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Enterprise-
Part 6: Messaging Service Model

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Enterprise-Contro Messaging Service Model

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ISA
67 Alexander Drive
P. O. Box 12277
Research Triangle Park, North Carolina 27709
USA

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This standard was approved by the ISA Standards and Practices Board on 3 September 2014:

DEDICATION

This standard is dedicated with great respect and gratitude to the memory of Dr. Theodore (Ted) Williams, Professor of Engineering at Purdue University, who is known for the development of the Purdue Enterprise Reference Architecture upon which the ISA-95 series of standards is based. Dr. Williams was an early leader and major contributor in the development of the ISA-95 series.

Among his many accomplishments, Dr. Williams served as Director of the Purdue Laboratory for Applied Industrial Control from 1965 to 1994; as president of the American Automatic Control Council (AACC) from 1965 to 1967; as president of ISA in 1969; and as the first chairman of the IFAC/IFIP Task Force on Architectures for Integrating Manufacturing Activities and Enterprises from 1990 to 1996.

Dr. Williams was awarded the Sir Harold Hartley Silver Medal by the Institute of Measurement and Control in London, England in 1976, and the A. F. Sperry Founder Award Gold Medal by ISA in 1990.

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FOREWORD

ISA-95 is a multi-part series of standards that defines enterprise to control system integration. This Part 6 standard defines a set of services (Messaging Service Model – MSM) used to interface business and manufacturing activities.

- Clause 4 is normative. It defines the general service model and functions of the MSM services.
- Clause 5 is normative. It defines the methods of operation of MSM channels, topics, and security.
- Clause 6 is normative. It defines the MSM service definitions.
- Clause 7 is informative. It illustrates scenarios for use of the MSM services.
- Clause 8 is normative. It defines compliance.
- Annex A is informative. It provides considerations for (MSM) service providers.
- Annex B is informative. It provides a brief description of Enterprise Service Buses as a message exchange mechanism.
- Annex C is a bibliography.

The ISA-95 series consists of the following standards under the general title Enterprise-Control System Integration:

- Part 1: Models and Terminology
- Part 2: Object Models and Attributes
- Part 3: Activity Models of Manufacturing Operations Management
- Part 4: Object Models and Attributes of Manufacturing Operations Management
- Part 5: Business-to-Manufacturing Transactions
- Part 6: Messaging Service Model

For more information on the ISA-95 series of standards, visit www.isa.org/standards.

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INTRODUCTION

This ISA-95 Part 6 standard is based on the use of ISA-95 object models defined in ISA-95 Parts 2, 4 and 5 (Parts 1 and 3 do not contain object models) to define a set of services that may be used to exchange information messages. It is recognized that other, non-Part 6 sets of services are possible and are not deemed invalid as a result of this standard. This Part 6 standard defines a Messaging Service Model (MSM) for exchanging data exchange messages in a publish/subscribe mode and a request/response mode. It defines a minimal interface subset to message exchange systems.

The Messaging Service Model provides a method for applications to send and receive messages from MSM service providers without regard to the underlying communication mechanism, as part of a complete application-to-application communication protocol.

This Part 6 standard defines a set of services definitions that are designed to provide the functionality needed for a vendor-independent method for sending and receiving data exchange messages on a message exchange system, such as an Enterprise Service Bus (ESB).

The knowledge requirements to interface to just one message exchange system can be immense, and are usually not transferable to a different system. MSM defines a single interface, independent of the underlying services, for Level 3-3 and Level 4-3 communications. This removes the need for vendors to build custom interface after custom interface, and for end users to get locked into a single vendor because their investment prevents them from reusing any of the integration efforts.

Enterprise-control system integration involves multiple different steps to exchange data between different computer system applications, as shown in Figure 1.

a) The applications usually have different internal representations of exchanged objects in their own local data stores. This representation is usually converted from the local format to a commonly accepted global format. The ISA-95 Part 2 standard defines representations of a global format for Level 4-3 data exchanges. The Part 4 standard defines representations of a global format for Level 3-3 data exchanges. This conversion, from local to global and global to local, is usually performed twice for any two-way communications.

   EXAMPLE 1 Assume two applications, ALPHA and BETA: the ALPHA application initiates a data exchange with the BETA application, and BETA responds back to ALPHA. The format conversions are: AL HA’ c f b f f h qu d , b f BETA’ c format for the requ d , BETA’ c f b f f h p d , d b f AL HA’ f f h p d .

b) Conversion must be performed to align the namespaces among the exchanging applications, and is usually performed four times for any two-way communications.

   EXAMPLE 2 Names for elements of data may be codes, tag names, or equipment identifiers.

