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Information technology — International Standardized Profiles AFTnn — File Transfer, Access and Management —

Part 2:

Definition of document types, constraint sets
and syntaxes

*Technologies de l'information — Profils normalisés internationaux AFTnn —
Transfert, accès et gestion de fichier —*

*Partie 2: Définition de types de documents, ensembles de contraintes et
syntaxes*



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Foreword

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

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC1. In addition to developing International Standards, ISO/IEC JTC1 has created a Special Group on Functional Standardization for the elaboration of International Standardized Profiles.

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/IEC ISP 10607-2 was prepared with the collaboration of

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

ISO/IEC ISP 10607 consists of the following parts, under the general title *Information technology - International Standardized Profiles AFTnn - File Transfer, Access and Management* :

- *Part 1: Specification of ACSE, Presentation and Session protocols for the use by FTAM*
- *Part 2 : Definition of document types, constraint sets and syntaxes*
- *Part 3 : AFT11 - Simple File Transfer Service (unstructured)*
- *Part 4 : AFT12 - Positional File Transfer Service (flat)*
- *Part 5 : AFT22 - Positional File Access Service (flat)*
- *Part 6 : AFT3 - File Management Service*

This second edition cancels and replaces the first edition (ISO/IEC ISP 10607-2:1990), which has been revised. It also incorporates amendment 1:1991 and amendment 2:1994.

Annexes A, B and C of this part of ISO/IEC ISP 10607 are for information only.

Introduction

This part of ISO/IEC ISP 10607 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.

One of the most important roles for an ISP is to serve as the basis for the development (by organizations other than ISO and IEC) of internationally recognized tests and test centres. ISPs are produced not simply to legitimize a particular choice of base standards and options, but to promote real system interoperability. The development and widespread acceptance of tests based on this and other ISPs is crucial to the successful realization of this goal.

The text for this part of ISO/IEC ISP 10607 was developed in close co-operation among the FTAM Expert Groups of the three International OSI/OSI Workshops : OSI Implementors' Workshop (OIW), the European Workshop for Open Systems (EWOS) and the Asia-Oceania Workshop (AOW). This part of ISO/IEC ISP 10607 is harmonized among these three Workshops and it was finally ratified by the Workshops' plenary assemblies.

Information technology — International Standardized Profiles AFTnn — File Transfer, Access and Management —

Part 2:

Definition of document types, constraint sets and syntaxes

1 Scope

1.1 General

This part of ISO/IEC ISP 10607 contains the basic definitions of document types, constraint sets, abstract syntaxes, and transfer syntaxes as used and referenced in the FTAM application ISO/IEC ISP 10607-3 (AFT11), ISO/IEC ISP 10607-4 (AFT12), ISO/IEC ISP 10607-5 (AFT22) and ISO/IEC ISP 10607-6 (AFT3). Additional document types, constraint sets and syntaxes may be defined and added to this part of ISO/IEC ISP 10607 to be referenced by either the existing parts of ISO/IEC ISP 10607 or by further parts yet to be defined.

1.2 Position within the taxonomy

This part of ISO/IEC ISP 10607 is the second part, as common text, of a multi-part ISP identified in ISO/IEC TR 10000-2 as “AFT, File Transfer, Access and Management” (see also ISO/IEC TR 10000-1, 8.2 for the definition of multipart ISPs).

2 Normative references

The following documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC ISP 10607. 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/IEC ISP 10607 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.

Corrigenda to the base standards referenced : See annex A for a complete list of these documents which are identified in this part of ISO/IEC ISP 10607.

2.1 Identical Recommendations | International Standards

- ITU-T Recommendation X.680 (1994) | ISO/IEC 8824-1:1995, *Information technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation.*

- ITU-T Recommendation X.690 (1994) | ISO/IEC 8825-1:1995, *Information technology - ASN.1 encoding rules : Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER).*

2.2 Additional references

- ISO 1989:1985, *Programming languages - COBOL.*
- ISO 6523:1984, *Data interchange - Structures for the identification of organizations.*
- ISO 8571-1:1988, *Information processing systems - Open Systems Interconnection - File Transfer, Access and Management - Part 1 : General introduction.*
- ISO 8571-2:1988, *Information processing systems - Open Systems Interconnection - File Transfer, Access and Management - Part 2 : Virtual Filestore Definition.*
- ISO 8571-3:1988, *Information processing systems - Open Systems Interconnection - File Transfer, Access and Management - Part 3 : File Service Definition .*
- ISO 8571-4:1988, *Information processing systems - Open Systems Interconnection - File Transfer, Access and Management - Part 4 : File Protocol Specification.*
- ISO 8571-4:1988/Amd.4:1992, *Information processing systems - Open Systems Interconnection - File Transfer, Access and Management - Part 4 : File Protocol Specification - Amendment 4 .*
- ISO/IEC 8571-5:1990, *Information processing systems - Open Systems Interconnection - File Transfer, Access and Management - Part 5 : Protocol Implementation Conformance Statement Proforma.*
- ISO/IEC TR 10000-1:1992¹⁾, *Information technology - Framework and taxonomy of International Standardized Profiles - Part 1 : Framework.*
- ISO/IEC TR 10000-2:1994¹⁾, *Information technology - Framework and taxonomy of International Standardized Profiles - Part 2 : Principles and Taxonomy for OSI Profiles.*

¹⁾ Currently under revision.

- ISO/IEC ISP 10607-1:1995, *Information technology - International Standardized Profiles AFTnn - File Transfer, Access and Management - Part 1 : Specification of ACSE, Presentation and Session protocols for the use by FTAM.*
- 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/IEC ISP 10607-4:1995, *Information technology - International Standardized Profiles AFTnn - File Transfer, Access and Management - Part 4 : AFT12 - Positional File Transfer Service (flat).*
- ISO/IEC ISP 10607-5:1995, *Information technology - International Standardized Profiles AFTnn - File Transfer, Access and Management - Part 5 : AFT22 - Positional File Access Service (flat).*
- ISO/IEC ISP 10607-6:1995, *Information technology - International Standardized Profiles AFTnn - File Transfer, Access and Management - Part 6 : AFT3 - File Management Service.*

3 Definitions

The terms used in this part of ISO/IEC ISP 10607 are defined in the referenced base standards.

