INTERNATIONAL STANDARDIZED PROFILE

ISO/ISP 14226-2

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Industrial automation systems — International Standardized Profile AMM11: MMS General Applications Base Profile —

Part 2:
Common MMS requirements

Systèmes d'automatisation industrielle — Profil normalisé international AMM11: Profil de base pour applications générales MMS —

Partie 2: Prescriptions courantes pour MMS

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

An International Standardized Profile is an internationally agreed, harmonized document which identifies a standard or group of standards, together with options and parameters, necessary to accomplish a function or set of functions.

Draft International Standardized Profiles are circulated to national bodies for voting. Publication as an International Standardized Profile requires approval by at least 75 % of the national bodies casting a vote.

International Standardized Profile ISO/ISP 14226-2 was prepared by Technical Committee ISO/TC 184, *Industrial automation systems and integration*, Subcommittee SC 5, *Architecture and communications*, with the collaboration of

- Asia-Oceania Workshop (AOW);
- European Workshop for Open Systems (EWOS);
- Open Systems Environment Implementors' Workshop (OIW).

ISO/ISP 14226 consists of the following parts, under the general title *Industrial automation systems - International Standardized Profile AMM11: MMS General Applications Base Profile*:

- *Part 1: Specification of ACSE, Presentation and Session protocols for use by MMS*
- *Part 2: Common MMS requirements*
- *Part 3: Specific MMS requirements*

Annex A forms an integral part of this part of ISO/ISP 14226.

Introduction

ISO/ISP 14226 is defined within the context of Functional Standardization, in accordance with the principles specified by ISO/IEC TR 10000, "Framework and Taxonomy of International Standardized Profiles". The context of Functional Standardization is one part of the overall field of Information Technology (IT) standardization activities, covering base standards, profiles, and registration mechanisms. A profile defines a combination of base standards that collectively perform a specific well-defined IT function. Profiles standardize the use of options and other variations in the base standards, and provide a basis for the development of uniform, internationally recognized system tests.

Industrial automation systems – International Standardized Profile AMM11: MMS General Applications Base Profile –

Part 2:

Common MMS requirements

1 Scope

1.1 General

This part of ISO/ISP 14226 specifies the common MMS requirements that form the basis for ISO/ISP 14226-3 and for other ISPs referencing this part. This part of ISO/ISP 14226, when used in conjunction with other ISPs, specifies how the MMS standard shall be used to provide the MMS functions required by applications controlling a full range of devices in the scope of MMS.

1.2 Position within the Taxonomy

This part of ISO/ISP 14226 is the second part of a multi-part ISP identified in ISO/IEC TR 10000-2 as "AMM11, MMS General Applications Base Profile".

It may be combined with any T-Profile specifying the OSI connection-mode transport service.

2 Normative References

The following documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/ISP 14226. At the time of publication, the editions indicated were valid. All documents are subject to revision, and parties to agreements based on this part of ISO/ISP 14226 are warned against automatically applying any more recent editions of the documents listed below, since the nature of references made by ISPs to such documents is that they may be specific to a particular edition. Members of IEC and ISO maintain registers of currently valid International Standards and ISPs, and ITU-T maintains published editions of its current Recommendations.

ISO/IEC 9506-1:1990, *Industrial automation systems -- Manufacturing Message Specification -- Part 1: Service definition*.

ISO/IEC 9506-1:1990/Amd.1:1993, *Industrial automation systems - Manufacturing Message Specification - Part 1: Service definition AMENDMENT 1: Data exchange*.

ISO/IEC 9506-1:1990/Amd.2:1995, *Industrial automation systems - Manufacturing Message Specification - Part 1: Service definition AMENDMENT 2: Conditioned service response*.

ISO/IEC 9506-1:1990/Cor.1:1995, *Industrial automation systems - Manufacturing Message Specification - Part 1: Service definition TECHNICAL CORRIGENDUM 1*.

ISO/IEC 9506-1:1990/Cor.2:1995, *Industrial automation systems - Manufacturing Message Specification - Part 1: Service definition TECHNICAL CORRIGENDUM 2.*

ISO/IEC 9506-2:1990, *Industrial automation systems -- Manufacturing Message Specification -- Part 2: Protocol specification.*

ISO/IEC 9506-2:1990/Amd.1:1993, *Industrial automation systems - Manufacturing Message Specification - Part 2: Protocol specification AMENDMENT 1: Data exchange.*

ISO/IEC 9506-2:1990/Amd.2:1995, *Industrial automation systems - Manufacturing Message Specification - Part 2: Protocol specification AMENDMENT 2: Conditioned service response.*

ISO/IEC 9506-2:1990/Cor.1:1995, *Industrial automation systems - Manufacturing Message Specification - Part 2: Protocol specification TECHNICAL CORRIGENDUM 1.*

ISO/IEC 9506-2:1990/Cor.2:1995, *Industrial automation systems - Manufacturing Message Specification - Part 2: Protocol specification TECHNICAL CORRIGENDUM 2.*

ISO/IEC TR 10000-1:1995, *Information technology - Framework and taxonomy of International Standardized Profiles - Part 1: General principles and documentation framework.*

ISO/IEC TR 10000-2:1995, *Information technology - Framework and taxonomy of International Standardized Profiles - Part 2: Principles and Taxonomy for OSI profiles.*

ISO/IEC ISP 10607-3:1995, *Information technology - International Standardized Profiles AFTnn - File Transfer, Access and Management - Part 3: AFT11 - Simple File Transfer Service (unstructured).*

ISO/ISP 14226-1:1996, *Industrial automation systems - International Standardized Profile AMM11: MMS General Applications Base Profile - Part 1: Specification of ACSE, Presentation, and Session protocols for use by MMS.*

3 Definitions

For the purposes of this part of ISO/ISP 14226, the definitions given in the referenced base standards and the following definitions apply.

3.1 MMS implementation: A realization of an MMS user together with its underlying MMS provider.

3.2 calling MMS implementation: The MMS implementation that issues the Initiate request primitive.

3.3 called MMS implementation: The MMS implementation that issues the Initiate response primitive.

4 Abbreviations

For the purposes of this part of ISO/ISP 14226, the abbreviations given in the referenced base standards and the following abbreviations apply.

Client-CR	Client Conformance Requirements
Server-CR	Server Conformance Requirements

5 Conformance Requirements

This part of ISO/ISP 14226 states requirements upon implementations to achieve interworking. A claim of conformance to this part of ISO/ISP 14226 is a claim that all requirements in the relevant base standards are satisfied, and that all requirements in the following subclauses and in annex A are satisfied. Annex A states the relationship between these requirements and those of base standards.

