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AS/NZS ISO/IEC 14752

Australian/New Zealand Standard™

Information technology—Open distributed processing—Protocol support for computational interactions

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RECONFIRMATION

OF
AS/NZS ISO/IEC 14752:2003
Information technology—Open distributed processing—Protocol support for computational interactions

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee IT-015, Software Engineering.

This Standard is identical with, and has been reproduced from ISO/IEC 14752:2000, *Information technology—Open distributed processing—Protocol support for computational interactions*.

The objective of this Standard is to define how interactions between computational objects in a computational specification of a system relate to protocol support for those interactions in an engineering specification of that system.

The terms 'normative' and 'informative' are used to define the application of the annex to which they apply. A normative annex is an integral part of a standard, whereas an informative annex is only for information and guidance.

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Reference to International Standard		*Australian/New Zealand Standard*	
ISO/IEC		AS/NZS	
14750	Information technology—Open distributed processing—Interface definition language	ISO/IEC 14750	Information technology—Open distributed processing—Interface definition language
14753	Information technology—Open distributed processing—Interface references and binding	ISO/IEC 14753	Information technology—Open distributed processing—Interface references and binding

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AUSTRALIAN/NEW ZEALAND STANDARD

INFORMATION TECHNOLOGY – OPEN DISTRIBUTED PROCESSING – PROTOCOL SUPPORT FOR COMPUTATIONAL INTERACTIONS

1 Scope

This Recommendation | International Standard is based on the framework of abstractions and concepts developed in the Reference Model for Open Distributed Processing (ITU-T Rec. X.902 | ISO/IEC 10746-2 and ITU-T Rec. X.903 | ISO/IEC 10746-3).

This Recommendation | International Standard defines how interactions between computational objects in a computational specification of a system relate to protocol support for those interactions in an engineering specification of that system. In particular it:

- defines a General Interworking Framework (GIF);
- within the GIF, defines a set of facilities each comprising a set of functionally-related service primitives as abstract definitions of the interactions of basic engineering objects and channel objects;
- defines the parameters of the service primitives of the GIF;
- defines the permitted sequence of the service primitives by means of state tables;
- specifies, in annexes, the mapping of the GIF service primitives and their parameters to the messages and fields of particular protocols.

As specified in this Recommendation | International Standard, the GIF defines protocol support for a pragmatic subset of the possible computational interactions defined in ITU-T Rec. X.903 | ISO/IEC 10746-3. It is also restricted in the features of the protocol support and the supported transparencies.

The GIF, as specified here, defines:

- support for computational operations, but not for streams;
- support using stub, binder and protocol objects hierarchically, such that any interaction at the interworking reference point of the supporting protocol object supports liaisons of one of those objects or of the basic engineering object, and any interaction to support those liaisons is passed via that interworking reference point; and
- interactions at a single interworking reference point, from the perspective of one side; interceptors are not explicitly considered;

NOTE 1 – It is intended that the GIF could be extended, in a future amendment, to support streams and flows. The present specification is restricted to areas that are technically stable.

The GIF supports at least some forms of:

- access transparency; and
- location transparency.

The GIF as specified here also supports a limited equivalent of relocation transparency. Other transparencies are not addressed in this present specification.

NOTE 2 – It is intended that the GIF could be extended, in future amendments, to support additional transparencies.

The GIF does not explicitly model Quality of Service requirements.

The application of security-related issues to the GIF are not included in the current text and are for further study.

The set of mappings to particular protocols specified in annexes to this Recommendation | International Standard is not exhaustive. The GIF could be mapped to other protocols.

NOTE 3 – In particular, a mapping to the DCOM protocol family would be a candidate for an additional annex.

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2 Normative References

The following Recommendations and International Standards contain provisions which, through reference in this text, constitute provisions of this Recommendation | International Standard. At the time of publication, the editions indicated were valid. All Recommendations and Standards are subject to revision, and parties to agreements based on this Recommendation | International Standard are encouraged to investigate the possibility of applying the most recent edition of the Recommendations and Standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards. The Telecommunication Standardization Bureau of the ITU maintains a list of currently valid ITU-T Recommendations.

2.1 Identical Recommendation | International Standards

- ITU-T Recommendation X.210 (1993) | ISO/IEC 10731:1994, *Information technology – Open systems interconnection – Basic Reference Model – Conventions for the definition of OSI services*.
- ITU-T Recommendation X.902 (1995) | ISO/IEC 10746-2:1996, *Information technology – Open distributed processing – Reference Model: Foundations*.
- ITU-T Recommendation X.903 (1995) | ISO/IEC 10746-3:1996, *Information technology – Open distributed processing – Reference Model: Architecture*.
- ITU-T Recommendation X.920 (1997) | ISO/IEC 14750:1999, *Information technology – Open distributed processing – Interface definition language*.
- ITU-T Recommendation X.930 (1998) | ISO/IEC 14753:1999, *Information technology – Open distributed processing – Interface references and bindings*.

