Stable Implementation Agreements for Open Systems Interconnection Protocols: Part 18 - Network Management

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Foreword

This part of the Stable Implementation Agreements was prepared by the Network Management Special Interest Group (NMSIG) of the National Institute of Standards and Technology (NIST) Workshop for Implementors of Open Systems Interconnection (OSI). See Procedures Manual for Workshop charter.

Text in this part has been approved by the Plenary of the above–mentioned Workshop.

To highlight textual changes since the last Workshop output, additions to the text in this part are marked with redlining; deleted text is left in but marked with strikeouts.

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0 Introduction

Within the community of OSI researchers, users, and vendors, there is a recognized need to address the problems of initiating, terminating, monitoring, and controlling communication activities and assisting in their harmonious operation, as well as handling abnormal conditions. The activities that address these problems are collectively called network management.

Network management can be viewed as the set of operational and administrative mechanisms necessary to:

a. bring up, enroll, and/or alter network resources,

b. keep network resources operational,

c. fine tune these resources and/or plan for their expansion,

d. manage the accounting of their usage, and

e. manage their protection from unauthorized use/tampering.

As such, network management is typically concerned with management activities in at least the following five functional areas: configuration management, fault management, performance management, accounting management, and security management. In order to accomplish these management activities, information must be exchanged among open systems.

In Part 18, there are Implementation Agreements (IA's) for providing interoperable OSI management information communication services among OSI systems. Also contained here are agreements on management information. These agreements pertain to the exchange of management information and management commands between open systems operating in a multivendor environment. For example, one goal is to ensure that a management system built by one vendor can manage objects built by another vendor.

1 Scope

The purpose of this Part (Part 18), is to provide implementation agreements that will enable independent vendors to supply customers with a diverse set of networking products that can be managed as part of an integrated environment. Where possible, these agreements are based upon OSI Network Management standards.

1.1 Phased Approach

Because of the broad scope of the subject, and given that OSI Systems Management standards are still evolving, it is reasonable to assume that a comprehensive set of network management implementation agreements will take a number of years to develop. To arrive at an initial set of implementation agreements in a timely fashion, a phased approach has been adopted.

This phased work approach will result in a series of implementation agreements based on the expanding scope of the OSI Systems Management standards. It is the intention of the NMSIG to define the content of each phase as a compatible superset of the previous Phases to ensure that Phase N products can interact with products based on the implementation agreements of earlier phases.

1.1.1 Alignment With Evolving Standards

In some cases, these phased implementation agreements may be based on DIS standards. As the relevant standards progress from DIS to IS, the agreements will be aligned in future phases.

When a defect is found in any of the management related standards, the reported defect may be technically resolved by the appropriate international technical committee with likely approval by the voting members pending for several months. Since relevant defects can't be ignored in an implementation, these agreements will note defect resolutions which have the tentative approval of the appropriate standards committee. These interim resolutions will be recorded in clause 4.

Once a defect resolution has been completed by the appropriate standards body, the agreed upon resolution will be incorporated into the next phase of these implementors agreements. If appropriate, a previous phase that relied on an interim resolution will be examined to determine whether errata should be issued to bring the original phase into line with the final resolution.

1.1.2 Definition of Phase 1

As a first step in this phased approach, the NMSIG has targeted an initial set of agreements that provide limited interoperable management in a heterogeneous vendor environment. They are the beginning of a comprehensive set of implementation agreements based on the emerging OSI Systems Management standards. Furthermore, these initial agreements allow the community to gain experience with OSI management standards as they emerge.

The focus of the Phase 1 agreements is to enable a managing process provided by one vendor to interoperate with an agent process provided by a different vendor to perform limited management on a set of managed objects.

The scope of Phase 1 implementation agreements is the following:

Management Functions:

Object Management Function [OMF],
State Management Function [STMF],
Attributes For Representing Relationships [ARR],
Alarm Reporting Function [ARF],
Event Report Management Function [ERMF].

Management Information:

Information Model, Naming, Guidelines and Templates for Defining Managed Objects

Management Communication:

CMIS/P, Association Policies, and Upper Layer Services Required

Management Objects:

Support Objects required for the above.

Editor's Note: [The relation of the MIL definitions in Annex A of the Working Document to Phase 1 IA's needs to be clarified.**]**

Conformance Criteria:

Conformance Criteria for the above functionality.

To accomplish these goals in a timely fashion, the following simplifying constraints have been reflected in the Phase 1 agreements:

1. No agreements are provided regarding management domains.

2. These agreements require only the following application service elements: the Association Control Service Element (ACSE), the Common Management Information Service Element (CMISE), Remote Operations Service Element (ROSE), and the System Management Application Service Element (SMASE).

3. These agreements do not require implementation of services defined by the Directory standards.

4. No agreements regarding the security of management are provided.

1.1.3 Future Phases

It is the intention of the NMSIG to freeze the content of Phase 1 when these agreements are progressed to Stable status. Alignment changes required as the standards progress from DIS to IS will be made in future phases.

As standards defining new functionality are progressed, the NMSIG will define future phases incorporating the new functionality as a compatible superset of previous phases.

2 Normative References

The following documents are referenced in the statements of the agreements relating to OSI network management. The notation "*" indicates that tentative object identifiers contained in these DIS–level documents are superseded by the NMSIG Phase 1 object identifiers contained in Annex B.2 of these agreements.

[ACSEP] ISO 8650, Information Processing Systems – Open Systems Interconnection – Protocol Specification for the Association Control Service Element (Revised Final Text of DIS 8650), ISO/IEC JTC1/SC21 N2327, 21 April 1988.

[ACSES] ISO 8649, Information Processing Systems – Open Systems Interconnection – Service Definition for the Association Control Service Element (Revised Final Text of DIS 8649), ISO/IEC JTC1/SC21 N2326, 21 April 1988.

[ADDRMVP] ISO/IEC 9596/DAD 2, Common Management Information Protocol Specification: Addendum 2 (Add/Remove Protocol), ISO/IEC JTC1/SC21, 1 February 1990.

[ADDRMVS] ISO/IEC 9595/DAD 2, Common Management Information Service Definition: Addendum 2 (Add/Remove Service), ISO/IEC JTC1/SC21, 1 February 1990.

[ARF]* ISO/IEC DIS 10164–4, Information Technology – Open Systems Interconnection – Systems Management – Part 4: Alarm Reporting Function, ISO/IEC JTC1/SC21 N4858, June 1990.

[ARR]* ISO/IEC DIS 10164–3, Information Technology – Open Systems Interconnection – Systems Management – Part 3: Attributes for Representing Relationships, ISO/IEC JTC1/SC21 N4857, June 1990.

[ASN1] ISO/IEC 8824, Information Technology – Open System Interconnection – Specification of Abstract Syntax Notation One (ASN.1), ISO/IEC JTC1/SC21 N4720, 30 April 1990.

[CANGETP] ISO/IEC 9596/DAD 1, Common Management Information Protocol Specification: Addendum 1 (CancelGet Protocol), ISO/IEC JTC1/SC21, 1 February 1990.

[CANGETS] ISO/IEC 9595/DAD 1, Common Management Information Service Definition: Addendum 1 (CancelGet Service), ISO/IEC JTC1/SC21, 1 February 1990.

[CMIP] ISO/IEC 9596–1, Information Technology – Open Systems Interconnection – Common Management Information Protocol Specification – Part 1: Specification, 24 November l990.