The conformance requirements of this part of ISO/ISP 14226 are described in terms of "Client Conformance Requirements (Client-CR)" and "Server Conformance Requirements (Server-CR)" for each service.

An MMS implementation compliant with the Client-CR for all services in this part of ISO/ISP 14226 is called a "Client Implementation".

An MMS implementation compliant with the Server-CR for all services in this part of ISO/ISP 14226 is called a "Server Implementation".

5.1 General Requirements for use of all parts of MMS

To achieve interworking, each server implementation shall be able to accept an association with a client implementation.

5.1.1 Max supported PDU size

The max_mms_pdu_size is defined as the maximum number of octets in an MMSpdu encoded using the negotiated transfer syntax. The size shall apply to all MMSpdu's with the exception of the Initiate-request PDU, Initiate-response PDU and Initiate-error PDU. The max_mms_pdu_size shall be negotiated during connection initiation using the LocalDetailCalling and LocalDetailCalled parameters of the MMS Initiate service.

The negotiated max_mms_pdu_size shall be applied as follows:

- Any received MMSpdu whose length is less than or equal to the negotiated max_mms_pdu_size shall be properly parsed and processed.

- An MMS implementation should not send an MMSpdu whose size exceeds the negotiated max_mms_pdu_size. If an MMS implementation sends an MMSpdu that exceeds the negotiated max_mms_pdu_size, then it shall be prepared to receive a Reject PDU. Should an MMS implementation receive an MMSpdu that exceeds the negotiated max_mms_pdu_size, it shall either reject the MMSpdu or accept the MMSpdu as if no size violation had occurred and performed the expected processing.

- If an MMS implementation is unable to send a service response because the response would exceed the max_mms_pdu_size, then it shall return a Service response (-) with an error class of SERVICE and an error code of OTHER.

- When rejecting an MMSpdu because it exceeds the negotiated max_mms_pdu_size, an MMS implementation shall use a Reject PDU Type of PDU-ERROR and a Reject Code of INVALID-PDU in the resulting Reject PDU.

5.1.2 FileName

Restrictions for the use of the type FileName in the MMS Abstract Syntax are specified in ISO/IEC ISP 10607-3:1995, subclause 9.1.

5.2 Service-specific Requirements

5.2.1 Environment and General Management

5.2.1.1 Initiate Service

5.2.1.1.1 Negotiation of MMS Abstract Syntaxes

On the A-Associate response the MMS responder shall not accept more than one presentation context derived from an MMS abstract syntax. For this agreement, the term 'MMS abstract syntax' shall represent an abstract syntax from the set containing the abstract syntax defined in clause 19 of ISO/IEC 9506-2:1990 and abstract syntaxes defined by MMS companion standards.

5.2.1.1.2 Max Serv Outstanding

An MMS implementation which intends to conform only with the Client Conformance Requirements for Requester CBB's shall:

a) propose one or greater for the value of the Proposed Max Serv Outstanding Called parameter in the Initiate service when initiating the application association (calling);

b) offer one or greater for the value of the Negotiated Max Serv Outstanding Calling parameter in the Initiate service when receiving the application association initiation (called);

An MMS implementation which intends to conform to one or more Server Conformance Requirements for Responder CBB's shall:

a) propose one or greater for the value of the Proposed Max Serv Outstanding Calling parameter in the Initiate service when initiating the application association (calling);

b) offer one or greater for the value of the Negotiated Max Serv Outstanding Called parameter in the Initiate service when receiving the application association initiation (called);

5.2.1.1.3 Local Detail Calling

The Local Detail Calling parameter in the Initiate request primitive shall specify the max_mms_pdu_size guaranteed to be supported by the calling MMS implementation. If the Local Detail Calling parameter is absent from the request primitive, then the calling MMS implementation shall guarantee support for an unlimited max_mms_pdu_size.

If present in the request or indication primitives, the Local Detail Calling parameter shall not be less than 64; however, it is recommended that at least 512 octets be supported.

5.2.1.1.4 Local Detail Called

The Local Detail Called parameter in the Initiate response primitive shall specify the negotiated max_mms_pdu_size for the application association.

If the Local Detail Calling parameter is omitted in the indication primitive, then the Local Detail Called parameter:

a) may be omitted from the response, indicating that the calling MMS implementation and the called MMS implementation are prepared to support an unbounded max_mms_pdu_size;

b) may be specified in the response, indicating a requirement to support the specified value for max_mms_pdu_size.

If the Local Detail Calling is included in the request, then this parameter shall be present in the response and its value shall be less than or equal to the value of the Local Detail Calling parameter of the request.

If present in the response, the Local Detail Called shall not be less than 64; however, it is recommended that at least 512 octets be supported.

5.2.1.1.5 Rules of Extensibility

Any additional valid tagged ASN.1 values received as sequence elements in the parameters of the Initiate-RequestPDU, the Initiate-ResponsePDU, or the Initiate-ErrorPDU shall be ignored for upward compatibility purposes.

Implementations shall be capable of parsing up to 128 bits in the services supported field of either the Initiate-RequestPDU or Initiate-ResponsePDU. Implementations shall be capable of parsing up to 32 bits in the parameter CBB field of either the Initiate-RequestPDU or the Initiate-ResponsePDU. In both cases, the behaviour of the implementation shall be no different than if the PDU received had not contained additional bits.

5.2.2 VMD Support

5.2.2.1 Get Capability List Service

Only one capability shall be described in each Visible String of the SEQUENCE OF.

5.2.3 Domain Management

5.2.3.1 List Of Capabilities

Only one capability shall be described in each Visible String of the SEQUENCE OF.

The order of the strings within the List Of Capabilities parameter may have significance to the server implementation and shall be preserved.

5.2.3.2 Initiate Download Sequence Service

The List Of Capabilities parameter shall follow the limitations of 5.2.3.1.

The syntax and semantics of the capabilities shall be defined by the Server implementation in the PICS. Any deviation from the defined syntax and semantics shall be reasons for the Server implementation to return a service error with Error Class equal to RESOURCE and Error Code equal to CAPABILITY-UNKNOWN.

5.2.3.3 Download Segment Service

A client implementation that receives a Download Segment indication after issuing a Download Segment Result (+) with the More Follows parameter equal to FALSE or after issuing a Download Segment Result (-) shall issue either a service error, specifying an Error Class equal to SERVICE and an Error Code equal to PRIMITIVES-OUT-OF-SEQUENCE, or an Abort Request.

