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SERIES T: TERMINAL EQUIPMENT AND PROTOCOLS FOR TELEMATIC SERVICES

DOCUMENT TRANSFER AND MANIPULATION (DTAM) – SERVICES AND PROTOCOLS – SERVICE DEFINITION

Reedition of CCITT Recommendation T.432 published in the Blue Book, Fascicle VII.7 (1988)

NOTES

1 CCITT Recommendation T.432 was published in Fascicle VII.7 of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).

2 In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Recommendation T.432

DOCUMENT TRANSFER AND MANIPULATION (DTAM) – SERVICES AND PROTOCOLS – SERVICE DEFINITION

0 Introduction

This Recommendation defines the services provided by an application-service-element, the document transfer and manipulation service element (DTAM), to support applications in a distributed telematic systems environment. This Recommendation is one of a set of Recommendations defining the services for sets of application-service-elements specifically used by a number of applications.

1 Scope and field of application

This Recommendation defines in an abstract way the document transfer and manipulation (DTAM) service within the OSI application layer in terms of:

a) the primitive actions and events of the service;

b) the parameter data associated with each primitive action and event;

c) the relationship between, and the valid sequences of, these actions and events.

The DTAM service is provided in conjunction with the association control service element (ACSE) service (Recommendation X.217), and the presentation service (Recommendation X.216) or session-service (Recommendation X.215) according to the rules of Recommendation T.62 bis.

This Recommendation does not specify individual implementations or products, nor does it contain the implementation of entities and interfaces within a telematic system.

2 References

– Rec. T.62 bis: Control procedures for Teletex and Group 4 facsimile services based on Recommendations X.215 and X.225.

– Rec. T.400: Introduction to document architecture, transfer and manipulation.

– Rec. T.411: Open document architecture (ODA) and interchange format – Introduction and general principles.

– Rec. T.412: Open document architecture (ODA) and interchange format – Document structures.

– Rec. T.414: Open document architecture (ODA) and interchange format – Document profile.

– Rec. T.415: Open document architecture (ODA) and interchange format – Open document interchange format (ODIF).

– Rec. T.416: Open document architecture (ODA) and interchange format – Character content architecture.

– Rec. T.417: Open document architecture (ODA) and interchange format – Raster graphics content architectures.

– Rec. T.418: Open document architecture (ODA) and interchange format – Geometric graphics content architectures.

– Rec. T.431: Document transfer and manipulation (DTAM) – Services and protocols – Introduction and general principles.

– Rec. T.433: Document transfer and manipulation (DTAM) – Services and protocols – Protocol specifications.

– Rec. T.441: Document transfer and manipulation (DTAM) – Operational structure.

– Rec. X.200: Reference model of open systems interconnection for CCITT applications.

– Rec. X.208: Specification of abstract syntax notation one (ASN.1).

– Rec. X.209: Specification of basic encoding rules for abstract syntax notation one (ASN.1).

– Rec. X.215: Session service definition for open systems interconnection for CCITT applications.

– Rec. X.216: Presentation service definition for open system interconnection for CCITT applications.

– Rec. X.217: Association control service definition for open systems interconnection for CCITT applications.

– Rec. X.218: Reliable transfer: Model and service definition.

– Rec. X.219: Remote operation: Model, notation and service definition.

3 Definitions and abbreviations

Terms and abbreviations are defined in Recommendation T.431.

4 Conventions

This Recommendation defines services for the DTAM following the descriptive conventions defined in Recommendation X.210. In 9, the definition of each DTAM service includes a table that lists the parameters of its primitives. For a given primitive, the presence of each parameter is described by one of the following values:

blank	Not applicable
M	Presence mandatory
U	Presence is a user option
C	Presence is conditional on a successful negotiation of another parameter in previous Primitive
D	Presence is a DTAM-SE service-provider option
A	Presence subject to conditions defined in Recommendation X.217
P	Presence subject to conditions defined in Recommendation X.216.

In addition, the notation (=) indicates that a parameter value is semantically equal to the value to its left in the table.

5 Model of the DTAM service

This Recommendation uses the abstract model for a service defined in the OSI service convention in Recommendation X.210 (see Note 1). The model defines the interactions between the two DTAM-service-users and the DTAM-service-provider which take place between application entities. Information is passed between a DTAM-service-user and the DTAM-service provider by DTAM service primitives which may carry parameters.

One of the DTAM-service-users is defined as the initiator and the other is defined as the responder.

The model of the DTAM service is illustrated in Figure 1/T.432.

The DTAM service defines a single activity between the initiator and the responder (see Note 2).

Note 1 – Recommendation X.210 defines a model for the service provided by a layer of the OSI reference model.

Note 2 – At any one time, an application entity may be involved in more than one instance of the DTAM service activity, and each instance is based on a separate application association.

The DTAM is provided in two modes of operations:

a) *Transparent mode*

is provided solely to allow interworking with older implementations based on Recommendation T.73. This mode implies some restrictions in use of DTAM services;

b) *Normal mode*

is provided to allow full use of DTAM services based on the OSI service definition and protocol specification.