   EXAMPLE 3 Data which are represented in one element namespace, such as codes 1,2,3,4, may have a different namespace in another application, such as codes Ok, Done, Error, Delay.

c) Once information is in the global format with appropriate global names, the exchanged information is sent from one application to another application.

d) Messages are transported from one application to another, either within the same computer environment or across computers. Transport mechanisms are defined in other standards, such as TCP/IP and Ethernet standards.

e) When data exchange information is received, there are specific rules that define what resultant data are to be returned. The transaction rules are defined in the ISA-95 Part 5 standard.

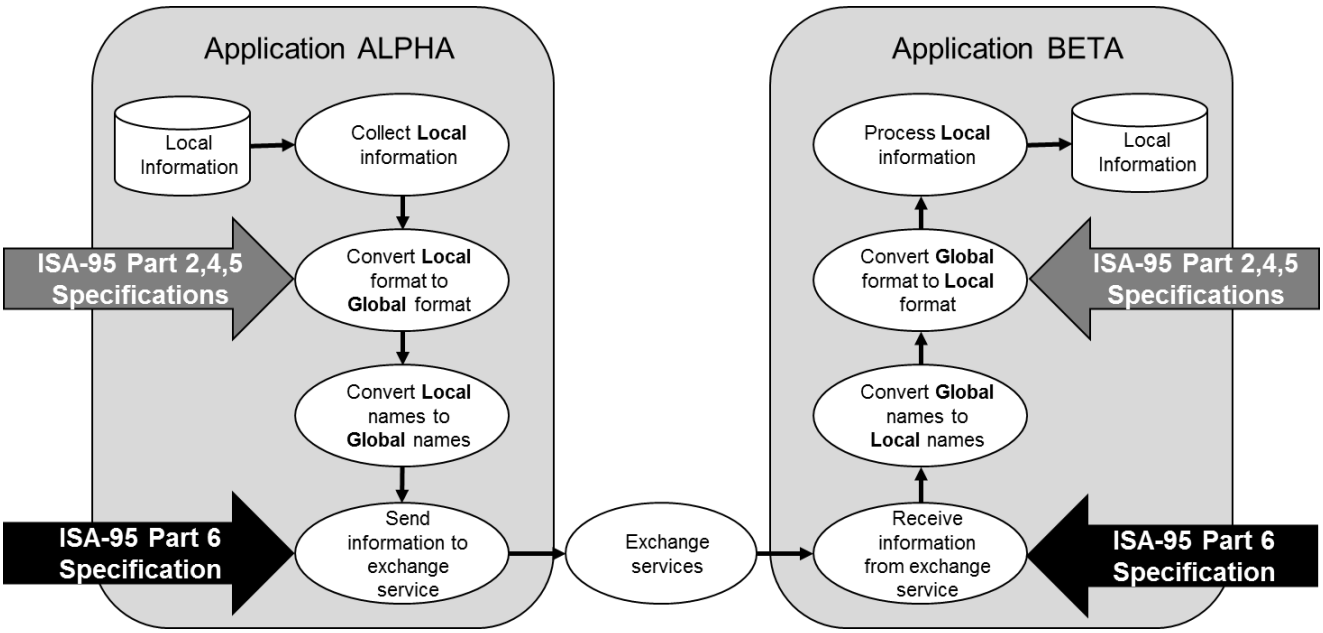

Figure 1 – Steps in application-to-application communication

Enterprise-Control System Integration

Part 6: Messaging Service Model

1 Scope

This part of ISA-95 defines a model of a set of messaging services for information exchanges across Levels 3 and 4, and within Level 3, between applications performing business and manufacturing activities. This standard defines a standard interface for information exchange between systems.

2 References

[1] ANSI/ISA-95.00.01-2010 (IEC 62264-1 Mod), Enterprise-Control System Integration – Part 1: Models and Terminology

[2] ANSI/ISA-95.00.02-2010 (IEC 62264-2 Mod), Enterprise-Control System Integration – Part 2: Object Model Attributes

[3] ANSI/ISA-95.00.04-2012, Enterprise-Control System Integration – Part 4: Objects and Attributes for Manufacturing Operations Management Integration

[4] ANSI/ISA-95.00.05-2013, Enterprise-Control System Integration – Part 5: Business-to-Manufacturing Transactions

3 Definitions and abbreviations

3.1 Terms and definitions

3.1.1
channel description
text that describes a channel

3.1.2
channel type
primary use of a channel for publications or requests

3.1.3
channel URI
primary identifier for a channel

3.1.4
filter expression
filtering element that may be applied to messages on a channel

3.1.5
listener identification
implementation defined element that is used to indicate to an application when a new message has arrived

3.1.6
message content
body of the message

3.1.7
message expiry
duration until the expiration of a publication message on a publication channel