[CMIS] ISO/IEC 9595, Information Technology – Open Systems Interconnection – Common Management Information Service Definition, Common Management Information Service, 24 November 1990.

[DMI]* ISO/IEC DIS 10165–2, Information Technology – Open Systems Interconnection – Structure of Management Information – Part 2: Definition of Management Information, ISO/IEC JTC1/SC21 N4867, June 1990.

[ERMF]* ISO/IEC DIS 10164–5, Information Technology – Open Systems Interconnection – Systems Management – Part 5: Event Report Management Function, ISO/IEC JTC1/SC21 N4860, June 1990.

[ISPFRM] ISO/IEC TR 10000–1, Information Technology – Framework and Taxonomy of International Standardized Profiles – Part 1: Framework, ISO/IEC JTC1/SGFS N184, 9 February 1990.

[ISPSRVC] ISO/IEC TR 8509, Information Processing Systems – Open Systems Interconnection – Service Conventions, TC97/SC16/1646.

[MIM] ISO/IEC DIS 10165–1, Information Technology – Open Systems Interconnection – Management Information Services – Structure of Management Information – Part 1: Management Information Model, ISO/IEC JTC1/SC21 N5252, June 1990.

[OMF]* ISO/IEC DIS 10164–1, Information Technology – Open Systems Interconnection – Systems Management – Part 1: Object Management Function, ISO/IEC JTC1/SC21 N4855, June 1990.

[SMO]* ISO/IEC DIS 10040, Information Technology – Open Systems Interconnection – Systems Management Overview, ISO/IEC JTC1/SC21 N4865R, 16 June 1990.

[STMF]* ISO/IEC DIS 10164–2, Information Technology – Open Systems Interconnection – Systems Management – Part 2: State Management Function, ISO/IEC JTC1/SC21 N4856, June 1990.

3 Status

(Refer to the Working Implementation Agreements Document.)

4 Errata

Editor's Note: "Defect Report" material (including applicability) may be included here.

The following table indicates the clause, type, and reference document of technical errata to this part.

Erratum No.	Type	Referenced Document	Clause	Comment
1	Technical	NMSIG-91/08	6.4.5	This clause, previously clause 6.2.6, was modified and moved to clause 6.4.5 to clarify that it is intended as a support agreement for CMIP rather than a usage agreement for CMIS.

5 Management Functions and Services

5.1 General Agreements

5.1.1 Conventions Used In SMF Agreements

Each System Management Function defines a set of services referred to in this document as "SMF services". Agreements pertinent to SMF services are provided in the following subclauses. Each subclause contains a series of tables, as follows.

1. For each System Management Function, a table lists the SMF services encompassed by the function, whether each SMF service is currently within the scope of these agreements, and related management support objects (if any). Although a management support object may be **related** to a SMF service, it may or may not be **required** to provide the SMF service.

2. For each SMF service, a normative table references text agreements which constrain the usage and/or value of the associated service parameters. Text agreements defined elsewhere in this document are referenced by clause number. The lack of a reference signifies no agreement beyond the base standard.

These tables include codes which specify parameter usage for request, indication, response, and confirmation service primitives. These codes, defined in subclause 1.8.3 of these agreements (Classification of Conformance), in ISO/IEC TR 10000–1 (Framework and Taxonomy of ISPs) [ISPFRM], and in ISO/IEC TR 8509 (Service Conventions) [ISPSRVC], are repeated here for reader convenience:

M	Mandatory
O	Optional
C(p)	If Condition p exists, then parameter is mandatory; otherwise, the parameter is not applicable.
X	Excluded
I	Out Of Scope In these agreements, this means that, for the corresponding element, * implementations may use it outside the scope of these agreements, * conformance tests shall not be provided for it, * implementations may conform to other agreements where it is required, * no requirements are placed on either transmitter or receiver to support it, * receiver actions are unspecified when present.
-	Not Applicable
(=)	The value of the parameter is identical to the corresponding parameter in the interaction described by the preceding related service primitive.
U	The use of the parameter is a service-user option.

In addition, the convention "A>B" is used in normative tables to indicate both the usage specified by the base standard (A) and the additional constraint imposed by these agreements (B). This convention is intended to call attention to agreements which modify the usage of a service parameter.

Unless otherwise noted, conditional parameters (C) shall be present according to the conditions defined in [CMIS] and the referenced System Management Function base standard.

5.1.2 General Agreements Referenced By Many SMF Services

The following general agreements pertain to some or all of the System Management Function services defined throughout clause 5. Normative tables for each SMF service reference these general agreements where applicable. These agreements do not apply to SMF services and parameters which do not reference them.

5.1.2.1 Minimal Filter Complexity

If an implementation supports Multiple Object Selection, then it shall minimally support AND and OR with a set of two filter conditions (which shall not themselves be AND or OR), and NOT. In addition, the implementation shall support the filter conditions Equality, GreaterOrEqual, LessOrEqual, and Present. This means that a conforming implementation is not required to support compounds (AND or OR) with more than two items, and is not required to support the Substring filter condition. Additional filter items and conditions are beyond the scope of these agreements.

5.1.2.2 Mode Parameter Usage

All SMF Services mapped to CMIS M–EVENT–REPORT, M–ACTION, and M–SET shall allow either confirmed or unconfirmed Mode to be specified by the service invoker. The choice of Mode may be constrained by the managed object class definition.

5.2 Object Management Function Agreements

5.2.1 General Agreements

These agreements address the following SMF services defined by the object management standard [OMF]:

Table 1: Scope of Agreements Relating to SMF Services Defined by the Object Management Standard [OMF]

Object Management SMF Service	Within Scope Of Agreements	Related Management Support Objects
Object Creation Reporting	Yes	Event Forwarding Discriminator
Object Deletion Reporting	Yes	Event Forwarding Discriminator
Object Name Change Reporting	No	Event Forwarding Discriminator
Attribute Value Change Reporting	Yes	Event Forwarding Discriminator
PT-Create	Yes	
PT-Delete	Yes	
PT-Action	Yes	
PT-Set	Yes	
PT-Get	Yes	
PT-Event	Yes	Event Forwarding Discriminator

5.2.2 Object Creation Reporting

This subclause provides agreements pertinent to the Object Creation Reporting SMF service defined by section 9.1.1 of [OMF]. Relevant CMIS agreements defined in subclause 6.3.1 are repeated here for completeness.

Table 2: Agreements On Parameter Usage Pertinent to the Object Creation Reporting SMF Service

SMF Object Creation Reporting Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Invoke Identifier	M	M(=)		6.4
Mode	M	-	5.1.2.2	
Managed Object Class	M	U		6.4.5
Managed Object Instance	M	U		6.2.1
Object Creation	M	C(=)		6.4.5
Event Time	U	-		6.2.3
Create Information				
Source Indicator	U	-		6.3.1.1
Additional Create Information	U	-		6.3.1.1
Current Time	-	U		6.2.3
Event Reply	-	C		
Errors	-	C		6.4.4

5.2.3 Object Deletion Reporting

This subclause provides agreements pertinent to the Object Deletion Reporting SMF service defined by section 9.1.2 of [OMF]. Relevant CMIS agreements defined in subclause 6.3.1 are repeated here for completeness.

