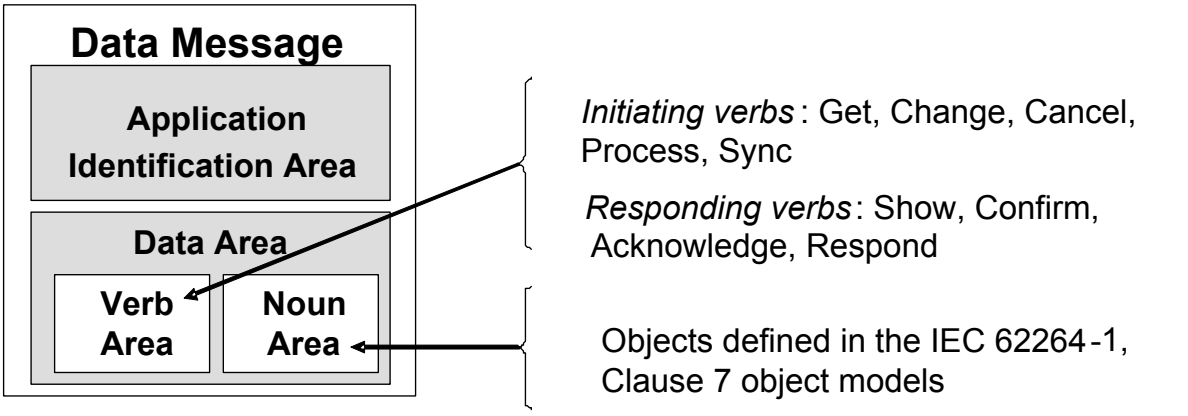

Figure 2 – Typical exchanged data set