STD.ISO 10164-22-ENGL 2000 ■ 4851903 0819403 002 ■

INTERNATIONAL STANDARD

ISO/IEC 10164-22

First edition
2000-04-15

Information technology — Open Systems Interconnection — Systems Management: Response time monitoring function

Technologies de l'information — Interconnexion de systèmes ouverts (OSI) — Gestion-systèmes: Fonction de contrôle de temps de réponse

This material is reproduced from ISO documents under International Organization for Standardization (ISO) Copyright License Number HIS/CC/1996. Not for resale. No part of these ISO documents may be reproduced in any form, electronic retrieval system or otherwise, except as allowed in the copyright law of the country of use, or with the prior written consent of ISO (Case postale 56,1211 Geneva 20, Switzerland, Fax +41 22 734 10 79), IHS or the ISO Licensor's members.

Reference number
ISO/IEC 10164-22:2000(E)

© ISO/IEC 2000

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS

Not for Resale

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

© ISO/IEC 2000

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 734 10 79
E-mail copyright@iso.ch
Web www.iso.ch

Printed in Switzerland

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

CONTENTS

		Page
1	Scope	1
2	Normative references	2
	2.1 Identical ITU-T Recommendations I International Standards	2
	2.2 Paired ITU-T Recommendations I International Standards	3
	2.3 Additional references	3
3	Definitions	3
	3.1 Management framework definitions	4
	3.2 Systems management overview definitions	4
	3.3 CMIS definitions	4
	3.4 Management information model definitions	4
	3.5 Guidelines for the definition of managed objects definitions	5
	3.6 Requirement and guidelines for implementation conformance statement proformas associated with OSI management definitions	5
	3.7 State management function definitions	5
	3.8 Time management function definitions	5
	3.9 Additional Definitions	5
4	Symbols and abbreviations	6
5	Conventions	6
6	Requirements	6
	6.1 Summarization of response times	7
	6.2 Management and control of the summarization	7
	6.3 Monitoring statistics on the response time	7
7	Model	7
	7.1 Response monitoring relationship	7
	7.2 Selection of response information	9
8	Generic definitions	9
	8.1 Managed relationship classes	9
	8.2 Managed object class	10
	8.3 Conditional packages	12
	8.4 Attributes	13
	8.5 Notifications	15
	8.6 Relationship mapping definitions	16
	8.7 Compliance	16
9	Service definition	16
	9.1 Introduction	16
	9.2 Establishment of response monitoring	17
	9.3 Termination of response monitoring	17
	9.4 Binding route role objects	17
	9.5 Unbinding route role objects	17
	9.6 QUERY bound object	17
	9.7 Response Confirmation Reporting Service	17
10	Functional units	18
11	Protocol	18
	11.1 Elements of procedures	18
	11.2 Abstract Syntax	18
	11.3 Negotiation of functional units	20

© ISO/IEC 2000 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

		Page
12	Relationship with other functions	21
13	Conformance	22
13.1	Static conformance	22
13.2	Dynamic conformance	22
13.3	Management implementation conformance statement requirements	22
Annex A – Management Information Definitions for Response Time Monitoring		23
A.1	Relationship class definition	23
A.2	Managed object classes	23
A.3	Packages	27
A.4	Attributes	29
A.5	Notification	34
A.6	Relationship mapping definition	35
A.7	ASN.1 definitions	36
Annex B – MCS proforma		38
B.1	Introduction	38
B.2	Identification of the implementation	40
B.3	Identification of the Recommendations I International Standards in which the management information is defined	40
B.4	Management conformance summary	41
Annex C – MOCS proforma		44
C.1	Introduction	44
C.2	Instructions for completing the MOCS proforma to produce a MOCS	44
C.3	Statement of conformance to the responseConfirmationObject object class	45
C.4	Statement of conformance to the responseConfirmationRecord object class	47
C.5	Statement of conformance to the responseDelayMonitor object class	52
C.6	Statement of conformance to the responseMonitor object class	59
C.7	Statement of conformance to the responseRequester object class	67
C.8	Statement of conformance to the route object class	69
Annex D – MRCS proforma		71
D.1	Introduction	71
D.2	Instructions for completing the MRCS	71
D.3	Managed relationship support	71
D.4	Roles support	71
D.5	Relationship management operations, notifications, and parameters support	72
D.6	Relationship object support	72
Annex E – MICS proforma		73
E.1	Introduction	73
E.2	Instructions for completing the MICS proforma to produce a MICS	73
E.3	Statement of conformance to the management information	73
Annex F – An Example Procedure to Summarize Histogram Data		81
Annex G – An example to summarize statistics on response times		82
1	Statistics for periodical response-request	82
2	Statistics for irregular response-request	82
3	Summarization of frequency distribution (ex., histogram data)	82

© ISO/IEC 2000 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO/IEC 10164 may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 10164-22 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in collaboration with ITU-T. The identical text is published as ITU-T Recommendation X.748.

ISO/IEC 10164 consists of the following parts, under the general title *Information technology — Open Systems Interconnection — Systems Management*:

— *Part 1: Object management function*

— *Part 2: State management function*

— *Part 3: Attributes for representing relationships*

— *Part 4: Alarm reporting function*

— *Part 5: Event report management function*

— *Part 6: Log control function*

— *Part 7: Security alarm reporting function*

— *Part 8: Security audit trail function*

— *Part 9: Objects and attributes for access control*

— *Part 10: Usage metering function for accounting purposes*

— *Part 11: Metric objects and attributes*

— *Part 12: Test management function*

— *Part 13: Summarization function*

— *Part 14: Confidence and diagnostic test categories*

— *Part 15: Scheduling function*

© ISO/IEC 2000 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

— *Part 16: Management knowledge management function*

— *Part 17: Change over function*

— *Part 18: Software management function*

— *Part 19: Management domain and management policy management function*

— *Part 20: Time management function*

— *Part 21: Command sequencer for systems management*

— *Part 22: Response time monitoring function*

Annex A forms a normative part of this part of ISO/IEC 10164. Annexes B to G are for information only.

© ISO/IEC 2000 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Introduction

This Recommendation | International Standard is developed according to ITU-T Rec. X.200 | ISO/IEC 7498-1 and CCITT Rec. X.700 | ISO/IEC 7498-4. This Recommendation | International Standard is related to the following Recommendation | International Standards:

- ITU-T Recommendation X.701 (1997) | ISO/IEC 10040:1998, *Information technology – Open Systems Interconnection – Systems management overview.*
- ITU-T Recommendation X.710 (1997) | ISO/IEC 9595:1998, *Information technology – Open Systems Interconnection – Common management information service definition.*
- ITU-T Recommendation X.711 (1997) | ISO/IEC 9596-1:1998, *Information technology – Open Systems Interconnection – Common management information protocol: Specification.*
- CCITT Recommendation X.720 (1992) | ISO/IEC 10165-1:1993, *Information technology – Open Systems Interconnection – Structure of management information: Management information model.*

OSI management standardization inevitably involves coordinated work by a number of standards bodies. ITU-T SG7 and ISO/IEC JTC 1/SC 21/WG 4 are jointly responsible for the development of Recommendations | International Standards that describe the architecture for OSI management, the services, protocols and functions that are used for systems management, and the structure of management information. Other groups, in ITU-T, ISO/IEC JTC 1/SC 21, ISO/IEC JTC 1/SC 6 and elsewhere, are responsible for the development of Recommendations | International Standards that describe the management aspects of particular layers of the OSI Basic Reference Model; these may describe (N)-layer management protocols, management aspects of (N)-layer operation, and managed objects that provide a "management view" of aspects of the layer operation and are visible to systems management.

© ISO/IEC 2000 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

INTERNATIONAL STANDARD

ITU-T RECOMMENDATION

INFORMATION TECHNOLOGY – OPEN SYSTEMS INTERCONNECTION – SYSTEMS MANAGEMENT: RESPONSE TIME MONITORING FUNCTION

1 Scope

This Recommendation | International Standard defines a systems management function which may be used by an application process in a centralized or decentralized environment to interact for the purposes of systems-management, as defined by CCITT Rec. X.700 | ISO/IEC 7498-4. This Recommendation | International Standard defines the response time monitoring function that consists of services, functional units, generic definitions and protocols. It is positioned in the application layer of ITU-T Rec. X.200 | ISO/IEC 7498 and is defined according to the model provided by ISO/IEC 9545. The role of systems management functions are described by ITU-T Rec. X.701 | ISO/IEC 10040.

This Recommendation | International Standard:

- establishes user requirements for the response time monitoring function;
- establishes a model that relates the services and generic definitions provided by this function to user requirements;
- defines the services provided by the function;
- defines generic notification type; and
- specifies the protocol that is necessary in order to provide the services.

This Recommendation | International Standard does not:

- define the nature of any implementation intended to provide the response time monitoring function;
- specify the manner in which management is accomplished by the use of the response time monitoring;
- define the nature of any interactions which result in the use of the response time monitoring;
- specify the services necessary for the establishment, normal and abnormal release of a management association;
- preclude the definition of further notification types.

The functions and the management information defined in this Recommendation | International Standard include:

- Summarization of the response time on any request of information and its management;
- Definition of the relationship on response monitoring;
- Setting and modification of the monitoring and the summarization conditions;
- Scheduling of the monitoring and the summarization; and
- Notification when response information or its statistical result is over a threshold.

The functions and the management information defined in this Recommendation | International Standard do not include:

- Management information definitions for summarization of response time statistical;
- How to retrieve response times locally (e.g., the test function to confirm response times); and
- Local mechanisms to summarize information related to the response request and response.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

2 Normative references

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

2.1 Identical Recommendations I International Standards

- ITU-T Recommendation X.200 (1994) I ISO/IEC 7498-1:1994, *Information technology – Open Systems Interconnection – Basic Reference Model: The basic model.*
- ITU-T Recommendation X.207 (1993) I ISO/IEC 9545:1994, *Information technology – Open Systems Interconnection – Application layer structure.*
- ITU-T Recommendation X.701 (1997) I ISO/IEC 10040:1998, *Information technology – Open Systems Interconnection – Systems management overview.*
- ITU-T Recommendation X.710 (1997) I ISO/IEC 9595:1998, *Information technology – Open Systems Interconnection – Common management information service.*
- ITU-T Recommendation X.711 (1997) I ISO/IEC 9596-1:1998, *Information technology – Open Systems Interconnection – Common Management Information Protocol: Specification.*
- CCITT Recommendation X.720 (1992) I ISO/IEC 10165-1:1993, *Information technology – Open Systems Interconnection – Structure of management information: Management information model.*
- CCITT Recommendation X.721 (1992) I ISO/IEC 10165-2:1992, *Information technology – Open Systems Interconnection – Structure of management information: Definition of management information.*
- CCITT Recommendation X.722 (1992) I ISO/IEC 10165-4:1992, *Information technology – Open Systems Interconnection – Structure of management information: Guidelines for the definition of managed objects.*
- ITU-T Recommendation X.723 (1993) I ISO/IEC 10165-5:1994, *Information technology – Open Systems Interconnection – Structure of management information: Generic management information.*
- ITU-T Recommendation X.724 (1996) I ISO/IEC 10165-6:1997, *Information technology – Open Systems Interconnection – Structure of management information: Requirements and guidelines for implementation conformance statement proformas associated with OSI management.*
- ITU-T Recommendation X.725 (1995) I ISO/IEC 10165-7:1996, *Information technology – Open Systems Interconnection – Structure of management information: General Relationship Model.*
- CCITT Recommendation X.730 (1992) I ISO/IEC 10164-1:1993, *Information technology – Open Systems Interconnection – Systems Management: Object management function.*
- CCITT Recommendation X.731 (1992) I ISO/IEC 10164-2:1993, *Information technology – Open Systems Interconnection – Systems Management: State management function.*
- CCITT Recommendation X.732 (1992) I ISO/IEC 10164-3:1993, *Information technology – Open Systems Interconnection – Systems Management: Attributes for representing relationships.*
- CCITT Recommendation X.733 (1992) I ISO/IEC 10164-4:1992, *Information technology – Open Systems Interconnection – Systems Management: Alarm reporting function.*
- CCITT Recommendation X.734 (1992) I ISO/IEC 10164-5:1993, *Information technology – Open Systems Interconnection – Systems Management: Event report management function.*
- CCITT Recommendation X.735 (1992) I ISO/IEC 10164-6:1993, *Information technology – Open Systems Interconnection – Systems Management: Log control function.*

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

- ITU-T Recommendation X.737 (1995) | ISO/IEC 10164-14:1996, *Information technology – Open Systems Interconnection – Systems Management: Confidence and diagnostic test categories.*

- ITU-T Recommendation X.738 (1993) | ISO/IEC 10164-13:1995, *Information technology – Open Systems Interconnection – Systems Management: Summarization function.*

- ITU-T Recommendation X.739 (1993) | ISO/IEC 10164-11:1994, *Information technology – Open Systems Interconnection – Systems Management: Metric objects and attributes.*

- ITU-T Recommendation X.741 (1995) | ISO/IEC 10164-9:1995, *Information technology – Open Systems Interconnection – Systems Management: Objects and attributes for access control.*

- ITU-T Recommendation X.743 (1998) | ISO/IEC 10164-20:1999, *Information technology – Open Systems Interconnection – Systems Management: Time Management Function.*

- ITU-T Recommendation X.746 (1995) | ISO/IEC 10164-15:1995, *Information technology – Open Systems Interconnection – Systems Management: Scheduling function.*

- ITU-T Recommendation X.749 (1997) | ISO/IEC 10164-19:1998, *Information technology – Open Systems Interconnection – Systems Management: Management domain and management policy management function.*

- ITU-T Recommendation X.753 (1997) | ISO/IEC 10164-21:1998, *Information technology – Open Systems Interconnection – Systems Management: Command sequencer for systems management.*

2.2 Paired ITU-T Recommendations | International Standards equivalent in technical content

- CCITT Recommendation X.208 (1988), *Specification of Abstract Syntax Notation One (ASN.1).*

  ISO/IEC 8824:1990, *Information technology – Open Systems Interconnection – Specification of Abstract Syntax Notation One (ASN.1).*

- ITU-T Recommendation X.291 (1995), *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications – Abstract test suite specification.*

  ISO/IEC 9646-2:1994, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 2: Abstract test suite specification.*

- ITU-T Recommendation X.296 (1995), *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications – Implementation conformance statements.*

  ISO/IEC 9646-7:1995, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 7: Implementation Conformance Statements.*

- CCITT Recommendation X.700 (1992), *Management framework for Open Systems Interconnection (OSI) for CCITT applications.*

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

2.3 Additional references

- ITU-T Recommendation M.3100 (1995), *Generic network information model.*

3 Definitions

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

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

3.1 Management framework definitions

This Recommendation | International Standard makes use of the following term as defined in CCITT Rec. X.700 | ISO/IEC 7498-4:

- managed object.

3.2 Systems management overview definitions

This Recommendation | International Standard makes use of the following terms as defined in ITU-T Rec. X.701 | ISO/IEC 10040:

a) managed object class;

b) manager;

c) MOCS;

d) MOCS proforma;

e) notification;

f) (systems management) operation.

3.3 CMIS definitions

This Recommendation | International Standard makes use of the following term as defined in ITU-T Rec. X.710 | ISO/IEC 9595:

- attribute.

3.4 Management information model definitions

This Recommendation | International Standard makes use of the following terms as defined in CCITT Rec. X.720 | ISO/IEC 10165-1:

a) action;

b) attribute group;

c) attribute type;

d) behaviour;

e) characteristic;

f) containment;

g) inheritance;

h) invariant;

i) multiple inheritance;

j) name binding;

k) naming tree;

l) packages;

m) parameter;

n) post-condition;

o) pre-condition;

p) specialization;

q) subclass;

r) subordinate object;

s) superclass;

t) superior object.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

3.5 Guidelines for the definition of managed objects definitions

This Recommendation | International Standard makes use of the following terms as defined in CCITT Rec. X.722 | ISO/IEC 10165-4:

a) managed object class definition;

b) template.

3.6 Requirement and guidelines for implementation conformance statement proformas associated with OSI management definitions

This Recommendation | International Standard makes use of the following terms as defined in ITU-T Rec. X.724 | ISO/IEC 10165-6:

a) managed relationship conformance statement (MRCS);

b) MRCS proforma.

3.7 State management function definitions

This Recommendation | International Standard makes use of the following terms as defined in CCITT Rec. X.731 | ISO/IEC 10164-2:

a) administrative state;

b) operational state;

c) usage state.

3.8 Time management function definitions

This Recommendation | International Standard makes use of the following term as defined in ITU-T Rec. X.743 | ISO/IEC 10164-20:

– accuracy.

3.9 Additional Definitions

3.9.1 one way response time: Response time in the case that the response requester role and the response confirmation role are fulfilled by two different objects.

3.9.2 response confirmation: A confirmation of receipt of the response associated with a response request by a response requester.

3.9.3 response confirmation role: A role to confirm receipt of the response associated with a response request by a response requester.

3.9.4 response monitor: An object which is aware of a monitored response requester and a monitored response confirmation role object and can provide response times between the two to managers.

3.9.5 response monitoring relationship: The relationship between one object in the response requester role which requests a response, one object in the response confirmation role which confirms the response and one object in the response monitor role which monitors that response confirmation and makes available the confirmation to managers.

3.9.6 response requester: An object which in a response monitoring relationship and has taken a response requester role.

3.9.7 response requester role: A role taken by an object in which it is capable of sending response requests.

3.9.8 response time: A time period between the time when a sending of response request is triggered and the time when its response is received by the response confirmation role object.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

3.9.9 round trip response time: Response time in the case that both the response requester role and the response confirmation role are fulfilled by the same object.

3.9.10 route: An object which in a response monitoring relationship has taken a route role.

3.9.11 route role: A role taken by an object through which the response request or the response passes. For example, the connection or routing point between a response requester and a response confirmation role object.

4 Symbols and abbreviations

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

ASN.1 Abstract Syntax Notation One

APDU Application Protocol Data Unit

CMIS Common Management Information Service

EDC Event Discrimination Counter

GDMO Guidelines for the Definition of Managed Objects

GRM General Relationship Model

MIM Management Information Model

MRCS Managed Relationship Conformance Statement

MO Managed Object

MOCS Managed Object Conformance Statement

OSI Open Systems Interconnection

PDU Protocol Data Unit

QoS Quality of Service

RC Relationship Class

SMI Structure of Management Information

5 Conventions

This Recommendation | International Standard defines services for response confirmation reporting following the descriptive conventions defined in ITU-T Rec. X.210 | ISO/IEC 10731.

The following notation is used in this Recommendation | International Standard service parameter tables:

M The parameter is mandatory;

(=) The value of the parameter is equal to the value of the parameter in the column to the left;

U The use of the parameters is a service-user option;

– The parameter is not present in the interaction described by the primitive concerned;

C The parameter is conditional;

P The parameter is subject to the constraints imposed by ITU-T Rec. X.710 | ISO/IEC 9595.

6 Requirements

In order to tune up the performance of the communication network between systems or other objects, the following functions may be needed:

- Monitoring circuit traffic;
- Selection of the best routes;
- Improvement of performance of each communication device, etc.

The goal of these communication performance management activities is to ensure that managed response delays are within desired limits. So, for performance tuning, the response times must be monitored to confirm the real result of the tuning. Here, the response time means total processing time including sending a request, transmission through physical protocol, receiving request, execution (or rejection) of request, sending response and receiving response.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

6.1 Summarization of response times

The MIS-User needs the ability to:

- Summarize round trip and/or one way response time in any communication;
- Summarize response times of PDUs through a specified route or connection;
- Summarize response times of multicasted PDUs indicating the synchronization mode (single cast, atomic or best effort);
- Summarize response delay time from a constant time value or the value of a specified time attribute;
- Log and disseminate response time information.
- Summarize information related with response time accuracy.

6.2 Management and control of the summarization

The MIS-User needs the ability to:

- Establish and terminate the relationship for response monitoring;
- Bind and unbind monitored objects related to the response monitoring relationship;
- Suspend and resume the monitoring behaviour;
- Query information on the response monitoring;
- Schedule response monitoring;
- Record and log response request information in order to identify requests for which no response has been received.

6.3 Monitoring statistics on the response time

The MIS-User needs the ability to:

- Summarize response time statistics by using ITU-T Rec. X.738 | ISO/IEC 10164-13;
- Estimate response time statistics using ITU-T Rec. X.739 | ISO/IEC 10164-11;
- Summarize several types of frequency distribution (for example, histogram) of response times;
- Log and disseminate response time statistics.
- Schedule monitoring statistics on response time statistics.

7 Model

7.1 Response monitoring relationship

This Recommendation | International Standard defines the response monitoring relationship binding a response requester role, a response confirmation role, zero or more route roles and a response monitoring role as illustrated in Figure 1. These roles may be fulfilled by one or more managed object instances.

7.1.1 Response monitor role

The instance having response monitor role monitors triggering of the response request by the response requester and confirmation time of the response by response confirmation. The response monitor has an attribute representing response time of the response request and may have the function to emit a notification with the response time information. This role shall optionally have response timeout value and a QoS alarm is emitted unless the response arrives before the timeout expires.