2.2 Other Specifications

The edition of [CORBA 2] indicated below was valid at the time of publication of this Recommendation | International Standard. [CORBA 2] is subject to revision, and parties to agreements based on this Recommendation | International Standard are encouraged to investigate the possibility of applying later editions of [CORBA 2] when they become available.

- [CORBA 2] – *The Common Object Request Broker: Architecture and Specification, Revision 2.3, Object Management Group, December 1998 (OMG Doc Number: Formal/98-12-01).*
- RFC 793, "Transmission Control Protocol", 1981.

3 Definitions

For the purposes of this Recommendation | International Standard, the following definitions apply.

3.1 Terms defined in the ODP Reference Model: Foundations

This Specification makes use of the following terms defined in ITU-T Rec. X.902 | ISO/IEC 10746-2:

a) binding;

c) client object;

c) initiating object;

d) interface;

e) interface signature;

f) name;

g) object;

h) reference point;

i) responding object;

j) server object;

k) viewpoint.

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3.2 Terms defined in the ODP Reference Model: Architecture

This Specification makes use of the following terms defined in ITU-T Rec. X.903 | ISO/IEC 10746-3.

a) announcement;

b) basic engineering object;

c) binder;

d) capsule

e) channel;

f) computational object;

g) computational language;

h) computational viewpoint;

i) engineering viewpoint;

j) interrogation;

k) interceptor;

l) invocation;

m) (computational) operation;

n) operation interface;

o) protocol object;

p) signal;

q) signal interface;

r) stub;

s) termination.

3.3 Definitions for protocol support for computational interactions

This Specification makes use of the following terms.

3.3.1 access facility: A set of service primitives that allow a stub objects to negotiate the abstract and transfer syntax to be used for the operation data to be transmitted over the channel.

3.3.2 association: A relationship (binding) between protocol objects (or between a protocol object and an interceptor) that is established independently of the protocol exchanges that support a particular computational interaction.

3.3.3 association management facility: A set of service primitives which support the management of an association between protocol objects.

3.3.4 basic interworking facility: A set of service primitives which have a direct correspondence with computational signals which model computational operations.

3.3.5 client-side: A node, cluster or capsule, which:

a) contains a basic engineering object corresponding to a computational client object; and

b) contains, or is potentially capable of containing, stub, binder and protocol objects in a channel supporting operations involving the client object.

The term client-side is used prior to the establishment of a channel, during the channel's lifetime and after it has terminated.

3.3.6 deliver primitive: A service primitive for which the protocol object is the responding object of the corresponding communication.

3.3.7 invocation submit: A signal in the implicitly defined signal interface of a client computational object which has the same name and parameters as the invocation of an interrogation or announcement in the original operation interface.

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3.3.8 invocation deliver: A signal in the implicitly defined signal interface of a server computational object which has the same name and parameters as the invocation of an interrogation or announcement in the original operation interface.

3.3.9 location facility: A set of service primitives that allow a client-side binder object to ask a server-side if it will accept requests carrying invocations to a particular (computational) server object. The server-side can confirm or reject the proposal or suggest an alternative server-side that is capable of handling requests.

3.3.10 server-side: A node, cluster or capsule, which:

a) contains, or is potentially capable of containing, a basic engineering object that corresponds to a computational server object and stub, binder and protocol objects in a channel supporting operations involving the server object; or

b) contains, or is a potentially capable of containing, a protocol object which (possibly via interactions with other engineering objects) can return a reply identifying another server-side.

The term server-side is used prior to the establishment of a channel, during the channel's lifetime and after it has terminated. It is also used when an appropriate basic engineering object cannot be instantiated following some received message.

3.3.11 service primitive: An abstract definition of an interaction of channel objects that causes protocol exchanges between the protocol objects in the channel.

3.3.12 submit primitive: A service primitive for which the protocol object is the initiating object of the corresponding communication.

3.3.13 termination deliver: A signal in the implicitly defined signal interface of a client computational object which has the same name and parameters as one of the terminations of an interrogation in the original operation interface.

3.3.14 termination submit: A signal in the implicitly defined signal interface of a server computational object which has the same name and parameters as one of the terminations of an interrogation in the original operation interface.

4 Abbreviations

For the purposes of this Recommendation | International Standard, the following abbreviations apply.

GIF	General Interworking Framework
ODP	Open Distributed Processing
ODP IDL	Open Distributed Processing Interface Definition Language
OSI	Open Systems Interconnection
psci	Protocol Support for Computational Interactions
RM-ODP	Open Distributed Processing: Reference Model
TCP	Transmission Control Protocol

5 Conventions

State tables are used to specify the allowed sequence of primitives in each of the facilities of the GIF. Each state machine is initially in the "idle" state. A particular primitive is only permitted if the intersection of the current state and that primitive is non-blank. The entry in the cell defines the state subsequent to the primitive The states are defined by the top row of the state table and have self-explanatory names. If there is an inconsistency between the natural language description of state transitions and the corresponding state table, the natural language description shall take precedence.