5.2.3.4 Terminate Download Sequence Service

If a client implementation receives a Terminate Download Sequence indication in which the Discard parameter is absent and the client implementation has not issued a Download Segment response with the More Follows parameter equal to FALSE for that Domain, it shall behave as if it had received a Terminate Download Sequence indication with the Discard parameter present with the Error Class equal to VMD-STATE and Error Code equal to DOMAIN-TRANSFER-PROBLEM. It is then up to the client implementation to determine the true state of the Domain and take any recovery action.

5.2.3.5 Initiate Upload Sequence Service

The List Of Capabilities parameter shall follow the limitations of 5.2.3.1.

5.2.3.6 Upload Segment Service

A server implementation that receives a Upload Segment indication for an Upload State Machine for which it has issued an Upload Segment Result (-) or an Upload Segment Result (+) with the More Follows parameter equal to FALSE, shall issue either a service error, specifying an Error Class equal to SERVICE and an Error Code equal to PRIMITIVES-OUT-OF-SEQUENCE, or an Abort Request.

5.2.3.7 Get Domain Attributes Service

The List Of Capabilities parameter shall follow the limitations of 5.2.3.1.

5.2.4 Program Invocation Management

5.2.4.1 Start

A Program Invocation State of NON-EXISTENT shall be returned in a Result (-) when a request to start a non-existent Program Invocation is received.

5.2.4.2 Stop

A Program Invocation State of NON-EXISTENT shall be returned in a Result (-) when a request to stop a non-existent Program Invocation is received.

5.2.4.3 Resume

A Program Invocation State of NON-EXISTENT shall be returned in a Result (-) when a request to resume a non-existent Program Invocation is received.

5.2.4.4 Reset

A Program Invocation State of NON-EXISTENT shall be returned in a Result (-) when a request to reset a non-existent Program Invocation is received.

5.2.4.5 Kill

A Program Invocation State of NON-EXISTENT shall be returned in a Result (-) when a request to kill a non-existent Program Invocation is received.

5.2.5 Variable Access

5.2.5.1 Scattered Access

No implementations shall be required to propose or accept the VSCA Parameter CBB.

5.2.5.2 Floating Point

It is strongly recommended that for services which use floating point types or values, that the choice of floating-point in the Data and TypeSpecification productions be used instead of the choice of real.

No implementations shall be required to propose or accept the REAL Parameter CBB.

Any implementation which supports data of the MMS floating-point type, shall be capable of supporting a size parameter of format width 32 and exponent width 8.

Implementations that provide support for floating point data and types shall support the choice of "floating point" in the Data and TypeSpecification productions.

5.2.5.3 List Of Variables

The order of Variable Specification that appears in the List Of Variable shall not constrain the temporal order of the access to individual variables by the V-Put and V-Get functions in the Server implementation.

5.2.5.4 Parameter CBBs

Each server implementation that claims support for the Read, Write, or InformationReport service shall be capable of supporting either the VNAM or VADR parameter CBB.
Each client implementation that claims support for the Read, Write or InformationReport service shall be capable of supporting the VNAM and VADR parameter CBBs.

5.2.5.5 Named Variable Scope

Each server implementation that claims support for the VNAM parameter CBB shall be capable of supporting either VMD-Specific or Domain-Specific named variables.

Each client implementation that claims support for the VNAM parameter CBB shall be capable of supporting both VMD-Specific and Domain-Specific named variables.

5.2.5.6 Address Types

Each server implementation that claims support for the VADR parameter CBB shall be capable of supporting either the Symbolic-Address or Numeric-Address choice.

Each client implementation that claims support for the VADR parameter CBB shall be capable of supporting both the Symbolic-Address and Numeric-Address choices.

5.2.6 Semaphore Management

Out of scope.

5.2.7 Operator Communication

No additional requirements have been identified.

5.2.8 Event Management

Out of scope.

5.2.9 Journal Management

Out of scope.

5.2.10 File Access

Out of scope.

5.2.11 File Management

Out of scope.

5.2.12 Data Exchange Management

Out of scope.

Annex A

(normative)

ISPICS Requirements List

A.1 General

This annex describes the common MMS requirements in terms of tables which were derived from the base standard. They are intended to give a precise specification of requirements.

A.2 Classification of Requirements

Throughout this annex, to specify the level of support for each feature, the following classification is used.

Client-CR : Client Conformance Requirement.

Server-CR :Server Conformance Requirement

A.2.1 Base Column

The "Base" column reflects the definitions and specifications in ISO/IEC 9506-1:1990 and ISO/IEC 9506-2:1990. Each entry in this column is chosen from the following list:

mandatory; m : That feature shall be supported, i.e. its syntax and procedures shall be implemented as specified in the base standard.

However, it is not a requirement that the feature shall be used in all instances of communication, unless mandated by the base standard .

optional; o : Any feature denoted by "o" is left to the implementation as to whether that feature is implemented or not.

If a parameter is optionally supported, then the syntax shall be implemented, but it is left to each implementation whether the procedures are implemented or not.

A.2.2 F/S Column

The "F/S" column reflects the requirements of this Functional Standard. Each entry in this column is chosen from the following terminology:

supported; m : Any feature denoted by "m" is mandatory or optional in the base standard. That feature shall be supported, i.e. its syntax and procedures shall be implemented as specified in the base standard or in this part of ISO/ISP 14226 by all implementations claiming conformance to this part of ISO/ISP 14226.

However, it is not a requirement that the feature shall be used in all instances of communication, unless mandated by the base standard or stated otherwise in this part of this A-Profile.

optionally supported; o : Any feature denoted by "o" is left to the implementation as to whether that feature is implemented or not.

If a parameter is optionally supported, then the syntax shall be implemented, but it is left to each implementation whether the procedures are implemented or not.

conditionally supported; c : Any feature denoted by "c<n>" shall be supported under the condition referenced c<n> specified in this part of ISO/ISP 14226, where <n> stands for a number. If these conditions are not met, the feature is outside the scope of this part of ISO/ISP 14226.

excluded; x : Any feature denoted by "x" is excluded in this part of ISO/ISP 14226, i.e. an implementation shall behave as if the feature is not implemented.

companion standard specific; cs : Any feature denoted by "cs" is left to be defined by an ISP or a part of an ISP referencing this part of ISO/ISP 14226, and based on a companion standard abstract syntax. For ISPs that are based on the abstract syntax defined by ISO/IEC 9506-2, "cs" is equivalent to "excluded; x".

outside of scope; i : Any feature denoted by "i" is outside the scope of this part of ISO/ISP 14226, i.e. it may be ignored, and will therefore not be subject of an ISP conformance test. However the syntax of all parameters of supported PDUs shall be implemented, even if the procedures are not (i.e. the Receiver shall be able to decode the PDU).

not applicable; - : Any feature denoted by "-" is not defined in the context where it is mentioned, e.g. a parameter which is not part of the respective PDU. The occurrence of "not applicable" features is mainly due to the format of the tables in ISPICS Requirements List.

functional standard choice; * : Any feature denoted by "*" is left to be defined by an ISP or a part of an ISP referencing this part of ISO/ISP 14226. The referencing profile shall replace the "*" by any of the alternatives given in the list above.