A response monitor role may have a response synchronization attribute whose value is "single cast", "atomic" or "best effort". If the value is "single cast", the response monitor role object monitors only one response to one response request. If the value is "atomic" or "best effort", the monitor object can monitor more than one response to a response request. If the value is "atomic", the response time is monitored as the time until *all* the responses are returned. If the value is "best effort", the response time is monitored as the time until the first *one* of the responses returns. Time synchronization between these roles is needed.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

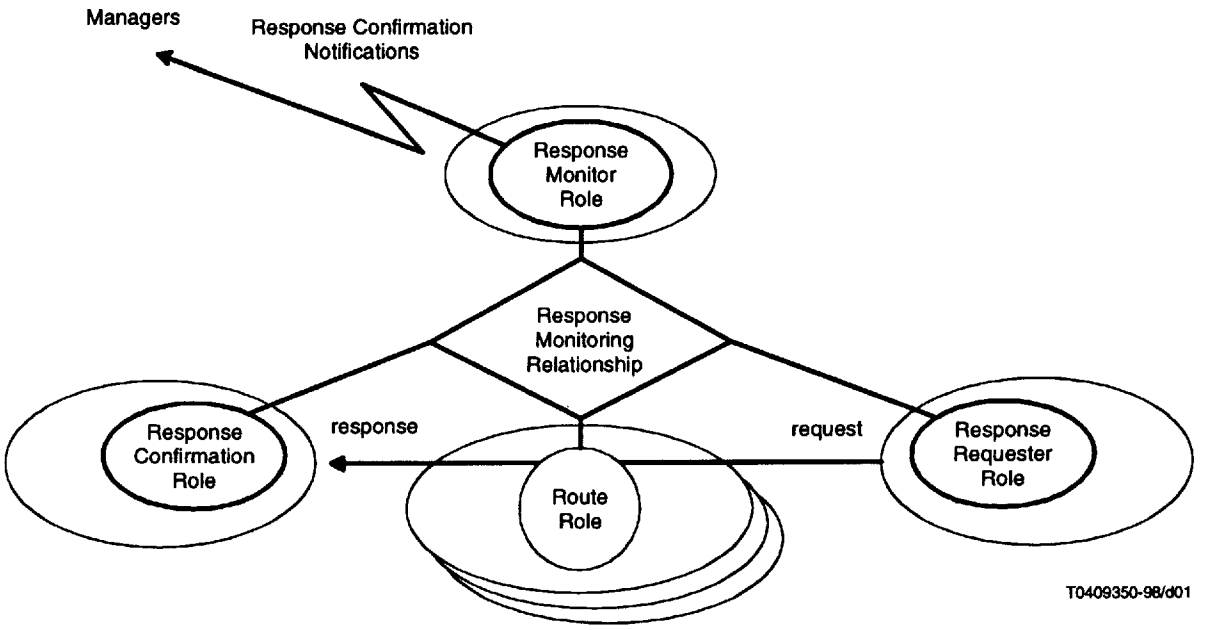


Figure 1 – Response Monitoring Model

The response monitoring function uses several conditional packages that provide various levels of sophistication in scheduling the activity of the response monitor role object. These packages are characterized by the following:

- the time during which monitoring is active. This property is supported by time-related attributes in the conditional packages that contain information related to scheduling.

This Recommendation | International Standard defines the response monitor managed object superclass and a subclass, response delay monitor managed object class, as the response monitor role compatible class.

To support cases where lengths of response requests and responses are not uniform, the response monitor role managed object class conditionally supports request/response length package. This package has response request length attribute and response length attribute.

If the response time summarization mode attribute value is "raw response time" (0) , the response time attribute value indicates the raw response time. If this mode attribute value is "response time per bit" (1), the response time attribute value is calculated according to the following expression.

$$\frac{RT_{raw} \times 2}{L_s + L_r}$$

where:

RT_{raw} is raw response time of any PDU of any length.

L_s is the response request length, the bit length of the response request PDU.

L_r is the response length, the bit length of the response PDU.

If this request/response length package is supported, response request length and response length are carried by response confirmation notification.

Optionally, as a precision of the measured response time, a maximum error value of the response time is carried by response confirmation notification. Time accuracy and precision requirements are described in 6.2 of ITU-T Rec. X.743 | ISO/IEC 10164-20.

7.1.2 Response requester role

Exactly one response requester role must be identified in a response monitoring relationship.

An object in this role may have the response request notification which is generated when a response request is issued. After receipts of this type of notification or by getting log records of this notification type, a manager confirms whether the associated response confirmation has arrived.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

7.1.3 Response confirmation role

Exactly one response confirmation role must be identified in a response monitoring relationship.

In some cases, the object instance realizing a response confirmation role may be the same as that fulfilling the response monitor role.

In other cases, the object instance realizing a response confirmation role may be the same as the object instance realizing the response requester role. In this case, "round trip response time" can be monitored. On the other hand, if the response confirmation role managed object instance is different from the response requester role managed object instance, "one way response time" can be monitored.

7.1.4 Route role

One or more route roles may be identified as so called responders, connections or routing points. If route role cardinality is "0" (default cardinality), all the response times of PDUs are monitored regardless of any responders, connections or routes. The generic types of responders, connections and routing points shall be defined as compatible classes. The generic compatible classes referenced in this Recommendation | International Standard as route role compatible managed object classes are as follows:

Responder type: "ITU-T Rec. X.723 | ISO/IEC 10165-5": sap1, "ITU-T Rec. X.723 | ISO/IEC 10165-5": sap2.

Connection type: "ITU-T Rec. X.723 | ISO/IEC 10165-5": singlePeerConnection.

Routing points type: "ITU-T Rec. X.723 | ISO/IEC 10165-5": sap2.

If a summarization of response time through a special type of routing point is required, the unit whose response times are monitored can be indicated as a set of not only a response-requester and responders but also routing points. In this case, a compatible class of route role which represents such a special type of routing point (sap2 etc.) may be defined.

In the case of **connection-oriented** communication, if a summarization of response time through a special type of connections is required, the unit whose response times are monitored can be indicated as a set of not only a response-requester and responders but also such a connections. In this case, a compatible class of route role which represents such a special type of connection may be defined.

NOTE – The route role is used not to control the route of the communication but to indicate the route through which PDUs are monitored.

7.1.5 Response time-out

The response time-out value may be set in the response monitor role object. If the time-out value is set, the response monitor emits a notification not upon response receipt, but rather upon timeout error QoS report including an identifier of the request which was generated the indicated time-out ago.

7.2 Selection of response information

All the response confirmation notifications are inputted in the following event discrimination objects.

- Event Forwarding Discriminator (EFD): see ITU-T Rec. X.734 | ISO/IEC 10164-5
- Log : see CCITT Rec. X.735 | ISO/IEC 10164-6
- Event Discrimination Counter (EDC): see ITU-T Rec. X.753 | ISO/IEC 10164-21

Response information (for example, response times) in the response confirmation notification is evaluated with the values of discriminator construct. If they evaluate to TRUE, the procedures associated with each discrimination object are executed.

8 Generic definitions

8.1 Managed relationship classes

The response monitoring relationship class is defined in this Recommendation | International Standard.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

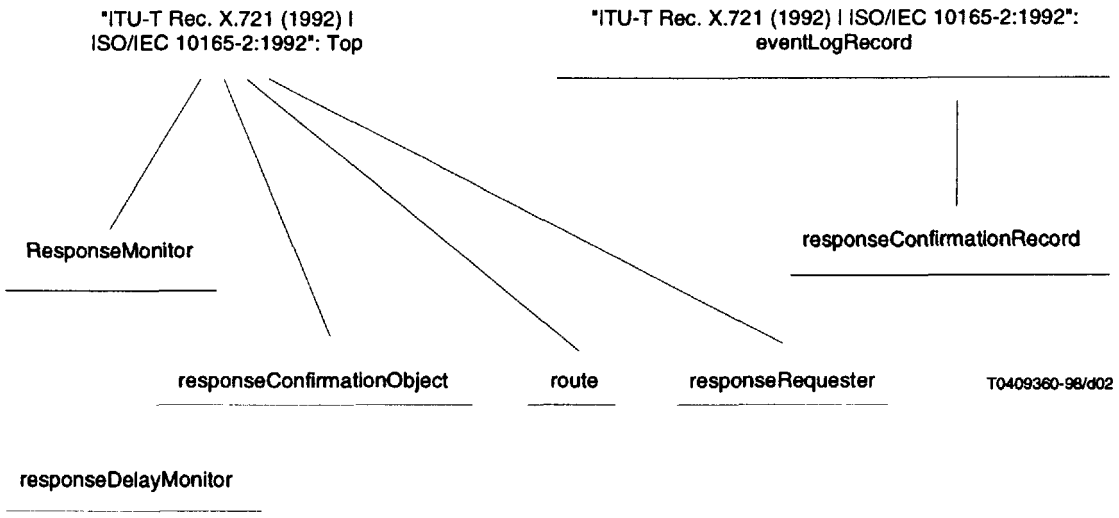
8.1.1 Response monitoring relationship class

The response monitoring relationship class defines the relation between one response requester role, one response confirmation role and one response monitor role and optionally route role. In this relationship, the response monitor role object monitors the response request sent from the response requester role object and that response received by the response confirmation role object. The response monitor role object may summarize the response times between the response requester role object and the response confirmation role object.

This relationship class instance may bind one or more route role objects. In the case that one response monitoring relationship class instance binds one or more route role objects, the monitor role object binding with this relationship class instance monitors only the responses that pass through all these route role objects.

8.2 Managed object class

The managed object classes in this Recommendation | International Standard are the objects that are bound by the response monitoring relationship and the response confirmation record object whose inheritance structure is shown in Figure 2.



NOTE – Instantiable managed objects are underlined.

Figure 2 – Inheritance structure of objects bound by the response monitoring relationship

8.2.1 Response confirmation object managed object class

The response confirmation object managed object class must be instantiated before the associated response monitoring relationship managed object class is instantiated. This managed object class supports the response confirmation object id attribute and optionally the response requester indication list attribute which represents the list of response requester objects that may issue response requests to the response confirmation object.

This managed object class is compatible with the sap1 and sap2 managed object class as defined in ITU-T Rec. X.723 | ISO/IEC 10165-5 if none of the conditional packages are supported in the response confirmation object instance. So, sapId attribute in sap1 or sap2 may have same behaviour as the response confirmation object ID attribute.

8.2.2 Response confirmation record managed object class

This managed object is used to represent logged information that results from response confirmation notifications or event reports.

8.2.3 Response delay monitor managed object class

This managed object is a subclass of the response monitor managed object class. This subclass supports the response delay time attribute which represents delay times of associated responses. The response time-out package is mandatory in this managed object class.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

8.2.4 Response monitor managed object class

Response monitor managed object class may be instantiated before or after the ESTABLISH operation is received. But if a new ESTABLISH operation has a new parameter set of response requester, response confirmation object and routes and the response monitor managed object instance for monitoring its set does not exist, a new instance compatible with response monitor managed object class must be created immediately. With a new ESTABLISH operation, one instance compatible with the response monitor managed object class is bound with a new response monitoring relationship instance. After this binding, if the operational state is enabled and the availability status is not offDuty in the monitor object, the response monitor compatible class instance starts monitoring responses indicated by the ESTABLISH parameters.

If the response monitoring relationship instance indicated by the parameter set of a new ESTABLISH operation already exists, the monitoring is started by the manager without new bindings.

The response requester indication attribute in this managed object class identifies the response requester compatible object monitored by the response monitor object. This attribute value is modified by UNBIND and BIND operations. The default value is null (NULL), representing that this instance has no binding with a response requester object.

The response confirmation object indication attribute in this managed object class fulfilling the response confirmation role that is monitored by the response monitor object. This attribute value is modified by UNBIND and BIND operation. The default value is null (NULL), representing that this instance has no binding with response confirmation role object.

The route list attribute in this managed object class identifies the route role objects monitored by the response monitor object. The elements of this attribute can be added or removed. Elements are added by the BIND operation and removed by the UNBIND operation. The default value is null (NULL), representing that the response monitor role object instance has no binding with the route role object. If the route role cardinality is "0" (default cardinality), the response times of all PDUs are monitored regardless of there responders, connections or routes.

The response time attribute in this managed object class represents the most recent response time between the indicated response requester and response confirmation object. This attribute value is read-only.

NOTE – This attribute may be used by objects derived from scanner objects defined in ITU-T Rec. X.739 | ISO/IEC 10164-11.

If the response time summarization mode attribute value is "raw response time" (0), the response time attribute value indicates the raw response time and is an INTEGER type. If this mode attribute value is "response time per bit" (1), the response time attribute value is calculated according to the following expression as a REAL type.

$$\frac{RT_{raw} \times 2}{L_s + L_r}$$

where:

RT_{raw} is the raw response time of any PDU of any length.

L_s is the response request length, the bit length of the response request PDU.

L_r is the response length, the bit length of the response PDU.

The maximum response time error attribute in this managed object identifies the precision of the measured response time. If this attribute value is noEstimateOnResponseTimeError (–1), it indicates that the precision of the response time is unknown.

This class has a response synchronization attribute whose value is "single cast", "atomic" or "best effort". If the value is "single cast", the response monitor role object monitors the only the first response to a response request. If the value is "atomic" or "best effort", the monitor object can monitor more than one response to a response request. If the value is "atomic", the response time is monitored as the time until all the responses return. If the value is "best effort", the response time is monitored as the time until the first response returns. The default value of this attribute is "single cast".

This class also has an operational state attribute. If this attribute value is disabled, it indicates that response monitoring has been stopped by the local system.

If the response confirmation notification package is present, a response confirmation notification is issued when the associated response confirmation role object receives a response monitored by the response monitor object.

To support cases where lengths of response requests and responses are not uniform, the response monitor role managed object class conditionally supports request/response length package. This package has response request length attribute and response length attribute. If this request/response length package is supported, response request length and response length are carried by response confirmation notification.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

If the response timeout package is present, the quality of service alarm is issued when the time-out period specified by the response timeout attribute is reached after the associated response request has been issued.

The response monitor managed object class supports several conditional packages that provide various levels of *sophistication* in scheduling the activity of the response monitor role object. These packages are characterized by the following:

- The time during which monitoring is active. This property is supported by time-related attributes in the conditional packages that contain information related to scheduling.

8.2.5 Response requester managed object class

Response requester managed object class must be instantiated before the associated response monitoring relationship managed object class is instantiated. This managed object class supports response requester id attribute and optionally response confirmation object indication list attribute which represents the list of response confirmation objects that may return responses to the response requester.

This managed object class is compatible with the sap1 and sap2 managed object classes defined in ITU-T Rec. X.723 | ISO/IEC 10165-5 if none of the conditional packages are supported in the response requester managed object instance. Thus the sapId attribute in sap1 or sap2 may have the same behaviour as the response requester ID attribute.

8.2.6 Route managed object class

The route managed object class must be instantiated before the associated response monitoring relationship managed object class is instantiated. This managed object class supports the route id attribute.

This managed object class is compatible with the sap1 and sap2 managed object classes defined in ITU-T Rec. X.723 | ISO/IEC 10165-5. The sapId attribute in the sap1 or sap2 may have the same behaviour as the route id attribute.

This managed object class is also compatible with the singlePeerConnection managed object class defined in ITU-T Rec. X.723 | ISO/IEC 10165-5. The connectionId attribute in singlePeerConnection may have the same behaviour as the route id attribute.

8.3 Conditional packages

8.3.1 Request/response length package

The request response length package supports monitored unit length, response request length attribute which indicates the bit length of response request PDU and response length attribute which indicates the bit length of response PDU. These attributes are read-only.

This package is conditionally supported by the response monitor role object class. Response request length and response length attributes are updated when the response monitor services a response.

8.3.2 Response confirmation notification package

The response confirmation notification package supports the response confirmation notification.

This package is conditionally supported by the response monitor role object class. If response monitor role object supports this package, the information defined in 8.5.1 is emitted in a response confirmation notification.

8.3.3 Response confirmation object list package

The response confirmation object list package supports the response confirmation object indication list attribute.

This package is conditionally supported by the response requester role object class. If response requester role object supports this package, all the response confirmation objects bound with the response requester role object coordinated by a response monitoring relationship are identified by the response confirmation object indication list attribute.

8.3.4 Response requester list package

The response requester list package supports the response requester indication list attribute.

This package is conditionally supported by the response confirmation role object class. If a response confirmation role object supports this package, all the response requester objects bound with the response confirmation role object coordinated by a response monitoring relationship are identified by the response requester indication list attribute.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

8.3.5 Response timeout package

The response timeout length package supports the response timeout attribute and the quality of service alarm. The response timeout attribute is writeable and its default value is NULL.

This package is conditionally supported by the response monitor role object class. If the response timeout attribute value is not NULL and the response time is greater than the response timeout attribute value, a "response time excessive" error is carried by the probable cause field of the quality of service alarm is emitted.

8.4 Attributes

8.4.1 Maximum response time error attribute

The attribute is a response time type. This attribute is supported by the response monitor managed object class. A value of this attribute indicates the precision of the response time value represented by the response time attribute.

8.4.2 Request identifier attribute

The request identifier attribute is a choice of integer type, invoke ID or ANY. If the request is APDU request defined according to OSI standards, the invoke ID is used. This attribute value is used to identify each response request.

8.4.3 Response confirmation object identifier attribute

The response confirmation object identifier attribute is a simple name type. This attribute value is used to identify instance of the response confirmation object managed object class.

8.4.4 Response confirmation object indication attribute

The response confirmation object indication attribute is an object instance type. This attribute is supported by a response monitor role object. This identifies a response confirmation object whose response time is monitored by the response monitor.

8.4.5 Response confirmation object indication list attribute

The response confirmation object indication list attribute is a SET OF object instance. This attribute may be supported by a response requester role object. It identifies the response confirmation objects with which the response requester role is bound to the same response monitor by the response monitoring relationship.

8.4.6 Response delay time attribute

The response delay time attribute is a time period type. This attribute is supported by a response delay monitor object. This indicates a response delay time which is calculated by subtracting response timeout attribute value from response time attribute value.

8.4.7 Response length attribute

The response length attribute is a Integer type. This attribute is optionally supported by the response monitor managed object class. This attribute value represents the length of the response PDU. The unit of this representation is a bit.

8.4.8 Response monitor identifier attribute

The response monitor identifier attribute is a simple name type. This attribute value is used to identify each instance of the response monitor managed object class.

8.4.9 Response request length attribute

The response request length attribute is a Integer type. This attribute is optionally supported by the response monitor managed object class. This attribute value represents the length of the requested PDU. The unit of this representation is a bit.

8.4.10 Response requester identifier attribute

The response requester identifier attribute is a simple name type. This attribute value is used to identify each instance of the response requester managed object class.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

8.4.11 Response requester indication attribute

The response requester indication attribute has an object instance type. This attribute is supported by a response monitor role object. This identifies a response requester whose response time is monitored by the response monitor.

8.4.12 Response requester indication list attribute

The response requester indication list attribute has a SET OF object instance type. This attribute may be supported by a response confirmation role object. Its value is a list of response response requesters with which the response confirmation role is bound to the same response monitor by the response monitoring relationship.

8.4.13 Response synchronization attribute

The response synchronization attribute is an enumerated type whose possible values are "single cast(–1)", "best effort(0)" and "atomic(1)". This attribute is supported by a response monitor object. If the value is "single cast", the response monitor role object monitors the only one response to the response request. If the value is "atomic" or "best effort", the monitor object can monitor more than one response to a response request. If the value is "atomic", the response time is monitored until *all* the responses are returned. If the value is "best effort", the response time is monitored until the first response returns. Time synchronization between these roles is needed.

8.4.14 Response time attribute

The response time attribute is a response time type. This attribute may be supported by a response monitor managed object class. A value of this attribute indicates a response time from when a response request is sent by the monitored response requester to when the response arrives at the monitored response confirmation object.

This attribute is a choice of seconds, milli seconds, micro seconds, nano seconds, pico seconds, and seconds per bit value. The last one is a REAL type and the others are INTEGER type. The seconds per bit value is calculated according to the following expression.

$$\frac{RT_{raw} \times 2}{L_s + L_r}$$

where:

RT_{raw} is the raw response time of any PDU of any length.

L_s is the response request length, the bit length of the response request PDU.

L_r is the response length, the bit length of the response PDU.

8.4.15 Response time summarization mode attribute

If the response time summarization mode attribute value is "raw response time" (0), the response time attribute value indicates the raw response time and is an INTEGER type. If this mode attribute value is "response time per bit" (1), the response time attribute value is set by the response time per a bit length as a REAL type.

8.4.16 Response timeout attribute

The response timeout attribute is a time period type. This attribute is supported by the response monitor managed object class. A value of this attribute indicates a response timeout used to compare with the response time which is summarized by the response monitor.

8.4.17 Route identifier attribute

The route identifier attribute is a simple name type. This attribute value is used to identify each instance of the route role managed object class.

8.4.18 Route list attribute

The route list attribute is a SET OF object instance type. This attribute is supported by a response monitor managed object class. A value of this attribute identifies a set of objects fulfilling the route role in a response monitoring relationship.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

8.5 Notifications

8.5.1 Response confirmation notification

8.5.1.1 Behaviour of response confirmation notification

The response confirmation notification is issued when the response to a response request sent from the monitored response request role object arrives at the monitored response confirmation role object. This notification carries information related to that response as its parameters.

8.5.1.2 Parameters for response confirmation notification

The response confirmation notification carries the following information as parameters.

8.5.1.2.1 Maximum response time error information

This attribute is a response time type. A value of this information indicates the precision of the response time value represented by the response time attribute.

8.5.1.2.2 Request identifier information

The request identifier information is a choice of integer type, invoke ID or ANY. If the request is an APDU request as defined according to OSI standards, invoke ID is used. This information is used to identify each response request.

8.5.1.2.3 Response confirmation object indication information

The response confirmation object indication information is an object instance type. This identifies the response confirmation object whose response time is monitored by the response monitor.

8.5.1.2.4 Response delay time information

The response delay time information is a time period type. This indicates a response delay time which is calculated by subtracting response timeout attribute value from response time attribute value.

8.5.1.2.5 Response monitor identifier information

The response monitor identifier information is a simple name type. This attribute value is used to identify the instance of the response monitor managed object class.

8.5.1.2.6 Response requester indication information

The response requester indication information is an object instance type. This indicates the response requester which response time is monitored by the response monitor.

8.5.1.2.7 Response synchronization information

The response synchronization information is an enumerated type whose possible values are "single cast(–1)", "best effort(0)" and "atomic(1)". If the value is "single cast", the response monitor role object monitors only the one response to one response request. If the value is "atomic" or "best effort", the monitor object can monitor more than one response to a response request. If the value is "atomic", the response time is monitored as the time until *all* the responses are returned. If the value is "best effort", the response time is monitored as the time until the first response returns. Time synchronization between these roles is needed.

8.5.1.2.8 Response time information

The response time information is a response time type. A value of this parameter indicates the response time from when a response request has been sent by the monitored response requester to when the corresponding response arrives at the monitored response confirmation object.

8.5.1.2.9 Response timeout information

The response timeout information is a time period type. A value of this parameter indicates the difference between the time when the response request is issued and the time when the timeout occurs without its response.

8.5.1.2.10 Route list information

The route list is a SET OF object instance type. A value of this parameter indicates a set of objects compatible with a route role object.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

8.5.1.2.11 Notification identifier information

This information is used to identify each notification instance as defined in CCITT Rec. X.733 | ISO/IEC 10164-4.

8.5.1.2.12 Correlated Notifications information

This information, when present, may be used to indicate the correlated notifications associated with the notification as defined in CCITT Rec. X.733 | ISO/IEC 10164-4.

8.5.1.2.13 Additional text

This parameter, when present, may be used for extensions to this notification as defined in CCITT Rec. X.733 | ISO/IEC 10164-4.

8.5.1.2.14 Additional information

This parameter, when present, may be used for extensions to this notification as defined in CCITT Rec. X.733 | ISO/IEC 10164-4.

8.6 Relationship mapping definitions

8.6.1 Response monitoring relationship mapping

The response monitoring relationship mapping defines the following mapping described in A.6 using GRM:

- Mapping each role to a managed object class;
- Mapping each identification to the object instance identifier attribute supported by the mapped managed object class;
- Mapping each relationship operation to a GDMO operation in the mapped managed object class instance.