4 Abbreviations

This clause lists only abbreviations as used in clauses 1 to 5.

AFT	Profile sub-class : File Transfer, Access and Management
ASN.1	Abstract Syntax Notation One
FTAM	File Transfer, Access and Management
ISP	International Standardized Profile
OSI	Open Systems Interconnection

5 Conformance

No conformance requirements are specified in this part of ISO/IEC ISP 10607.

NOTE - This part of ISO/IEC ISP 10607 is a register of document types, constraint sets, abstract syntaxes, and transfer syntaxes. Conformance requirements are specified in the parts of ISO/IEC ISP 10607 which reference these objects.

6 Document type definitions

The definition of "lexical order" which appears in some of the following document type definitions, is a local implementation issue.

6.1 NBS-9 File directory file document type

6.1.1 Entry number : NBS-9

6.3.2 Information objects

Table 1 - Information objects in NBS-9

document type name	{ iso identified-organization oiw(14) ftamsig(5) document-type(5) file-directory(9) } "NBS-9 FTAM file-directory file"
abstract syntax names a) name for asname1	{ iso identified-organization oiw(14) ftamsig(5) abstract-syntax(2) nbs-as2(2) } "NBS file directory entry abstract syntax"
transfer syntax names	{ joint-iso-ccitt asn1(1) basic-encoding(1) } "Basic Encoding of a single ASN.1 type"
parameter syntax PARAMETERS ::= [0] IMPLICIT BIT STRING { -- Kernel group read-filename (0), read-permitted-actions (1), read-contents-type (2), -- Storage group read-storage-account (3), read-date-and-time-of-creation (4), read-date-and-time-of-last-modification (5), read-date-and-time-of-last-read-access (6), read-date-and-time-of-last-attribute-modification (7), read-identity-of-creator (8), read-identity-of-last-modifier (9), read-identity-of-last-reader (10), read-identity-of-last-attribute-modifier (11), read-file-availability (12), read-filesize (13), read-future-filesize (14), -- Security group read-access-control (15), read-legal-qualifications (16), -- Private group read-private-use (17) }	
file model	{ iso standard 8571 file-model(3) hierarchical(1) } "FTAM hierarchical file model"
constraint set	{ iso standard 8571 constraint-set(4) unstructured(1) } "FTAM unstructured constraint set"
file contents	Datatype1 ::= FileDirectoryEntry -- as defined by NBS-AS2 in 8.1

6.1.3 Scope and field of application

The document type defines the contents of a file for transfer (not for storage) using FTAM.

6.1.4 References

ISO 8571-1:1988, *Information processing systems - Open Systems Interconnection - File Transfer, Access and Management - Part 1 : General introduction*.

ISO 8571-2:1988, *Information processing systems - Open Systems Interconnection - File Transfer, Access and Management - Part 2 : Virtual Filestore Definition*.

6.1.5 Definitions

This definition makes use of the terms data element, data unit and file access data unit as defined in ISO 8571-1.

6.1.6 Abbreviations

FTAM	File Transfer, Access and Management
NBS	National Bureau of Standards, USA

6.1.7 Document semantics

The document consists of one file access data unit, which consists only of zero, one or more data elements of type "FileDirectoryEntry" (defined in NBS-AS2).

The document structure takes any of the forms allowed by the FTAM hierarchical file model as constrained by the unstructured constraint set. These definitions appear in ISO 8571-2.

The parameter of the document type is used on F-OPEN request to specify the desired attributes of each of the files in the filestore, when reading the document.

6.1.8 Abstract syntactic structure

The abstract syntactic structure of the document is a series of file directory entries, each of which is defined by the "FileDirectoryEntry" definition in NBS-AS2.

Additional constraints are defined for this document type: file access actions are restricted to read. File-directory files may not be written or modified (except as a side effect of actions performed on individual files contained within a file directory).

6.1.9 Definition of transfer

6.1.9.1 Datatype definition

The file consists of zero or more values of Datatype1 defined in table 1.

6.1.9.2 Presentation data values

The document is transferred as a series of presentation data values. Each presentation data value shall consist of one value of the ASN.1 data type "Datatype1", carrying one of the file directory entries from the document.

All values are transmitted in the same (but any) presentation context established to support the abstract syntax name "asname1" declared in table 1.

6.1.9.3 Sequence of presentation data values

The sequence of presentation data values is the same as the sequence of file directory entries within the data unit in the file.

6.1.10 Transfer syntax

An implementation supporting this document type shall support the transfer syntax generation rules named in table 1 for all presentation data values transferred. Implementations may optionally support other named transfer syntaxes.

6.1.11 ASE specific specifications for FTAM

Relaxation is allowed to any bitstring combination of the document type parameter.

6.2 INTAP-1 Record file document type

6.2.1 Entry number : INTAP-1

6.2.2 Information objects

Table 2 - Information objects in INTAP-1

document type name	{ iso member-body 392 ftam(10) document-type(2) intap-record-file(1) } "INTAP record file"
abstract syntax names name for asname1	{ iso member-body 392 ftam(10) abstract-syntax(3) intap-as1(1) } "INTAP abstract syntax AS1"
transfer syntax names	{ iso member-body 392 ftam(10) transfer-syntax(4) intap-ts1(1) } "INTAP transfer syntax TS1" { joint-iso-ccitt asn1(1) basic-encoding(1) } "Basic Encoding of a single ASN.1 type"
parameter syntax PARAMETERS ::= SEQUENCE { maximum-record-length [1] IMPLICIT INTEGER OPTIONAL, record-significance [2] IMPLICIT INTEGER {variable (0), fixed (1) } OPTIONAL }	
file model	{ iso standard 8571 file-model(3) hierarchical(1) } "FTAM hierarchical file model"
constraint set	{ iso standard 8571 constraint-set(4) unstructured(1) } "FTAM unstructured constraint set"
file contents	Datatype1 ::= Record-Element -- as defined in 8.2

6.2.3 Scope and field of application

The document type defines the contents of a file for storage, for transfer and access by FTAM.