A.2.3 Value/Reference

The "Value/Ref." column specifies constraints on values for the parameter and/or contains references to text in this or other documents.

A.2.4 Conditional MACROs

The following MACROs are used in the F/S Column:

STR1 : Any feature denoted by "STR1" is conditioned on the support of STR1 Parameter CBB. Its requirement is left to be defined by an ISP that references this part of ISO/ISP 14226 and specifies the nature of its support for the STR1 Parameter CBB.

STR2 : Any feature denoted by "STR2" is conditioned on the support of STR2 Parameter CBB. Its requirement is left to be defined by an ISP that references this part of ISO/ISP 14226 and specifies the nature of its support for the STR2 Parameter CBB.

VADR : Any feature denoted by "VADR" is conditioned on the support of VADR Parameter CBB. Its requirement is left to be defined by an ISP that references this part of ISO/ISP 14226 and specifies the nature of its support for the VADR Parameter CBB.

VNAM : Any feature denoted by "VNAM" is conditioned on the support of VNAM Parameter CBB. Its requirement is left to be defined by an ISP that references this part of ISO/ISP 14226 and specifies the nature of its support for the VNAM Parameter CBB.

VLIS : Any feature denoted by "VLIS" is conditioned on the support of VLIS Parameter CBB. Its requirement is left to be defined by an ISP that references this part of ISO/ISP 14226 and specifies the nature of its support for the VLIS Parameter CBB.

VSCA : Any feature denoted by "VSCA" is conditioned on the support of VSCA Parameter CBB. Its requirement is left to be defined by an ISP that references this part of ISO/ISP 14226 and specifies the nature of its support for the VSCA Parameter CBB.

VALT : Any feature denoted by "VALT" is conditioned on the support of VALT Parameter CBB. Its requirement is left to be defined by an ISP that references this part of ISO/ISP 14226 and specifies the nature of its support for the VALT Parameter CBB.

REAL : Any feature denoted by "REAL" is conditioned on the support of REAL Parameter CBB. Its requirement is left to be defined by an ISP that references this part of ISO/ISP 14226 and specifies the nature of its support for the REAL Parameter CBB.

TPY : Any feature denoted by "TPY" is conditioned on the support of TPY Parameter CBB. Its requirement is left to be defined by an ISP that references this part of ISO/ISP 14226 and specifies the nature of its support for the TPY Parameter CBB.

MOD : Any feature denoted by "MOD" is left to be defined by an ISP that references this part of ISO/ISP 14226 and specifies the nature of its support for the MMS Modifiers.

A.3 Supported MMS PDU's

A.3.1 Environment and General Management

Ref	MMS PDU	Client-CR				Server-CR			
		Sending		Receiving		Sending		Receiving	
		Base	F/S	Base	F/S	Base	F/S	Base	F/S
1	InitiateRequest	o	*	o	*	o	*	m	m
2	InitiateResponse	o	*	o	*	m	m	o	*
3	InitiateError	o	*	o	*	m	m	o	*
4	ConcludeRequest	o	*	o	*	o	*	m	m
5	ConcludeResponse	o	*	o	*	m	m	o	*
6	ConcludeError	o	*	o	*	m	m	o	*
7	CancelRequest	o	*	o	*	o	*	o	*
8	CancelResponse	o	*	o	*	o	*	o	*
9	CancelError	o	*	o	*	o	*	o	*
10	Reject	m	m	m	m	m	m	m	m

Note: Abort service is provided by ACSE.

A.3.2 MMS Modifiers

Ref	Modifier	Client-CR		Server-CR	
		Base	F/S	Base	F/S
1	attachToEventCondition	o	i	o	i
2	attachToSemaphore	o	i	o	i

A.3.3 Parameter CBBs

Ref	Parameter	Base	Client-CR		Server-CR	
			F/S	Value/Ref.	F/S	Value/Ref.
1	str1	o	*		*	
2	str2	o	*		*	
3	vnam	o	c1		c1	
4	valt	o	*		*	
5	vadr	o	c1		c1	
6	vsca	o	i		i	
7	tpy	o	*		*	
8	vlis	o	*		*	
9	real	o	i		i	
10	cei	o	i		i	

c1: See 5.2.5.4 to determine the requirements for these CBBs.

A.3.4 VMD Support

In this subclause and the following subclauses of clause A.3 the column "MMS PDU's" contains one single entry for each MMS service. In case of a confirmed service this single entry shall represent the corresponding Request-, Response- and Error-PDU'S. In case of an unconfirmed service it shall represent the corresponding Request-PDU.

For responder role service CBBs, the Client-CR column shall indicate the support of sending the Request-PDU and receiving the Response-PDU and Error-PDU, whereas, the Server-CR column shall indicate the support of receiving the Request-PDU and sending the Response-PDU and Error-PDU.

For requester role service CBBs, the Client-CR column shall indicate the support of receiving the Request-PDU and (in case of a confirmed service) sending the Response-PDU and Error-PDU, whereas, the Server-CR column shall indicate the support of sending the Request-PDU and (in case of a confirmed service) receiving the Response-PDU and Error-PDU.

NOTE - As an example, the 'm' in the Server-CR column for the Identify service means that the Server implementation has to support the receiving of the Identify-Request PDU and the sending of the Identify-Response PDU and the Identify-Error PDU, whereas the 'o' in the Client-CR column means that the Client implementation may or may not support the sending of the Identify-Request PDU, and the receiving of the Identify-Response PDU and the Identify-Error PDU.