8.7 Compliance

Managed object class definitions may import the appropriate specification of managed objects, notifications, actions, and/or attribute types defined in this Recommendation | International Standard. This is achieved by reference to the templates defined in this Recommendation | International Standard and CCITT Rec. X.721 | ISO/IEC 10165-2. The reference mechanism is defined in ITU-T Rec. X.723 | ISO/IEC 10165-4.

The appropriate specification of relationship class and relationship mapping defined in this Recommendation | International Standard may be imported. This is achieved by reference to the templates defined in this Recommendation | International Standard and ITU-T Rec. X.725 | ISO/IEC 10165-7. The reference mechanism is also defined in ITU-T Rec. X.725 | ISO/IEC 10165-7.

9 Service definition

This Recommendation | International Standard defines the response confirmation reporting service. The use of services defined in other functions is described below.

9.1 Introduction

This Recommendation | International Standard provides services to monitor and to control monitoring of response times. In particular, the operations that can be applied to instances of managed object classes bound by a response monitoring relationship are:

- establishment of a response monitoring relationship;
- termination of a response monitoring relationship;
- binding/unbinding monitored objects;
- response confirmation report;
- suspension/resumption of response monitoring;
- getting response time.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

9.2 Establishment of response monitoring

If the manager needs to monitor a new request-response relation, the manager shall use the ESTABLISH relationship operation to create a new instance of a response monitoring relationship. This operation has parameters that identify a response requester, a response confirmation object, and, optionally, routes through which a request and its response are carried. The establishment procedure is as follows.

1) Agent receives ESTABLISH operation.
2) Agent creates an instance of response monitoring RC (relationship class).
3) The response monitoring RC object (instance) binds the response requester object identified as a parameter of the ESTABLISH operation.
4) If the response monitor object which has the role to monitor the response between the response requester and the response confirmation object through the routes indicated by parameters of the ESTABLISH operation already exists, the RC object binds that response monitor object. If it does not exist, a new response monitor object is instantiated and bound with the RC object.
5) If the response confirmation object identified by the parameter of ESTABLISH operation is different from the response monitor object, the RC object binds that response confirmation object.
6) If one or more routes need to be used by the request or response, the RC object may bind those route objects.
7) If all these procedures are successful and the ESTABLISH operation is in confirmed mode, the success confirmation including the instance identifiers of the monitor object and the other related objects is returned from the agent.
8) If one or more of these procedures result in an error and the ESTABLISH operation is in confirmed mode, all these procedures are rolled back and the error information is returned from the agent. If the rollback behaviour results in failure, the other error information is moreover returned from the agent.

9.3 Termination of response monitoring

If the manager needs to terminate monitoring the request-response relation, the manager shall use the TERMINATE relationship operation to unbind all the related bindings and release all the related resources. The termination procedure is as follows.

1) Agent receives TERMINATE operation.
2) The RC object unbinds all the bindings with itself.
3) If the unbound response monitor role object is not bound with any other RC objects and the monitor role object has delete-if-no-bindings package, the response monitor role object is deleted.
4) If one or more of these procedures result in an error and the TERMINATION operation is in confirmed mode, all these procedures are rolled back and the error information is returned from the agent. If the rollback behaviour results in failure, the other error information is moreover returned from the agent.

9.4 Binding route role objects

The BIND operation shall be used to bind a new route role object with the response monitoring relationship.

9.5 Unbinding route role objects

The UNBIND operation shall be used to unbind a new route role object from the response monitor role object.

9.6 QUERY bound object

The QUERY operation shall be used to get instance ids bound by a response monitoring relationship instance.

9.7 Response Confirmation Reporting Service

This clause specifies the response confirmation reporting service which is defined in this Recommendation | International Standard and maps it to the CMIS M-EVENT-REPORT service.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

Table 1 – Response confirmation reporting parameters

Parameter Name	Req/Ind	Rsp/Cnf
Invoke identifier	P	P
Mode	P	–
Managed object class	P	P
Managed object instance	P	P
Event type	M	C (=)
Event time	P	–
Event information		
ResponseMonitorId	M	–
ResponseRequesterInd	M	–
ResponseConfirmationObjectInd	M	–
RouteList	U	–
RequestIdentifier	M	–
NotificationIdentifier	U	–
CorrelatedNotifications	U	–
ResponseTime	M	–
MaximumResponseTimeError	U	–
ResponseRequestLength	U	–
ResponseLength	U	–
ResponseSync	U	–
ResponseDelayTime	U	–
ResponseTimeout	U	–
AdditionalText	U	–
AdditionalInformation	U	–
Current time	–	P
Event reply	–	P
Errors	–	P

10 Functional units

Two functional units are defined in this Recommendation | International Standard for the response time monitoring:

a) monitor response time: this functional unit supports QUERY service and response confirmation report service.

b) control response monitor: this functional unit supports establishment, termination, binding, unbinding, state change and scheduling services

11 Protocol

11.1 Elements of procedures

Elements of establishment and termination service procedures are defined in 9.2 and 9.3.

11.2 Abstract Syntax

11.2.1 Managed Objects

Table 2 identifies the relationship between the managed objects defined in 8.2 of this Recommendation | International Standard and the managed object class specification in Annex A.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Table 2 – Managed objects and reference labels

Managed Object Name	Reference Label
Response confirmation object	responseConfirmationObject
Response confirmation record	responseConfirmationRecord
Response delay monitor	responseDelayMonitor
Response monitor	responseMonitor
Response requester	responseRequester
Route	route

11.2.2 Attributes

11.2.2.1 Attributes imported from the definition of management information

This Recommendation | International Standard references the following management attribute, whose abstract syntax are specified in CCITT Rec. X.721 | ISO/IEC 10165-2:

– operationalState.

11.2.2.2 Attributes defined in this Recommendation | International Standard

This Recommendation | International Standard references the following management attributes, whose abstract syntax are specified in Annex A:

a) maximumResponseTimeError;

b) requestIdentifier;

c) responseConfirmationObjectId;

d) responseConfirmationObjectInd;

e) responseConfirmationObjectIndList;

f) responseDelayTime;

g) responseLength;

h) responseMonitorId;

i) responseRequesterId;

j) responseRequesterInd;

k) responseRequesterIndList;

l) responseRequestLength;

m) responseSync;

n) responseTime;

o) responseTimeout;

p) responseTimeSummarizationMode;

q) routeId;

r) routeList.

11.2.2.3 Parameter to Attribute Mapping

Table 3 identifies the relationship between the notification service parameters defined in 8.5 of this Recommendation | International Standard and the attribute type specifications in Annex A.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Table 3 – Parameters and attribute names

Parameter	Attribute Name
MaximumResponseTimeError	maximumResponseTimeError
Request identifier	requestIdentifier
Response confirmation object indication	responseConfirmationObjectInd
Response delay time	responseDelayTime
Response monitor identifier	responseMonitorId
Response requester indication	responseRequesterInd
Response synchronization	responseSync
Response time	responseTime
Response timeout	responseTimeout
Route list	routeList

11.2.3 Notifications

11.2.3.1 Referenced Notifications

This Recommendation | International Standard references the following events defined in CCITT Rec. X.730 | ISO/IEC 10164-1:

a) Object creation notification;

b) Object deletion notification;

c) Processing error alarm notification.

This Recommendation | International Standard references the following event defined in CCITT Rec. X.731 | ISO/IEC 10164-2.

– State change notification.

This Recommendation | International Standard references the following events defined in CCITT Rec. X.733 | ISO/IEC 10164-4.

a) Processing error alarm notification;

b) Quality of service alarm notification.

11.2.3.2 Notifications Defined in this Recommendation | International Standard

Table 4 identifies the relationship between the notifications defined in 9.7 of this Recommendation | International Standard and the notification type specifications in Annex A.

Table 4 – Notifications

Event Type	Notification Type
Response confirmation	responseConfirmation

11.3 Negotiation of functional units

This Recommendation | International Standard assigns the following object identifier value

{joint-iso-ms(9) function(2) part22(22) functionalUnitPackage(1)}

as a value of the ASN.1 type FunctionalUnitPackageId defined in ITU-T Rec. X.701 | ISO/IEC 10040 to use for negotiating the following functional units:

– 0 monitor response time functional unit

– 1 control response monitor functional unit

where the number identifies the bit positions in the BIT STRING assigned to the functional units, and the names referencing the functional units are defined in clause 10.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

Within the Systems management application context, the mechanism for negotiating the functional units is described in ITU-T Rec. X.701 | ISO/IEC 10040.

NOTE – The requirement to negotiate functional units is specified by the application context.

12 Relationship with other functions

The response time monitoring function uses the services defined in CCITT Rec. X.731 | ISO/IEC 10164-2 for the notification of state changes, and the services defined in CCITT Rec. X.730 | ISO/IEC 10164-1 for the creation and deletion of managed objects, the retrieval of attributes and notifications of attribute value changes.

Control of the response confirmation report service is provided by mechanisms supported in CCITT Rec. X.734 | ISO/IEC 10165-5.

Management service of response confirmation record is provided by mechanisms specified in CCITT Rec. X.735 | ISO/IEC 10164-6.

Access control capabilities specified in ITU-T Rec. X.741 | ISO/IEC 10164-9 may be used to control access from manager to response monitor.

Response time attribute value in the response monitor role object can be scanned and analysed statistically by scanner objects specified in ITU-T Rec. X.739 | ISO/IEC 10164-11 and ITU-T Rec. X.738 | ISO/IEC 10164-13. Response confirmation reports can be scanned and analysed statistically by scanner objects specified in ITU-T Rec. X.739 | ISO/IEC 10164-11 and ITU-T Rec. X.738 | ISO/IEC 10164-13. See Figure 3.

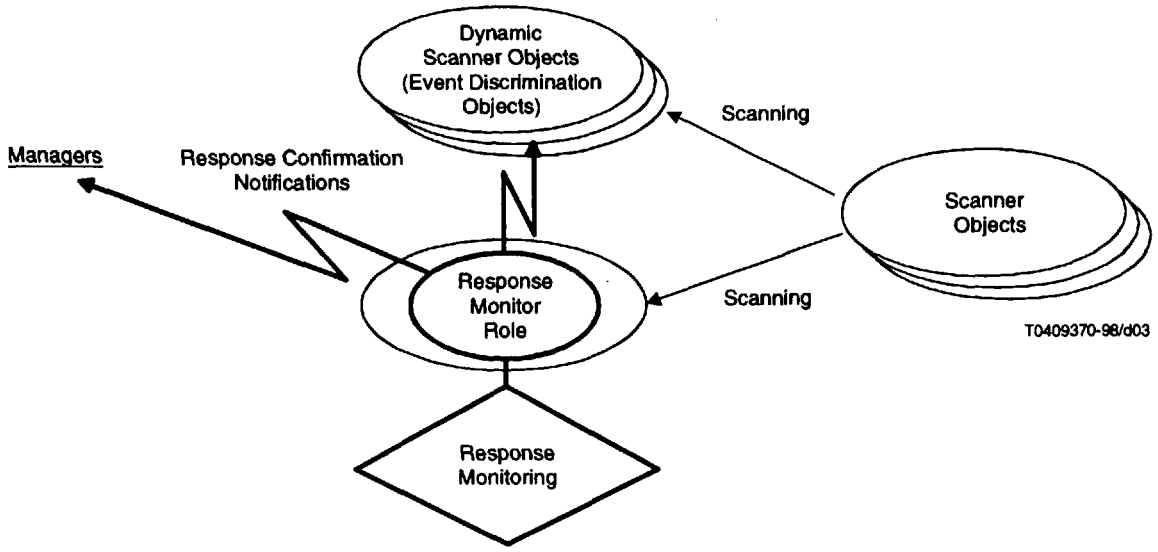


Figure 3 – Relationship between response monitor and scanner objects

The loop back test specified in ITU-T Rec. X.737 | ISO/IEC 10164-14 may be used to monitor the response time.

The response monitor role object may identify an external scheduler as specified in ITU-T Rec. X.746 | ISO/IEC 10164-15.

The mechanisms to manage response monitoring domain are specified in ITU-T Rec. X.749 | ISO/IEC 10164-19.

In the case that the response requester role object and the response confirmation role object is not in the same local system and each have clocks, synchronization of the clocks is needed. Services and protocols for that synchronization and its management are defined in ITU-T Rec. X.743 | ISO/IEC 10164-20.

Response time histogram generation service can be provided by mechanisms specified in Annex C of ITU-T Rec. X.753 | ISO/IEC 10164-21. An example of histogram generation is described in Annexes F and G of this Recommendation | International Standard.

The mechanisms to manage creation of response monitor are specified in ITU-T Rec. X.753 | ISO/IEC 10164-21.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

The response requester role, response confirmation role and route role in the response monitoring relationship may be mapped onto the sap1 or sap2 objects specified in ITU-T Rec. X.723 | ISO/IEC 10165-5. The route role in the response monitoring relationship may also be mapped onto the single peer connection object specified in ITU-T Rec. X.723 | ISO/IEC 10165-5.

13 Conformance

Implementations claiming to conform to this Recommendation | International Standard shall comply with the conformance requirements as defined in the following subclauses.

13.1 Static conformance

The implementation shall conform to the requirements of this Recommendation | International Standard in the manager role, the agent role or both roles. A claim of conformance to at least one role shall be made in Table B.1.

If a claim of conformance is made for support in the manager role, the implementation shall support at least one management operation specified by this Recommendation | International Standard. The conformance requirements in the manager role for those management operations are identified in Table B.3 and further tables referenced by Annex B.

If a claim of conformance is made for support in the agent role, the implementation shall support at least one of the managed objects described in Table B.4 and further tables referenced by Annex B.

The implementation shall support the transfer syntax derived from the encoding rules specified in CCITT Rec. X.209 | ISO/IEC 8825 named {joint-iso-itu-t asn1(1) basicEncoding(1)} for the abstract data types referenced by the definitions for which support is claimed.

13.2 Dynamic conformance

Implementations claiming to conform to this Recommendation | International Standard shall support the elements of procedure and definitions of semantics corresponding to the definitions for which support is claimed.

13.3 Management implementation conformance statement requirements

Any MCS proforma, MOCS proforma, MRCS proforma, and MICS proforma which conforms to this Recommendation | International Standard shall be technically identical to the proformas specified in Annexes B, C, D and E preserving table numbering and the index numbers of items, and differing only in pagination and page headers.

The supplier of an implementation which is claimed to conform to this Recommendation | International Standard shall complete a copy of the management conformance summary (MCS) provided in Annex B as part of the conformance requirements together with any other ICS proformas referenced as applicable from that MCS. An ICS which conforms to this Recommendation | International Standard shall:

- describe an implementation which conforms to this Recommendation | International Standard;
- have been completed in accordance with the instructions for completion given in ITU-T Rec. X.724 | ISO/IEC 10165-6;
- include the information necessary to uniquely identify both the supplier and the implementation.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

Annex A

Management Information Definitions for Response Time Monitoring

(This annex forms an integral part of this Recommendation | International Standard)

A.1 Relationship class definition

responseMonitoring RELATIONSHIP CLASS
BEHAVIOUR responseMonitoringBehaviour BEHAVIOUR "

The response monitoring relationship class defines the relationship between one response requester role, one response confirmation role and one response monitor role and optionally route role. In this relationship, the response monitor role object monitors the response request sent from the response requester role object and the response received by the response confirmation role object. The response monitor role object may summarize the response times between the response requester role object and the response confirmation role object.

An instance of this relationship class instance may bind one or more route role objects. In the case that one response monitoring relationship class instance binds one or more route role objects, the monitor role object binding with this relationship class instance monitors only the responses that passed through the resources represented by all these route role objects.

";;

ROLE responseRequesterRole
COMPATIBLE WITH responseRequester
PERMITTED-ROLE-CARDINALITY-CONSTRAINT RTMModule.RangeOneToOne;
REQUIRED-ROLE-CARDINALITY-CONSTRAINT RTMModule.RangeOneToOne;
PERMITTED-RELATIONSHIP-CARDINALITY-CONSTRAINT RTMModule.RangeZeroToMax;
REGISTERED AS {joint-iso-itu-t ms(9) function(2) part22(22) relationshipRole(13) 1};

ROLE responseConfirmationRole
COMPATIBLE WITH responseConfirmationObject
PERMITTED-ROLE-CARDINALITY-CONSTRAINT RTMModule.RangeOneToOne;
REQUIRED-ROLE-CARDINALITY-CONSTRAINT RTMModule.RangeOneToOne;
PERMITTED-RELATIONSHIP-CARDINALITY-CONSTRAINT RTMModule.RangeZeroToMax;
REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) relationshipRole(13) 2};

ROLE responseMonitorRole
COMPATIBLE WITH responseMonitor;
PERMITTED-ROLE-CARDINALITY-CONSTRAINT RTMModule.RangeOneToOne;
REQUIRED-ROLE-CARDINALITY-CONSTRAINT RTMModule.RangeOneToOne;
PERMITTED-RELATIONSHIP-CARDINALITY-CONSTRAINT RTMModule.RangeOneToOne;
REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) relationshipRole(13) 3};

ROLE routeRole
COMPATIBLE WITH route;
PERMITTED-ROLE-CARDINALITY-CONSTRAINT RTMModule.RangeZeroToMax;
REQUIRED-ROLE-CARDINALITY-CONSTRAINT RTMModule.RangeZeroToMax;
PERMITTED-RELATIONSHIP-CARDINALITY-CONSTRAINT RTMModule.RangeZeroToMax;
BIND-SUPPORT routeRoleBind
UNBIND-SUPPORT routeRoleUnbind
REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) relationshipRole(13) 4};
REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) relationshipClass(11) 1};

A.2 Managed object classes

responseConfirmationObject MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":top;

CHARACTERIZED BY

responseConfirmationObjectPackage PACKAGE

BEHAVIOUR

responseConfirmationBehaviour BEHAVIOUR

DEFINED AS"

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

The response confirmation object managed object class must be instantiated before the associated response monitoring relationship managed object class is instantiated. This managed object class supports the response confirmation object id attribute and optionally the response requester indication list attribute which represents the list of response requester objects that may issue response requests to the response confirmation object.

This managed object class is compatible with the sap1 and sap2 managed object classes defined in ITU-T Rec. X.723 | ISO/IEC 10165-5 if none of the conditional packages are supported in the response confirmation object instance. In this case, the sapId attribute in sap1 or sap2 has the same behaviour as the responseConfirmationObjectId attribute.";;

ATTRIBUTES

responseConfirmationObjectId SET-BY-CREATE GET;;;

CONDITIONAL PACKAGES

responseRequesterListPkg PRESENT IF "the requester-responseConfirmationObject relationship is one-way from confirmation object to requester or reciprocal.";

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) managedObjectClass(3) 1};

responseConfirmationRecord MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2:1992":eventLogRecord;

CHARACTERIZED BY

responseConfirmationRecordPackage PACKAGE

BEHAVIOUR

responseConfirmationRecordBehaviour BEHAVIOUR

DEFINED AS "This managed object is used to represent logged information that resulted from response confirmation notifications or event reports.";;

ATTRIBUTES

muximumResponseTimeError GET,

responseMonitorId GET,

responseRequesterInd GET,

responseConfirmationObjectInd GET,

requestIdentifier GET,

responseTime GET,

responseSync GET;;;

CONDITIONAL PACKAGES

reqResLengthPkg PRESENT IF "lengths of response requests and responses are not uniform and needed to be summarized.",

responseTimeoutPkg PRESENT IF "the response time-out parameter is present";

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) managedObjectClass(3) 2};

responseDelayMonitor MANAGED OBJECT CLASS

DERIVED FROM responseMonitor;

CHARACTERIZED BY

responseDelayMonitorPackage PACKAGE

BEHAVIOUR

responseDelayMonitorBehaviour BEHAVIOUR

DEFINED AS"

The responseTimeoutPkg package must be supported in this managed object class instance.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

A value of the responseDelayTime attribute indicates a response delay time which is calculated by subtracting the response timeout attribute value from the response time attribute value. Whenever a response arrives responseDelayMonitor, this attribute value is set to the new response delay time.

";;

ATTRIBUTES

responseDelayTime GET;;;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) managedObjectClass(3) 3};

responseMonitor MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":top;

CHARACTERIZED BY

responseMonitorPackage PACKAGE

BEHAVIOUR

responseMonitorBehaviour BEHAVIOUR

DEFINED AS"

The response monitor managed object class may be instantiated before or after the ESTABLISH operation is received. But if an ESTABLISH operation has a new parameter set of response requester, response confirmation object and routes, and the response monitor managed object instance for monitoring its set does not exist, a new instance compatible with the response monitor managed object class must be created immediately. Through an ESTABLISH operation, one instance compatible with response monitor managed object class is bound with a new response monitoring relationship instance. After this binding, if the operational state is enabled and the availability status is not offDuty in the monitor object, the response monitor compatible class instance starts monitoring responses as indicated by the ESTABLISH parameters.

If the response monitoring relationship instance identified by the parameter set of a new ESTABLISH operation already exists, the monitoring is started without new bindings.

The responseRrequesterInd attribute in this managed object class identifies the response requester compatible object monitored by the response monitor object. This attribute value is modified by the UNBIND and BIND operations. Its default value is NULL, representing that this instance has no binding with a response requester object.

The responseConfirmationObjectInd attribute in this managed object class identifies the object being compatible with response confirmation object monitored by the response monitor object. This attributes value is modified by the UNBIND and BIND operation. Its default value is NULL, representing that this instance has no binding with a response confirmation role object.

The routeList attribute in this managed object class identifies the route role objects monitored by the response monitor object. The elements of this attribute can be added or removed. This attribute's element values are added by the BIND operation and removed by the UNBIND operation. Its default value is NULL, representing that the response monitor role object instance has no binding with a route role object. If route role cardinality is 0 (zero, default cardinality), the response times of all PDUs are monitored regardless of their responders, connections or routes.

The responseTime attribute in this managed object class represents the most recent response time between the indicated response requester and response confirmation object. This attribute value is read-only. The initial value of this attribute is notYetResponded (–1). If the responseTimeSummarizationMode attribute value is rawResponseTime (0), the responseTime attribute value indicates the raw response time and is an INTEGER type. If the mode value is responseTimePerBit (1), the responseTime attribute value is calculated according to the following expression as a REAL type.

$$(RTraw * 2) / (Ls + Lr)$$

where:

RT raw is the raw response time of any PDU of any length.

Ls is the response request length, the bit length of the response request PDU.

Lr is the response length, the bit length of the response PDU.

The maximumResponseTimeError attribute in this managed object identifies the precision of the measured response time. If this attribute value is noEstimateOnResponseTimeError (–1), it indicates that the precision of the response time is unknown.