Table 3: Agreements On Parameter Usage Pertinent to the Object Deletion Reporting SMF Service

SMF Object Deletion Reporting Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Invoke Identifier	M	M(=)		6.4
Mode	M	-	5.1.2.2	
Managed Object Class	M	U		6.4.5
Managed Object Instance	M	U		6.2.1
Object Deletion	M	C(=)		6.4.5
Event Time	U	-		6.2.3
Delete Information				
Source Indicator	U	-		6.3.1.1
Additional Delete Information	U	-		6.3.1.1
Current Time	-	U		6.2.3
Event Reply	-	C		
Errors	-	C		6.4.4

5.2.4 Object Name Change Reporting

The Object Name Change Reporting SMF service is used by the managed system to report the renaming of a managed object instance to a managing system.

Use of the Object Name Change Reporting SMF service is beyond the scope of these agreements.

5.2.5 Attribute Value Change Reporting

This subclause provides agreements pertinent to the Attribute Value Change Reporting SMF service defined by section 9.1.4 of [OMF]. Relevant CMIS agreements defined in subclause 6.3.1 are repeated here for completeness.

Table 4: Agreements On Parameter Usage Pertinent to the Attribute Value Change Reporting SMF Service

SMF Attr Value Change Report Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Invoke Identifier	M	M(=)		6.4
Mode	M	-	5.1.2.2	
Managed Object Class	M	U		6.4.5
Managed Object Instance	M	U		6.2.1
Attribute Value Change	M	C(=)		6.4.5
Event Time	U	-		6.2.3
Attribute Change Information				
Attribute Change Definition				
Attribute ID	M	-		6.3.1.1
Old Attr Value	U	-		6.3.1.1
New Attribute Value	M	-		6.3.1.1
Source Indicator	U	-		6.3.1.1
Additional Change Information	U	-		6.3.1.1
Current Time	-	U		6.2.3
Event Reply	-	C		
Errors	-	C		6.4.4

5.2.6 PT-Create

This subclause provides agreements pertinent to the PT–Create SMF service defined by section 9.1.5 of [OMF]. Relevant CMIS agreements defined in subclause 6.3.5 are repeated here for completeness.

Table 5: Agreements On Parameter Usage Pertinent to the PT-Create SMF Service

SMF PT-Create Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Invoke Identifier	M	M(=)		6.4
Managed Object Class	M	C		6.4.5
Managed Object Instance	U	C		6.2.1, 6.3.5.1
Support Object Instance	U	-		6.2.1
Access Control	U	-		6.2.4
Reference Object Instance	U	-		6.2.1
Attribute List	U	C	[1]	6.4.5, 6.3.5.2
Current Time	-	U		6.2.3
Errors	-	C		6.4.4, 6.3.5.2

[1] This parameter shall be included in ALL success confirmations.

Editor's Note: It is unclear whether attributes such as objectClass and ID are permitted in the Attribute List parameter of the PT–CREATE request. This question has been submitted to ANSI X3T5.4. Depending upon the answer, it may be necessary to add an agreement stating that the Managed Object Class and Instance parameters override any values provided in the Attribute List parameter.

5.2.7 PT-Delete

This subclause provides agreements pertinent to the PT–Delete SMF service defined by section 9.1.6 of [OMF]. Relevant CMIS agreements defined in subclause 6.3.6 are repeated here for completeness.

Table 6: Agreements On Parameter Usage Pertinent to the PT-Delete SMF Service

SMF PT-Delete Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Invoke Identifier	M	M(=)		6.4

SMF PT-Delete Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Linked Id	-	C		6.4
Base Object Class	M	-		6.4.5
Base Object Instance	M	-		6.2.1
Scope	U	-		6.2.2.1
Filter	U	-	5.1.2.1	6.2.2.2
Access Control	U	-		6.2.4
Synchronization	U	-		6.2.2.3
Managed Object Class	-	C		6.4.5
Managed Object Instance	-	C		6.2.1
Current Time	-	U		6.2.3
Errors	-	C		6.3.6.1, 6.4.4

5.2.8 PT-Set

This subclause provides agreements pertinent to the PT–Set SMF service defined by section 9.1.8 of [OMF]. Relevant CMIS agreements defined in subclause 6.3.3 are repeated here for completeness.

Table 7: Agreements On Parameter Usage Pertinent to the PT-Set SMF Service

SMF PT-Set Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Invoke Identifier	M	M(=)		6.4
Linked Id	-	C		6.4
Mode	M	-	5.1.2.2	
Base Object Class	M	-		6.4.5
Base Object Instance	M	-		6.2.1
Scope	U	-		6.2.2.1

SMF PT-Set Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Filter	U	-	5.1.2.1	6.2.2.2
Access Control	U	-		6.2.4
Synchronization	U	-		6.2.2.3
Managed Object Class	-	C		6.4.5
Managed Object Instance	-	C		6.2.1
Modification List	M	-		6.4.5, 6.3.3.1, 6.3.3.3, 6.3.3.4
Attribute List	-	U		6.4.5, 6.3.3.1, 6.3.3.3
Current Time	-	U		6.2.3
Errors	-	C		6.3.3.2, 6.4.4

5.2.9 PT-Action

This subclause provides agreements pertinent to the PT–Action SMF service defined by section 9.1.7 of [OMF]. Relevant CMIS agreements defined in subclause 6.3.4 are repeated here for completeness.

Table 8: Agreements On Parameter Usage Pertinent to the PT-Action SMF Service

SMF PT-Action Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Invoke Identifier	M	M(=)		6.4
Linked Id	-	C		6.4
Mode	M	-	5.1.2.2	
Base Object Class	M	-		6.4.5
Base Object Instance	M	-		6.2.1
Scope	U	-		6.2.2.1

SMF PT-Action Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Filter	U	-	5.1.2.1	6.2.2.2
Access Control	U	-		6.2.4
Synchronization	U	-		6.2.2.3
Managed Object Class	-	C		6.4.5
Managed Object Instance	-	C		6.2.1
Action Type	M	C(=)		6.4.5
Action Information	U	-		
Current Time	-	U		6.2.3
Action Reply	-	C		
Errors	-	C		6.4.4

5.2.10 PT-Get

This subclause provides agreements pertinent to the PT–Get SMF service defined by section 9.1.9 of [OMF]. Relevant CMIS agreements defined in subclause 6.3.2 are repeated here for completeness.

Table 9: Agreements On Parameter Usage Pertinent to the PT-Get SMF Service

SMF PT-Action Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Invoke Identifier	M	M(=)		6.4
Linked Id	-	C		6.6
Base Object Class	M	-		6.4.5
Base Object Instance	M	-		6.2.1
Scope	U	-		6.2.2.1
Filter	U	-	5.1.2.1	6.2.2.2
Access Control	U	-		6.2.4

SMF PT-Action Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Synchronization	U	-		6.2.2.3
Attribute ID List	U	-		6.4.5
Managed Object Class	-	C		6.4.5
Managed Object Instance	-	C		6.2.1
Current Time	-	U		6.2.3
Attribute List	-	C		6.4.5, 6.3.2.1, 6.3.2.3
Errors	-	C		6.3.2.2, 6.4.4

5.2.11 PT-Event

This subclause provides agreements pertinent to the PT–Event SMF service defined by section 9.1.10 of [OMF]. Relevant CMIS agreements defined in subclause 6.3.1 are repeated here for completeness.