Ref	MMS PDU	Client-CR		Server-CR	
		Base	F/S	Base	F/S
1	Status	o	*	o	*
2	UnsolicitedStatus	o	*	o	*
3	GetNameList	o	*	o	*
4	Identify	o	*	m	m
5	Rename	o	i	o	i
6	GetCapabilityList	o	*	o	*

A.3.5 Domain Management

Ref	MMS PDU	Client-CR		Server-CR	
		Base	F/S	Base	F/S
1	InitiateDownloadSequence	o	*	o	*
2	DownloadSegment	o	*	o	*
3	TerminateDownloadSequence	o	*	o	*
4	InitiateUploadSequence	o	*	o	*
5	UploadSegment	o	*	o	*
6	TerminateUploadSequence	o	*	o	*
7	RequestDomainDownload	o	*	o	*
8	RequestDomainUpload	o	*	o	*
9	LoadDomainContent	o	*	o	*
10	StoreDomainContent	o	*	o	*
11	DeleteDomain	o	*	o	*
12	GetDomainAttributes	o	*	o	*

A.3.6 Program Invocation Management

Ref	MMS PDU	Client-CR		Server-CR	
		Base	F/S	Base	F/S
1	CreateProgramInvocation	o	*	o	*
2	DeleteProgramInvocation	o	*	o	*
3	Start	o	*	o	*
4	Stop	o	*	o	*
5	Resume	o	*	o	*
6	Reset	o	*	o	*
7	Kill	o	*	o	*
8	GetProgramInvocationAttributes	o	*	o	*

A.3.7 Variable Access

Ref	MMS PDU	Client-CR		Server-CR	
		Base	F/S	Base	F/S
1	Read	o	*	o	*
2	Write	o	*	o	*
3	InformationReport	o	*	o	*
4	GetVariableAccessAttributes	o	*	o	*
5	DefineNamedVariable	o	c1	o	c1
6	DefineScatteredAccess	o	i	o	i
7	GetScatteredAccessAttributes	o	i	o	i
8	DeleteVariableAccess	o	c2	o	c2
9	DefineNamedVariableList	o	c3	o	c3
10	GetNamedVariableListAttributes	o	c3	o	c3
11	DeleteNamedVariableList	o	c3	o	c3
12	DefineNamedType	o	*	o	*
13	GetNamedTypeAttributes	o	*	o	*
14	DeleteNamedType	o	*	o	*

c1: To be defined by an ISP referencing this part of ISO/ISP 14226. If this service is supported, then VNAM and VADR shall also be supported.

c2: To be defined by an ISP referencing this part of ISO/ISP 14226. If this service is supported, then VNAM shall also be supported.

c3: To be defined by an ISP referencing this part of ISO/ISP 14226. If this service is supported, then VLIS shall also be supported.

A.3.8 Semaphore Management

Ref	MMS PDU	Client-CR		Server-CR	
		Base	F/S	Base	F/S
1	TakeControl	o	i	o	i
2	RelinquishControl	o	i	o	i
3	DefineSemaphore	o	i	o	i
4	DeleteSemaphore	o	i	o	i
5	ReportSemaphoreStatus	o	i	o	i
6	ReportPoolSemaphoreStatus	o	i	o	i
7	ReportSemaphoreEntryStatus	o	i	o	i

A.3.9 Operator Communication

Ref	MMS PDU	Client-CR		Server-CR	
		Base	F/S	Base	F/S
1	Input	o	*	o	*
2	Output	o	*	o	*

A.3.10 Event Management

Ref	MMS PDU	Client-CR		Server-CR	
		Base	F/S	Base	F/S
1	DefineEventCondition	o	i	o	i
2	DeleteEventCondition	o	i	o	i
3	GetEventConditionAttributes	o	i	o	i
4	ReportEventConditionStatus	o	i	o	i
5	AlterEventConditionMonitoring	o	i	o	i
6	TriggerEvent	o	i	o	i
7	DefineEventAction	o	i	o	i
8	DeleteEventAction	o	i	o	i

9	GetEventActionAttributes	o	i	o	i
10	ReportEventActionStatus	o	i	o	i
11	DefineEventEnrollment	o	i	o	i
12	DeleteEventEnrollment	o	i	o	i
13	GetEventEnrollmentAttributes	o	i	o	i
14	ReportEventEnrollmentStatus	o	i	o	i
15	AlterEventEnrollment	o	i	o	i
16	EventNotification	o	i	o	i
17	AcknowledgeEventNotification	o	i	o	i
18	GetAlarmSummary	o	i	o	i
19	GetAlarmEnrollmentSummary	o	i	o	i

A.3.11 Journal Management

Ref	MMS PDU	Client-CR		Server-CR	
		Base	F/S	Base	F/S
1	ReadJournal	o	i	o	i
2	WriteJournal	o	i	o	i
3	InitializeJournal	o	i	o	i
4	ReportJournalStatus	o	i	o	i
5	CreateJournal	o	i	o	i
6	DeleteJournal	o	i	o	i

A.3.12 File Access

Ref	MMS PDU	Client-CR		Server-CR	
		Base	F/S	Base	F/S
1	ObtainFile	o	i	o	i

A.3.13 File Management

This subclause is informative only.

Ref	MMS PDU	Client-CR		Server-CR	
		Base	F/S	Base	F/S
1	FileOpen	o	i	o	i
2	FileRead	o	i	o	i
3	FileClose	o	i	o	i

A.3.14 Data Exchange Management

Ref	MMS PDU	Client-CR		Server-CR	
		Base	F/S	Base	F/S
1	GetDataExchangeAttributes	o	i	o	i
2	ExchangeData	o	i	o	i

A.3.15 Additional PDUs

Ref	MMS PDU	Client-CR		Server-CR	
		Base	F/S	Base	F/S
1	Additional PDU	o	cs	o	cs

A.4 PDU-Specific Requirements

This clause contains tables for all PDUs which have been marked as 'm', '*', or 'c<n>' in F/S column of clause A.3. Some of the PDU parameters represent complex structures which are described using the following conventions:

a) If a parameter with label <x> is a CHOICE type, the corresponding alternatives are listed below this parameter, using the sub-labels <x>.a, <x>.b, <x>.c, etc.

b) If a parameter with label <x> is a SEQUENCE or SEQUENCE OF SEQUENCE type, the sequence members are listed below that parameter using the sub-labels <x>.1, <x>.2, <x>.3, etc.

c) Some of the complex parameters are described in separate tables. In these cases, parameter names start with an upper case letter, otherwise parameters start with a lower case letter.

A.4.1 Environment and General Management

A.4.1.1 Initiate Request PDU

Ref	Parameter	Sending			Receiving		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	localDetailCalling	o	m	5.2.1.1.3	m	m	
2	proposedMaxServOutstandingCal	m	m	5.2.1.1.2	m	m	
3	proposedMaxServOutstandingCal	m	m	5.2.1.1.2	m	m	
4	proposedDataStructureNestingLe	m	m		m	m	
5	initiateRequestDetail	m	m	Note 1	m	m	

Note 1: InitiateRequestDetail is specified in ISO/ISP 14226-3 or in another ISP referencing this part of ISO/ISP 14226.