6.2.4 References

ISO 8571-1:1988, *Information processing systems - Open Systems Interconnection - File Transfer, Access and Management - Part 1 : General introduction*.

ISO 8571-2:1988, *Information processing systems - Open Systems Interconnection - File Transfer, Access and Management - Part 2 : Virtual Filestore Definition*.

6.2.5 Definitions

This definition makes use of the terms data element, data unit and file access data unit as defined in ISO 8571-1.

6.2.5.1 record : an ordered series of one or more record-elements. Data units of this document type consist of one or more records (see figure 1).

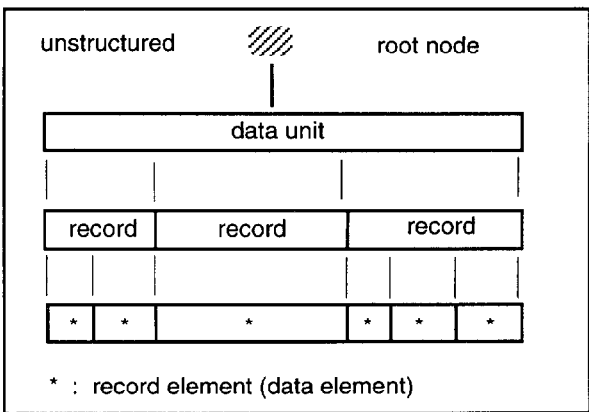


Figure 1 - Structure of INTAP-1 document type

6.2.6 Abbreviations

FADU	File Access Data Unit
FTAM	File Transfer, Access and Management
INTAP	Interoperability Technology Association for Information Processing, Japan

6.2.7 Document semantics

The document consists of one file access data unit, which consists only of zero, one or more records. The order of each of these records is significant.

The document structure takes the form allowed by the FTAM hierarchical file model as constrained by the unstructured constraint set (see table 2). These definitions appear in ISO 8571-2.

Each record consists of octets of any value from 0 to 255. The meaning attached to these values is not constrained by the document type.

There are no size or length limitations imposed by this definition, except those specified here. Each record is of a length determined by the number of octets given by the maximum-record-length parameter. If this parameter is not present, the default is that the length of records is unbounded. If the value of the record-significance parameter is variable, or if the parameter is not present, the length of each record is less than or equal to the length given in the maximum-record-length parameter. If the value is fixed, the length of each record is exactly equal to the length given.

6.2.8 Abstract syntactic structure

The abstract syntactic structure of the document is a series of octet strings (record elements). The grouping of record elements into records is indicated by the context-specific-number field of each record-element as specified in 8.2.

6.2.9 Definition of transfer

6.2.9.1 Datatype definition

The file consists of zero or more values of Datatype1 (see table 2 for the definition).

6.2.9.2 Presentation data values

The document is transferred as a series of presentation data values. Each presentation data value shall consist of one value of ASN.1 data type "Datatype1", carrying one of the record-elements from the document. All values are transmitted in the same (but any) presentation context defined to support the abstract syntax name "asname1".

NOTE - Specific carrier standards may impose additional constraints on the presentation context to be used, where the above permits a choice.

Boundaries between presentation data values in the same presentation context, and boundaries between P-DATA primitives, are chosen locally by the sending entity at the time of transmission, and carry no semantics of the document type. Receivers which support this document type shall accept a document with any of the permitted transfer options.

6.2.9.3 Sequence of presentation data values

The sequence of presentation data values is the same as the sequence of record-elements within the data unit in the file.

6.2.10 Transfer syntax

For transferred presentation data values there are two types of transfer syntax names for INTAP-1 specified in table 2. They are INTAP transfer syntax TS1 and Basic Encoding of a single ASN.1 type. The former is used for compression of data, and the latter is used for basic encoding (non-compression) of data. Implementations supporting this document type shall support the syntax for the basic encoding and may optionally support the syntax for compression of data. Implementations may optionally support other named transfer syntaxes.

6.2.11 ASE specific specifications

6.2.11.1 String length relaxation

String length relaxation loses explicit information in the document type identification. A document of type INTAP-1 may be relaxed to another document of type INTAP-1 with a larger maximum-record-length parameter, or no maximum-record-length parameter.

6.2.11.2 The EXTEND operation

When the EXTEND operation is applied to a data unit of an INTAP-1 document, the transferred data shall be an INTAP-1 document with parameters equal to those of the original INTAP-1 document. The resulting document consists of the record-elements of the original INTAP-1 document, followed by the record-elements of the new INTAP-1 document. The boundary of the original and new record-elements is not visible in the new document.

6.2.11.3 The REPLACE operation

When the REPLACE operation is applied to the root FADU of an INTAP-1 document, the transferred material shall be any INTAP-1 document with the same parameter values.