Table 10: Agreements On Parameter Usage Pertinent to the PT-Event SMF Service

SMF PT-Action Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Invoke Identifier	M	M(=)		6.4
Mode	M	-	5.1.2.2	
Managed Object Class	M	U		6.4.5
Managed Object Instance	M	U		6.2.1
Event Type	M	C(=)		6.4.5
Event Time	U	-		6.2.3
Event Information	U	-		6.3.1.1
Current Time	-	U		6.2.3
Event Reply	-	C		

SMF PT-Action Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Errors	-	C		6.4.4

5.3 State Management Function Agreements

5.3.1 General Agreements

These agreements address the following SMF services defined by the state management standard [STMF]:

Table 11: Scope of Agreements Relating to SMF Services Defined by the State Management Standard [STMF]

State Management SMF Service	Within Scope Of Agreements	Related Management Support Objects
State Change Reporting	Yes	Event Forwarding Discriminator

5.3.2 State Change Reporting

This subclause provides agreements pertinent to the State Change Reporting SMF service defined by section 9.3 of [STMF]. Relevant CMIS agreements defined in subclause 6.3.1 are repeated here for completeness.

Table 12: Agreements On Parameter Usage Pertinent to the State Change Reporting SMF Service

SMF State Change Report Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Invoke Identifier	M	M(=)		6.4
Mode	M	-	5.1.2.2	
Managed Object Class	M	U		6.4.5
Managed Object Instance	M	U		6.2.1

SMF State Change Report Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
State Change	M	U		6.4.5
Event Time	U	-		6.2.3
State Change Information				
Old Operational State	U	-		6.3.1.1
New Operational State	C	-		6.3.1.1
Old Usage State	U	-		6.3.1.1
New Usage State	C	-		6.3.1.1
Old Administrative State	U	-		6.3.1.1
New Administrative State	C	-		6.3.1.1
Old Repair Status	U	-		6.3.1.1
New Repair Status	C	-		6.3.1.1
Old Installation Status	U	-		6.3.1.1
New Installation Status	C	-		6.3.1.1
Old Availability Status	U	-		6.3.1.1
New Availability Status	C	-		6.3.1.1
Old Control Status	U	-		6.3.1.1
New Control Status	C	-		6.3.1.1
Additional State Change Info	U	-		6.3.1.1
Current Time	-	U		6.2.3
Event Reply	-	C		
Errors	-	C		6.4.4

5.4 Attributes For Representing Relationships Agreements

5.4.1 General Agreements

These agreements address the following SMF services defined by the Attributes For Representing Relationships standard [ARR]:

Table 13: Scope of Agreements Relating to SMF Services Defined by the Attributes For Representing Relationships Standard [ARR]

Attributes For Representing Relationships SMF Service	Within Scope Of Agreements	Related Management Support Objects
Relationship Change Reporting	Yes	Event Forwarding Discriminator

5.4.2 Relationship Change Reporting

This subclause provides agreements pertinent to the Relationship Change Reporting SMF service defined by section 9.3 of [ARR]. Relevant CMIS agreements defined in subclause 6.3.1 are repeated here for completeness.

Table 14: Agreements On Parameter Usage Pertinent to the Relationship Change Reporting SMF Service

SMF Rel Change Report Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Invoke Identifier	M	M(=)		6.4
Mode	M	-	5.1.2.2	
Managed Object Class	M	U		6.4.5
Managed Object Instance	M	U		6.2.1
Relationship Change	M	U		6.4.5
Event Time	U	-		6.2.3
Relationship Change Information				

SMF Rel Change Report Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Old UserObject	U	-		6.3.1.1
New UserObject	C	-		6.3.1.1
Old ProviderObject	U	-		6.3.1.1
New ProviderObject	C	-		6.3.1.1
Old Peer	U	-		6.3.1.1
New Peer	C	-		6.3.1.1
Old Primary	U	-		6.3.1.1
New Primary	C	-		6.3.1.1
Old Secondary	U	-		6.3.1.1
New Secondary	C	-		6.3.1.1
Old BackUp Object Instance	U	-		6.3.1.1
New Backup Object Instance	C	-		6.3.1.1
Old BackedUp Object Instance	U	-		6.3.1.1
New BackedUp Object Instance	C	-		6.3.1.1
Old Owner	U	-		6.3.1.1
New Owner	C	-		6.3.1.1
Old Member	U	-		6.3.1.1
New Member	C	-		6.3.1.1
Additional Relationship Change Info	U	-		6.3.1.1
Current Time	-	U		6.2.3
Event Reply	-	C		
Errors	-	C		6.4.4

5.5 Alarm Reporting Function Agreements

5.5.1 General Agreements

These agreements address the following SMF services defined by the alarm reporting standard [ARF]:

Table 15: Scope of Agreements Relating to SMF Services Defined by the Alarm Reporting Standard [ARF]

Alarm Reporting SMF Service	Within Scope Of Agreements	Related Management Support Objects
Alarm Reporting	Yes	Event Forwarding Discriminator & Alarm Record

5.5.2 Alarm Reporting

This subclause provides agreements pertinent to the Alarm Reporting SMF service defined by section 9.3 of [ARF]. Relevant CMIS agreements defined in subclause 6.3.1 are repeated here for completeness.

Table 16: Agreements On Parameter Usage Pertinent to the Alarm Reporting SMF Service

SMF Alarm Reporting Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Invoke Identifier	M	M		6.4
Mode	M	-	5.1.2.2	
Managed Object Class	M	U		6.4.5
Managed Object Instance	M	U		6.2.1
Alarm Type	M	C(=)		6.4.5
Event Time	U	-		6.2.3
Alarm Information				
Probable Cause	M	-		6.3.1.1

SMF Alarm Reporting Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Specific Problems	U	-	[2]	6.3.1.1
Perceived Severity	M	-		6.3.1.1
Backup Object Instance	C	-	[1]	6.3.1.1
BackedUp Status	U	-		6.2.1
Trend Indication	U	-		6.3.1.1
Threshold Information	C	-		6.3.1.1
Notification Identifier	U	-	[3]	6.3.1.1
Correlated Notifications	U	-	[2]	6.3.1.1
Generic State Change	C	-		6.3.1.1
Monitored Attributes	U	-		6.3.1.1
Proposed Repair Action	U	-	[2]	6.3.1.1
Problem Text	U	-	[4]	6.3.1.1
Problem Data	U>I	-	[5]	6.3.1.1
Current Time	-	U		6.2.3
Event Reply	-	C		
Errors	-	C		6.4.4

[1] To avoid ambiguity, the Distinguished Name form of this parameter shall be implemented and may be used. Use of Local Distinguished Name and Non–Specific forms are beyond the scope of these agreements. If an implementation is unable to decode or understand the semantics of this parameter, an appropriate CMIS error (i.e., Invalid Attribute Value) shall be returned.

[2] To limit implementation complexity, the maximum number of SET items contained within the Specific Problems, Correlated Notifications, and Proposed Repair Action parameters which recipients must be able to process shall be 64.

[3] To limit implementation complexity, the maximum length of the Notification Id parameter shall be 32 bits.

[4] To limit implementation complexity, the maximum length of the Problem Text parameter which recipients must be able to process shall be 256 octets.

[5] Use of the Problem Data parameter is beyond the scope of these agreements.