A.4.1.2 Initiate Response PDU

Ref	Parameter	Sending			Receiving		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	localDetailCalled	o	m	5.2.1.1.4	m	m	
2	negotiatedMaxServOutstandingC	m	m	5.2.1.1.2	m	m	
3	negotiatedMaxServOutstandingC	m	m	5.2.1.1.2	m	m	
4	negotiatedDataStructureNestingL	m	m		m	m	
5	initiateResponseDetail	m	m	Note 1	m	m	

Note 1: InitiateResponseDetail is specified in ISO/ISP 14226-3 or in another ISP referencing this part of ISO/ISP 14226.

A.4.1.3 Initiate Error PDU

Ref	Parameter	Sending			Receiving		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	errorClass	m	m		m	m	
2	errorCode	m	m		m	m	
3	additionalCode	o	*		o	*	
4	additionalDescription	o	*		o	*	

A.4.1.4 Conclude Request PDU

No parameter.

A.4.1.5 Conclude Response PDU

No parameter.

A.4.1.6 Conclude Error PDU

Ref	Parameter	Sending			Receiving		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	errorClass	m	m		m	m	
2	errorCode	m	m		m	m	
3	additionalCode	o	*		o	*	
4	additionalDescription	o	*		o	*	

A.4.1.7 Cancel Request PDU

Ref	Parameter	Sending			Receiving		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	originalInvokeID	m	m		m	m	

A.4.1.8 Cancel Response PDU

Ref	Parameter	Sending			Receiving		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	originalInvokeID	m	m		m	m	

A.4.1.9 Cancel Error PDU

Ref	Parameter	Sending			Receiving		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	originalInvokeID	m	m		m	m	
2	errorClass	m	m		m	m	

3	errorCode	m	m		m	m	
4	additionalCode	o	*		o	*	
5	additionalDescription	o	*		o	*	

A.4.1.10 Reject PDU

Ref	Parameter	Sending			Receiving		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	originalInvokeID	m	m		m	m	
2	rejectReason	m	m		m	m	

A.4.2 VMD Support

A.4.2.1 Status Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	extendedDerivation	m	m		m	m	
4	csStatusRequest	o	cs		o	cs	

A.4.2.2 Status Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	vmdLogicalStatus	m	m		m	m	
3	vmdPhysicalStatus	m	m		m	m	
4	localDetail	o	m		o	*	
5	csStatusResponse	o	cs		o	cs	

A.4.2.3 Status Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	
3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	

A.4.2.4 Unsolicited Status PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	vmdLogicalStatus	m	m		m	m	
2	vmdPhysicalStatus	m	m		m	m	
3	localDetail	o	m		o	*	
4	csStatusResponse	o	cs		o	cs	

A.4.2.5 GetNameList Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	objectClass	m	m		m	m	
4	csObjectClass	o	cs		o	cs	
5	objectScope	m	m		m	m	
6	continueAfter	m	m		m	m	
7	csGetNameListRequest	o	cs		o	cs	

A.4.2.6 GetNameList Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfIdentifier	m	m		m	m	
3	moreFollows	m	m		m	m	
4	csGetNameListResponse	o	cs		o	cs	

A.4.2.7 GetNameList Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	
3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	

A.4.2.8 Identify Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	

A.4.2.9 Identify Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	vendorName	m	m		m	m	

3	modelName	m	m		m	m	
4	revision	m	m		m	m	
5	listOfAbstractSyntaxes	o	*		m	m	

A.4.2.10 Identify Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	
3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	

A.4.2.11 GetCapabilityList Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	continueAfter	m	m		m	m	
4	csGetCapabilityListRequest	o	cs		o	cs	

A.4.2.12 GetCapabilityList Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfCapabilities	m	m		m	m	5.2.3.1
3	moreFollows	m	m		m	m	
4	csGetCapabilityListResponse	o	cs		o	cs	

A.4.2.13 GetCapabilityList Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	
3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	

A.4.3 Domain Management

A.4.3.1 InitiateDownloadSequence Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	domainName	m	m		m	m	
4	listOfCapabilities	m	m	5.2.3.1	m	m	
5	sharable	m	m		m	m	
6	csInitiateDownloadSequenceRequ	o	cs		o	cs	

A.4.3.2 InitiateDownloadSequence Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	csInitiateDownloadSequenceResp	o	cs		o	cs	

A.4.3.3 InitiateDownloadSequence Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	
3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	

A.4.3.4 DownloadSegment Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	domainName	m	m		m	m	
4	csDownloadSegmentRequest	o	cs		o	cs	

A.4.3.5 DownloadSegment Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	loadData	m	m		m	m	
2.a	non-coded	o	m		o	*	
2.b	coded	o	*		o	*	
3	moreFollows	m	m		m	m	
4	csDownloadSegmentResponse	o	cs		o	cs	

A.4.3.6 DownloadSegment Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	
3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	

A.4.3.7 TerminateDownloadSequence Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	domainName	m	m		m	m	
4	discard	m	m		o	o	
4.1	errorClass	m	m		m	m	
4.2	errorCode	m	m		m	m	
4.3	additionalCode	o	*		o	*	
4.4	additionalDescription	o	*		o	*	
5	csTerminateDownloadSeqRequest	o	*		o	*	

A.4.3.8 TerminateDownloadSequence Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	csTerminateDownloadSeqRespons	o	cs		o	cs	

A.4.3.9 TerminateDownloadSequence Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	
3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	

A.4.3.10 InitiateUploadSequence Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	domainName	m	m		m	m	
4	csInitiateUploadSequenceRequest	o	cs		o	cs	

A.4.3.11 InitiateUploadSequence Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	ulsmID	m	m		m	m	
3	listOfCapabilities	m	m		m	m	5.2.3.1
4	csInitiateUploadSequenceRespons	o	cs		o	cs	

A.4.3.12 InitiateUploadSequence Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	
3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	

A.4.3.13 UploadSegment Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	ulsmID	m	m		m	m	
4	csUploadSegmentRequest	o	cs		o	cs	

A.4.3.14 UploadSegment Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	loadData	m	m		m	m	
2.a	non-coded	o	m		o	*	
2.b	coded	o	*		o	*	
3	moreFollows	m	m		m	m	
4	csUploadSegmentResponse	o	cs		o	cs	

A.4.3.15 UploadSegment Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	
3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	