6.3 NBS-6 Sequential file document type

6.3.1 Entry number : NBS-6

6.3.2 Information objects

Table 3 - Information objects in NBS-6

document type name	{ iso identified-organization oiw(14) ftamsig(5) document-type(5) sequential(6) }		
	"NBS-6 FTAM sequential file"		
abstract syntax names			
a) name for asname1	{ iso identified-organization oiw(14) ftamsig(5) abstract-syntax(2) nbs-as1(1) }		
	"NBS abstract syntax AS1"		
b) name for asname2	{ iso standard 8571 abstract-syntax(2) ftam-fadu(2) }		
	"FTAM FADU"		
transfer syntax names	{ joint-iso-ccitt asn1(1) basic-encoding(1) }		
	"Basic Encoding of a single ASN.1 type"		
parameter syntax			
PARAMETERS	::=	SEQUENCE OF CHOICE { parameter0 Parameter0, parameter1 Parameter1, parameter2 Parameter2 }	
Parameter0	::=	[0] INTEGER { univer-time (23), gen-time (24), boolean (1), null (5) }	
Parameter1	::=	[1] SEQUENCE { universal-class-number-1 INTEGER { int (2), bit (3), ia5 (22), graphic (25), general (27), octet (4) }, string-length INTEGER }	
Parameter2	::=	[2] SEQUENCE { private-class-number INTEGER { float(0) }, length-1 INTEGER, length-2 INTEGER }	
file model	{ iso standard 8571 file-model(3) hierarchical(1) }		
	"FTAM hierarchical file model"		
constraint set	{ iso standard 8571 constraint-set(4) sequential-flat(2) }		
	"FTAM sequential flat constraint set"		
file contents	Datatype1	::= PrimType --as defined by NBS abstract syntax AS1 in 8.3	
	Datatype2	::= Node-Descriptor-Data-Element	

6.3.3 Scope and field of application

The document type defines the contents of a file for storage, for transfer and access by FTAM.

NOTE - Storage refers to apparent storage within the virtual filestore.

6.3.4 References

ISO 8571-1:1988, *Information processing systems - Open Systems Interconnection - File Transfer, Access and Management - Part 1 : General introduction.*

ISO 8571-2:1988, *Information processing systems - Open Systems Interconnection - File Transfer, Access and Management - Part 2 : Virtual Filestore Definition.*

6.3.5 Definitions

This definition makes use of the terms data element, data unit and file access data unit as defined in ISO 8571-1.

6.3.6 Abbreviations

FTAM File Transfer, Access and Management

6.3.7 Document semantics

The document consists of zero, one or more file access data units. Each FADU contains precisely zero or one data unit which consists of zero, one or more data elements. The order of each of these elements is significant.

The document structure takes any of the forms allowed by the FTAM hierarchical file model as constrained by the sequential flat constraint set (see table 3). These definitions appear in ISO 8571-2. As additional constraints FADU Identity will be limited to begin, end, first and next.

For a specific file the number of data elements in a data unit is given by the parameters. Each data element is a data type from the set of primitive data types defined in 8.3. Each data unit contains the same data element types in the same order as all other data units. These types are determined by the parameters 0 through 2.

For Datatype1, the string-length field of Parameter1 specifies the length of the value in octets for the INTEGER, BIT STRING and OCTET STRING types. For character-type data elements, the string-length indicates the actual number of characters from the specified character set, not including any escape sequences or overhead from the character encoding.

For floating point numbers, finite form, length-1 and length-2 specify the length in bits of mantissa and exponent, respectively. The length-1 and length-2 values are irrelevant for the other choices of floating point numbers.

6.3.8 Abstract syntactic structure

The abstract syntactic structure of the document is a hierarchically structured file as defined in the ASN.1 module ISO8571-FADU in ISO 8571-2, in which each of the file access data units has the abstract syntactic structure of NBS-AS1 as defined by the parameters.

6.3.9 Definition of transfer

6.3.9.1 Datatype definitions

The file consists of data values which are of either

- a) Datatype1 defined in table 3, where the PrimType in the datatype is given by the NBS-AS1 definition; or
- b) Datatype2 defined in table 3, the ASN.1 datatype declared as "Data-Element" in the ASN.1 module ISO8571-FADU.

6.3.9.2 Presentation data values

The document is transferred as a series of presentation data values, each of which is either

- a) one value of the ASN.1 datatype "Datatype1", carrying one of the data elements from the document. All values are transmitted in the same (but any) presentation context established to support the abstract syntax name "asname1"; or
- b) a value of "Datatype2". All values are transmitted in the same (but any) presentation context established to support the abstract syntax name "asname2".

NOTES

1 Specific carrier standards may impose additional constraints on the presentation context to be used, where the above permits a choice.

2 Any document type defined in this entry either makes no use of Datatype2, or starts with a Datatype2 transmission.

Boundaries between presentation data values in the same presentation context, and boundaries between P-DATA primitives, are chosen locally by the sending entity at the time of transmission, and carry no semantics of the document type. Receivers which support this document type shall accept a document with any of the permitted transfer options (e.g., document type parameters and transfer syntaxes).

6.3.9.3 Sequence of presentation data values

The sequence of presentation data values of type a) and the sequence of presentation data values of types a) and b) is the same as the sequence of data elements within a data unit, and data units in the hierarchical structure, when flattened according to the definition of the hierarchical file model in ISO 8571-2.

6.3.10 Transfer syntax

An implementation supporting this document type shall support the transfer syntax generation rules named in table 3 for all presentation data values transferred.

Implementations may optionally support other named transfer syntaxes.

6.3.11 ASE specific specifications

6.3.11.1 Structural simplification

This simplification loses information.

The document type NBS-6 may be simplified to the document type FTAM-3 (allowed only when reading the file). The octet representation of the transferred data is

unpredictable. It will usually correspond to the data values as stored in the local real filestore of the responder.

6.3.11.2 Access context selection

A document of type NBS-6 may be accessed in any one of the access contexts defined in the sequential flat constraint set. The presentation data units transferred in each case are those derived from the structuring elements defined for that access context in ISO 8571-2.

6.3.11.3 The INSERT operation

When the INSERT operation is applied at the end of file, the transferred material shall be the series of FADUs which would be generated by reading any NBS-6 document with the same parameter values in access context FA.