6 Overview

6.1 General Interworking Framework

As defined in ITU-T Rec. X.903 | ISO/IEC 10746-3, operations in the computational viewpoint correspond in the engineering viewpoint to interactions between basic engineering objects. Where these engineering interactions in the engineering viewpoint are distributed, a channel connects the basic engineering objects. The establishment and use of the channel involves interactions between the various kinds of engineering object in the channel. In some form or other

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these interactions result in observable events occurring at the interworking interface of the protocol objects, according to the rules of one or more protocol specifications. At least some of these observable events will have a direct correspondence to the computational interactions. Other protocol events will be concerned with the management of the engineering binding including the support of required transparencies.

The General Interworking Framework (GIF) defined in this Recommendation | International Standard defines an abstraction of the engineering interactions of the basic engineering and channel objects, including the correspondence between computational operations and the relevant engineering interactions. Mappings of the GIF to particular, implementable, protocols are specified in annexes to this Recommendation | International Standard.

The GIF comprises a set of *facilities* each consisting of a number of *service primitives*. Each facility supports the liaison between one kind of channel object (e.g. stub, binder, protocol) and the service primitives are abstract definitions of the interactions of that kind of object with its peers.

NOTE 1 – If the channel objects were themselves considered as computational objects, a facility would be seen as an interface, and the service primitives as signals.

A mapping of the GIF to a particular protocol will typically specify constraints on the sequencing of the service primitives between different facilities. Such sequencing constraints are not included in the GIF which is intended to support mappings to protocols with a variety of properties and capabilities.

NOTE 2 – For example, mappings to protocols using non-blocking connections, blocking connections and connectionless protocols each give rise to different constraints.

GIF supports both evolution and extensibility. Evolution is obtained by defining, in the abstract form of the service primitives, the architecture used and the messages exchanged for communication. Extensibility is offered by introducing optionality of some of the service primitives and by flexibility in the mapping from service primitives to particular protocols.

NOTE 3 – The GIF itself could also be extended, adding further service primitives or facilities. Such extensions could address additional transparencies.

6.2 Liaisons between channel objects

A distributed engineering binding between basic engineering objects, corresponding to a computational binding is supported by liaisons between the peer channel objects on the client and server sides. Figure 1 shows the relationships between the various objects.

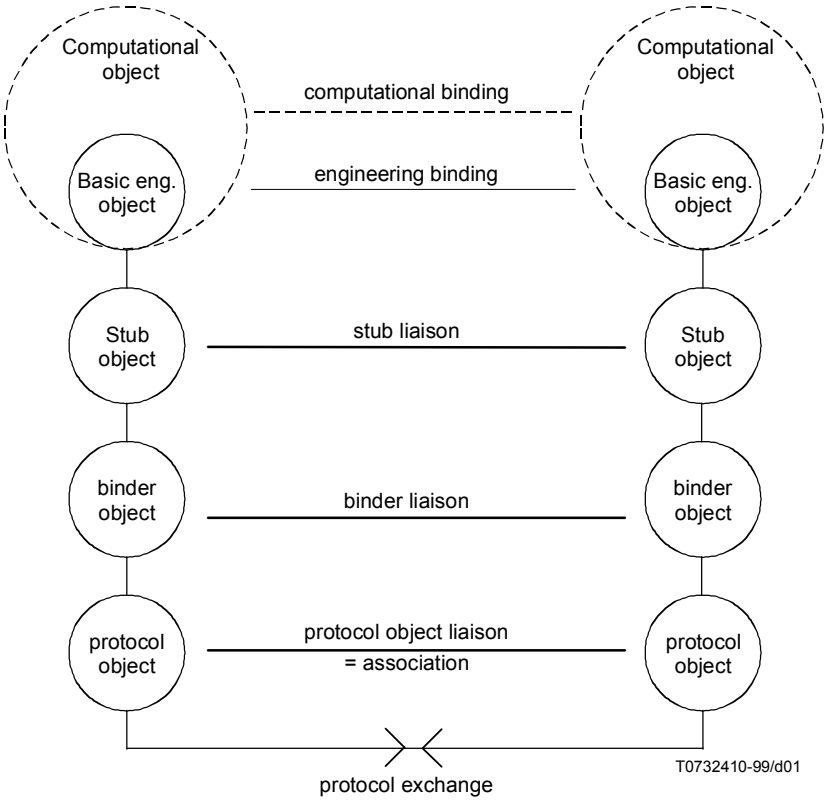

Figure 1 – Relationships of channel objects

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