5.6 Event Report Management Function Agreements

5.6.1 General Agreements

These agreements address the following SMF services defined by the event report management standard [ERMF]:

Table 17: Scope of Agreements Relating to SMF Services Defined by the Event Report Management Standard [ERMF]

Event Report Management SMF Service	Within Scope Of Agreements	Related Management Support Objects
Initiation of ERF	Yes	Event Forwarding Discriminator
Termination of ERF	Yes	Event Forwarding Discriminator
EFD Modification, Suspension, Resumption	Yes	Event Forwarding Discriminator

5.6.2 Initiation Of Event Report Forwarding

This subclause provides agreements pertinent to the Initiation of Event Report Forwarding SMF service defined by section 9.2 of [ERMF]. Relevant CMIS agreements defined in subclause 6.3.5 are repeated here for completeness.

Table 18: Agreements On Parameter Usage Pertinent to the Initiation of Event Report Forwarding SMF Service

SMF Initiation of ERF Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Invoke Identifier	M	M(=)		6.4

SMF Initiation of ERF Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Managed Object Class	M	C		6.4.5
Managed Object Instance	U	C		6.2.1, 6.3.5.1
Support Object Instance	U	-		6.2.1
Access Control	U	-		6.2.4
Reference Object Instance	U	-		6.2.1
Discriminator Construct	U	C	[1], 5.1.2.1	6.4.5, 6.3.5.2
Destination Address	U	C		6.4.5, 6.3.5.2
Backup Address	U	C		6.4.5, 6.3.5.2
Active Address	U	C		6.4.5, 6.3.5.2
Administrative State	U	C		6.4.5, 6.3.5.2
Operational State	-	C		6.4.5, 6.3.5.2
Usage State	-	C		6.4.5, 6.3.5.2
Availability Status	-	C		6.4.5, 6.3.5.2
Allomorphic List	U	C		6.4.5, 6.3.5.2
Packages	U	C		6.4.5, 6.3.5.2
Week Mask	U	C	[3]	6.4.5, 6.3.5.2
Intervals Of Day	U	C	[2]	6.4.5, 6.3.5.2
Start Time	U	C	[3]	6.4.5, 6.3.5.2
Stop Time	U	C	[3]	6.4.5, 6.3.5.2
Schedular Name	U>I	C>I	[4]	6.4.5, 6.3.5.2
Current Time	-	U		6.2.3
Errors	-	C		6.4.4, 6.3.5.2

[1] As specified in [CMIP], the value "AND {}" shall be used to represent an all–pass Discriminator Construct. If this parameter is omitted from the request, the all–pass value shall be assigned to the Discriminator Construct attribute.

[2] The Daily Scheduling Package, if supported by an object, shall support at minimum the default 24 hour interval.

[3] The Weekly Scheduling Package, if supported by an object, shall support the default values for Start Time and Stop Time attributes. The Week Mask attribute shall support scheduling for each day of the week, and, at a minimum, the default 24 hour period for intervals of the day.

[4] Support for the External Schedular Package is beyond the scope of these agreements.

5.6.3 Termination Of Event Report Forwarding

This subclause provides agreements pertinent to the Termination of Event Report Forwarding SMF service defined by section 9.3 of [ERMF]. Relevant CMIS agreements defined in subclause 6.3.6 are repeated here for completeness.

Table 19: Agreements On Parameter Usage Pertinent to the Termination of Event Report Forwarding SMF Service

SMF Termination of ERF Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Invoke Identifier	M	M(=)		6.4
Linked Id	-	C		6.4
Base Object Class	M	-		6.4.5
Base Object Instance	M	-		6.2.1
Scope	U	-		6.2.2.1
Filter	U	-	5.1.2.1	6.2.2.2
Access Control	U	-		6.2.4
Synchronization	U	-		6.2.2.3
Managed Object Class	-	C		6.4.5
Managed Object Instance	-	C		6.2.1
Current Time	-	U		6.2.3

SMF Termination of ERF Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Errors	-	C		6.3.6.1, 6.4.4

5.6.4 EFD Modification, Suspension, and Resumption

This subclause provides agreements pertinent to the Event Forwarding Discriminator Modification, Suspension, and Resumption SMF service defined by section 9.4 of [ERMF]. Relevant CMIS agreements defined in subclause 6.3.3 are repeated here for completeness.

Table 20: Agreements On Parameter Usage Pertinent to the Event Forwarding Discriminator Modification, Suspension, and Resumption SMF Service

SMF EFD Mod/Suspend/Resume Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Invoke Identifier	M	M(=)		6.4
Linked Id	-	C		6.4
Mode	M	-	5.1.2.2	
Base Object Class	M	-		6.4.5
Base Object Instance	M	-		6.2.1
Scope	U	-		6.2.2.1
Filter	U	-	5.1.2.1	6.2.2.2
Access Control	U	-		6.2.4
Synchronization	U	-		6.2.2.3
Managed Object Class	-	C		6.4.5
Managed Object Instance	-	C		6.2.1
Discriminator Construct	U	C	[1], 5.1.2.1	6.4.5, 6.3.3.1, 6.3.3.3, 6.3.3.4

SMF EFD Mod/Suspend/Resume Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Destination Address	U	C		6.4.5, 6.3.3.1, 6.3.3.3, 6.3.3.4
Backup Address	U	C		6.4.5, 6.3.3.1, 6.3.3.3, 6.3.3.4
Active Address	U	C		6.4.5, 6.3.3.1, 6.3.3.3, 6.3.3.4
Administrative State	U	C		6.4.5, 6.3.3.1, 6.3.3.3, 6.3.3.4
Allomorphic List	U	C		6.4.5, 6.3.3.1, 6.3.3.3, 6.3.3.4
Week Mask	U	C	[3]	6.4.5, 6.3.3.1, 6.3.3.3, 6.3.3.4
Intervals Of Day	U	C	[2]	6.4.5, 6.3.3.1, 6.3.3.3, 6.3.3.4
Start Time	U	C	[3]	6.4.5, 6.3.3.1, 6.3.3.3, 6.3.3.4
Stop Time	U	C	[3]	6.4.5, 6.3.3.1, 6.3.3.3, 6.3.3.4
Schedular Name	U>I	C>I	[4]	6.4.5, 6.3.3.1, 6.3.3.3, 6.3.3.4
Current Time	-	U		6.2.3

SMF EFD Mod/Suspend/Resume Parameter	Req	Rsp	SMF Agreements	CMIS Agreements
Errors	-	C		6.3.3.2, 6.4.4

[1] As specified in [CMIP], the value "AND {}" shall be used to represent an all–pass Discriminator Construct.

[2] The Daily Scheduling Package, if supported by an object, shall support at minimum the default 24 hour interval.

[3] The Weekly Scheduling Package, if supported by an object, shall support the default values for Start Time and Stop Time attributes. The Week Mask attribute shall support scheduling for each day of the week, and, at a minimum, the default 24 hour period for intervals of the day.

[4] Support for the External Schedular Package is beyond the scope of these agreements.

5.7 Log Control Function Agreements

(Refer to the Working Implementation Agreements Document.)

6 Management Communications

This clause identifies, in detail, use of the management communications services and protocols, based on the standards defined in [CMIS], [CMIP], [ADDRMVS/P] and [CANGETS/P].