6.4 NBS-7 Random access file document type

6.4.1 Entry number : NBS-7

6.4.2 Information objects

Table 4 - Information objects in NBS-7

document type name	{ iso identified-organization oiw(14) ftamsig(5) document-type(5) random-file(7) }			"NBS-7 FTAM random access file"		
abstract syntax names						
a) name for asname1	{ iso identified-organization oiw(14) ftamsig(5) abstract-syntax(2) nbs-as1(1) }					
	"NBS abstract syntax AS1"					
b) name for asname2	{ iso standard 8571 abstract-syntax(2) ftam-fadu(2) }					
	"FTAM FADU"					
transfer syntax names	{ joint-iso-ccitt asn1(1) basic-encoding(1) }					
	"Basic Encoding of a single ASN.1 type"					
parameter syntax						
PARAMETERS	::=	SEQUENCE OF CHOICE { parameter0 Parameter0, parameter1 Parameter1, parameter2 Parameter2 }				
Parameter0	::=	[0] INTEGER {	univer-time	(23),		
			gen-time	(24),		
			boolean	(1),		
			null	(5) }		
Parameter1	::=	[1] SEQUENCE {				
		universal-class-number-1	INTEGER	{ int	(2),	
				bit	(3),	
				ia5	(22),	
				graphic	(25),	
				general	(27),	
				octet	(4) },	
		string-length	INTEGER	}		
Parameter2	::=	[2] SEQUENCE {				
		private-class-number	INTEGER	{ float (0) },		
		length-1	INTEGER,			
		length-2	INTEGER }			
file model	{ iso standard 8571 file-model(3) hierarchical(1) }					
	"FTAM hierarchical file model"					
constraint set	{ iso identified-organization oiw(14) ftamsig(5) constraint-set(4) nbs-ordered-flat(1) }					
	"NBS ordered flat constraint set"					
file contents	Datatype1	::=	PrimType	--as defined by NBS abstract syntax AS1 in 8.3		
	Datatype2	::=	CHOICE {			
			node-descriptor-data-element	Node-Descriptor-Data-Element,		
			enter-subtree-data-element	Enter-Subtree-Data-Element,		
			exit-subtree-data-element	Exit-Subtree-Data-Element }		

6.4.3 Scope and field of application

The document type defines the contents of a file for storage, for transfer and access by FTAM.

NOTE - Storage refers to apparent storage within the virtual filestore.

6.4.4 References

ISO 8571-1:1988, *Information processing systems - Open Systems Interconnection - File Transfer, Access and Management - Part 1 : General introduction*.

ISO 8571-2:1988, *Information processing systems - Open Systems Interconnection - File Transfer, Access and Management - Part 2 : Virtual Filestore Definition*.

6.4.5 Definitions

This definition makes use of the terms data element, data unit and file access data unit as defined in ISO 8571-1.

6.4.6 Abbreviations

FTAM File Transfer, Access and Management

6.4.7 Document semantics

The document consists of zero, one or more file access data units. Each FADU contains precisely zero or one data unit which consists of zero, one or more data elements. The order of each of these elements is significant.

The document structure takes any of the forms allowed by the FTAM hierarchical file model as constrained by the NBS-ordered-flat constraint set (see table 4). These definitions appear in 7.1.

For a specific file the number of data elements in a data unit is given by the parameters. Each data element is a data type from the set of primitive data types defined in 8.3. Each data unit contains the same data element types in the same order as all other data units. These types are determined by the parameters 0 through 2.

For Datatype1, the string-length field of Parameter1 specifies the length of the value in octets for the INTEGER, BIT STRING and OCTET STRING types. For character-type data elements, the string-length indicates the actual number of characters from the specified character set, not including any escape sequences or overhead from the character encoding.

For floating point numbers, finite form, length-1 and length-2 specify the length in bits of mantissa and exponent, respectively. The length-1 and length-2 values are irrelevant for the other choices of floating point numbers.

6.4.8 Abstract syntactic structure

The abstract syntactic structure of the document is a hierarchically structured file as defined in the ASN.1 module ISO8571-FADU in ISO 8571-2, in which each of the file access data units has the abstract syntactic structure of NBS-AS1 as defined by the parameters.

6.4.9 Definition of transfer

6.4.9.1 Datatype definitions

The file consists of data values which are of either

- a) Datatype1 defined in table 4, where the PrimType in the datatype is given by the NBS-AS1 definition; or
- b) Datatype2 defined in table 4, the ASN.1 datatype declared as "Data-Element" in the ASN.1 module ISO8571-FADU.

6.4.9.2 Presentation data values

The document is transferred as a series of presentation data values, each of which is either

- a) one value of the ASN.1 datatype "Datatype1", carrying one of the data elements from the document. All values are transmitted in the same (but any) presentation context established to support the abstract syntax name "asname1"; or
- b) a value of "Datatype2". All values are transmitted in the same (but any) presentation context established to support the abstract syntax name "asname2".

NOTES

1 Specific carrier standards may impose additional constraints on the presentation context to be used, where the above permits a choice.

2 Any document type defined in this entry either makes no use of Datatype2, or starts with a Datatype2 transmission.

Boundaries between presentation data values in the same presentation context, and boundaries between P-DATA primitives, are chosen locally by the sending entity at the time of transmission, and carry no semantics of the document type. Receivers which support this document type shall accept a document with any of the permitted transfer options (e.g., document type parameters and transfer syntaxes).

6.4.9.3 Sequence of presentation data values

The sequence of presentation data values of type a) and the sequence of presentation data values of types a) and b) is the same as the sequence of data elements within a data unit, and data units in the hierarchical structure, when flattened according to the definition of the hierarchical file model in ISO 8571-2.

6.4.10 Transfer syntax

An implementation supporting this document type shall support the transfer syntax generation rules named in table 4 for all presentation data values transferred.

Implementation may optionally support other named transfer syntaxes.

6.4.11 ASE specific specifications

6.4.11.1 Structural simplification

This simplification loses information.

The document type NBS-7 may be accessed as a document type FTAM-3 (allowed only when reading the file) by specifying document type FTAM-3 in the contents

type parameter in F-OPEN request, and limiting access context to UA on F-READ.

The octet representation of the transferred data is unpredictable. It will usually correspond to the data values as stored in the local real filestore of the responder.

A document of type NBS-7 can be accessed as a document of type NBS-6 (allowed only when reading the file) by specifying document type NBS-6 with appropriate data type parameters in the contents type parameter on the F-OPEN request.