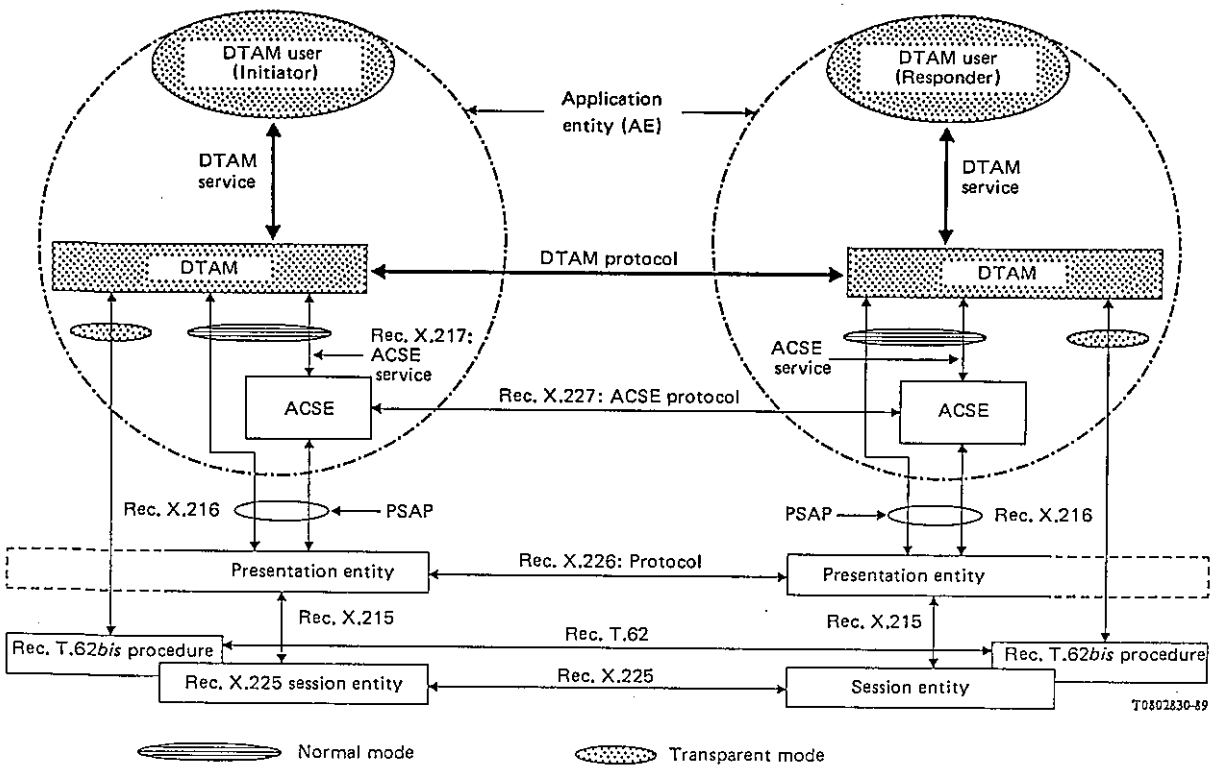

FIGURE 1/T.432

Model of DTAM service

6 DTAM services

This section provides a short description of the DTAM service. The services and the primitives by which they are invoked are defined in 9. For each service, the user of the service (the application entity that begins the sequence of primitives) is stated.

6.1 *DTAM association use control*

Three services are associated with DTAM association use control:

a) the DTAM establishment service is used by the initiator to create a DTAM association for the application association linking the two DTAM-service-users;

b) the DTAM termination service is used by either the initiator or the responder being subject to the owning the data token to dissolve the DTAM association between the DTAM- service-user and the DTAM-service-provider;

Note – The DTAM termination is not restricted to a map into A-RELEASE service provided by ACSE;

c) the DTAM abort service is used by either the service users or the service provider to dissolve the DTAM association unconditionally.

6.2 *DTAM capability*

The DTAM capability service provides the means for invocation or negotiation of application and communication characteristics during an association being in effect up to the next subsequent DTAM capability invocation. A DTAM capability service is used by either the initiator or the responder being subject to the owning the data token to negotiate or invoke the above characteristics.

6.3 *Document bulk transfer*

DTAM provides a function to transmit the document in bulk from the one DTAM user to another peer under the communications environment defined by the DTAM association use and the DTAM capability functions.

6.4 *Document unconfirmed manipulations*

DTAM provides a function partially modifying a document seen by both users, by generating, revising or deleting structures (pages, blocks, etc.) of an existing document or to create a new document by generating structure without any confirmation of the manipulation. Five services are associated with document manipulation:

a) the unconfirmed create operation service is used by both sides to add the constituents of ODA and operational structure to an existing document or to create constituents of ODA and operational structure;

b) the unconfirmed delete operation service is used by both sides to delete the constituents of ODA and operational structure of an existing document;

c) the unconfirmed modify operation service is used by both sides to modify the attributes of the constituents of ODA and operational structure of an existing document;

d) the unconfirmed call operation service is used by both sides to request to address or to read an object of the operational structure which contains a sequence of the DTAM protocol data units. These protocol data units are applicable to the existing document;

e) the unconfirmed rebuild operation service is for further study.