This clause covers the agreements pertaining to the use of associations over which to carry management PDUs, agreements pertaining to the services offered to a CMIS Service User (in terms of the functions defined in clause 5), agreements pertaining to the protocol used to convey the management PDUs, and agreements pertaining to the services required of other layers in order to convey the management PDUs defined.

6.1 Association Policies

Associations are established using the procedures described in [ACSEP].

6.1.1 Application Context Negotiation

These IAs specify the negotiation of application contexts as described in [SMO]. Other application contexts are outside the scope of these agreements.

6.1.2 Functional Unit Negotiation

These IAs specify that System Management Functional Units are negotiated as specified in [SMO].

6.1.3 Security Aspects of Associations

(Refer to the Working Implementation Agreements Document.)

6.2 General Agreements on Users of CMIS

These agreements are based on the standard defined in [CMIS], [CMIP], [ADDRMVP] and [ADDRMVS] constrain the users of CMIS services and not the implementation of CMIP itself.

6.2.1 Object Naming

Object Naming will be accomplished using Distinguished Name or Local Distinquished Name. Use of nonspecific form is outside the scope of these agreements.

6.2.2 Multiple Object Selection

Multiple Object Selection applies to all management operations except M–EVENT–REPORT, M–CREATE and M–CANCEL–GET.

6.2.2.1 Scoping

These network management IAs specify that scoping shall be used as specified in [CMIS] 6.5.1, 8.3.1.1.5, 8.3.2.1.6, 8.3.3.1.6, 8.3.5.1.5.

6.2.2.2 Filtering

These network management IAs specify that filtering shall be used as specified in [CMIS] 6.5.2, 8.3.1.1.6, 8.3.2.1.7, 8.3.3.1.7, 8.3.5.1.6.

If a system receives a filter parameter that it is unable to process, it shall return the error "complexity limitation", including the CMISFilter requested.

If, in the process of filtering from a set of selected entities, there are no managed objects selected, the system shall return an empty response consisting of an Invoke ID and no response argument.

6.2.2.3 Synchronization

In order to support interoperability between managing systems and managed systems, these network management IAs define that the default synchronization (i.e., BestEffort) shall be supported by all conforming systems. Atomic synchronization may also be supported as an option.

If a performer is unable to comply with a synchronization request specified by an invoker, the performer shall return the error "synchronization not supported" with the parameter indicating the synchronization not supported.

6.2.2.4 Multiple Replies

These network management IAs specify the use of multiple replies as specified in [CMIS] 7.1, 7.2.3.

6.2.3 Current/Event Time

The time value that is reported to CMIS, if provided, should be as close as possible to, but not before, the actual time that the operation to which the reported time value applies occurred. This constraint is stipulated to provide the most accurate timestamp for temporal ordering of operations and events on a single open system.

For these network management IAs, the encoding of the Current Time parameters is ASN.1 Generalised Time, UTC Type, as specified in [ASN1] clause 32.3, b) and c), with the precision of the time representation indicating the granularity of the time measurement. For example, the string 19890613123012.333–0500 represents a local time of 12:30:12 (and 333 msecs) on 13th June 1989, in a time zone which is 5 hours behind GMT.

6.2.4 Access Control

Conformant implementations are not required to use this field. The Access Control field, if provided by the invoker in CMIS request indicators, may be ignored by responding systems which do not support access control. These systems shall not reject a request on the basis of the presence of access information. The invoker may interpret this as acceptance of the access control parameter.

6.2.5 CMIS Functional Units

Only the Kernel Functional Unit must be supported. Other functional units except Extended Service are optional and their use shall be negotiated as specified in [CMIS]. Extended Service is not within the scope of these agreements. Negotiation for its "non use" shall be supported.

6.3 Specific Agreements on Users of CMIS

These agreements are based on the standard defined in [CMIS] and [ADDRMVS]. The agreements in this clause have been defined in terms of those capabilities necessary to support the functions and services defined in clause 5 (Management Functions and Services) of these agreements. These agreements constrain the users of CMIS services and not the implementation of CMIP itself.

The parameter presence information in the tables in this clause is repeated from [CMIS] and has the same meaning as in the standard. It is repeated for reader convenience. In addition, these tables provide references to text clauses where agreements are stated relative to parameters in each table. The lack of a reference signifies no agreement beyond the base standard.

6.3.1 M-EVENT-REPORT

The following agreements and clarifications, pertinent to section 8.2 of the base standard [CMIS] and section 6.3 of the base standard [CMIP] and regarding the M–EVENT–REPORT service, are included within these network management IAs.

Clause 5 (Management Functions and Services) of these agreements defines some of the types of Event Reports that may be sent.

6.3.1.1 Event Argument

All arguments defined for the particular event type of the managed object class (see clause 7, Management Information Agreements) for the M–EVENT–REPORT must be supplied in the Event Argument parameter. The Event Information and Event Reply parameters shall be supplied as specified for the event type.

6.3.1.2 Parameter Agreements

Conditional parameters (C) shall be included according to the conditions defined in [CMIS] unless those conditions are refined by the referenced agreement.

Table 21: M-EVENT REPORT Parameters

Item	Parameter Name	Req/Ind	Rsp/Conf	Text Reference
1	Invoke Identifier	M	M(=)	6.4
2	Mode	M	-	
3	Managed Object Class	M	U	6.4.5
4	Managed Object Instance	M	U	6.2.1
5	Event Type	M	C=	6.4.5
6	Event Time	U	-	6.2.3
7	Event Information	U	-	6.3.1.1
8	Current Time	-	U	6.2.3
9	Event Reply	-	C	
10	Errors	-	C	6.4.4

6.3.2 M-GET

The following agreements and clarifications, pertinent to section 8.3.1 of the base standard [CMIS] and section 6.4 of the base standard [CMIP] and regarding the M–GET service, are included within these network management IAs.

6.3.2.1 Successful Response

For a successful M–GET operation, the performer shall return (in the Attribute List parameter) either the attribute values for all attributes explicitly requested (in the Attribute Identifier List parameter), or the attribute values for all attributes defined for the managed object(s) selected (if the Attribute Identifier List is omitted).

6.3.2.2 Partially Successful or Unsuccessful Response

For a partially successful M–GET operation, where only some attribute values were retrieved, the performer shall return (in the Errors parameter, specifically encoded as GetListError) all attribute ids and their corresponding values that were successfully retrieved from the set of attributes selected as described above, together with all attribute ids, and the corresponding error codes, for each of the attributes for which errors were detected. All attributes requested by the invoker must be processed, with either a value or an error code returned for each.

6.3.2.3 Multiple Replies

For the final reply of a series of multiple relies or the single reply where no objects were selected when filtering has been specified, the GetResult is omitted. Hence Managed Object Class, Managed Object Instance, Current Time and Attribute List are all omitted in these cases.

6.3.2.4 Parameter Agreements

Conditional parameters (C) shall be included according to the conditions defined in [CMIS] unless those conditions are refined by the referenced agreement.