This class has a response synchronization attribute whose value is singleCast, atomic or bestEffort. If the value is singleCast, the response monitor role object monitors only the first response to a response request. If the value is atomic or bestEffort, the monitor object can monitor more than one response to a response request. If the value is atomic, the response time is monitored as the time until all the responses return. If the value is bestEffort, the response time is monitored as the time until the first response returns. The default value of this attribute is singleCast.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

This class also has an operational state attribute. If this attribute's value is disabled, it indicates that the response monitoring is stopped by the local system.

If the responseConfirmationNotifPkg is present, a response confirmation notification is issued when the associated response confirmation role object receives a response monitored by the response monitor object.

To support cases where lengths of response requests and responses are not uniform, the response monitor role managed object class conditionally supports request/response length package. This package has response request length attribute and response length attribute. If this request/response length package is supported, response request length and response length are carried by response confirmation notification.

If the responseTimeoutPkg is present, the quality of service alarm is issued when the time-out time indicated by the responseTimeout attribute is over after the associated response request is issued.

The response monitor managed object class supports several conditional packages that provide various levels of sophistication in scheduling the activity of the response monitor role object. These packages are characterized by the following:

- the time during which monitoring is active, this property is supported by time-related attributes in the conditional packages that contain information related to scheduling.

";;

ATTRIBUTES

responseMonitorId	SET-BY-CREATE GET,
responseRequesterInd	SET-BY-CREATE GET,
responseConfirmationObjectInd	SET-BY-CREATE GET,
routeList	ADD-REMOVE,
responseTimeSummarizationMode	GET-REPLACE,
responseTime	GET
	DEFAULT VALUE notYetResponded,
MaximumResponseTimeError	GET
	DEFAULT VALUE noEstimateOnResponseTimeError,
responseSync	GET-REPLACE
	DEFAULT VALUE defaultResponseSync,

"CCITT Rec. X.721 (1992) | ISO/IEC 10165-2:1992": operationalState GET;;;

CONDITIONAL PACKAGES

responseConfirmationNotifPkg PRESENT IF "the response confirmation notification is needed",

reqResLengthPkg PRESENT IF "lengths of response requests and responses are not uniform and need to be summarized",

responseTimeoutPkg PRESENT IF "the time-out of responses is monitored",

"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":availabilityStatusPackage PRESENT IF "any of the scheduling packages including duration, dailyScheduling, weeklyScheduling and externalScheduler package, are present",

"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":duration PRESENT IF "the response time monitoring function is scheduled to start at a specified time and stop at either a specified time or function continuously",

"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":dailyScheduling PRESENT IF "both the weekly scheduling package and external scheduler packages are not present in an instance and daily scheduling is supported by that instance",

"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":weeklyScheduling PRESENT IF "both the daily scheduling package and external scheduler packages are not present in an instance and weekly scheduling is supported by that instance",

"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":externalScheduler PRESENT IF "both the weekly scheduling package and daily scheduling package are not present in an instance and external scheduling is supported by that instance",

"ITU-T Recommendation M.3100:1995": createDeleteNotificationsPackage PRESENT IF "notification of object creation and object deletion events is required",

"ITU-T Recommendation M.3100:1995": attributeValueChangeNotificationsPackage PRESENT IF "notification of attribute value change events is required",

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

"ITU-T Recommendation M.3100:1995": stateChangeNotificationsPackage PRESENT IF "notification of state change events is required";

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) managedObjectClass(3) 4};

responseRequester MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":top;

CHARACTERIZED BY

responseRequesterPackage PACKAGE

BEHAVIOUR

responseRequesterBehaviour BEHAVIOUR

DEFINED AS "

The response requester managed object class must be instantiated before the associated response monitoring relationship managed object class is instantiated. This managed object class supports the responseRequesterId attribute and optionally the responseConfirmationObjectIndList attribute which represents the list of response confirmation objects that may return responses to the response requester.

This managed object class is compatible with the sap1 and sap2 managed object classes defined in ITU-T Rec. X.723 (1993) | ISO/IEC 10165-5 : 1994 if none of the conditional packages are supported in the response requester managed object instance. In this case, sapId attribute in sap1 or sap2 may have the same behaviour as the responseRequesterID attribute.

";;

ATTRIBUTES

responseRequesterId SET-BY-CREATE GET;;;

CONDITIONAL PACKAGES

responseConfirmationObjListPkg PRESENT IF "the requester-confirmation object relationship is one-way from requester to confirmation object or reciprocal.";

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) managedObjectClass(3) 5};

route MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":top;

CHARACTERIZED BY

routePackage PACKAGE

BEHAVIOUR

routeBehaviour BEHAVIOUR

DEFINED AS"

Route managed object class must be instantiated before the associated response monitoring relationship managed object class is instantiated. This managed object class supports routeId attribute.

This managed object class is compatible with sap1 and sap2 managed object class defined in ITU-T Rec. X.723 | ISO/IEC 10165-5. So, sapId attribute in sap1 or sap2 may has same behaviour as the routeId attribute.

This managed object class is also compatible with singlePeerConnection managed object class defined in ITU-T Rec. X.723 | ISO/IEC 10165-5. So, connectionId attribute in singlePeerConnection may has also same behaviour as the routeId attribute.

";;

ATTRIBUTES

routeId GET;;;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) managedObjectClass(3) 6};

A.3 Packages

responseConfirmationObjListPkg PACKAGE

BEHAVIOUR responseConfirmationObjListBehaviour BEHAVIOUR

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

DEFINED AS"

The response confirmation object list package supports the response confirmation object indication list attribute.

This package is conditionally supported by the response requester role object class. If a response requester role object *supports this* package, all the response confirmation objects bound with the response requester role object coordinated by response monitoring relationship are indicated by the response confirmation object indication list attribute.

";;

ATTRIBUTES

responseConfirmationObjectIndList GET-REPLACE;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) package(4) 1};

responseConfirmationNotifPkg PACKAGE

BEHAVIOUR responseConfirmationNotifBehaviour BEHAVIOUR

DEFINED AS"

The response confirmation notification package supports the response confirmation notification.

This package is conditionally supported by the response monitor role object class. If a response monitor role object supports this package, information defined in subclause 8.5.1 is emitted in a response confirmation notification whenever the response confirmation role object receives a response.

";;

NOTIFICATIONS

responseConfirmation;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) package(4) 2};

responseRequesterListPkg PACKAGE

BEHAVIOUR responseRequesterListBehaviour BEHAVIOUR

DEFINED AS"

The response requester list package supports the response requester indication list attribute.

This package is conditionally supported by the response confirmation role object class. If a response confirmation role object supports this package, all the response requester objects bound with the response confirmation role object coordinated by response monitoring relationship are indicated by the response requester indication list attribute.

";;

ATTRIBUTES

responseRequesterIndList GET-REPLACE;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) package(4) 3};

responseTimeoutPkg PACKAGE

BEHAVIOUR

responseTimeoutBehaviour BEHAVIOUR

DEFINED AS"

The response timeout package supports the response timeout attribute and quality of service alarm. The response timeout attribute is writeable and the default value is NULL.

This package is conditionally supported by the response monitor role object class. If the response timeout attribute value is not NULL and the response which response time is more than the response timeout attribute value, a responseTimeExcessive error is carried by the probable cause field of the quality of service alarm emitted.

";;

ATTRIBUTES

responseTimeout GET-REPLACE;

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

NOTIFICATIONS

"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":qualityofServiceAlarm;;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) package(4) 4};

reqResLengthPkg PACKAGE

BEHAVIOUR

reqResLengthBehaviour BEHAVIOUR

DEFINED AS"

The request response length package supports the monitored unit length, response request length and response length attributes. The first one is writeable and the others are read-only.

This package is conditionally supported by the response monitor role object class. Response request length and response length attributes are updated when the response monitor receives a response. ";;

ATTRIBUTES

responseRequestLength GET,

responseLength GET;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) package(4) 5};

A.4 Attributes

maximumResponseTimeError ATTRIBUTE

WITH ATTRIBUTE SYNTAX RTMModule.ResponseTime;

MATCHES FOR EQUALITY;

BEHAVIOUR

maximumResponseTimeErrorBehaviour BEHAVIOUR

DEFINED AS "

This attribute is a response time type. This attribute is supported by a responseMonitor managed object class. A value of this attribute indicates the precision of the response time value represented by the responseTime attribute.

";;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) attribute(7) 1};

requestIdentifier ATTRIBUTE

WITH ATTRIBUTE SYNTAX RTMModule.RequestIdentifier;

MATCHES FOR EQUALITY;

BEHAVIOUR

requestIdentifierBehaviour BEHAVIOUR

DEFINED AS "

This attribute is a choice of integer type, invoke ID or ANY. If the request is an APDU request defined according with OSI standards, invoke ID is used. This attribute value is used to identify each response request.

";;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) attribute(7) 2};

responseConfirmationObjectId ATTRIBUTE

WITH ATTRIBUTE SYNTAX "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":SimpleNameType;

MATCHES FOR EQUALITY;

BEHAVIOUR

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

responseConfirmationObjectIdBehaviour BEHAVIOUR

DEFINED AS " This attribute value is used to identify each instance of the response confirmation object managed object class.";;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) attribute(7) 3};

responseConfirmationObjectInd ATTRIBUTE

WITH ATTRIBUTE SYNTAX " ITU-T Rec. X.711 (1991) | ISO/IEC 9596-1: 1991":ObjectInstance;

MATCHES FOR EQUALITY;

BEHAVIOUR

responseConfirmationObjectIndBehaviour BEHAVIOUR

DEFINED AS ". This attribute is supported by a response monitor role object. This identifies a response confirmation object where response time is monitored by the response monitor.";;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) attribute(7) 4};

responseConfirmationObjectIndList ATTRIBUTE

WITH ATTRIBUTE SYNTAX "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":GroupObjects;

MATCHES FOR EQUALITY;

BEHAVIOUR

responseConfirmationObjectIndListBehaviour BEHAVIOUR

DEFINED AS "This attribute is a SET OF object instance type. This attribute is supported by a response requester role object. Its value is a list of response confirmation objects with the response requester role bound to the same response monitor by the response monitoring relationship.";;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) attribute(7) 5};

responseDelayTime ATTRIBUTE

WITH ATTRIBUTE SYNTAX "ITU-T Rec. X.739 (1993) | ISO/IEC 10164-11 : 1994":TimePeriod;

MATCHES FOR EQUALITY;

BEHAVIOUR

responseDelayTimeBehaviour BEHAVIOUR

DEFINED AS "

This attribute is a time period type. This attribute is supported by a response delay monitor object. It indicates the response delay time which is calculated by subtracting response timeout attribute value from response time attribute value.

.";;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) attribute(7) 6};

responseLength ATTRIBUTE

WITH ATTRIBUTE SYNTAX RTMModule.Integer;

MATCHES FOR EQUALITY;

BEHAVIOUR

responseLengthBehaviour BEHAVIOUR

DEFINED AS "

This attribute is an INTEGER and greater than 0. This attribute is optionally supported by a response monitor managed object class. This attribute value represents the bit length of response PDU.

";;

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) attribute(7) 7};

responseMonitorId ATTRIBUTE

WITH ATTRIBUTE SYNTAX "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":SimpleNameType;

MATCHES FOR EQUALITY;

BEHAVIOUR

responseMonitorIdBehaviour BEHAVIOUR

DEFINED AS "

This attribute value is used to identify each instance of the response monitor managed object class.

";;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) attribute(7) 8};

responseRequesterId ATTRIBUTE

WITH ATTRIBUTE SYNTAX "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":SimpleNameType;

MATCHES FOR EQUALITY;

BEHAVIOUR

responseRequesterIdBehaviour BEHAVIOUR

DEFINED AS "

This attribute is a simple name type. This attribute's value is used to identify each instance of the response requester managed object class.

";;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) attribute(7) 9};

responseRequesterInd ATTRIBUTE

WITH ATTRIBUTE SYNTAX "ITU-T Rec. X.711 (1991) | ISO/IEC 9596-1: 1991":ObjectInstance;

MATCHES FOR EQUALITY;

BEHAVIOUR

responseRequesterIndBehaviour BEHAVIOUR

DEFINED AS "

This attribute is an object instance type. This attribute is supported by a response monitor role object. It identifies a response requester whose response time is monitored by the response monitor.

";;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) attribute(7) 10};

responseRequesterIndList ATTRIBUTE

WITH ATTRIBUTE SYNTAX "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":GroupObjects;

MATCHES FOR EQUALITY;

BEHAVIOUR

responseRequesterIndListBehaviour BEHAVIOUR

DEFINED AS "

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

This attribute is a SET OF object instance type. This attribute is supported by a response confirmation role object. It identifies a set of response response requesters with which the response confirmation role is bound to the same response monitor by the response monitoring relationship.

";;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) attribute(7) 11 };

responseRequestLength ATTRIBUTE

WITH ATTRIBUTE SYNTAX RTMModule.Integer;

MATCHES FOR EQUALITY;

BEHAVIOUR

responseRequestLengthBehaviour BEHAVIOUR

DEFINED AS "

This attribute is an INTEGER and greater than 0. This attribute is optionally supported by a response monitor managed object class. This attribute value represents the bit length of requested PDU.

";;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) attribute(7) 12};

responseSync ATTRIBUTE

WITH ATTRIBUTE SYNTAX RTMModule.ResponseSync;

MATCHES FOR EQUALITY;

BEHAVIOUR

responseSyncBehaviour BEHAVIOUR

DEFINED AS "

This attribute is an enumerated type whose value is one of a singleCast(–1), bestEffort(0) or atomic(1). This attribute is supported by a response monitor object. If the value is singleCast , the response monitor role object monitors the only one response to one response request. If the value is atomic or bestEffort, the monitor object can monitor more than one response to a response request. If the value is atomic, the response time is monitored as the time until all the responses are returned. If the value is bestEffort, the response time is monitored as the time until the first response returns. ";;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) attribute(7) 13};

responseTime ATTRIBUTE

WITH ATTRIBUTE SYNTAX RTMModule.ResponseTime;

MATCHES FOR EQUALITY;

BEHAVIOUR

responseTimeBehaviour BEHAVIOUR

DEFINED AS "

This attribute is a time period type. This attribute is supported by the response monitor managed object class. A value of this attribute indicates a response time from when a response request is sent by the monitored response requester to when that response is arrived at the monitored response confirmation object.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

This attribute is a choice of seconds, milli seconds, micro seconds, nano seconds, pico seconds, and seconds per bit value. The last one is a REAL type and the others are INTEGER type. The seconds per bit value is calculated according to the following expression.

$$(RTraw * 2) / (Ls + Lr)$$

where:

RTraw is the raw response time of any PDU of any length.

Ls is the bit length of the response request PDU.

Lr is the bit length of the response PDU.

";;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) attribute(7) 14};

responseTimeout ATTRIBUTE

WITH ATTRIBUTE SYNTAX "ITU-T Rec. X.739 (1993) | ISO/IEC 10164-11 : 1994":TimePeriod;

MATCHES FOR EQUALITY;

BEHAVIOUR

responseTimeoutAttributeBehaviour BEHAVIOUR

DEFINED AS "

This attribute is a time period type. This attribute is supported by a response monitor managed object class. A value of this attribute indicates a response timeout value which is compared with the response time which is summarized by the response monitor.

";;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) attribute(7) 15};

responseTimeSummarizationMode ATTRIBUTE

WITH ATTRIBUTE SYNTAX RTMModule. ResponseTimeSummarizationMode;

MATCHES FOR EQUALITY;

BEHAVIOUR

responseTimeSummarizationModeBehaviour BEHAVIOUR

DEFINED AS "

If this attribute value is rawResponseTime (0), the response time attribute value in the same object indicates the raw response time and is an INTEGER type. If this attribute value is responseTimePerBit (1), the response time attribute value is set by the response time per a bit length of PDU as a REAL type.

";;

REGISTERED AS { joint-iso-ccittjoint-iso-itu-t ms(9) function(2) part22(22) attribute(7) 16};

routeId ATTRIBUTE

WITH ATTRIBUTE SYNTAX "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":SimpleNameType;

MATCHES FOR EQUALITY;

BEHAVIOUR

routeIdBehaviour BEHAVIOUR

DEFINED AS "

This attribute is a simple name type. This attribute value is used to identify each instance of the route role managed object class.

";;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) attribute(7) 17};

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

routeList ATTRIBUTE

WITH ATTRIBUTE SYNTAX "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":GroupObjects;

MATCHES FOR EQUALITY;

BEHAVIOUR

routeListBehaviour BEHAVIOUR

DEFINED AS "

This attribute is a SET OF object instance type. This attribute is supported by a response monitor managed object class. A value of this attribute lists a set of objects compatible with a route role object.

";;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) attribute(7) 18 } ;

A.5 Notification

responseConfirmation NOTIFICATION

BEHAVIOUR

responseConfirmationNotificationBehaviour BEHAVIOUR

DEFINED AS "

This notification is issued whenever the response to a response request sent from the monitored response request role object arrives at the monitored response confirmation role object. This notification carries the information related with that response as its parameters.

";;

WITH INFORMATION SYNTAX RTMModule.ResponseConfirmationInfo

AND ATTRIBUTE IDS

responseMonitor	responseMonitorId,
responseRequester	responseRequesterInd,
responseConfirmationObject	responseConfirmationObjectInd,
routeList	routeList,
requestIdentifier	requestIdentifier,
notificationIdentifier	"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2:1992":notificationIdentifier,
correlatedNotifications	"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2:1992":correlatedNotifications,
responseTime	responseTime,
maximumResponseTimeError	maximumResponseTimeError,
responseRequestLength	responseRequestLength,
responseLength	responseLength,
responseSync	responseSync,
responseDelayTime	responseDelayTime,
responseTimeout	responseTimeout,
additionalText	"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2:1992":additionalText,
additionalInformation	"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2:1992":additionalInformation;

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) notification(10) 1};

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

A.6 Relationship mapping definition

responseMonitoringRelationshipMapping RELATIONSHIP MAPPING

RELATIONSHIP CLASS responseMonitoring;

BEHAVIOUR responseMonitoringRelationshipMappingBehaviour BEHAVIOUR

DEFINED AS

"

The response monitoring relationship mapping defines the following mapping:

- Mapping each role to the related managed object class.
- Mapping each identification to the object instance identifier attribute supported by the mapped managed object class.
- Mapping each relationship operation to the GDMO operations on the mapped managed object class instance.

";;

ROLE responseRequesterRole

RELATED-CLASSES responseRequester

REPRESENTED BY ATTRIBUTE responseRequesterId

ROLE responseRequesterRole

RELATED-CLASSES "ITU-T Rec. X.723 (1993) | ISO/IEC 10165-5: 1994":sap1,

"ITU-T Rec. X.723 (1993) | ISO/IEC 10165-5: 1994":sap2

REPRESENTED BY ATTRIBUTE "ITU-T Rec. X.723 (1993) | ISO/IEC 10165-5: 1994":sapId

ROLE responseConfirmationRole

RELATED-CLASSES responseConfirmationObject,

REPRESENTED BY ATTRIBUTE responseConfirmationObjectId

ROLE responseConfirmationRole

RELATED-CLASSES "ITU-T Rec. X.723 (1993) | ISO/IEC 10165-5: 1994":sap1,

"ITU-T Rec. X.723 (1993) | ISO/IEC 10165-5: 1994":sap2

REPRESENTED BY ATTRIBUTE "ITU-T Rec. X.723 (1993) | ISO/IEC 10165-5: 1994":sapId

ROLE responseMonitorRole

RELATED-CLASSES responseMonitor

REPRESENTED BY ATTRIBUTE responseMonitorId

ROLE routeRole

RELATED-CLASSES route

REPRESENTED BY ATTRIBUTE routeId

ROLE routeRole

RELATED-CLASSES "ITU-T Rec. X.723 (1993) | ISO/IEC 10165-5: 1994":sap1,

"ITU-T Rec. X.723 (1993) | ISO/IEC 10165-5: 1994":sap2

REPRESENTED BY ATTRIBUTE sapId

ROLE routeRole

RELATED-CLASSES "ITU-T Rec. X.723 (1993) | ISO/IEC 10165-5: 1994":singlePeerConnection

REPRESENTED BY ATTRIBUTE connectionId

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

```
OPERATIONS MAPPING

ESTABLISH MAPS-TO-OPERATION

        CREATE responseMonitor OF responseMonitorRole  resReq-resConf-routeIndication

TERMINATE MAPS-TO-OPERATION

        DELETE responseMonitor OF responseMonitorRole

BIND routeRoleBind MAPS-TO-OPERATION

        ADD routeList

UNBIND routeRoleUnbind MAPS-TO-OPERATION

        REMOVE routeList

NOTIFY objectCreationNotification MAPS-TO-OPERATION

        NOTIFICATION objectCreationNotification OF responseMonitor

NOTIFY objectDeletionNotification MAPS-TO-OPERATION

        NOTIFICATION objectDeletionNotification OF responseMonitor

REGISTERED AS { joint-iso-itu-t ms(9) function(2) part22(22) relationshipMapping(12) 1};
```

A.7 ASN.1 definitions

```
RTMModule { joint-iso-itu-t ms(9) function(2) part22(22) asn1Module(2) 0}

DEFINITIONS IMPLICIT TAGS ::=

BEGIN

-- EXPORTS everything

IMPORTS
        InvokeIDType
        FROM Remote-Operations-APDUs{joint-iso-itu-t remote-operations(4) notation(0)}

        AttributeID, ObjectInstance
        FROM CMIP-1{joint-iso-itu-t ms(9) cmip(1) modules(0) protocol(3)}

        AdditionalText, AdditionalInformation, CorrelatedNotifications, GroupObjects, Member, NotificationIdentifier
        FROM Attribute-ASN1Module{joint-iso-itu-t ms(9) smi(3) part2(2) asn1Module(2) 1}

        Integer, TimePeriod
        FROM MetricModule{joint-iso-itu-t ms(9) function(2) part11(11) asn1Module(2) 0} ;

rTM-ManagedObjectClass OBJECT IDENTIFIER ::= {joint-iso-itu-t ms(9) function(2) part22(22) managedObjectClass(3)}

rTM-Package OBJECT IDENTIFIER ::= {joint-iso-itu-t ms(9) function(2) part22(22) package(4)}

rTM-Attribute OBJECT IDENTIFIER ::= {joint-iso-itu-t ms(9) function(2) part22(22) attribute(7)}

rTM-Notification OBJECT IDENTIFIER ::= {joint-iso-itu-t ms(9) function(2) part22(22) notification(10)}

-- default value definitions

defaultResponseSync      ResponseSync ::= singleCast

noEstimateOnResponseTimeError  ResponseTime ::= seconds : -1

notYetResponded    ResponseTime ::= seconds : -1

-- supporting productions

RangeOneToOne ::= INTEGER(1..1)

RangeZeroToMax ::= INTEGER(0..MAX)

RequestIdentifier ::= CHOICE{    number      [0]INTEGER,
                                 invokeID    [1]InvokeIDType,
                                 identifier  ANY -- defined by the type of request}
```


Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

```
ResponseConfirmationInfo ::= SEQUENCE{
        responseMonitor                 Subject,
        responseRequester               ObjectInstance,
        responseConfirmationObject          ObjectInstance,
        routeList                       GroupObjects,
        requestIdentifier               ResponseRequestId,
        notificationIdentifier          [1]NotificationIdentifier           OPTIONAL,
        correlatedNotifications         [2]CorrelatedNotifications          OPTIONAL,
        responseTime                    [3]ResponseTime,
        maximumResponseTimeError            [4]ResponseTime                 OPTIONAL,
        responseRequestLength           [5]Integer          OPTIONAL,
        responseLength                  [6]Integer          OPTIONAL,
        responseSync                    ResponseSync,
        responseDelayTime               [7]TimePeriod       OPTIONAL,
        responseTimeout                 [8]TimePeriod       OPTIONAL,
        additionalText                  [9]AdditionalText   OPTIONAL,
        additionalInformation           [10]AdditionalInformation           OPTIONAL}

ResponseSync ::= ENUMERATED             {singleCast (-1),
                                         bestEffort (0),
                                         atomic (1)}

ResponseTime ::= CHOICE {
            seconds                     [3]INTEGER,
            milliSeconds                [4]INTEGER,
            microSeconds                [5]INTEGER,
            nanoSeconds                 [6]INTEGER,
            picoSeconds                 [7]INTEGER,
            secondsPerBit               [8]REAL }

ResponseTimeSummarizationMode ::= ENUMERATED {
            rawResponseTime(0),
            responseTimePerBit (1) }

END -- of RTMModule
```

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Annex B[1)]

MCS proforma

(This annex does not form an integral part of this Recommendation I International Standard)

B.1 Introduction

B.1.1 Purpose and structure

The management conformance summary (MCS) is a statement by a supplier that identifies an implementation and provides information on whether the implementation claims conformance to any of the listed set of documents that specify conformance requirements to OSI management.