6.4.11.2 Access context selection

A document of type NBS-7 may be accessed in any one of the access contexts defined in the NBS ordered flat constraint set. The presentation data units transferred in each case are those derived from the structuring elements defined for that access context in ISO 8571-2.

6.4.11.3 The INSERT operation

When the INSERT operation is applied at the end of file, the transferred material shall be the series of FADUs which would be generated by reading any NBS-7 document with the same parameter values in access context FA.

6.5 NBS-8 Indexed sequential file document type

6.5.1 Entry number : NBS-8

6.5.2 Information objects

Table 5 - Information objects in NBS-8

document type name	{ iso identified-organization oiw(14) ftamsig(5) document-type(5) indexed-file(8) } “NBS-8 FTAM indexed file”		
abstract syntax names			
a) name for asname1	{ iso identified-organization oiw(14) ftamsig(5) abstract-syntax(2) nbs-as1(1) } “NBS abstract syntax AS1”		
b) name for asname2	{ iso standard 8571 abstract-syntax(2) ftam-fadu(2) } “FTAM FADU”		
transfer syntax names	{ joint-iso-ccitt asn1(1) basic-encoding(1) } “Basic Encoding of a single ASN.1 type”		
parameter syntax			
PARAMETERS	::=	SEQUENCE { datatypes DataTypes, keytype KeyType, keyposition KeyPosition }	
DataTypes	::=	SEQUENCE OF CHOICE { parameter0 Parameter0, parameter1 Parameter1, parameter2 Parameter2 }	
KeyType	::=	CHOICE { parameter0 Parameter0, parameter1 Parameter1, parameter2 Parameter2 } -- Parameter0, Parameter1, Parameter2 as defined for the document types NBS-6 -- and NBS-7	
KeyPosition	::=	INTEGER	
file model	{ iso standard 8571 file-model(3) hierarchical(1) } “FTAM hierarchical file model”		
constraint set	{ iso standard 8571 constraint-set(4) ordered-flat(3) } “FTAM ordered flat constraint set”		
file contents	Datatype1	::= PrimType	--as defined by NBS abstract syntax AS1 in 8.3
	Datatype2	::= CHOICE {	node-descriptor-data-element Node-Descriptor-Data-Element, enter-subtree-data-element Enter-Subtree-Data-Element, exit-subtree-data-element Exit-Subtree-Data-Element }
	Datatype3	::= PrimType	--as defined by NBS abstract syntax AS1 in 8.3

6.5.3 Scope and field of application

The document type defines the contents of a file for storage, for transfer and access using FTAM.

NOTE - Storage refers to apparent storage within the virtual filestore.

6.5.4 References

ISO 8571-1:1988, *Information processing systems - Open Systems Interconnection - File Transfer, Access and Management - Part 1 : General introduction.*

ISO 8571-2:1988, *Information processing systems - Open Systems Interconnection - File Transfer, Access and Management - Part 2 : Virtual Filestore Definition.*

6.5.5 Definitions

This definition makes use of the terms data element, data unit and file access data unit as defined in ISO 8571-1.

6.5.6 Abbreviations

FTAM File Transfer, Access and Management

6.5.7 Document semantics

The document consists of zero, one or more file access data units. Each FADU contains precisely one data unit which consists of zero, one or more data elements. The order of each of these elements is significant.

The document structure takes any of the forms allowed by the FTAM hierarchical file model as constrained by the FTAM ordered flat constraint set (see table 5). These definitions appear in ISO 8571-2.

The following additional requirements are specified for the use of the ordered flat constraint set:

- o The FADU Identities first, last, and node number are not required for conformant implementations;
- o The identities next and previous are allowed for all FADUs.

Each data element is a data type from the set of primitive data types defined in 8.3. Each data unit contains the same data element types in the same order as all other data units. These types and their respective maximum lengths are defined by the DataTypes parameter.

For Datatype1 and Datatype3, the string-length field of Parameter1 specifies the length of the value in octets for the INTEGER, BIT STRING and OCTET STRING types. For character-type data elements, the string-length indicates the actual number of characters from the specified character set, not including any escape sequences or overhead from the character encoding.

For floating point numbers, finite form, in Datatype1 and Datatype3, length-1 and length-2 specify the length in bits of mantissa and exponent, respectively. The length-1 and length-2 values are irrelevant for the other choices of floating point numbers.

Each data unit in the file has a key associated with it, which is the user-coded form of Node-Name. The key of each data unit is of the same data type as the key of all other data units in the file and is a single data element from the set of primitive data types defined in 8.3.

The type and length of the key are defined by the KeyType parameter.

The primitive data types and minimum size ranges of each unit which an implementation must accept as a key value are given in table 6.

The position of the key in the data unit is specified by the KeyPosition parameter:

- o KeyPosition = 0 implies the key is not part of the data;
- o KeyPosition > 0 specifies the actual data element in the data unit.

Table 6 - Datatypes for keys

Key Type	Minimum Range (octets)	Order
ASN.1 INTEGER	(1-2)	increasing numeric value
ASN.1 IA5String	(1-16)	lexical order
ASN.1 GraphicString	(1-16)	lexical order
ASN.1 GeneralString	(1-16)	lexical order
ASN.1 OCTET STRING	(1-16)	increasing value
ASN.1 GeneralizedTime		increasing time value
ASN.1 UniversalTime		increasing time value
NBS-AS1 FloatingPointNumber		increasing numeric value

6.5.8 Abstract syntactic structure

The abstract syntactic structure of the document is a hierarchically structured file as defined in the ASN.1 module ISO8571-FADU in ISO 8571-2, in which each of the file access data units has the abstract syntactic structure of NBS-AS1 as defined by the parameters.