Table 22: M-GET Parameters

Item	Parameter Name	Req/Ind	Rsp/Conf	Text Reference
1	Invoke Identifier	M	M(=)	6.4
2	Linked Identifier	-	C	6.4
3	Base Object Class	M	-	6.4.5
4	Base Object Instance	M	-	6.2.1
5	Scope	U	-	6.2.2.1
6	Filter	U	-	6.2.2.2
7	Access control	U	-	6.2.4
8	Synchronization	U	-	6.2.2.3
9	Attribute Identifier List	U	-	6.4.5
10	Managed Object Class	-	C	6.4.5
11	Managed Object Instance	-	C	6.2.1
12	Current Time	-	U	6.2.3
13	Attribute list	-	C	6.4.5, 6.3.2.1, 6.3.2.3
14	Errors	-	C	6.3.2.2, 6.4.4

6.3.3 M-SET

The following agreements and clarifications, pertinent to section 8.3.2 of the base standard [CMIS] and section 6.5 of the base standard [CMIP] and regarding the M–SET service, are included within these network management IAs.

6.3.3.1 Successful Response

For a successful M–SET confirmed operation, the performer shall return (in the Attribute List parameter) the attribute values for all attributes explicitly specified (in the Attribute List parameter) indicating their new values.

6.3.3.2 Partially Successful or Unsuccessful Response

For a partially successful M–SET operation, where only some attribute values were modified, the performer shall return (in the Errors parameter, specifically encoded as SetListError) all attribute ids and their corresponding values that were successfully modified from the set of attributes ids and values supplied, and all attribute ids and the corresponding error codes for each of the attributes for which errors were detected. All attributes requested by the invoker must be processed, with either a value or an error code returned for each.

6.3.3.3 Multiple Replies

For the final reply of a series of multiple relies or the single reply where no objects were selected when filtering has been specified, the SetResult is omitted. Hence Managed Object Class, Managed Object Instance, Current Time and Attribute List are all omitted in these cases.

6.3.3.4 Add/Remove Response

Where multi–valued attributes are involved in an M–SET operation [ADDRMVS], the values returned after any modification operation must be the full set of values of that attribute and not just the values that were modified (e.g., added or removed).

6.3.3.5 Parameter Agreements

Conditional parameters (C) shall be included according to the conditions specified in [CMIS] unless those conditions are modified by the referenced agreements.

Table 23: M-SET Parameters

Item	Parameter Name	Req/Ind	Rsp/Conf	Text Reference
1	Invoke Identifier	M	M(=)	6.4
2	Linked Identifier	-	C	6.4
3	Mode	M	-	
4	Base Object Class	M	-	6.4.5
5	Base Object Instance	M	-	6.2.1
6	Scope	U	-	6.2.2.1
7	Filter	U	-	6.2.2.2
8	Access control	U	-	6.2.4
9	Synchronization	U	-	6.2.2.3
10	Managed Object Class	-	C	6.4.5
11	Managed Object Instance	-	C	6.2.1
12	Modification List	M	-	6.4.5, 6.3.3.1, 6.3.3.3, 6.3.3.4
13	Attribute List	-	U	6.4.5, 6.3.3.1, 6.3.3.3
14	Current Time	-	U	6.2.3
15	Errors	-	C	6.3.3.2, 6.4.4

6.3.4 M-ACTION

The following agreements and clarifications, pertinent to section 8.3.3 of the base standard [CMIS] and section 6.6 of the base standard [CMIP] and regarding the M–ACTION service, are included within these network management IAs.

6.3.4.1 Multiple Objects

When multiple objects are selected for an M–ACTION operation, there is no ordering implied among selected objects.

6.3.4.2 Parameter Agreements

Conditional parameters (C) shall be included according to the conditions defined in [CMIS] unless those conditions are modified by the referenced agreements.

Table 24: M-ACTION Parameters

Item	Parameter Name	Req/Ind	Rsp/Conf	Text Reference
1	Invoke Identifier	M	M(=)	6.4
2	Linked Identifier	-	C	6.4
3	Mode	M	-	
4	Base Object Class	M	-	6.4.5
5	Base Object Instance	M	-	6.2.1
6	Scope	U	-	6.2.2.1
7	Filter	U	-	6.2.2.2
8	Managed Object Class	-	C	6.4.5
9	Managed Object Instance	-	C	6.2.1
10	Access control	U	-	6.2.4
11	Synchronization	U	-	6.2.2.3
12	Action Type	M	C(=)	6.4.5
13	Action Information	U	-	
14	Current Time	-	U	6.2.3
15	Action Reply	-	C	
16	Errors	-	C	6.4.4

6.3.5 M-CREATE

The following agreements and clarifications, pertinent to section 8.3.4 of the base standard [CMIS] and section 6.7 of the base standard [CMIP] and regarding the M–CREATE service, are included within these network management IAs.

6.3.5.1 Managed Object Instance

The Managed Object Instance request parameter may be present or absent depending on whether the invoker supplies the instance name or the performer assigns the instance name automatically. The definition of each Managed Object Class specifies whether or not this parameter must be present. This definition shall apply to every management–initiated creation of instances of that managed object class.

6.3.5.2 Attribute Values

The values of each of the attributes of the newly created object are derived as defined in [MIM] 5.2.2.1. If none of these methods provides a value for any one attribute, then the operation shall be considered to have failed, i.e., no new instance is created, and the error code 'Missing Attribute Value' shall be returned.

6.3.5.3 Parameter Agreements

Conditional parameters (C) shall be included according to the conditions defined in [CMIS] unless those conditions are modified by the referenced agreement.

Table 25: M-CREATE Parameters

Item	Parameter Name	Req/Ind	Rsp/Conf	Text Reference
1	Invoke Identifier	M	M(=)	6.4
2	Managed Object Class	M	C	6.4.5
3	Managed Object Instance	U	C	6.2.1, 6.3.5.1
4	Superior Object Instance	U	-	6.2.1
5	Access Control	U	-	6.2.4
6	Reference Object Instance	U	-	6.2.1
7	Attribute List	U	C	6.4.5, 6.3.5.2
8	Current Time	-	U	6.2.3
9	Errors	-	C	6.3.5.2, 6.4.4

6.3.6 M-DELETE

The following agreements and clarifications, pertinent to section 8.3.5 of the base standard [CMIS] and section 6.8 of the base standard [CMIP] and regarding the M–DELETE service, are included within these network management IAs.

6.3.6.1 Deletion of Objects Containing Objects

The error ‘Processing Failure’ shall be returned if a managed object has existing contained objects and the behavior defined for that object prohibits its deletion unless all contained objects have been deleted.

6.3.6.2 Parameter Agreements

Conditional parameters (C) shall be included according to the conditions defined in [CMIS] unless those conditions are modified by the referenced agreements.

Table 26: M-DELETE Parameters

Item	Parameter Name	Req/Ind	Rsp/Conf	Text Reference
1	Invoke Identifier	M	M(=)	6.4
2	Linked Identifier	-	C	6.4
3	Base Object Class	M	-	6.4.5
4	Base Object Instance	M	-	6.2.1
5	Scope	U	-	6.2.2.1
6	Filter	U	-	6.2.2.2
7	Access control	U	-	6.2.4
8	Synchronization	U	-	6.2.2.3
9	Managed Object Class	-	C	6.4.5
10	Managed Object Instance	-	C	6.2.1
11	Current Time	-	U	6.2.3
12	Errors	-	C	6.3.6.1, 6.4.4

6.4 Specific Agreements on CMIP

These agreements are based on the standard defined in [CMIP] and [ADDRMVP]. The agreements in this clause have been defined in terms of those capabilities necessary to support the functions and services defined in clause 5 (Management Functions and Services) of these agreements.