The MCS proforma is a document in the form of a questionnaire that when completed by the supplier of an implementation becomes the MCS.

B.1.2 Instructions for completing the MCS proforma to produce an MCS[2)]

The supplier of the implementation shall enter an explicit statement in each of the boxes provided. Specific instruction is provided in the text, which precedes each table.

B.1.3 Symbols, abbreviations and terms

For all annexes of this Recommendation I International Standard, the following common notations, defined in ITU-T Rec. X.291 I ISO/IEC 9646-2 and ITU-T Rec. X.296 I ISO/IEC 9646-7, are used for the Status column:

- m mandatory;
- o optional;
- c conditional;
- x prohibited;
- — not applicable or out of scope.

NOTE 1 – 'c', 'm', and 'o' are prefixed by "c:" when nested under a conditional or optional item of the same table;

NOTE 2 – 'o' may be suffixed by ".N" (where N is a unique number) for selectable options among a set of status values. Support of at least one of the choices (from the items with the same value of N) is required.

For all annexes of this Recommendation I International Standard, the following common notations, defined in ITU-T Rec. X.291 I ISO/IEC 9646-2 and ITU-T Rec. X.296 I ISO/IEC 9646-7, are used for the Support column:

- Y implemented;
- N not implemented;
- — no answer required;
- Ig the item is ignored (i.e. processed syntactically but not semantically).

The following abbreviations are used throughout all annexes of this Recommendation I International Standard:

smi2AttributeID	**{ joint-iso-ccitt ms(9) smi(3) part2(2) attribute(7) }**
smi2MObjectClass	**{ joint-iso-ccitt ms(9) smi(3) part2(2) managedObjectClass(3) }**
smi2Notification	**{ joint-iso-ccitt ms(9) smi(3) part2(2) notification(10) }**
part22-att	{ joint-iso-ccitt ms(9) function(2) part22(1) attribute(7) }
part22-not	{ joint-iso-ccitt ms(9) function(2) part22(1) notification(10) }
part22-rel	{ joint-iso-ccitt ms(9) function(2) part22(1) relationshipClass(11) }

---

1) **Copyright release for MCS proforma**

Users of this Recommendation I International Standard may freely reproduce the MCS proforma in this annex so that it can be used for its intended purpose, and may futher publish the completed MCS.

2) Instructions for MCS proforma are specified in ITU-T Rec. X.724 I ISO/IEC 10165-6.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

B.1.4 Table format

Some of the tables in this Recommendation I International Standard have been split because the information is too wide to fit on the page. Where this occurs, the index number of the first block of columns is the index numbers of the corresponding rows of the remaining blocks of columns. A complete table reconstructed from the constituent parts should have the following layout:

Index	First block of columns	Second block of columns	Etc.

In this Recommendation I International Standard the constituent parts of the table appear consecutively, starting with the first block of columns.

When a table with subrows is too wide to fit on a page, the continuation table(s) have been constructed with index numbers identical to the index numbers in the corresponding rows of the first table, and with subindex numbers corresponding to the subrows within each indexed row. For example, if Table X.1 has 2 rows and the continuation of Table X.1 has 2 subrows for each row, the tables are presented as follows:

Table X.1 – Title

					Support		
Index	A	B	C	D	E	F	G
1	a	b	–				
2	a	b	–				

Table X.1 – Title *(continued)*

Index	Subindex	H	I	J	K	L
1	1.1	h	i	j		
	1.2	h	i	j		
2	2.1	h	i	j		
	2.1	h	i	j		

A complete table reconstructed from the constituent parts should have the following layout:

					Support							
Index	A	B	C	D	E	F	G	Subindex	H	I	J	K	L
1	a	b	–					1.1	h	i	j		
								1.2	h	i	j		
2	a	b	–					2.1	h	i	j		
								2.2	h	i	j		

References made to cells within tables shall be interpreted as references within reconstructed tables. In the example, above, the reference X.1/1d corresponds with the blank cell in column G for row with Index 1, and X.1/1.2b corresponds with the blank cell in column L for row with Subindex 1.2.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

B.2 Identification of the implementation

B.2.1 Date of statement

The supplier of the implementation shall enter the date of this statement in the box below. Use the format DD MM-YYYY.

Date of statement

B.2.2 Identification of the implementation

The supplier of the implementation shall enter information necessary to uniquely identify the implementation and the system(s) in which it may reside, in the box below.

B.2.3 Contact

The supplier of the implementation shall provide information on whom to contact if there are any queries concerning the content of the MCS or any referenced conformance statement, in the box below.

B.3 Identification of the Recommendations I International Standards in which the management information is defined

The supplier of the implementation shall enter the title, reference number and date of the publication of the Recommendations I International Standards which specify the management information to which conformance is claimed, in the box below.

Recommendations I International Standards to which conformance is claimed

B.3.1 Technical corrigenda implemented

The supplier of the implementation shall enter the reference numbers of implemented technical corrigenda which modify the specification in the identified Recommendations I International Standards, in the box below.

B.3.2 Amendments implemented

The supplier of the implementation shall state the titles and reference numbers of implemented addenda to the identified Recommendations I International Standards, in the box below.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

B.4 Management conformance summary

The supplier of the implementation shall state the capabilities and features supported and provide a summary of conformance claims to Recommendations I International Standards using the tables in this annex.

The supplier of the implementation shall specify the roles that are supported, in Table B.1.

Table B.1 – Roles

Index	Roleas supported	Status	Support	Additional information
1	Manager role support	o.1		
2	Agent role support	o.1		

The supplier of the implementation shall specify support for the systems management functional unit, in Table B.2.

Table B.2 – Systems management functional unit

		Manager		Agent		
Index	Systems management functional unit name	Status	Support	Status	Support	Additional information
1	Monitor response time functional unit	c1		c2		
2	Control response monitor functional unit	c1		c2		

c1: If B.1/1a then o else –.

c2: If B.1/2a then o else –.

The supplier of the implementation shall specify support for management information in the manager role, in Table B.3.

Table B.3 – Manager role minimum conformance requirement

Index	Item	Status	Support	Additional information
1	Establishment of response monitoring	c3		
2	Termination of response monitoring	c3		
3	Binding route role objects	c4		
4	Unbinding route role objects	c4		
5	Query bound object	c5		
6	Response confirmation reporting service	c5		

c3: If B.1/1a then o.2 else –.

c4: If B.2/2a then m else (if B.1/1a then o.2 else –).

c5: If B.2/1a then m else (if B.1/1a then o.2 else –).

NOTE – Manager role minimum conformance requires support for at least one of the items identified in Table B.3. Support for the functional unit identified in Table B.2 mandates support for some of those items. Conditions c3 and c4 express both of these requirements.

The supplier of the implementation shall specify support for management information in the agent role, in Table B.4.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

Table B.4 – Agent role minimum conformance requirement

Index	Item	Status	Support	Table reference	Additional information
1	responseConfirmationObject	c7			
2	responseConfirmationRecord	o			
3	responseDelayMonitor	o			
4	responseMonitor	c7			
5	responseRequester	c7			
6	route	o			
7	response monitoring relationship	c7			

c7: If B.1/2a then m else –.

NOTE – The Table reference column in the above table is the notification reference of the MOCS supplied by the supplier of the managed object which claims to import the notification from this Recommendation | International Standard.

Table B.5 – Logging of event records

Index		Status	Support	Additional information
1	Does the implementation support logging of event records in agent role?	c8		

c8: If B.1/2a then o else –.

NOTE 1 – Conformance to this Recommendation | International Standard does not require conformance to CCITT Rec. X.735 | ISO/IEC 10164-6.

The supplier of the implementation shall provide information on claims of conformance to any of the Recommendations | International Standards summarized in the following tables. For each Recommendation | International Standard that the supplier of the implementation claims conformance to, the corresponding conformance statement(s) shall be completed, or referenced by, the MCS. The supplier of the implementation shall complete the Support, Table numbers and Additional information columns.

In Tables B.6, B.7, B.8 and B.9, the Status column is used to indicate whether the supplier of the implementation is required to complete the referenced tables or referenced items. Conformance requirements are as specified in the referenced tables or referenced items and are not changed by the value of the MCS Status column. Similarly, the Support column is used by the supplier of the implementation to indicate completion of the referenced tables or referenced items.

Table B.6 – PICS support summary

Index	Identification of the document that includes the PICS proforma	Table numbers of PICS proforma	Description	Constraints and values	Status	Support	Table numbers of PICS	Additional information
1	CCITT Rec. X.730 | ISO/IEC 10164-1	Annex E, all tables	SM application context	OBJECT IDENTIFIER	o			

NOTE 2 – Conformance to the MAPDUs defined in this Recommendation | International Standard can be claimed by completing the corresponding tables in the MICS and MOCS annexes of the referenced standards.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Table B.7 – MICS support summary

Index	Identification of the document that includes the MICS proforma	Table numbers of MICS proforma	Description	Constraints and values	Status	Support	Table numbers of MICS	Additional information
1	ITU-T Rec. X.748 | ISO/IEC 10164-22:	Table E.1	attributes	–	c9			
2	ITU-T Rec. X.748 | ISO/IEC 10164-22:	Table E.2	notifications	–	c9			
c9: If B.1/2a then m else –.								

Table B.8 – MOCS support summary

Index	Identification of the document that includes the MOCS proforma	Table numbers of MOCS proforma	Description	Constraints and values	Status	Support	Table numbers of MOCS	Additional information
1	"ITU-T Rec. X.748 | ISO/IEC 10164-22: 1997"	C.1-C.4	responseConfirmationObject		c7		C.1-C.4	
2	"ITU-T Rec. X.748 | ISO/IEC 10164-22: 1997"	C.5-C.9	responseConfirmationRecord		o		C.5-C.9	
3	"ITU-T Rec. X.748 | ISO/IEC 10164-22: 1997"	C.10-C.14	responseDelayMonitor		o		C.10-C.14	
4	"ITU-T Rec. X.748 | ISO/IEC 10164-22: 1997"	C.15-C.19	responseMonitor		c7		C.15-C.19	
5	"ITU-T Rec. X.748 | ISO/IEC 10164-22: 1997"	C.20-C.23	responseRequester		c7		C.20-C.23	
6	"ITU-T Rec. X.748 | ISO/IEC 10164-22: 1997"	C.24-C.27	route		o		C.24-C.27	

Table B.9 – MRCS support summary

Index	Identification of the document that includes the MRCS proforma	Table numbers of MRCS proforma	Description	Constraints and values	Status	Support	Table numbers of MRCS	Additional information
1	"ITU-T Rec. X.748 | ISO/IEC 10164-22: 1997"	Annex D	response monitoring relationship		c10		D.1	
c10: If B.4/7a then m else –.								

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Annex C[3)]

MOCS proforma

(This annex does not form an integral part of this Recommendation | International Standard)

C.1 Introduction

The purpose of this MOCS proforma is to provide a mechanism for a supplier of an implementation which claims conformance to a managed object class to provide conformance information in a standard form.

C.2 Instructions for completing the MOCS proforma to produce a MOCS

The supplier of the implementation shall state which items are supported in the tables below and if necessary provide additional information.

C.2.1 Statement of conformance to the managed object class

The MOCS proforma contained in this annex is comprised of information in tabular form, in accordance with ITU-T Rec. X.724 | ISO/IEC 10165-6. The supplier of the implementation shall state which items are supported in tables below and if necessary, provide additional information.

These tables were generated mechanically from the GDMO templates, with additions and clarifications added by hand.

The following common notations, defined in ITU-T Rec. X.724 | ISO/IEC 10165-6 are used for the status columns:

- m mandatory;
- o optional;
- c conditional;
- x prohibited;
- – not applicable or out of scope.

Note that "c", "m", "o" and "x" are prefixed by a "c:" when nested under a conditional or optional item of the same table.

Note that "o" may be suffixed by ".n" (where "n" is a unique number) for mutually exclusive or selectable options among a set of status values.

In the status column, the static requirements are stated as follows:

- m for characteristics contained in mandatory packages or in conditional packages if the GDMO condition is always true;
- o for characteristics of conditional packages with GDMO conditions that indicate static optionality, e.g. "if an instance supports it";
- cn for all other conditions, where "n" is a unique integer and "cn" is a reference to a conditional status expression as defined in ITU-T Rec. X.291 | ISO/IEC 9646-2 and ITU-T Rec. X.296 | ISO/IEC 9646-7. Each condition denoted by "cn" is relative to the containing table;
- x for characteristics explicitly prohibited by the definition;
- – for characteristics that are not mentioned by the definition.

---

3) **Copyright release for MOCS proforma**

Users of this Recommendation | International Standard may freely reproduce the MOCS proforma in this annex so that it can be used for its intended purpose, and may further publish the completed MOCS.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

The following common notations, defined in ITU-T Rec. X.724 | ISO/IEC 10165-6 and ITU-T Rec. X.296 | ISO/IEC 9646-7 are used for the support answer columns:

Y implemented;

N not implemented;

– no answer required;

The following abbreviations are used:

smi2AttributeID { joint-iso-ccitt ms(9) smi(3) part2(2) attribute(7) }

smi2MObjectClass { joint-iso-ccitt ms(9) smi(3) part2(2) managedObjectClass(3) }

smi2Notification { joint-iso-ccitt ms(9) smi(3) part2(2) notification(10) }

C.3 Statement of conformance to the responseConfirmationObject object class

Table C.1/MOCS – Managed object class support

Index	Managed object class template label	Value of object identifier for class	Support of all mandatory features	Is the actual class the same as the managed object class to which conformance is claimed? (Y/N)
1	responseConfirmationObject	{joint-iso-ccitt ms(9) function(2) part22(22) managedObjectClass(3) 1}		

If the answer to the actual class question in the managed object class support table is no, the supplier of the implementation shall fill in the actual class support in Table C.2/MOCS.

Table C.2/MOCS – Actual class support

Index	Actual managed object class template label	Value of object identifier for actual class	Additional information
1			
2			

C.3.1 Packages

The supplier of the implementation shall state whether or not the conditional packages specified by this class are supported by an instance of this class, in the "Support" and "Additional information" columns in Table C.3/MOCS.

Table C.3/MOCS – Package support

Index	Package template label	Value of object identifier for package	Constraints and values	Status	Support	Additional information
1	allomorphicPackage	{smi2Package 17}		c1		
2	packagesPackage	{smi2Package 16}		c2		
3	responseRequesterListPkg	{joint-iso-ccitt ms(9) function(2) part22(22) package(4) 3}		c3		

c1: If not (C.1/1b) then m else – .

c2: If C.3/1 or C.3/3 then m else – .

c3: If "the requester-responseConfirmationObject relationship is one-way from confirmation object to requester or reciprocal." Then m else – .

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

C.3.2 Attributes

The supplier of the implementation shall state whether or not the attributes specified by all packages instantiated in a managed object of this class are supported, in the "Support" and "Additional information" columns in Table C.4/MOCS. The supplier of the implementation shall indicate support for each of the operations for each attribute supported.

Table C.4/MOCS – Attribute support

				Set by Create		Get		Replace	
Index	Attribute template label	Value of object identifier for attribute	Constraints and values	Status	Support	Status	Support	Status	Support
1	allomorphs	{smi2AttributeID 50}		x		c1		x	
2	nameBinding	{smi2AttributeID 63}		–		m		x	
3	objectClass	{smi2AttributeID 65}		–		m		x	
4	packages	{smi2AttributeID 66}		–		c2		x	
5	responseConfirmationObjectId	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 2}		–		x		x	
6	responseRequesterIndList	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 9}		c3		c3		c3	

Table C.4/MOCS – Attribute support *(concluded)*

	Add		Remove		Set to Default		
Index	Status	Support	Status	Support	Status	Support	Additional information
1	x		x		x		
2	x		x		x		
3	x		x		x		
4	x		x		x		
5	x		x		x		
6	x		x		x		

c1: If not (C.1/1b) then m else – .

c2: If C.3/2 then m else – .

c3: If C.3/3 then m else – .

C.3.3 Attribute groups

There are no attribute groups defined for the managed object class.

C.3.4 Actions

There are no actions defined for this object class

C.3.5 Notifications

There are no notifications defined for this object class

C.3.6 Parameters

There are no parameters defined for this object class

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

C.4 Statement of conformance to the responseConfirmationRecord object class

Table C.5/MOCS – Managed object class support

Index	Managed object class template label	Value of object identifier for class	Support of all mandatory features	Is the actual class the same as the managed object class to which conformance is claimed? (Y/N)
1	responseConfirmationRecord	{joint-iso-ccitt ms(9) function(2) part22(22) managedObjectClass(3) 2}		

If the answer to the actual class question in the managed object class support table is no, the supplier of the implementation shall fill in the actual class support in Table C.6/MOCS.

Table C.6/MOCS – Actual class support

Index	Actual managed object class template label	Value of object identifier for actual class	Additional information
1			
2			

Packages

The supplier of the implementation shall state whether or not the conditional packages specified by this class are supported by an instance of this class, in the "Support" and "Additional information" columns in Table C.7/MOCS.

Table C.7/MOCS – Package support

Index	Package template label	Value of object identifier for package	Constraints and values	Status	Support	Additional information
1	additionalInformationPackage	{smi2Package 18}		c1		
2	additionalTextPackage	{smi2Package 19}		c2		
3	allomorphicPackage	{smi2Package 17}		c3		
4	correlatedNotificationsPackage	{smi2Package 23}		c4		
5	eventTimePackage	{smi2Package 11}		c5		
6	notificationIdentifierPackage	{smi2Package 24}		c6		
7	packagesPackage	{smi2Package 16}		c7		
8	responseTimeoutPkg	{joint-iso-ccitt ms(9) function(2) part22(22) package(4) 4}		c8		

c1: If "the Additional information parameter is present in the notification or report corresponding to the instance of event record or an instance of its subclasses" then m else –.

c2: If "the Additional text parameter is present in the notification or report corresponding to the instance of event record or an instance of its subclasses" then m else –.

c3: If not (C.5/1b) then m else –.

c4: If "the correlatedNotifications parameter is present in the notification or event report corresponding to the instance of an event record or an instance of its subclasses " then m else –.

c5: If "the event time parameter was present in the received event report" then m else –.

c6: If "the notification Identifier parameter is present in the notification or event report corresponding to the instance of an event record or an instance of its subclasses" then m else –.

c7: If C.7/1 or C.7/2 or C.7/3 or C.7/4 or C.7/5 or C.7/6 or C.7/8 then m else –.

c8: If "the response time-out parameter is present" then m else –.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Attributes

The supplier of the implementation shall state whether or not the attributes specified by all packages instantiated in a managed object of this class are supported, in the "Support" and "Additional information" columns in Table C.8/MOCS. The supplier of the implementation shall indicate support for each of the operations for each attribute supported.

Table C.8/MOCS – Attribute support

				Set by Create		Get		Replace	
Index	Attribute template label	Value of object identifier for attribute	Constraints and values	Status	Support	Status	Support	Status	Support
1	additionalInformation	{smi2AttributeID 6}		–		c1		x	
2	additionalText	{smi2AttributeID 7}		–		c2		x	
3	allomorphs	{smi2AttributeID 50}		x		c3		x	
4	correlatedNotifications	{smi2AttributeID 12}		–		c4		x	
5	eventTime	{smi2AttributeID 13}		–		c5		x	
6	eventType	{smi2AttributeID 14}		–		m		x	
7	loggingTime	{smi2AttributeID 59}		–		m		x	
8	logRecordId	{smi2AttributeID 3}		–		m		x	
9	managedObjectClass	{smi2AttributeID 60}		–		m		x	
10	managedObjectInstance	{smi2AttributeID 61}		–		m		x	
11	nameBinding	{smi2AttributeID 63}		–		m		x	
12	notificationIdentifier	{smi2AttributeID 16}		–		c6		x	
13	objectClass	{smi2AttributeID 65}		–		m		x	
14	packages	{smi2AttributeID 66}		–		c7		x	
15	requestIdentifier	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 1}		–		m		x	
16	responseConfirmation ObjectInd	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 3}		–		m		x	
17	responseMonitorId	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 6}		–		m		x	
18	responseRequesterInd	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 8}		–		m		x	
19	responseSync	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 10}		–		m		x	
20	responseTime	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 11}		–		m		x	
21	responseTimeout	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 12}		c8		c8		c8	

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Table C.8/MOCS – Attribute support *(concluded)*

	Add		Remove		Set to Default		
Index	Status	Support	Status	Support	Status	Support	Additional information
1	x		x		x		
2	x		x		x		
3	x		x		x		
4	x		x		x		
5	x		x		x		
6	x		x		x		
7	x		x		x		
8	x		x		x		
9	x		x		x		
10	x		x		x		
11	x		x		x		
12	x		x		x		
13	x		x		x		
14	x		x		x		
15	x		x		x		
16	x		x		x		
17	x		x		x		
18	x		x		x		
19	x		x		x		
20	x		x		x		
21	x		x		x		

c1: If C.7/1 then m else –.
c2: If C.7/2 then m else –.
c3: If not(C.5/1b) then m else –.
c4: If C.7/4 then m else –.
c5: If C.7/5 then m else –.
c6: If C.7/6 then m else –.
c7: If C.7/7 then m else –.
c8: If C.7/8 then m else –.