6.5.9 Definition of transfer

6.5.9.1 Datatype definitions

The file consists of data values which are of

a) Datatype1 defined in table 5, where the PrimType in the datatype is given by the NBS-AS1 definition; or

b) Datatype2 defined in table 5, the ASN.1 datatype declared as "Data-Element" in the ASN.1 module ISO8571-FADU; or

c) Datatype3, defined in table 5, which specifies the user-coded form of the Node-Name in the FTAM FADU abstract syntax, where user-coded is defined as an EXTERNAL.

6.5.9.2 Presentation data values

The document is transferred as a series of presentation data values, each of which is

a) one value of the ASN.1 datatype "Datatype1", carrying one of the data elements from the document. All values are transmitted in the same (but any) presentation context established to support the abstract syntax name "asname1"; or

b) a value of "Datatype2". All values are transmitted in the same (but any) presentation context established to support the abstract syntax name "asname2"; or

c) a value of "Datatype3" carrying a key. All values are transmitted in the same (but any) presentation context established to support the abstract syntax name "asname1".

NOTES

1 Specific carrier standards may impose additional constraints on the presentation context to be used, where the above permits a choice.

2 Any document type defined in this entry either makes no use of Datatype2, or starts with a Datatype2 transmission.

Boundaries between presentation data values in the same presentation context, and boundaries between P-DATA primitives, are chosen locally by the sending entity at the time of transmission, and carry no semantics of the document type. Receivers which support this document type shall accept a document with any of the permitted transfer options (e.g., document type parameters and transfer syntaxes).

6.5.9.3 Sequence of presentation data values

The sequence of presentation data values of type a) and the sequence of presentation data values of types a) and b) is the same as the sequence of data elements within a data unit, and data units in the hierarchical structure, when flattened according to the definition of the hierarchical file model in ISO 8571-2.

6.5.10 Transfer syntax

An implementation supporting this document type shall support the transfer syntax generation rules named in table 5 for all presentation data values transferred.

Implementations may optionally support other named transfer syntaxes.

6.5.11 ASE specific specifications

6.5.11.1 Structural simplification

This simplification loses information.

The document type NBS-8 may be accessed as a document type FTAM-3 (allowed only when reading the file) by specifying document type FTAM-3 in the contents type parameter in F-OPEN request, and limiting access context to UA on F-READ.

The octet representation of the transferred data is unpredictable. It will usually correspond to the data values as stored in the local real filestore of the responder.

A document of type NBS-8 can be accessed as a document of type NBS-6 (allowed only when reading the file) by specifying document type NBS-6 with appropriate data type parameters in the contents type parameter on the F-OPEN request. The traversal order of the FADUs must be maintained.

NOTE - The traversal order is as reading the file as NBS-8 in key order.

6.5.11.2 Access context selection

A document of type NBS-8 may be accessed in any one of the access contexts defined in the FTAM ordered flat constraint set. The presentation data units transferred in each case are those derived from the structuring elements defined for that access context in ISO 8571-2.

6.5.11.3 The INSERT operation

When the INSERT operation is applied, the transferred material shall be the series of FADUs which would be generated by reading any NBS-8 document with the same parameter values in access context FA.

The insertion of a new FADU after an already existing FADU will be indicated via a diagnostic on F-TRANSFER-END.

6.5.11.4 The EXTEND operation

This operation is excluded for use with this document type.

6.6 NBS-10 Random binary access file document type

6.6.1 Entry number : NBS-10

6.6.2 Information objects

Table 7 - Information objects in NBS-10

document type name	{ iso identified-organization oiw(14) ftamsig(5) document-type(5) random-binary(10) } "NBS-10 FTAM random binary access file"	
abstract syntax names		
a) name for asname1	{ iso identified-organization oiw(14) ftamsig(5) abstract-syntax(2) nbs-random-binary(4) } "NBS random binary access file abstract syntax"	
b) name for asname2	{ iso standard 8571 abstract-syntax(2) ftam-fadu(2) } "FTAM FADU"	
c) name for asname3	{ iso identified-organization oiw(14) ftamsig(5) abstract-syntax(2) nbs-node-name(3) } "NBS random access node name abstract syntax"	
transfer syntax names	{ joint-iso-ccitt asn1(1) basic-encoding(1) } "Basic Encoding of a single ASN.1 type"	
file model	{ iso standard 8571 file-model(3) hierarchical(1) } "FTAM hierarchical file model"	
constraint set	{ iso identified-organization oiw(14) ftamsig(5) constraint-set(4) nbs-random-access(2) } "NBS random access constraint set"	
file contents	Datatype1	::= OCTET STRING
	Datatype2	::= Node-Name
	--	The type to be used for Node-Name is defined in ISO8571-FADU
	--	The only choice for Node-Name is user-coded.
	Datatype3	::= NBS-Node-Name
		-- as defined by NBS random access node name
		-- abstract syntax in 8.4

6.6.3 Scope and field of application

The document type defines the contents of a file for storage, for transfer and access by FTAM.

6.6.4 References

ISO 8571-1:1988, *Information processing systems - Open Systems Interconnection - File Transfer, Access and Management - Part 1 : General introduction.*

ISO 8571-2:1988, *Information processing systems - Open Systems Interconnection - File Transfer, Access and Management - Part 2 : Virtual Filestore Definition.*

6.6.5 Definitions

This definition makes use of the terms data element, data unit and file access data unit as defined in ISO 8571-1.

6.6.6 Abbreviations

FTAM File Transfer, Access and Management

6.6.7 Document semantics

The document consists of zero, one or more file access data units. Each FADU contains precisely one data unit which consists of precisely one data element. The data element is made up of one octet. The order of each of these elements is significant. The semantics of the data element is not specified by this document type.

The document structure takes any of the forms allowed by the FTAM hierarchical file model as constrained by the NBS random access constraint set. The definition for FTAM hierarchical file model appears in ISO 8571-2.

There are no size or length limitations imposed by this definition.

6.6.8 Abstract syntactic structure

The abstract syntactic structure of the document is a series of octets.

6.6.9 Definition of transfer

6.6.9.1 Datatype definition

A presentation data value used for transfer is an ASN.1 OCTET STRING.