A.4.3.16 TerminateUploadSequence Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	ulsmID	m	m		m	m	
4	csTerminateUploadSequenceRequ	o	cs		o	cs	

A.4.3.17 TerminateUploadSequence Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	csTerminateUploadSeqResponse	o	cs		o	cs	

A.4.3.18 TerminateUploadSequence Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	
3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	

A.4.3.19 RequestDomainDownload Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	domainName	m	m		m	m	
4	listOfCapabilities	m	m		o	*	5.2.3.1
5	sharable	m	m		m	m	
6	filename	m	m		m	m	
7	csRequestDomainDownloadReque	o	cs		o	cs	

A.4.3.20 RequestDomainDownload Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	csRequestDomainDownloadRespo	o	cs		o	cs	

A.4.3.21 RequestDomainDownload Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	
3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	

A.4.3.22 RequestDomainUpload Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	domainName	m	m		m	m	
4	filename	m	m		m	m	
5	csRequestDomainUploadRequest	o	cs		o	cs	

A.4.3.23 RequestDomainUpload Response PDU

Rcf	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	csRequestDomainUploadRespons	o	cs		o	cs	

A.4.3.24 RequestDomainUpload Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	
3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	

A.4.3.25 LoadDomainContent Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	domainName	m	m		m	m	
4	listOfCapabilities	o	*	5.2.3.1	m	m	
5	sharable	m	m		m	m	
6	filename	m	m		m	m	
7	thirdParty	o	TPY		o	TPY	
8	csLoadDomainContentRequest	o	cs		o	cs	

A.4.3.26 LoadDomainContent Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	csLoadDomainContentResponse	o	cs		o	cs	

A.4.3.27 LoadDomainContent Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	
3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	

A.4.3.28 StoreDomainContent Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	domainName	m	m		m	m	
4	filename	m	m		m	m	
5	thirdParty	o	TPY		o	TPY	
6	csStoreDomainContentRequest	o	cs		o	cs	

A.4.3.29 StoreDomainContent Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	csStoreDomainContentResponse	o	cs		o	cs	

A.4.3.30 StoreDomainContent Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	
3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	

A.4.3.31 DeleteDomain Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	domainName	m	m		m	m	
4	csDeleteDomainRequest	o	cs		o	cs	

A.4.3.32 DeleteDomain Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	csDeleteDomainResponse	o	cs		o	cs	

A.4.3.33 DeleteDomain Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	

3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	

A.4.3.34 GetDomainAttributes Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	domainName	m	m		m	m	
4	csGetDomainAttributesRequest	o	cs		o	cs	

A.4.3.35 GetDomainAttributes Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfCapabilities	m	m		m	m	5.2.3.1
3	state	m	m		m	m	
4	mmsDeletable	m	m		m	m	
5	sharable	m	m		m	m	
6	listOfProgramInvocations	m	m		m	m	
7	uploadInProgress	m	m		m	m	
8	csGetDomainAttributesResponse	o	cs		o	cs	

A.4.3.36 GetDomainAttributes Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	

3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	

A.4.4 Program Invocation Management

A.4.4.1 CreateProgramInvocation Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	programInvocationName	m	m		m	m	
4	listOfDomainNames	m	m		m	m	
5	reusable	m	m		m	m	
6	monitorType	o	i		o	i	
7	csCreateProgramInvocationReque	o	cs		o	cs	

A.4.4.2 CreateProgramInvocation Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	csCreateProgramInvocationResponse	o	cs		o	cs	

A.4.4.3 CreateProgramInvocation Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	
3	errorClass	m	m		m	m	

4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	

A.4.4.4 DeleteProgramInvocation Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	programInvocationName	m	m		m	m	
4	csDeleteProgramInvocationReque	o	cs		o	cs	

A.4.4.5 DeleteProgramInvocation Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	csDeleteProgramInvocationResponse	o	cs		o	cs	

A.4.4.6 DeleteProgramInvocation Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	
3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	

A.4.4.7 Start Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	programInvocationName	m	m		m	m	
4	executionArgument	o	*		o	*	
4.a	simpleString	o	m		o	*	
4.b	encodedString	o	*		o	*	
5	csStartRequest	o	cs		o	cs	

A.4.4.8 Start Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	csStartResponse	o	cs		o	cs	

A.4.4.9 Start Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	
3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	
7	serviceSpecificInformation	m	m		m	m	5.2.4.1

A.4.4.10 Stop Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	programInvocationName	m	m		m	m	
4	csStopRequest	o	cs		o	cs	

A.4.4.11 Stop Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	csStopResponse	o	cs		o	cs	

A.4.4.12 Stop Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	
3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	
7	serviceSpecificInformation	m	m		m	m	5.2.4.2

A.4.4.13 Resume Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	programInvocationName	m	m		m	m	
4	executionArgument	o	*		o	*	
4.a	simpleString	o	m		o	*	
4.b	encodedString	o	*		o	*	
5	csResumeRequest	o	cs		o	cs	

A.4.4.14 Resume Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	csResumeResponse	o	cs		o	cs	

A.4.4.15 Resume Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	
3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	
7	serviceSpecificInformation	m	m		m	m	5.2.4.3

A.4.4.16 Reset Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	programInvocationName	m	m		m	m	
4	csResetRequest	o	cs		o	cs	

A.4.4.17 Reset Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	csResetResponse	o	cs		o	cs	

A.4.4.18 Reset Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	
3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	
7	serviceSpecificInformation	m	m		m	m	5.2.4.4

A.4.4.19 Kill Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	programInvocationName	m	m		m	m	
4	csKillRequest	o	cs		o	cs	

A.4.4.20 Kill Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	csKillResponse	o	cs		o	cs	

A.4.4.21 Kill Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	
3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	
7	serviceSpecificInformation	m	m		m	m	5.2.4.5

A.4.4.22 GetProgramInvocationAttributes Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	programInvocationName	m	m		m	m	
4	csGetPIAttributesRequest	o	cs		o	cs	

A.4.4.23 GetProgramInvocationAttributes Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	State	m	m		m	m	
3	listOfDomainNames	m	m		m	m	
4	mmsDeletable	m	m		m	m	
5	reusable	m	m		m	m	
6	monitor	m	m		m	m	
7	executionArgument	m	m		m	m	
7.a	simpleString	o	m		o	*	
7.b	encodedString	o	*		o	*	
8	csGetPIAttributesResponse	o	cs		o	cs	

A.4.4.24 GetProgramInvocationAttributes Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	
3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	

5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	

A.4.5 Variable Access

A.4.5.1 Read Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	specificationWithResult	m	m		m	m	
4	VariableAccessSpecification	m	m	A.4.5.1.1.	m	m	A.4.5.1.1.