Attribute groups

There are no attribute groups defined for the managed object class.

Actions

There are no actions defined for this object class.

Notifications

The supplier of the implementation shall state whether or not the notifications specified by all packages instantiated in a managed object of this class are supported, in the "Support" and "Additional information" columns in Table C.9/MOCS. The supplier of the implementation shall indicate support in terms of the confirmed and non-confirmed modes.

Table C.9/MOCS – Notification support

					Support		
Index	Notification type template label	Value of object identifier for notification type	Constraints and values	Status	Confirmed	Non-confirmed	Additional information
1	qualityofServiceAlarm	{smi2Notification 11}		c1			

c1: If C.7/8 then m else –.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

Table C.9/MOCS – Notification support *(concluded)*

Index	Sub-index	Notification field name label	Value of object identifier of attribute type associated with field	Constraints and values	Status	Support	Additional information
1	1.1	additionalInformation	{smi2AttributeID 6}		c:o		
	1.1.1	identifier	–		c:m		
	1.1.2	significance	–		c:m		
	1.1.3	information	–		c:m		
	1.2	additionalText	{smi2AttributeID 7}		c:o		
	1.3	backedUpStatus	{smi2AttributeID 11}		c:o		
	1.4	backUpObject	{smi2AttributeID 40}		c:o		
	1.4.1	objectName	–		c:o.1		
	1.4.1.1	distinguishedName	–		c:o.2		
	1.4.1.1.1	AttributeType	–		c:m		
	1.4.1.1.2	AttributeValue	–		c:m		
	1.4.1.2	nonSpecificForm	–		c:o.2		
	1.4.1.3	localDistinguishedName	–		c:o.2		
	1.4.1.3.1	AttributeType	–		c:m		
	1.4.1.3.2	AttributeValue	–		c:m		
	1.4.2	noObject	–		c:o.1		
	1.5	correlatedNotifications	{smi2AttributeID 12}		c:o		
	1.5.1	correlatedNotifications	–		c:m		
	1.5.2	sourceObjectInst	–		c:o		
	1.5.2.1	distinguishedName	–		c:o.3		
	1.5.2.1.1	AttributeType	–		c:m		
	1.5.2.1.2	AttributeValue	–		c:m		
	1.5.2.2	nonSpecificForm	–		c:o.3		
	1.5.2.3	localDistinguishedName	–		c:o.3		
	1.5.2.3.1	AttributeType	–		c:m		
	1.5.2.3.2	AttributeValue	–		c:m		
	1.6	monitoredAttributes	{smi2AttributeID 15}		c:o		
	1.6.1	attributeId	–		c:m		
	1.6.1.1	globalForm	–		c:o.4		
	1.6.1.2	localForm	–		c:o.4		
	1.6.2	attributeValue	–		c:m		
	1.7	notificationIdentifier	{smi2AttributeID 16}		c:o		
	1.8	perceivedSeverity	{smi2AttributeID 17}		c:m		
	1.9	probableCause	{smi2AttributeID 18}		c:m		
	1.9.1	globalValue	–		c:o.5		
	1.9.2	localValue	–		c:o.5		

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

Index	Sub-index	Notification field name label	Value of object identifier of attribute type associated with field	Constraints and values	Status	Support	Additional information
	1.10	proposedRepairActions	{smi2AttributeID 19}		c:o		
	1.10.1	OBJECT IDENTIFIER	–		c:o.6		
	1.10.2	INTEGER	–		c:o.6		
	1.11	specificProblems	{smi2AttributeID 27}		c:o		
	1.11.1	OBJECT IDENTIFIER	–		c:o.7		
	1.11.2	INTEGER	–		c:o.7		
	1.12	stateChangeDefinition	{smi2AttributeID 28}		c:o		
	1.12.1	attributeID	–		c:m		
	1.12.1.1	globalForm	–		c:o.8		
	1.12.1.2	localForm	–		c:o.8		
	1.12.2	oldAttributeValue	–		c:o		
	1.12.3	newAttributeValue	–		c:m		
	1.13	thresholdInfo	{smi2AttributeID 29}		c:o		
	1.13.1	triggeredThreshold	–		c:m		
	1.13.1.1	globalForm	–		c:o.9		
	1.13.1.2	localForm	–		c:o.9		
	1.13.2	observedValue	–		c:m		
	1.13.2.1	integer	–		c:o.10		
	1.13.2.2	real	–		c:o.10		
	1.13.3	thresholdLevel	–		c:o		
	1.13.3.1	up	–		c:o.11		
	1.13.3.1.1	high	–		c:m		
	1.13.3.1.1.1	integer	–		c:o.12		
	1.13.3.1.1.2	real	–		c:o.12		
	1.13.3.1.2	low	–		c:o		
	1.13.3.1.2.1	integer	–		c:o.13		
	1.13.3.1.2.2	real	–		c:o.13		
	1.13.3.2	down	–		c:o.11		
	1.13.3.2.1	high	–		c:m		
	1.13.3.2.1.1	integer	–		c:o.14		
	1.13.3.2.1.2	real	–		c:o.14		
	1.13.3.2.2	low	–		c:m		
	1.13.3.2.2.1	integer	–		c:o.15		
	1.13.3.2.2.2	real	–		c:o.15		
	1.13.4	armTime	–		c:o		
	1.14	trendIndication	{smi2AttributeID 30}		c:o		

Parameters

There are no parameters defined for this object class

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

C.5 Statement of conformance to the responseDelayMonitor object class

Table C.10/MOCS – Managed object class support

Index	Managed object class template label	Value of object identifier for class	Support of all mandatory features	Is the actual class the same as the managed object class to which conformance is claimed? (Y/N)
1	responseDelayMonitor	{joint-iso-ccitt ms(9) function(2) part22(22) managedObjectClass(3) 3}		

If the answer to the actual class question in the managed object class support table is no, the supplier of the implementation shall fill in the actual class support in Table C.11/MOCS.

Table C.11/MOCS – Actual class support

Index	Actual managed object class template label	Value of object identifier for actual class	Additional information
1			
2			

Packages

The supplier of the implementation shall state whether or not the conditional packages specified by this class are supported by an instance of this class, in the "Support" and "Additional information" columns in Table C.12/MOCS.

Table C.12/MOCS – Package support

Index	Package template label	Value of object identifier for package	Constraints and values	Status	Support	Additional information
1	allomorphicPackage	{smi2Package 17}		c1		
2	availabilityStatusPackage	{smi2Package 22}		c2		
3	dailyScheduling	{smi2Package 25}		o		
4	duration	{smi2Package 26}		c3		
5	externalScheduler	{smi2Package 27}		o		
6	packagesPackage	{smi2Package 16}		c4		
7	reqResLengthPkg	{joint-iso-ccitt ms(9) function(2) part22(22) package(4) 5}		c5		
8	responseConfirmationNotifPkg	{joint-iso-ccitt ms(9) function(2) part22(22) package(4) 2}		c6		
9	responseTimeoutPkg	{joint-iso-ccitt ms(9) function(2) part22(22) package(4) 4}		c7		
10	weeklyScheduling	{smi2Package 29}		o		

c1 : If not (C.10/1b) then m else –.

c2 : If "any of the scheduling packages including duration, dailyScheduling, weeklyScheduling and externalScheduler package, are present" then m else –.

c3 : If "the response time monitoring function is scheduled to start at a specified time and either a stop at specified time or function continuously" then m else –.

c4 : If C.12/1 or C.12/2 or C.12/3 or C.12/4 or C.12/5 or C.12/7 or C.12/8 or C.12/9 or C.12/10 then m else –.

c5 : If "lengths of response requests and responses are not uniform and needed to be summarize." then m else –.

c6 : If "the response confirmation notification is needed." then m else –.

c7 : If "the time-out of response is monitored." then m else –.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

Attributes

The supplier of the implementation shall state whether or not the attributes specified by all packages instantiated in a managed object of this class are supported, in the "Support" and "Additional information" columns in Table C.13/MOCS. The supplier of the implementation shall indicate support for each of the operations for each attribute supported.

Table C.13/MOCS – Attribute support

				Set by Create		Get		Replace	
Index	Attribute template label	Value of object identifier for attribute	Constraints and values	Status	Support	Status	Support	Status	Support
1	allomorphs	{smi2AttributeID 50}		x		c1		x	
2	availabilityStatus	{smi2AttributeID 33}		–		c2		x	
3	intervalsOfDay	{smi2AttributeID 57}		o		o		o	
4	monitoredUnitLength	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 15}		m		m		m	
5	nameBinding	{smi2AttributeID 63}		–		m		x	
6	objectClass	{smi2AttributeID 65}		–		m		x	
7	operationalState	{smi2AttributeID 35}		–		m		x	
8	packages	{smi2AttributeID 66}		–		c3		x	
9	responseConfirmationObjectInd	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 3}		–		x		x	
10	responseDelayTime	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 5}		–		m		x	
11	responseLength	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 17}		–		c4		x	
12	responseMonitorId	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 6}		–		x		x	
13	responseRequesterInd	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 8}		–		x		x	
14	responseRequestLength	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 16}		–		c4		x	
15	responseSync	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 10}		m		m		m	
16	responseTime	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 11}		–		m		x	
17	responseTimeout	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 12}		c5		c5		c5	
18	routeList	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 14}		–		x		x	
19	schedulerName	{smi2AttributeID 67}		–		o		x	
20	startTime	{smi2AttributeID 68}		c6		c6		c6	
21	stopTime	{smi2AttributeID 69}		c6		c6		c6	
22	weekMask	{smi2AttributeID 71}		o		o		o	

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

Table C.13/MOCS – Attribute support *(concluded)*

	Add		Remove		Set to Default		
Index	Status	Support	Status	Support	Status	Support	Additional information
1	x		x		x		
2	x		x		x		
3	o		o		o		
4	x		x		x		
5	x		x		x		
6	x		x		x		
7	x		x		x		
8	x		x		x		
9	x		x		x		
10	x		x		x		
11	x		x		x		
12	x		x		x		
13	x		x		x		
14	x		x		x		
15	x		x		x		
16	x		x		x		
17	x		x		x		
18	m		m		x		
19	x		x		x		
20	x		x		x		
21	x		x		c6		
22	o		o		o		

c1 : If not (C.10/1b) then m else –.
c2 : If C.12/2 then m else –.
c3 : If C.12/6 then m else –.
c4 : If C.12/7 then m else –.
c5 : If C.12/9 then m else –.
c6 : If C.12/4 then m else –.

Attribute groups

There are no attribute groups defined for the managed object class.

Actions

There are no actions defined for this object class

Notifications

The supplier of the implementation shall state whether or not the notifications specified by all packages instantiated in a managed object of this class are supported, in the "Support" and "Additional information" columns in Table C.14/MOCS. The supplier of the implementation shall indicate support in terms of the confirmed and non-confirmed modes.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Table C.14/MOCS – Notification support

Index	Notification type template label	Value of object identifier for notification type	Constraints and values	Status	Support		Additional information
					Con-firmed	Non-con-firmed	
1	qualityofServiceAlarm	{smi2Notification 11}		c1			
2	responseConfirmation	{joint-iso-ccitt ms(9) function(2) part22(22) notification(10) 1}		c2			
c1 : If C.12/9 then m else –. c2 : If C.12/8 then m else –.							

Table C.14/MOCS – Notification support *(concluded)*

Index	Sub-index	Notification field name label	Value of object identifier of attribute type associated with field	Constraints and values	Status	Support	Additional information
1	1.1	additionalInformation	{smi2AttributeID 6}		c:o		
	1.1.1	identifier	–		c:m		
	1.1.2	significance	–		c:m		
	1.1.3	information	–		c:m		
	1.2	additionalText	{smi2AttributeID 7}		c:o		
	1.3	backedUpStatus	{smi2AttributeID 11}		c:o		
	1.4	backUpObject	{smi2AttributeID 40}		c:o		
	1.4.1	objectName	–		c:o.1		
	1.4.1.1	distinguishedName	–		c:o.2		
	1.4.1.1.1	AttributeType	–		c:m		
	1.4.1.1.2	AttributeValue	–		c:m		
	1.4.1.2	nonSpecificForm	–		c:o.2		
	1.4.1.3	localDistinguishedName	–		c:o.2		
	1.4.1.3.1	AttributeType	–		c:m		
	1.4.1.3.2	AttributeValue	–		c:m		
	1.4.2	noObject	–		c:o.1		
	1.5	correlatedNotifications	{smi2AttributeID 12}		c:o		
	1.5.1	correlatedNotifications	–		c:m		
	1.5.2	sourceObjectInst	–		c:o		
	1.5.2.1	distinguishedName	–		c:o.3		
	1.5.2.1.1	AttributeType	–		c:m		
	1.5.2.1.2	AttributeValue	–		c:m		
	1.5.2.2	nonSpecificForm	–		c:o.3		
	1.5.2.3	localDistinguishedName	–		c:o.3		
	1.5.2.3.1	AttributeType	–		c:m		
	1.5.2.3.2	AttributeValue	–		c:m		

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Index	Sub-index	Notification field name label	Value of object identifier of attribute type associated with field	Constraints and values	Status	Support	Additional information
	1.6	monitoredAttributes	{smi2AttributeID 15}		c:o		
	1.6.1	attributeId	–		c:m		
	1.6.1.1	globalForm	–		c:o.4		
	1.6.1.2	localForm	–		c:o.4		
	1.6.2	attributeValue	–		c:m		
	1.7	notificationIdentifier	{smi2AttributeID 16}		c:o		
	1.8	perceivedSeverity	{smi2AttributeID 17}		c:m		
	1.9	probableCause	{smi2AttributeID 18}		c:m		
	1.9.1	globalValue	–		c:o.5		
	1.9.2	localValue	–		c:o.5		
	1.10	proposedRepairActions	{smi2AttributeID 19}		c:o		
	1.10.1	OBJECT IDENTIFIER	–		c:o.6		
	1.10.2	INTEGER	–		c:o.6		
	1.11	specificProblems	{smi2AttributeID 27}		c:o		
	1.11.1	OBJECT IDENTIFIER	–		c:o.7		
	1.11.2	INTEGER	–		c:o.7		
	1.12	stateChangeDefinition	{smi2AttributeID 28}		c:o		
	1.12.1	attributeID	–		c:m		
	1.12.1.1	globalForm	–		c:o.8		
	1.12.1.2	localForm	–		c:o.8		
	1.12.2	oldAttributeValue	–		c:o		
	1.12.3	newAttributeValue	–		c:m		
	1.13	thresholdInfo	{smi2AttributeID 29}		c:o		
	1.13.1	triggeredThreshold	–		c:m		
	1.13.1.1	globalForm	–		c:o.9		
	1.13.1.2	localForm	–		c:o.9		
	1.13.2	observedValue	–		c:m		
	1.13.2.1	integer	–		c:o.10		
	1.13.2.2	real	–		c:o.10		
	1.13.3	thresholdLevel	–		c:o		
	1.13.3.1	up	–		c:o.11		
	1.13.3.1.1	high	–		c:m		
	1.13.3.1.1.1	integer	–		c:o.12		
	1.13.3.1.1.2	real	–		c:o.12		
	1.13.3.1.2	low	–		c:o		
	1.13.3.1.2.1	integer	–		c:o.13		
	1.13.3.1.2.2	real	–		c:o.13		
	1.13.3.2	down	–		c:o.11		
	1.13.3.2.1	high	–		c:m		
	1.13.3.2.1.1	integer	–		c:o.14		
	1.13.3.2.1.2	real	–		c:o.14		

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Index	Sub-index	Notification field name label	Value of object identifier of attribute type associated with field	Constraints and values	Status	Support	Additional information
	1.13.3.2.2	low	–		c:m		
	1.13.3.2.2.1	integer	–		c:o.15		
	1.13.3.2.2.2	real	–		c:o.15		
	1.13.4	armTime	–		c:o		
	1.14	trendIndication	{smi2AttributeID 30}		c:o		
2	2.1	additionalInformation	{smi2AttributeID 6}		c:o		
	2.1.1	identifier	–		c:m		
	2.1.2	significance	–		c:m		
	2.1.3	information	–		c:m		
	2.2	additionalText	{smi2AttributeID 7}		c:o		
	2.3	correlatedNotifications	{smi2AttributeID 12}		c:o		
	2.3.1	correlatedNotifications	–		c:m		
	2.3.2	sourceObjectInst	–		c:o		
	2.3.2.1	distinguishedName	–		c:o.16		
	2.3.2.1.1	AttributeType	–		c:m		
	2.3.2.1.2	AttributeValue	–		c:m		
	2.3.2.2	nonSpecificForm	–		c:o.16		
	2.3.2.3	localDistinguishedName	–		c:o.16		
	2.3.2.3.1	AttributeType	–		c:m		
	2.3.2.3.2	AttributeValue	–		c:m		
	2.4	monitoredUnitLength	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 15}		c:o		
	2.4.1	eachPDULength	–		c:o.17		
	2.4.2	bitLength	–		c:o.17		
	2.4.3	octetLength	–		c:o.17		
	2.5	notificationIdentifier	{smi2AttributeID 16}		c:o		
	2.6	requestIdentifier	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 1}		c:m		
	2.6.1	number	–		c:o.18		
	2.6.2	invokeID	–		c:o.18		
	2.6.3	identifier	–		c:o.18		
	2.7	responseConfirmationObject Ind	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 3}		c:m		
	2.7.1	distinguishedName	–		c:o.19		
	2.7.1.1	AttributeType	–		c:m		
	2.7.1.2	AttributeValue	–		c:m		
	2.7.2	nonSpecificForm	–		c:o.19		
	2.7.3	localDistinguishedName	–		c:o.19		
	2.7.3.1	AttributeType	–		c:m		
	2.7.3.2	AttributeValue	–		c:m		

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Index	Sub-index	Notification field name label	Value of object identifier of attribute type associated with field	Constraints and values	Status	Support	Additional information
	2.8	responseDelayTime	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 5}		c:o		
	2.8.1	days	–		c:o.20		
	2.8.2	hours	–		c:o.20		
	2.8.3	minutes	–		c:o.20		
	2.8.4	seconds	–		c:o.20		
	2.8.5	milliSeconds	–		c:o.20		
	2.8.6	microSeconds	–		c:o.20		
	2.8.7	nanoSeconds	–		c:o.20		
	2.8.8	picoSeconds	–		c:o.20		
	2.9	responseLength	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 17}		c:o		
	2.9.1	integer	–		c:o.21		
	2.9.2	real	–		c:o.21		
	2.10	responseMonitorId	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 6}		c:m		
	2.10.1	number	–		c:o.22		
	2.10.2	string	–		c:o.22		
	2.11	responseRequesterInd	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 8}		c:m		
	2.11.1	distinguishedName	–		c:o.23		
	2.11.1.1	AttributeType	–		c:m		
	2.11.1.2	AttributeValue	–		c:m		
	2.11.2	nonSpecificForm	–		c:o.23		
	2.11.3	localDistinguishedName	–		c:o.23		
	2.11.3.1	AttributeType	–		c:m		
	2.11.3.2	AttributeValue	–		c:m		
	2.12	responseRequestLength	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 16}		c:o		
	2.12.1	integer	–		c:o.24		
	2.12.2	real	–		c:o.24		
	2.13	responseSync	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 10}		c:m		
	2.14	responseTime	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 11}		c:m		
	2.14.1	days	–		c:o.25		
	2.14.2	hours	–		c:o.25		
	2.14.3	minutes	–		c:o.25		

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Index	Sub-index	Notification field name label	Value of object identifier of attribute type associated with field	Constraints and values	Status	Support	Additional information
	2.14.4	seconds	–		c:o.25		
	2.14.5	milliSeconds	–		c:o.25		
	2.14.6	microSeconds	–		c:o.25		
	2.14.7	nanoSeconds	–		c:o.25		
	2.14.8	picoSeconds	–		c:o.25		
	2.15	responseTimeout	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 12}		c:o		
	2.15.1	days	–		c:o.26		
	2.15.2	hours	–		c:o.26		
	2.15.3	minutes	–		c:o.26		
	2.15.4	seconds	–		c:o.26		
	2.15.5	milliSeconds	–		c:o.26		
	2.15.6	microSeconds	–		c:o.26		
	2.15.7	nanoSeconds	–		c:o.26		
	2.15.8	picoSeconds	–		c:o.26		
	2.16	routeList	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 14}		c:m		
	2.16.1	distinguishedName	–		c:o.27		
	2.16.1.1	AttributeType	–		c:m		
	2.16.1.2	AttributeValue	–		c:m		
	2.16.2	nonSpecificForm	–		c:o.27		
	2.16.3	localDistinguishedName	–		c:o.27		
	2.16.3.1	AttributeType	–		c:m		
	2.16.3.2	AttributeValue	–		c:m		

Parameters

There are no parameters defined for this object class

C.6 Statement of conformance to the responseMonitor object class

Table C.15/MOCS – Managed object class support

Index	Managed object class template label	Value of object identifier for class	Support of all mandatory features	Is the actual class the same as the managed object class to which conformance is claimed? (Y/N)
1	responseMonitor	{joint-iso-ccitt ms(9) function(2) part22(22) managedObjectClass(3) 4}		

If the answer to the actual class question in the managed object class support table is no, the supplier of the implementation shall fill in the actual class support in Table C.16/MOCS.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

Table C.16/MOCS – Actual class support

Index	Actual managed object class template label	Value of object identifier for actual class	Additional information
1			
2			

Packages

The supplier of the implementation shall state whether or not the conditional packages specified by this class are supported by an instance of this class, in the "Support" and "Additional information" columns in Table C.17/MOCS.