Datatype2 is used to specify the FADU Identity of name-list in the FTAM PDUs specifying FADU Identity, where name-list is defined as a SEQUENCE OF EXTERNAL. The EXTERNAL is defined as Node-Name in the FTAM FADU abstract syntax. The use of Datatype2 is defined in 7.2 (NBS random access constraint set).

Datatype3 specifies the user-coded form of the Node-Name in the FTAM FADU abstract syntax, where user-coded is defined as an EXTERNAL. That EXTERNAL is defined by Datatype3. The use of Datatype3 is defined in 7.2 (NBS random access constraint set).

6.6.9.2 Presentation data values

The document is transferred as a series of presentation data values. Each presentation data value shall consist of the data from one or more FADUs concatenated together. The result is one value of the ASN.1 data type OCTET STRING. The fadu-count field supplied in the Node-Name specifies the number of FADUs to transfer during a Read operation. The requested FADUs may be transferred as one or more presentation data values.

All values are transmitted in the same (but any) presentation context established to support the abstract syntax name "asname1" declared in table 7.

NOTE - Specific carrier standards may impose additional constraints on the presentation context to be used, when the above permits a choice.

Boundaries between P-DATA primitives and between presentation data values are chosen locally by the sending entity at the time of transmission. The boundaries are not preserved when the file is stored and they carry no semantics of the document type. Receivers which support this document type shall accept a document with any of the permitted transfer options.

6.6.9.3 Sequence of presentation data values

The sequence of presentation data values is the same as the sequence of data units in the file.

6.6.10 Transfer syntax

An implementation supporting this document type shall support the transfer syntax generation rules named in table 7 for all presentation data values transferred.

Implementations may optionally support other named transfer syntaxes.

6.6.11 ASE specific specifications

6.6.11.1 Simplification

The document type NBS-10 may be simplified to the document type FTAM-3. The resultant document contains the same sequence of data values as would result from accessing the file as an NBS-10 file.

6.6.11.2 The READ operation

A READ operation may be applied to a range of FADUs via the FADU Identity of NodeSeq. The starting-fadu part of the node name specifies the node number of the first FADU; the fadu-count specifies the number of consecutive FADUs to be transferred.

A READ operation applied to a range of FADUs that spans beyond the end of file is valid. All available data in the range is transferred. An informative diagnostic (5005) is returned on the F-DATA-END request indicating that the end of file was reached and a portion of the request was satisfied.

6.6.11.3 The REPLACE operation

When the REPLACE operation is applied to the root FADU of an NBS-10 document, the transferred data shall be any NBS-10 document.

The REPLACE operation applied to a FADU Identity of node number is used to replace a series of FADUs, starting at the specified position in the file, by the new FADUs being transferred. The number of replaced FADUs is determined by the number of transferred FADUs.

If the replacement spans beyond the end of the existing file, then the additional FADUs are inserted at the end of the file.

6.6.11.4 The INSERT operation

When the INSERT operation is applied at the end of file, the transferred data shall be the series of FADUs which would be generated by reading any NBS-10 document in access context UA.

6.7 NBS-11 Indexed file with unique keys document type

6.7.1 Entry number : NBS-11

6.7.2 Information objects

Table 8 - Information objects in NBS-11

document type name	{ iso identified-organization oiw(14) ftamsig(5) document-type(5) indexed-file-with-unique-keys(11) } "NBS-11 FTAM indexed file with unique keys"		
abstract syntax names			
a) name for asname1	{ iso identified-organization oiw(14) ftamsig(5) abstract-syntax(2) nbs-as1(1) } "NBS abstract syntax AS1"		
b) name for asname2	{ iso standard 8571 abstract-syntax(2) ftam-fadu(2) } "FTAM FADU"		
transfer syntax names	{ joint-iso-ccitt asn1(1) basic-encoding(1) } "Basic Encoding of a single ASN.1 type"		
parameter syntax	PARAMETERS ::= SEQUENCE { datatypes DataTypes, keytype KeyType, keyposition KeyPosition } DataTypes ::= SEQUENCE OF CHOICE { parameter0 Parameter0, parameter1 Parameter1, parameter2 Parameter2 } KeyType ::= CHOICE { parameter0 Parameter0, parameter1 Parameter1, parameter2 Parameter2 } -- Parameter0, Parameter1, Parameter2 as defined for the document types NBS-6 -- and NBS-7 KeyPosition ::= INTEGER		
file model	{ iso standard 8571 file-model(3) hierarchical(1) } "FTAM hierarchical file model"		
constraint set	{ iso standard 8571 constraint-set(4) ordered-flat-unique-names(4) } "FTAM ordered flat constraint set with unique names"		
file contents	Datatype1	::= PrimType	--as defined by NBS abstract syntax AS1 in 8.3
	Datatype2	::= CHOICE {	node-descriptor-data-element Node-Descriptor-Data-Element, enter-subtree-data-element Enter-Subtree-Data-Element, exit-subtree-data-element Exit-Subtree-Data-Element }
	Datatype3	::= PrimType	--as defined by NBS abstract syntax AS1 in 8.3

6.7.3 Scope and field of application

The document type defines the contents of a file for storage, for transfer and access using FTAM.

NOTE - Storage refers to apparent storage within the virtual filestore.

6.7.4 References

ISO 8571-1:1988, *Information processing systems - Open Systems Interconnection - File Transfer, Access and Management - Part 1 : General introduction.*

ISO 8571-2:1988, *Information processing systems - Open Systems Interconnection - File Transfer, Access and Management - Part 2 : Virtual Filestore Definition.*

6.7.5 Definitions

This definition makes use of the terms data element, data unit and file access data unit as defined in ISO 8571-1.

6.7.6 Abbreviations

FTAM File Transfer, Access and Management

6.7.7 Document semantics

The document consists of zero, one or more file access data units. Each FADU contains precisely one data unit which consists of zero, one or more data elements. The order of each of these elements is significant.