These network management IAs make no agreements beyond the specifications in [CMIP] and [ADDRMVP], except the following:

6.4.1 Invoke/Linked Identifier Size

Invoke Identifiers and Linked Identifiers must be encoded in an integer of four (4) octets maximum length.

6.4.2 Version

Protocol Version 2 (only) is supported.

6.4.3 Linked Reply Values

Responders must send a linked reply value that corresponds to the original invoke operation value.

6.4.4 Error Codes

Responders must send error types that correspond to the operation definition for the original invoke.

6.4.5 Parameters

The CMIP globalForm shall be supported for the following parameters:

ActionTypeId
AttributeId
EventTypeId
ObjectClass

Use of localForm is outside the scope of these agreements.

6.5 Services Required by CMIP

CMIP requires the services provided by ACSE and ROSE. The conformance requirements for these services, and the underlying communication required to support them, are specified in part 5, subclause 13.7.

ACSE Functional Units: Kernel

6.6 CMIP PICS

(Refer to the Working Implementation Agreements Document.)

7 Management Information

This clause, which is based on ISO standards' documents [MIM] and [GDMO], contains agreements regarding basic concepts and modelling techniques related to management information. It enumerates agreements on (i) the information model (subclause 7.1), (ii) principles for naming managed objects and their attributes (subclause 7.2), and (iii) guidelines for defining management information (subclause 7.3). It is not within the scope of this clause to make agreements about specific elements of management information or to define such specific elements of management information. Such definitions and/or agreements can be obtained via the Management Information Library (MIL) produced by the OSI MIB Working Group (a subgroup of the NMSIG).

7.1 The Information Model

This subclause contains agreements related to the information model as specified in clause 5 of [MIM].

7.1.1 Inheritance

The following constraint related to inheritance is enforced in order to remove potential ambiguities:

> During the lifetime of a managed object instance, each of its attributes must have a value that is valid for the attribute syntax of that attribute.

7.1.2 Allomorphism

Allomorphism, as specified in clause 5.1.3 of [MIM], is not supported. Any other specification within the [MIM] or [GDMO] that refers to allomorphism is also not supported. "Not supported", in this context, means that an implementation that complies with the NMSIG IAs is not required to implement allomorphism.

7.1.3 Filter

The concept of filter is supported as specified in clause 5.3 of [MIM]. Restrictions on its usage are specified in subclause 6.2.2.2 and subclause 5.1.3.2 of these agreements. The restrictions in subclause 6.2.2.2 are applicable when the implementation is using "pure" CMIS. If the implementation is using services of the System Management Functions specified in clause 5, the filter restrictions specified in subclause 5.1.2.1 apply.

7.2 Principles of Naming

This subclause contains agreements about principles of naming as specified in clause 6 of [MIM].

7.2.1 Name Structure

7.2.1.1 Object Class Identification

A managed object class is identified by an ASN.1 object identifier, as specified in clause 6.3.1 of [MIM].

7.2.1.2 Object Instance Identification

The distinguished name approach is used for the identification of managed object instances, as specified in clause 6.3.2 of [MIM].

7.2.1.3 Attribute Identification

Each individual attribute of a managed object is identified by an ASN.1 object identifier, as specified in clause 6.3.4 of [MIM].

7.2.1.4 Managed Object Knowledge

Dynamic sharing of management knowledge is not supported. However, all attributes related to shared management knowledge are contained in the managed object class "top", which is defined in [DMI]. Since all managed object class definitions in the MIL are derived from "top" as defined in [DMI], these managed object classes will, by definition, contain the management knowledge attributes.

Since Allomorphism is not supported, the Allomorphic Superclasses attribute, which is one of the attributes defined in "top", will have as its value, the OBJECT IDENTIFIER of the managed object class to which it belongs.

7.3 Guidelines for the Definition of Management Information

This subclause contains agreements about guidelines for the definition of management information, as specified in [GDMO]. These guidelines apply to developers of contributions to the Management Information Library. They form a normative part of the standard; hence they must be strictly followed while defining management information.

7.3.1 Syntactical Definitions of Management Information

7.3.1.1 Managed Object Class Template

The ALLOMORPHIC SET construct of the Managed Object Class Template specified in clause 10.3.2 of [GDMO] is not supported. "Not supported", in this context, means that no managed object class definition in the Management Information Library will contain this construct.

7.3.1.2 Package Template

The following constraints apply to the Package Template specified in clause 10.4.2 of [GDMO]:

> For the ATTRIBUTE GROUPS construct, new attributes shall not be added to the group attribute from within the managed object class template because this can lead to ambiguities. Hence, the [<attribute–label>] portion of the supporting definition for the ATTRIBUTE GROUPS construct shall not be used.
>
> The REGISTERED AS construct shall be mandatory.

7.3.1.3 Attribute Template

The following constraint applies to the Attribute Template specified in clause 10.7.2 of [GDMO]:

> The BEHAVIOUR construct may be omitted only if a behaviour definition has been inherited from the parent attribute, i.e., the attribute is derived from another attribute whose definition contains a BEHAVIOUR contsturct.

7.3.1.4 Attribute Group Template

For the ATTRIBUTE GROUP to be useful, it is recommended that the GROUP ELEMENTS construct be present.

7.3.2 Guidelines For Defining Behaviour

The following details shall be provided in the set of specifications defining a managed object class:

- a textual description of the network resource the managed object class represents, including its functional role.

- a description of the relationships that can occur between different instances of the managed object class being defined, as well as those that can occur between instances of the managed object class being defined and instances of other managed object classes.

- a description of the operations that are supported by the managed object class, with precise definition of the effects, side effects if any, constraints, response notifications, failure modes.

- specification of how instances of this managed object class are created and deleted, particularly whether they can be created/deleted via the management CREATE/DELETE operations.

- a description of notifications that can be generated, the conditions that generate them (e.g., crossing of a threshold), their contents and side–effects, if any. In particular, identify all the attributes that are subject to the AttributeChange and StateChange notifications, if these notifications are supported.

- other constraints, including those involving other managed object classes.

7.3.3 Other Guidelines

The Systems Management functions have defined various attributes and events, as indicated in clause 5 of these agreements. Object definers shall make use of these attributes and events wherever applicable.

7.3.4 Initial Value Managed Objects (IVMO)

The following text clarifies underlying concepts of Initial Value Managed Objects (IVMOs) specfied in clause 8.7 of [GDMO]:

> Initial Value Managed Objects, described in clause 8.7 of [GDMO], are most useful in cases where managed object classes that do not support the CREATE operation have been defined. Instances of such object classes would be created as a result of the normal operation of the network, but it may be desirable to be able to control the initial values of attributes of new instances of such object classes via management. IVMOs provide a mechnanism to do this. The NMSIG Transport Connection Profile managed object class defined in the MIL is an example of an IVMO. It represents the collection of characteristic attributes that supply default and initially advertised attribute values to be used by instances of the NMSIG Transport Connection managed object class when the instances are created. Since the NMSIG Transport Connection managed object class

does not support the management CREATE operation, this IVMO serves as a mechanism which allows initial values of attributes of instances of the NMSIG Transport Connection managed object class to be controlled by management.

8 Conformance

(Refer to the Working Implementation Agreements Document.)

ANNEX A -- Management Information Library (MIL)

(Refer to the Working Implementation Agreements Document.)

ANNEX B -- NMSIG Object Identifiers

(Refer to the Working Implementation Agreements Document.)