Table C.17/MOCS – Package support

Index	Package template label	Value of object identifier for package	Constraints and values	Status	Support	Additional information
1	allomorphicPackage	{smi2Package 17}		c1		
2	availa0bilityStatusPackage	{smi2Package 22}		c2		
3	dailyScheduling	{smi2Package 25}		o		
4	duration	{smi2Package 26}		c3		
5	externalScheduler	{smi2Package 27}		o		
6	packagesPackage	{smi2Package 16}		c4		
7	reqResLengthPkg	{joint-iso-ccitt ms(9) function(2) part22(22) package(4) 5}		c5		
8	responseConfirmationNotifPkg	{joint-iso-ccitt ms(9) function(2) part22(22) package(4) 2}		c6		
9	responseTimeoutPkg	{joint-iso-ccitt ms(9) function(2) part22(22) package(4) 4}		c7		
10	weeklyScheduling	{smi2Package 29}		o		

c1: If not (C.15/1b) then m else –.

c2: If "any of the scheduling packages including duration, dailyScheduling, weeklyScheduling and externalScheduler package, are present" then m else –.

c3: If "the response time monitoring function is scheduled to start at a specified time and either a stop at specified time or function continuously" then m else –.

c4: If C.17/1 or C.17/2 or C.17/3 or C.17/4 or C.17/5 or C.17/7 or C.17/8 or C.17/9 or C.17/10 then m else –.

c5: If "lengths of response requests and responses are not uniform and needed to be summarize." then m else –.

c6: If "the response confirmation notification is needed." then m else –.

c7: If "the time-out of response is monitored." then m else –.

Attributes

The supplier of the implementation shall state whether or not the attributes specified by all packages instantiated in a managed object of this class are supported, in the "Support" and "Additional information" columns in Table C.18/MOCS. The supplier of the implementation shall indicate support for each of the operations for each attribute supported.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

Table C.18/MOCS – Attribute support

				Set by Create		Get		Replace	
Index	Attribute template label	Value of object identifier for attribute	Constraints and values	Status	Support	Status	Support	Status	Support
1	allomorphs	{smi2AttributeID 50}		x		c1		x	
2	availabilityStatus	{smi2AttributeID 33}		–		c2		x	
3	intervalsOfDay	{smi2AttributeID 57}		o		o		o	
4	monitoredUnitLength	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 15}		m		m		m	
5	nameBinding	{smi2AttributeID 63}		–		m		x	
6	objectClass	{smi2AttributeID 65}		–		m		x	
7	operationalState	{smi2AttributeID 35}		–		m		x	
8	packages	{smi2AttributeID 66}		–		c3		x	
9	responseConfirmationObjectInd	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 3}		–		x		x	
10	responseLength	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 17}		–		c4		x	
11	responseMonitorId	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 6}		–		x		x	
12	responseRequesterInd	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 8}		–		x		x	
13	responseRequestLength	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 16}		–		c4		x	
14	responseSync	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 10}		m		m		m	
15	responseTime	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 11}		–		m		x	
16	responseTimeout	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 12}		c5		c5		c5	
17	routeList	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 14}		–		x		x	
18	schedulerName	{smi2AttributeID 67}		–		o		x	
19	startTime	{smi2AttributeID 68}		c6		c6		c6	
20	stopTime	{smi2AttributeID 69}		c6		c6		c6	
21	weekMask	{smi2AttributeID 71}		o		o		o	

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Table C.18/MOCS – Attribute support *(concluded)*

	Add		Remove		Set to Default		
Index	Status	Support	Status	Support	Status	Support	Additional information
1	x		x		x		
2	x		x		x		
3	o		o		o		
4	x		x		x		
5	x		x		x		
6	x		x		x		
7	x		x		x		
8	x		x		x		
9	x		x		x		
10	x		x		x		
11	x		x		x		
12	x		x		x		
13	x		x		x		
14	x		x		x		
15	x		x		x		
16	x		x		x		
17	m		m		x		
18	x		x		x		
19	x		x		x		
20	x		x		c6		
21	o		o		o		

c1: If not (C.15/1b) then m else –.
c2: If C.17/2 then m else –.
c3: If C.17/6 then m else –.
c4: If C.17/7 then m else –.
c5: If C.17/9 then m else –.
c6: If C.17/4 then m else –.

Attribute groups

There are no attribute groups defined for the managed object class.

Actions

There are no actions defined for this object class

Notifications

The supplier of the implementation shall state whether or not the notifications specified by all packages instantiated in a managed object of this class are supported, in the "Support" and "Additional information" columns in Table C.19/MOCS. The supplier of the implementation shall indicate support in terms of the confirmed and non-confirmed modes.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

Table C.19/MOCS – Notification support

					Support		
Index	Notification type template label	Value of object identifier for notification type	Constraints and values	Status	Con-firmed	Non-con-firmed	Additional information
1	qualityofServiceAlarm	{smi2Notification 11}		c1			
2	responseConfirmation	{joint-iso-ccitt ms(9) function(2) part22(22) notification(10) 1}		c2			
c1: If C.17/9 then m else –. c2: If C.17/8 then m else –.							

Table C.19/MOCS – Notification support *(concluded)*

Index	Sub-index	Notification field name label	Value of object identifier of attribute type associated with field	Constraints and values	Status	Support	Additional information
1	1.1	additionalInformation	{smi2AttributeID 6}		c:o		
	1.1.1	identifier	–		c:m		
	1.1.2	significance	–		c:m		
	1.1.3	information	–		c:m		
	1.2	additionalText	{smi2AttributeID 7}		c:o		
	1.3	backedUpStatus	{smi2AttributeID 11}		c:o		
	1.4	backUpObject	{smi2AttributeID 40}		c:o		
	1.4.1	objectName	–		c:o.1		
	1.4.1.1	distinguishedName	–		c:o.2		
	1.4.1.1.1	AttributeType	–		c:m		
	1.4.1.1.2	AttributeValue	–		c:m		
	1.4.1.2	nonSpecificForm	–		c:o.2		
	1.4.1.3	localDistinguishedName	–		c:o.2		
	1.4.1.3.1	AttributeType	–		c:m		
	1.4.1.3.2	AttributeValue	–		c:m		
	1.4.2	noObject	–		c:o.1		
	1.5	correlatedNotifications	{smi2AttributeID 12}		c:o		
	1.5.1	correlatedNotifications	–		c:m		
	1.5.2	sourceObjectInst	–		c:o		
	1.5.2.1	distinguishedName	–		c:o.3		
	1.5.2.1.1	AttributeType	–		c:m		
	1.5.2.1.2	AttributeValue	–		c:m		
	1.5.2.2	nonSpecificForm	–		c:o.3		
	1.5.2.3	localDistinguishedName	–		c:o.3		
	1.5.2.3.1	AttributeType	–		c:m		
	1.5.2.3.2	AttributeValue	–		c:m		

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Index	Sub-index	Notification field name label	Value of object identifier of attribute type associated with field	Constraints and values	Status	Support	Additional information
	1.6	monitoredAttributes	{smi2AttributeID 15}		c:o		
	1.6.1	attributeId	–		c:m		
	1.6.1.1	globalForm	–		c:o.4		
	1.6.1.2	localForm	–		c:o.4		
	1.6.2	attributeValue	–		c:m		
	1.7	notificationIdentifier	{smi2AttributeID 16}		c:o		
	1.8	perceivedSeverity	{smi2AttributeID 17}		c:m		
	1.9	probableCause	{smi2AttributeID 18}		c:m		
	1.9.1	globalValue	–		c:o.5		
	1.9.2	localValue	–		c:o.5		
	1.10	proposedRepairActions	{smi2AttributeID 19}		c:o		
	1.10.1	OBJECT IDENTIFIER	–		c:o.6		
	1.10.2	INTEGER	–		c:o.6		
	1.11	specificProblems	{smi2AttributeID 27}		c:o		
	1.11.1	OBJECT IDENTIFIER	–		c:o.7		
	1.11.2	INTEGER	–		c:o.7		
	1.12	stateChangeDefinition	{smi2AttributeID 28}		c:o		
	1.12.1	attributeID	–		c:m		
	1.12.1.1	globalForm	–		c:o.8		
	1.12.1.2	localForm	–		c:o.8		
	1.12.2	oldAttributeValue	–		c:o		
	1.12.3	newAttributeValue	–		c:m		
	1.13	thresholdInfo	{smi2AttributeID 29}		c:o		
	1.13.1	triggeredThreshold	–		c:m		
	1.13.1.1	globalForm	–		c:o.9		
	1.13.1.2	localForm	–		c:o.9		
	1.13.2	observedValue	–		c:m		
	1.13.2.1	integer	–		c:o.10		
	1.13.2.2	real	–		c:o.10		
	1.13.3	thresholdLevel	–		c:o		
	1.13.3.1	up	–		c:o.11		
	1.13.3.1.1	high	–		c:m		
	1.13.3.1.1.1	integer	–		c:o.12		
	1.13.3.1.1.2	real	–		c:o.12		
	1.13.3.1.2	low	–		c:o		
	1.13.3.1.2.1	integer	–		c:o.13		
	1.13.3.1.2.2	real	–		c:o.13		
	1.13.3.2	down	–		c:o.11		
	1.13.3.2.1	high	–		c:m		
	1.13.3.2.1.1	integer	–		c:o.14		
	1.13.3.2.1.2	real	–		c:o.14		

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

Index	Sub-index	Notification field name label	Value of object identifier of attribute type associated with field	Constraints and values	Status	Support	Additional information
	1.13.3.2.2	low	–		c:m		
	1.13.3.2.2.1	integer	–		c:o.15		
	1.13.3.2.2.2	real	–		c:o.15		
	1.13.4	armTime	–		c:o		
	1.14	trendIndication	{smi2AttributeID 30}		c:o		
2	2.1	additionalInformation	{smi2AttributeID 6}		c:o		
	2.1.1	identifier	–		c:m		
	2.1.2	significance	–		c:m		
	2.1.3	information	–		c:m		
	2.2	additionalText	{smi2AttributeID 7}		c:o		
	2.3	correlatedNotifications	{smi2AttributeID 12}		c:o		
	2.3.1	correlatedNotifications	–		c:m		
	2.3.2	sourceObjectInst	–		c:o		
	2.3.2.1	distinguishedName	–		c:o.16		
	2.3.2.1.1	AttributeType	–		c:m		
	2.3.2.1.2	AttributeValue	–		c:m		
	2.3.2.2	nonSpecificForm	–		c:o.16		
	2.3.2.3	localDistinguishedName	–		c:o.16		
	2.3.2.3.1	AttributeType	–		c:m		
	2.3.2.3.2	AttributeValue	–		c:m		
	2.4	monitoredUnitLength	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 15}		c:o		
	2.4.1	eachPDULength	–		c:o.17		
	2.4.2	bitLength	–		c:o.17		
	2.4.3	octetLength	–		c:o.17		
	2.5	notificationIdentifier	{smi2AttributeID 16}		c:o		
	2.6	requestIdentifier	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 1}		c:m		
	2.6.1	number	–		c:o.18		
	2.6.2	invokeID	–		c:o.18		
	2.6.3	identifier	–		c:o.18		
	2.7	responseConfirmationObject Ind	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 3}		c:m		
	2.7.1	distinguishedName	–		c:o.19		
	2.7.1.1	AttributeType	–		c:m		
	2.7.1.2	AttributeValue	–		c:m		
	2.7.2	nonSpecificForm	–		c:o.19		

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Index	Sub-index	Notification field name label	Value of object identifier of attribute type associated with field	Constraints and values	Status	Support	Additional information
	2.7.3	localDistinguishedName	–		c:o.19		
	2.7.3.1	AttributeType	–		c:m		
	2.7.3.2	AttributeValue	–		c:m		
	2.8	responseDelayTime	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 5}		c:o		
	2.8.1	days	–		c:o.20		
	2.8.2	hours	–		c:o.20		
	2.8.3	minutes	–		c:o.20		
	2.8.4	seconds	–		c:o.20		
	2.8.5	milliSeconds	–		c:o.20		
	2.8.6	microSeconds	–		c:o.20		
	2.8.7	nanoSeconds	–		c:o.20		
	2.8.8	picoSeconds	–		c:o.20		
	2.9	responseLength	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 17}		c:o		
	2.9.1	integer	–		c:o.21		
	2.9.2	real	–		c:o.21		
	2.10	responseMonitorId	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 6}		c:m		
	2.10.1	number	–		c:o.22		
	2.10.2	string	–		c:o.22		
	2.11	responseRequesterInd	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 8}		c:m		
	2.11.1	distinguishedName	–		c:o.23		
	2.11.1.1	AttributeType	–		c:m		
	2.11.1.2	AttributeValue	–		c:m		
	2.11.2	nonSpecificForm	–		c:o.23		
	2.11.3	localDistinguishedName	–		c:o.23		
	2.11.3.1	AttributeType	–		c:m		
	2.11.3.2	AttributeValue	–		c:m		
	2.12	responseRequestLength	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 16}		c:o		
	2.12.1	integer	–		c:o.24		
	2.12.2	real	–		c:o.24		
	2.13	responseSync	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 10}		c:m		
	2.14	responseTime	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 11}		c:m		

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

Index	Sub-index	Notification field name label	Value of object identifier of attribute type associated with field	Constraints and values	Status	Support	Additional information
	2.14.1	days	–		c:o.25		
	2.14.2	hours	–		c:o.25		
	2.14.3	minutes	–		c:o.25		
	2.14.4	seconds	–		c:o.25		
	2.14.5	milliSeconds	–		c:o.25		
	2.14.6	microSeconds	–		c:o.25		
	2.14.7	nanoSeconds	–		c:o.25		
	2.14.8	picoSeconds	–		c:o.25		
	2.15	responseTimeout	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 12}		c:o		
	2.15.1	days	–		c:o.26		
	2.15.2	hours	–		c:o.26		
	2.15.3	minutes	–		c:o.26		
	2.15.4	seconds	–		c:o.26		
	2.15.5	milliSeconds	–		c:o.26		
	2.15.6	microSeconds	–		c:o.26		
	2.15.7	nanoSeconds	–		c:o.26		
	2.15.8	picoSeconds	–		c:o.26		
	2.16	routeList	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 14}		c:m		
	2.16.1	distinguishedName	–		c:o.27		
	2.16.1.1	AttributeType	–		c:m		
	2.16.1.2	AttributeValue	–		c:m		
	2.16.2	nonSpecificForm	–		c:o.27		
	2.16.3	localDistinguishedName	–		c:o.27		
	2.16.3.1	AttributeType	–		c:m		
	2.16.3.2	AttributeValue	–		c:m		

Parameters

There are no parameters defined for this object class

C.7 Statement of conformance to the responseRequester object class

Table C.20/MOCS – Managed object class support

Index	Managed object class template label	Value of object identifier for class	Support of all mandatory features	Is the actual class the same as the managed object class to which conformance is claimed? (Y/N)
1	responseRequester	{joint-iso-ccitt ms(9) function(2) part22(22) managedObjectClass(3) 5}		

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

If the answer to the actual class question in the managed object class support table is no, the supplier of the implementation shall fill in the actual class support in Table C.21/MOCS.

Table C.21/MOCS – Actual class support

Index	Actual managed object class template label	Value of object identifier for actual class	Additional information
1			
2			

Packages

The supplier of the implementation shall state whether or not the conditional packages specified by this class are supported by an instance of this class, in the "Support" and "Additional information" columns in Table C.22/MOCS.

Table C.22/MOCS – Package support

Index	Package template label	Value of object identifier for package	Constraints and values	Status	Support	Additional information
1	allomorphicPackage	{smi2Package 17}		c1		
2	packagesPackage	{smi2Package 16}		c2		
3	responseConfirmationObj ListPkg	{joint-iso-ccitt ms(9) function(2) part22(22) package(4) 1}		c3		

c1: If not (C.20/1b) then m else –.

c2: If C.22/1 or C.22/3 then m else –.

c3: If "the requester-confirmation object relationship is one-way from requester to confirmation object or reciprocal." then m else –.

Attributes

The supplier of the implementation shall state whether or not the attributes specified by all packages instantiated in a managed object of this class are supported, in the "Support" and "Additional information" columns in Table C.23/MOCS. The supplier of the implementation shall indicate support for each of the operations for each attribute supported.

Table C.23/MOCS – Attribute support

				Set by Create		Get		Replace	
Index	Attribute template label	Value of object identifier for attribute	Constraints and values	Status	Support	Status	Support	Status	Support
1	allomorphs	{smi2AttributeID 50}		x		c1		x	
2	nameBinding	{smi2AttributeID 63}		–		m		x	
3	objectClass	{smi2AttributeID 65}		–		m		x	
4	packages	{smi2AttributeID 66}		–		c2		x	
5	responseConfirmation ObjectIndList	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 4}		c3		c3		c3	
6	responseRequesterId	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 7}		–		x		x	

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Table C.23/MOCS – Attribute support *(concluded)*

	Add		Remove		Set to Default		
Index	Status	Support	Status	Support	Status	Support	Additional information
1	x		x		x		
2	x		x		x		
3	x		x		x		
4	x		x		x		
5	x		x		x		
6	x		x		x		
c1: If not (C.20/1b) then m else –. c2: If C.22/2 then m else –. c3: If C.22/3 then m else –.							

Attribute groups

There are no attribute groups defined for the managed object class.

Actions

There are no actions defined for this object class

Notifications

There are no notifications defined for this object class

Parameters

There are no parameters defined for this object class

C.8 Statement of conformance to the route object class

Table C.24/MOCS – Managed object class support

Index	Managed object class template label	Value of object identifier for class	Support of all mandatory features	Is the actual class the same as the managed object class to which conformance is claimed? (Y/N)
1	route	{joint-iso-ccitt ms(9) function(2) part22(22) managedObjectClass(3) 6}		

If the answer to the actual class question in the managed object class support table is no, the supplier of the implementation shall fill in the actual class support in Table C.25/MOCS.

Table C.25/MOCS – Actual class support

Index	Actual managed object class template label	Value of object identifier for actual class	Additional information
1			
2			

Packages

The supplier of the implementation shall state whether or not the conditional packages specified by this class are supported by an instance of this class, in the "Support" and "Additional information" columns in Table C.26/MOCS.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

Table C.26/MOCS – Package support

Index	Package template label	Value of object identifier for package	Constraints and values	Status	Support	Additional information
1	allomorphicPackage	{smi2Package 17}		c1		
2	packagesPackage	{smi2Package 16}		c2		
c1: If not (C.24/1b) then m else –. c2: If C.26/1 then m else –.						

Attributes

The supplier of the implementation shall state whether or not the attributes specified by all packages instantiated in a managed object of this class are supported, in the "Support" and "Additional information" columns in Table C.27/MOCS. The supplier of the implementation shall indicate support for each of the operations for each attribute supported.

Table C.27/MOCS – Attribute support

				Set by Create		Get		Replace	
Index	Attribute template label	Value of object identifier for attribute	Constraints and values	Status	Support	Status	Support	Status	Support
1	allomorphs	{smi2AttributeID 50}		x		c1		x	
2	nameBinding	{smi2AttributeID 63}		–		m		x	
3	objectClass	{smi2AttributeID 65}		–		m		x	
4	packages	{smi2AttributeID 66}		–		c2		x	
5	routeId	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 13}		–		m		x	

Table C.27/MOCS – Attribute support *(concluded)*

	Add		Remove		Set to Default		
Index	Status	Support	Status	Support	Status	Support	Additional information
1	x		x		x		
2	x		x		x		
3	x		x		x		
4	x		x		x		
5	x		x		x		
c1: If not (C.24/1b) then m else –. c2: If C.26/2 then m else –.							

Attribute groups

There are no attribute groups defined for the managed object class.

Actions

There are no actions defined for this object class

Notifications

There are no notifications defined for this object class

Parameters

There are no parameters defined for this object class

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Annex D[4)]

MRCS proforma

(This annex does not form an integral part of this Recommendation I International Standard)

D.1 Introduction

The purpose of this MRCS proforma is to provide a mechanism for a supplier of an implementation which claims conformance, in the manager role, to management information specified in this Recommendation I International Standard, to provide conformance information in a standard form.

D.2 Instructions for completing the MRCS

The MRCS proforma contained in this annex is comprised of information in tabular form, in accordance with ITU-T Rec. X.724 I ISO/IEC 10165-6. In addition to the general guidance given in ITU-T Rec. X.724 I ISO/IEC 10165-6, the Additional information column shall be used to identify the object classes for which the management operations are supported. The supplier of the implementation shall state which items are supported in tables below and if necessary, provide additional information.

D.3 Managed relationship support

The supplier of the implementation shall state the relationship class and the role binding supported using Table D.1.

Table D.1 – Managed relationship support

Index	Relationship class template label	Value of object identifier for relationship class	Relationship mapping template label	Value of object identifier for relationship mapping	Status	Support	Additional information
1	responseMonitoring Relationship	{part22-rel 1}					

D.4 Roles support

For each object identified in the role binding, the supplier of the implementation shall indicate support using Table D.2. If there are packages specified for the role, the supplier of the implementation shall indicate support using Table D.3.

Table D.2 – Roles support

Index	Role label	Constraints and values	Status	Support	Value of object identifier for actual participants managed object class	MOCS reference for actual participants managed object class	Additional information
1	responseRequesterRole		m				
2	responseConfirmationRole		m				
3	responseMonitorRole		m				
4	responseRouteRole		o				

4) **Copyright release for MRCS proforma**

Users of this Recommendation I International Standard may freely reproduce the MRCS proforma in this annex so that it can be used for its intended purpose, and may further publish the completed MRCS.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

D.5 Relationship management operations, notifications, and parameters support

The supplier of implementation shall indicate the relationship management operations and notifications supported Table D.3.

Table D.3 – Relationship management operations, notifications, and parameters support

Index	Relationship management operation or notification	Systems management operator or notification	Constraints and values	Status	Support	Additional information
1	ESTABLISH					
2	TERMINATE					
3	BIND route role					
4	UNBIND route role					
5	QUERY bound object					
6	NOTIFY object creation					
7	NOTIFY object deletion					

NOTE – Systems management operation or notification column to be filled in by proforma specifier of each specific relationship mapping defined.

D.6 Relationship object support

The supplier of the implementation shall indicate support for the relationship object class, if any, specified in the relationship mapping template by using the MOCS proforma defined in ITU-T Rec. X.724 | ISO/IEC 10165-6. The relationship object class shall be a subclass of genericRelationshipObject.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

Annex E[5)]

MICS proforma

(This annex does not form an integral part of this Recommendation I International Standard)

E.1 Introduction

The purpose of this MICS proforma is to provide a mechanism for a supplier of an implementation which claims conformance, in the manager role, to management information specified in this Recommendation I International Standard, to provide conformance information in a standard form.

E.2 Instructions for completing the MICS proforma to produce a MICS

The MICS proforma contained in this annex is comprised of information in tabular form, in accordance with ITU-T Rec. X.724 I ISO/IEC 10165-6. In addition to the general guidance given in ITU-T Rec. X.724 I ISO/IEC 10165-6, the Additional information column shall be used to identify the object classes for which the management operations are supported. The supplier of the implementation shall state which items are supported in tables below and if necessary, provide additional information.