A.4.5.1.1 VariableAccessSpecification

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1.a	listOfVariable	o	m		m	m	
1.a.1	VariableSpecification	m	m	A.4.5.1.2.	m	m	A.4.5.1.2.
1.a.2	AlternateAccess	o	VALT	A.4.5.1.8.	o	VALT	A.4.5.1.8.
1.b	variableListName	o	VLIS		o	VLIS	

A.4.5.1.2 VariableSpecification

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1.a	name	o	VNAM		o	VNAM	
1.b	Address	o	VADR	A.4.5.1.6.	o	VADR	A.4.5.1.6.
1.c	variableDescription	o	VADR		o	VADR	
1.c.1	Address	m	m	A.4.5.1.6.	m	m	A.4.5.1.6.
1.c.2	TypeSpecification	m	m	A.4.5.1.7.	m	m	A.4.5.1.7.

1.d	scatteredAccessDescription	o	VSCA		o	VSCA	
1.e	invalidated	m	m		m	m	

A.4.5.1.3 Named Variable Object

Ref.	Parameter	Client-CR		Server-CR	
		Base	F/S	Base	F/S
1	VMD	o	m	o	c.1
2	Domain	o	m	o	c.1
3	AA-Specific	o	o	o	o

c.1: If VNAM is supported, then either VMD or Domain scope shall be supported.

A.4.5.1.4 Named Variable List Object

Ref.	Parameter	Client-CR		Server-CR	
		Base	F/S	Base	F/S
1	VMD	o	o	o	o
2	Domain	o	o	o	o
3	AA-Specific	o	o	o	o

A.4.5.1.5 Named Types Object

Ref.	Parameter	Client-CR		Server-CR	
		Base	F/S	Base	F/S
1	VMD	o	o	o	o
2	Domain	o	o	o	o
3	AA-Specific	o	o	o	o

A.4.5.1.6 Address

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1.a	numericAddress	o	m		o	c1	
1.b	symbolicAddress	o	m		o	c1	
1.c	unconstrainedAddress	o	*		o	*	

c1: At least one of these address types shall be supported (see 5.2.5.6).

A.4.5.1.7 TypeSpecification

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1.a	typeName	o	*		o	*	
1.b	array	o	STR1		o	STR1	
1.b.1	packed	m	m		m	m	
1.b.2	numberOfElements	m	m		m	m	
1.b.3	TypeSpecification	m	m		m	m	
1.c	structure	o	STR2		o	STR2	
1.c.1	packed	m	m		m	m	
1.c.2	components	m	m		m	m	
1.c.2.1	componentName	o	VALT		o	VALT	
1.c.2.	TypeSpecification	m	m		m	m	
1.d	boolean	o	*		o	*	
1.e	bit-string	o	*		o	*	
1.f	integer	o	*		o	*	
1.g	unsigned	o	*		o	*	
1.h	floatingPoint	o	*		o	*	
1.i	real	o	REAL		o	REAL	
1.j	octet-string	o	*		o	*	
1.k	visible-string	o	*		o	*	
1.l	generalized-time	o	*		o	*	
1.m	binary-time	o	*		o	*	
1.n	bcd	o	*		o	*	
1.o	objId	o	*		o	*	

A.4.5.1.8 AlternateAccess

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1.a	unnamed	o	STR1		o	STR1	
1.a.1	selectAlternateAccess	m	m		m	m	
1.a.1.1	AccessSelection	m	m	A.4.5.1.9.	m	m	A.4.5.1.9.
1.a.1.2	AlternateAccess	m	m		m	m	
1.a.2	SelectAccess	m	m	A.4.5.1.10.	m	m	A.4.5.1.10.
1.b	named	o	STR2		o	STR2	
1.b.1	componentName	m	m		m	m	
1.b.2	AlternateAccessSelection	m	m		m	m	
1.b.2.1	selectAlternateAccess	o	m		m	m	
1.b.2.2	SelectAccess	o	m	A.4.5.1.10.	m	m	A.4.5.1.10.

A.4.5.1.9 AccessSelection

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1.a	component	o	STR2		o	STR2	
1.b	index	o	STR1		o	STR1	
1.c	IndexRange	o	STR1	A.4.5.1.11.	o	STR1	A.4.5.1.11.
1.d	allElements	o	STR1		o	STR1	

A.4.5.1.10 SelectAccess

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1.a	component	o	STR2		o	STR2	
1.b	index	o	STR1		o	STR1	
1.c	IndexRange	o	STR1	A.4.5.1.11.	o	STR1	A.4.5.1.11.
1.d	allElements	o	STR1		o	STR1	

A.4.5.1.11 IndexRange

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	lowIndex	m	m		m	m	
2	numberOfElements	m	m		m	m	

A.4.5.2 Read Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	VariableAccessSpecification	m	m	A.4.5.1.1.	m	m	A.4.5.1.1.
3	listOfAccessResult	m	m		m	m	
3.a	failure	m	m		m	m	
3.b	Data	m	m	A.4.5.2.1.	m	m	A.4.5.2.1.

A.4.5.2.1 Data

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
a	array	o	STR1		o	STR1	
b	structure	o	STR2		o	STR2	
c	boolean	o	*		o	*	
d	bit-string	o	*		o	*	
e	integer	o	*		o	*	
f	unsigned	o	*		o	*	
g	floating-point	o	*		o	*	
h	real	o	REAL		o	REAL	
i	octet-string	o	*		o	*	
j	visible-string	o	*		o	*	
k	generalized-time	o	*		o	*	
l	binary-time	o	*		o	*	

m	bcd	o	*		o	*	
n	booleanArray	o	*		o	*	
o	objectId	o	*		o	*	

A.4.5.3 Read Error PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	modifierPosition	o	MOD		o	MOD	
3	errorClass	m	m		m	m	
4	errorCode	m	m		m	m	
5	additionalCode	o	*		o	*	
6	additionalDescription	o	*		o	*	

A.4.5.4 Write Request PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfModifier	o	MOD		o	MOD	
3	VariableAccessSpecification	m	m	A.4.5.1.1.	m	m	A.4.5.1.1.
4	listOfData	m	m	A.4.5.2.1.	m	m	A.4.5.2.1.

A.4.5.5 Write Response PDU

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/Ref.	Base	F/S	Value/Ref.
1	invokeID	m	m		m	m	
2	listOfWriteResult	m	m		m	m	
2.a	dataAccessError	m	m		m	m	
2.b	success	m	m		m	m	