E.3 Statement of conformance to the management information

E.3.1 Attributes

The specifier of a manager role implementation that claims to support the attributes specified in this Recommendation I International Standard shall import a copy of this table and complete it.

Table E.1/MICS – Attribute support

				Set by Create		Get		Replace	
Index	Attribute template label	Value of object identifier for attribute	Constraints and values	Status	Support	Status	Support	Status	Support
1	allomorphs	{smi2AttributeID 50}	–	x		o		x	
2	nameBinding	{smi2AttributeID 63}	–	–		o		x	
3	objectClass	{smi2AttributeID 65}	–	–		o		x	
4	packages	{smi2AttributeID 66}	–	–		o		x	
5	responseConfirmationObjectId	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 2}	–	–		x		x	
6	responseRequesterIndList	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 9}	–	o		o		o	
7	additionalInformation	{smi2AttributeID 6}	–	–		o		x	
8	additionalText	{smi2AttributeID 7}	–	–		o		x	
9	correlatedNotifications	{smi2AttributeID 12}	–	–		o		x	
10	eventTime	{smi2AttributeID 13}	–	–		o		x	
11	eventType	{smi2AttributeID 14}	–	–		o		x	
12	loggingTime	{smi2AttributeID 59}	–	–		o		x	
13	logRecordId	{smi2AttributeID 3}	–	–		o		x	
14	managedObjectClass	{smi2AttributeID 60}	–	–		o		x	

5) **Copyright release for MICS proforma**

Users of this Recommendation I International Standard may freely reproduce this MICS proforma in this annex so that it can be used for its intended purpose, and may further publish the completed MICS.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Table E.1/MICS – Attribute support *(continued)*

				Set by create		Get		Replace	
Index	Attribute template label	Value of object identifier for attribute	Constraints and values	Status	Support	Status	Support	Status	Support
15	managedObjectInstance	{smi2AttributeID 61}	–	–		o		x	
16	notificationIdentifier	{smi2AttributeID 16}	–	–		o		x	
17	requestIdentifier	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 1}	–	–		o		x	
18	responseMonitorId	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 6}	–	–		o		x	
19	responseRequesterInd	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 8}	–	–		o		x	
20	responseSync	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 10}	–	–		o		x	
21	responseTime	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 11}	–	–		o		x	
22	responseTimeout	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 12}	–	o		o		o	
23	availabilityStatus	{smi2AttributeID 33}	–	–		o		x	
24	intervalsOfDay	{smi2AttributeID 57}	–	o		o		o	
25	monitoredUnitLength	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 15}	–	o		o		o	
26	operationalState	{smi2AttributeID 35}	–	–		o		x	
27	responseDelayTime	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 5}	–	–		o		x	
28	responseLength	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 17}	–	–		o		x	
29	responseRequestLength	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 16}	–	–		o		x	
30	routeList	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 14}	–	–		x		x	
31	schedulerName	{smi2AttributeID 67}	–	–		o		x	
32	startTime	{smi2AttributeID 68}	–	o		o		o	
33	stopTime	{smi2AttributeID 69}	–	o		o		o	
34	weekMask	{smi2AttributeID 71}	–	o		o		o	

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Table E.1/MICS – Attribute support *(concluded)*

	Add		Remove		Set to Default		
Index	Status	Support	Status	Support	Status	Support	Additional information
1	x		x		x		
2	x		x		x		
3	x		x		x		
4	x		x		x		
5	x		x		x		
6	x		x		x		
7	x		x		x		
8	x		x		x		
9	x		x		x		
10	x		x		x		
11	x		x		x		
12	x		x		x		
13	x		x		x		
14	x		x		x		
15	x		x		x		
16	x		x		x		
17	x		x		x		
18	x		x		x		
19	x		x		x		
20	x		x		x		
21	x		x		x		
22	x		x		x		
23	x		x		x		
24	o		o		o		
25	x		x		x		
26	x		x		x		
27	x		x		x		
28	x		x		x		
29	x		x		x		
30	o		o		x		
31	x		x		x		
32	x		x		x		
33	x		x		o		
34	o		o		o		

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Table E.2/MICS – Notification support

Index	Notification type template label	Value of object identifier for notification type	Constraints and values	Status	Support		Additional information
					Con-firmed	Non-confirmed	
1	qualityofServiceAlarm	{smi2Notification 11}		c1			
2	responseConfirmation	{joint-iso-ccitt ms(9) function(2) part22(22) notification(10) 1}		c2			
c1: If C.17/9 then m else –. c2: If C.17/8 then m else –.							

Table E.2/MICS – Notification support *(concluded)*

Index	Sub-index	Notification field name label	Value of object identifier of attribute type associated with field	Constraints and values	Status	Support	Additional information
1	1.1	additionalInformation	{smi2AttributeID 6}		c:o		
	1.1.1	identifier	–		c:m		
	1.1.2	significance	–		c:m		
	1.1.3	information	–		c:m		
	1.2	additionalText	{smi2AttributeID 7}		c:o		
	1.3	backedUpStatus	{smi2AttributeID 11}		c:o		
	1.4	backUpObject	{smi2AttributeID 40}		c:o		
	1.4.1	objectName	–		c:o.1		
	1.4.1.1	distinguishedName	–		c:o.2		
	1.4.1.1.1	AttributeType	–		c:m		
	1.4.1.1.2	AttributeValue	–		c:m		
	1.4.1.2	nonSpecificForm	–		c:o.2		
	1.4.1.3	localDistinguishedName	–		c:o.2		
	1.4.1.3.1	AttributeType	–		c:m		
	1.4.1.3.2	AttributeValue	–		c:m		
	1.4.2	noObject	–		c:o.1		
	1.5	correlatedNotifications	{smi2AttributeID 12}		c:o		
	1.5.1	correlatedNotifications	–		c:m		
	1.5.2	sourceObjectInst	–		c:o		
	1.5.2.1	distinguishedName	–		c:o.3		
	1.5.2.1.1	AttributeType	–		c:m		
	1.5.2.1.2	AttributeValue	–		c:m		
	1.5.2.2	nonSpecificForm	–		c:o.3		
	1.5.2.3	localDistinguishedName	–		c:o.3		
	1.5.2.3.1	AttributeType	–		c:m		
	1.5.2.3.2	AttributeValue	–		c:m		

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

Index	Sub-index	Notification field name label	Value of object identifier of attribute type associated with field	Constraints and values	Status	Support	Additional information
	1.6	monitoredAttributes	{smi2AttributeID 15}		c:o		
	1.6.1	attributeId	–		c:m		
	1.6.1.1	globalForm	–		c:o.4		
	1.6.1.2	localForm	–		c:o.4		
	1.6.2	attributeValue	–		c:m		
	1.7	notificationIdentifier	{smi2AttributeID 16}		c:o		
	1.8	perceivedSeverity	{smi2AttributeID 17}		c:m		
	1.9	probableCause	{smi2AttributeID 18}		c:m		
	1.9.1	globalValue	–		c:o.5		
	1.9.2	localValue	–		c:o.5		
	1.10	proposedRepairActions	{smi2AttributeID 19}		c:o		
	1.10.1	OBJECT IDENTIFIER	–		c:o.6		
	1.10.2	INTEGER	–		c:o.6		
	1.11	specificProblems	{smi2AttributeID 27}		c:o		
	1.11.1	OBJECT IDENTIFIER	–		c:o.7		
	1.11.2	INTEGER	–		c:o.7		
	1.12	stateChangeDefinition	{smi2AttributeID 28}		c:o		
	1.12.1	attributeID	–		c:m		
	1.12.1.1	globalForm	–		c:o.8		
	1.12.1.2	localForm	–		c:o.8		
	1.12.2	oldAttributeValue	–		c:o		
	1.12.3	newAttributeValue	–		c:m		
	1.13	thresholdInfo	{smi2AttributeID 29}		c:o		
	1.13.1	triggeredThreshold	–		c:m		
	1.13.1.1	globalForm	–		c:o.9		
	1.13.1.2	localForm	–		c:o.9		
	1.13.2	observedValue	–		c:m		
	1.13.2.1	integer	–		c:o.10		
	1.13.2.2	real	–		c:o.10		
	1.13.3	thresholdLevel	–		c:o		
	1.13.3.1	up	–		c:o.11		
	1.13.3.1.1	high	–		c:m		
	1.13.3.1.1.1	integer	–		c:o.12		
	1.13.3.1.1.2	real	–		c:o.12		
	1.13.3.1.2	low	–		c:o		
	1.13.3.1.2.1	integer	–		c:o.13		
	1.13.3.1.2.2	real	–		c:o.13		
	1.13.3.2	down	–		c:o.11		
	1.13.3.2.1	high	–		c:m		
	1.13.3.2.1.1	integer	–		c:o.14		
	1.13.3.2.1.2	real	–		c:o.14		

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Index	Sub-index	Notification field name label	Value of object identifier of attribute type associated with field	Constraints and values	Status	Support	Additional information
	1.13.3.2.2	low	–		c:m		
	1.13.3.2.2.1	integer	–		c:o.15		
	1.13.3.2.2.2	real	–		c:o.15		
	1.13.4	armTime	–		c:o		
	1.14	trendIndication	{smi2AttributeID 30}		c:o		
2	2.1	additionalInformation	{smi2AttributeID 6}		c:o		
	2.1.1	identifier	–		c:m		
	2.1.2	significance	–		c:m		
	2.1.3	information	–		c:m		
	2.2	additionalText	{smi2AttributeID 7}		c:o		
	2.3	correlatedNotifications	{smi2AttributeID 12}		c:o		
	2.3.1	correlatedNotifications	–		c:m		
	2.3.2	sourceObjectInst	–		c:o		
	2.3.2.1	distinguishedName	–		c:o.16		
	2.3.2.1.1	AttributeType	–		c:m		
	2.3.2.1.2	AttributeValue	–		c:m		
	2.3.2.2	nonSpecificForm	–		c:o.16		
	2.3.2.3	localDistinguishedName	–		c:o.16		
	2.3.2.3.1	AttributeType	–		c:m		
	2.3.2.3.2	AttributeValue	–		c:m		
	2.4	monitoredUnitLength	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 15}		c:o		
	2.4.1	eachPDULength	–		c:o.17		
	2.4.2	bitLength	–		c:o.17		
	2.4.3	octetLength	–		c:o.17		
	2.5	notificationIdentifier	{smi2AttributeID 16}		c:o		
	2.6	requestIdentifier	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 1}		c:m		
	2.6.1	number	–		c:o.18		
	2.6.2	invokeID	–		c:o.18		
	2.6.3	identifier	–		c:o.18		
	2.7	responseConfirmationObjectInd	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 3}		c:m		
	2.7.1	distinguishedName	–		c:o.19		
	2.7.1.1	AttributeType	–		c:m		
	2.7.1.2	AttributeValue	–		c:m		
	2.7.2	nonSpecificForm	–		c:o.19		

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Index	Sub-index	Notification field name label	Value of object identifier of attribute type associated with field	Constraints and values	Status	Support	Additional information
	2.7.3	localDistinguishedName	–		c:o.19		
	2.7.3.1	AttributeType	–		c:m		
	2.7.3.2	AttributeValue	–		c:m		
	2.8	responseDelayTime	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 5}		c:o		
	2.8.1	days	–		c:o.20		
	2.8.2	hours	–		c:o.20		
	2.8.3	minutes	–		c:o.20		
	2.8.4	seconds	–		c:o.20		
	2.8.5	milliSeconds	–		c:o.20		
	2.8.6	microSeconds	–		c:o.20		
	2.8.7	nanoSeconds	–		c:o.20		
	2.8.8	picoSeconds	–		c:o.20		
	2.9	responseLength	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 17}		c:o		
	2.9.1	integer	–		c:o.21		
	2.9.2	real	–		c:o.21		
	2.10	responseMonitorId	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 6}		c:m		
	2.10.1	number	–		c:o.22		
	2.10.2	string	–		c:o.22		
	2.11	responseRequesterInd	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 8}		c:m		
	2.11.1	distinguishedName	–		c:o.23		
	2.11.1.1	AttributeType	–		c:m		
	2.11.1.2	AttributeValue	–		c:m		
	2.11.2	nonSpecificForm	–		c:o.23		
	2.11.3	localDistinguishedName	–		c:o.23		
	2.11.3.1	AttributeType	–		c:m		
	2.11.3.2	AttributeValue	–		c:m		
	2.12	responseRequestLength	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 16}		c:o		
	2.12.1	integer	–		c:o.24		
	2.12.2	real	–		c:o.24		
	2.13	responseSync	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 10}		c:m		
	2.14	responseTime	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 11}		c:m		

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Index	Sub-index	Notification field name label	Value of object identifier of attribute type associated with field	Constraints and values	Status	Support	Additional information
	2.14.1	days	–		c:o.25		
	2.14.2	hours	–		c:o.25		
	2.14.3	minutes	–		c:o.25		
	2.14.4	seconds	–		c:o.25		
	2.14.5	milliSeconds	–		c:o.25		
	2.14.6	microSeconds	–		c:o.25		
	2.14.7	nanoSeconds	–		c:o.25		
	2.14.8	picoSeconds	–		c:o.25		
	2.15	responseTimeout	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 12}		c:o		
	2.15.1	days	–		c:o.26		
	2.15.2	hours	–		c:o.26		
	2.15.3	minutes	–		c:o.26		
	2.15.4	seconds	–		c:o.26		
	2.15.5	milliSeconds	–		c:o.26		
	2.15.6	microSeconds	–		c:o.26		
	2.15.7	nanoSeconds	–		c:o.26		
	2.15.8	picoSeconds	–		c:o.26		
	2.16	routeList	{joint-iso-ccitt ms(9) function(2) part22(22) attribute(7) 14}		c:m		
	2.16.1	distinguishedName	–		c:o.27		
	2.16.1.1	AttributeType	–		c:m		
	2.16.1.2	AttributeValue	–		c:m		
	2.16.2	nonSpecificForm	–		c:o.27		
	2.16.3	localDistinguishedName	–		c:o.27		
	2.16.3.1	AttributeType	–		c:m		
	2.16.3.2	AttributeValue	–		c:m		

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Annex F

An Example Procedure to Summarize Histogram Data

(Informative Example)

(This annex does not form an integral part of this Recommendation | International Standard)

The following is an example of the management procedure in the case that a number of PDUs whose response times are more than 5 seconds and a number of PDUs whose response times are less than 5 seconds are respectively counted as a histogram data.

1) A manager system sets the discriminator construct which selects response confirmation notification whose response time is less than 5 seconds to one of the two eventDiscriminationCounter MO instances. And it sets the other discriminator construct which selects response confirmation notification whose response time is more than 5 seconds to the other eventDiscriminationCounter MO instance. Where, both the constructs are set to select notifications including the specified invoke ID value, "255".

2) When response PDU is received by the response requester, a response confirmation notification is created from the response monitor.

3) The created notification is inputted to both eventDiscriminationCounters and discriminated. If one of the discriminator construct evaluate the notification to TRUE, the eventDiscriminationCounter increments the counter of itself.

4) The counter values are reported as the histogram data by a metricScanner MO instance which scans the difference values of counter attribute in the two eventDiscriminationCounter instances.

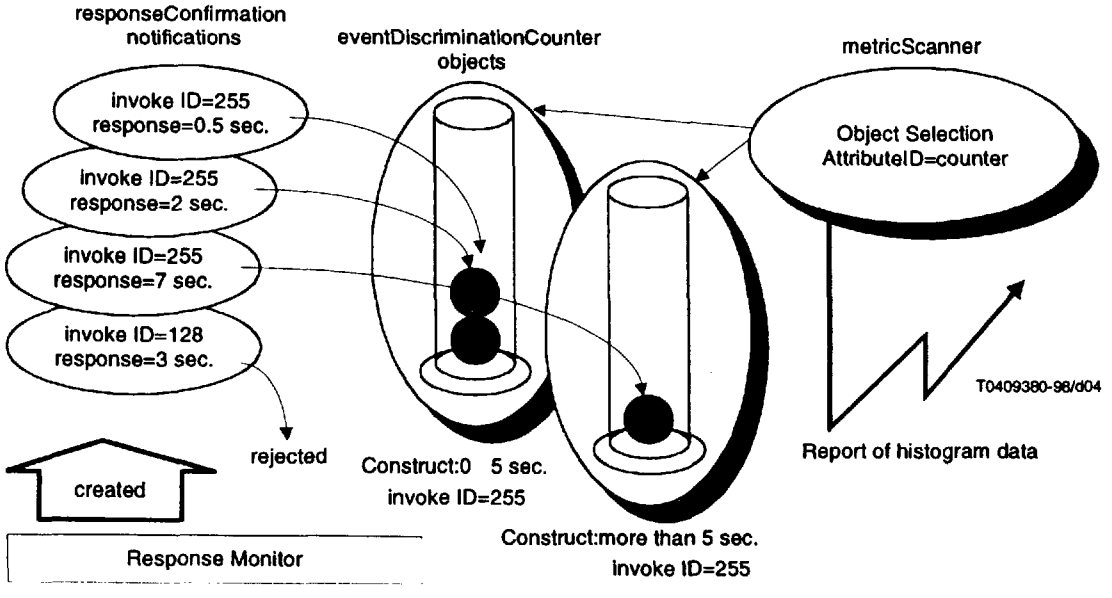


Figure F.1 – An Example to summarize histogram data

NOTE – When histogram generation mechanism using EDC is supported, strict time accuracy of clocks for both the responseMonitor role object and the EDC object is not required because response times are decided in the response-requester role object (above mentioned). But, in this case, rough clock accuracy is needed. Namely, EDC has the timeout time until when responses requested in a specified interval time are counted. If the drift of clocks is over the timeout time, response times that should be counted shall not be counted by that EDC instance. So, such a notice should be described in the RTM function document.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Annex G

An example to summarize statistics on response times

(This annex does not form an integral part of this Recommendation I International Standard)

G.1 Statistics for periodical response-request

If the sampled data is periodical-(request)event type which samples are created periodically and the statistical data is not raw frequency distribution data for discrete probability variable, for example histogram data or bar diagram data, the scanning objects specified in ITU-T Rec. X.739 I ISO/IEC 10164-11 or ITU-T Rec. X.738 I ISO/IEC 10164-13 may be used to summarize the statistical data or it's estimation.

G.2 Statistics for irregular response-request

If the sampled data is irregular-(request)event type which samples are generated irregularly, the dynamic scanner objects specified in ITU-T Rec. X.738 I ISO/IEC 10164-13 or it's subclass objects may be used to summarize the statistical data.

G.3 Summarization of frequency distribution (ex., histogram data)

Whether the response-request type is periodical or irregular, this specification provides one model to create frequency distribution(ex., histogram data) of response information (response time) and to monitor the frequency distribution data by using the response confirmation notification generated from a response monitoring role object (see Figure G.1). The template and ASN.1 definitions that support this model are defined in ITU-T Rec. X.753 I ISO/IEC 10164-21.

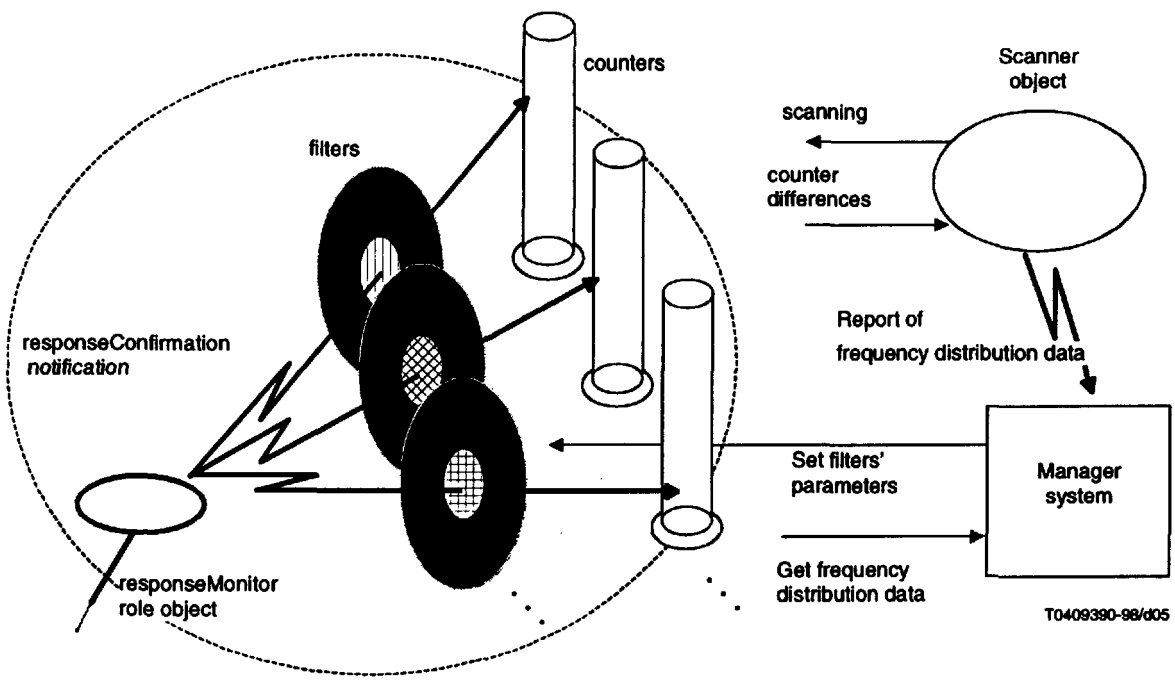


Figure G.1 – Summarization Model of Frequency Distribution on Response Information

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

All the response confirmation notifications are inputted to all the filters. Values indicating a monitored response relationship are set to the filters. The associated response time area is set to the filter. If the filter evaluates to TRUE, the counter associated with each filter is incremented. The counter differences are periodically scanned by the scanner objects and reported to a manager as a frequency distribution.

NOTE – For example, CMIS filters (defined in ITU-T Rec. X.711 | ISO/IEC 9596-1) and one metric scanner (defined in SC21 N 8807: Enhanced Scanner Objects – Second Working Draft) can be used as the filters and the scanner object. This example is described in Annex B and C. We can also choose BucketDescriptionList defined in ISO/IEC 10164-13/DAM2 as the filter to generate only histogram data.

Response monitor role object has optionally a frequency distribution package. This package includes a filter list attribute which represents the contents set in the filters and a counter value list attribute each element of which represents a counter value and the associated filter identifier. The value of filter attribute can be directly changed by the manager. The counter value can be directly got and set to only "0" by the manager.

If the frequency distribution package is present, response monitor role object has optionally a summarizeFrequency package which has counter attribute identifiers which may be specified and observed by external scanner objects.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

ICS 35.100.70

Price based on 83 pages

© ISO/IEC 2000 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS

Not for Resale