6.5 *Document confirmed manipulation (for further study)*

DTAM provides a function to partially modify a document seen by both users, by generating, revising or deleting structure of an existing document or to create a new document by generating structure with a confirmation of the manipulation.

6.6 *Typed data transmission*

DTAM optionally provides the function of typed data transmission which is independent of data token control.

6.7 *Reliable transfer (checkpointing and retransferring)*

Two services are associated with reliable transfer (checkpointing, restarting and recovery):

a) the checkpointing service is used by the sender (DTAM-PM) of document to establish marks in the flow of data for the purpose of subsequent recovery or restart;

b) the document retransfer service is used by the sender or the receiver (DTAM user) of document to interrupt a transfer in progress and negotiate a point at which it is to be restarted.

6.8 *Exception report*

DTAM optionally provides an exception reporting function for exceptional error control during the DTAM communication.

6.9 *Document selection control (for further study)*

Four services are associated with document selection control:

a) the document selection service is used by the initiator to select an existing document and to bind the specified document to the DTAM application-association;

b) the document deselection service is used by the initiator to release the binding between the DTAM application-association and the specified document;

c) the document creation service is used by the initiator to create a specified document and to select to newly created document;

d) the document deletion service is used by the initiator to release an existing selection in such a way that the previously selected document ceases to exist.

6.10 *Document management (for further study)*

Two services are associated with document management:

a) the read attributes service is used by the initiator to interrogate the document attributes of the selected document;

b) the change attributes service is used by the initiator to modify the document attributes of the selected document.

6.11 *Document open control (for further study)*

Two services are associated with document open control:

a) the document open service is used by the initiator to establish the presentation context and the concurrency and commitment controls for data transfer;

b) the document close service is used by the initiator to release the context established by the document open service.

6.12 *Grouping control (for further study)*

Two services are associated with grouping control:

a) the beginning of grouping service is used by the initiator to indicate the start of a set of grouped primitives which are to be processed and responded to as a group;

b) the end of grouping service is used by the initiator to indicate the end of a set of grouped primitives which are to be processed and responded to as a group.

7 Functional units

DTAM service classes in the Recommendation T.431 and functional units are logical groupings of related services defined in this Recommendation for the purpose of:

a) negotiation of the DTAM-service-user's requirements during DTAM application-association establishment;

b) reference by other CCITT Recommendations.

7.1 *Association use control functional unit*

The DTAM provides the trigger for the establishment and use of the association. The association use control unit supports the basic DTAM services for unique discrimination of both application entities (AEs), selection of functional units, set of an initial DTAM capability, establishment, termination and abort of association use.

7.2 *Capability functional unit*

The DTAM capability functional unit provides the means for invocation or negotiation of application and communication characteristics during an association being in effect up to the next subsequent DTAM capability invocation.

7.3 *Data transmission functional unit*

The DTAM provides document transfer methods, such as bulk document transfer, document manipulation and typed data transmission. The data transmission unit consists of the following four units.

7.3.1 *Document bulk transfer functional unit*

The DTAM has a function to transmit the document in bulk to the other DTAM user under the communication environment defined at the start of the association use and/or the capability control The documents represented by the document interchange format defined in Recommendations T.415 and T.441 are transmitted using the bulk document transfer unit.

Note – The detailed definition of Recommendation T.441 (interchange format of operational structure) depends on the ongoing work on operation structure.

7.3.2 *Document unconfirmed manipulation functional unit*

DTAM provides a function to partially modify a document by generating, revising or deleting structures of an existing document or to create a new document. The DTAM user uses a document manipulation unit to manipulate structures of an existing document or to create a new document.

7.3.3 *Document confirmed manipulation functional unit*

Use of this functional unit is for further study.

7.3.4 *Typed data transmission functional unit*

The DTAM provides a function to pass these units on directly to the DTAM user as typed data. User information (e.g. transmission interrupt) can be transported by typed data transmission unit without being subject to token control.

7.4 *Exception report functional unit*

The DTAM provides exception reporting services for exceptional conditions occurring in the DTAM user or DTAM-service-provider.

7.5 Session management functional units

The DTAM manages dialogue control functions provided by the session layer, the following functional units being available for DTAM communication environment.

7.5.1 *Token control functional unit*

Transmission rights required for document transfer and document manipulations are controlled with the token control unit. This functional unit will be selected in the case of the half-duplex communication mode.

For the document manipulation functional unit, only the "data token" is required in nature. However, the right to use the document manipulation is handled as follows:

– when the document bulk transfer functional unit is selected in addition to the document manipulation, D-CONTROLGIVE service is used;

– when only the document manipulation functional unit is selected, DTOKENGIVE service is used.

7.5.2 *Reliable transfer support functional unit*

This functional unit provides two different ways of transferring a document in a reliable way:

– eliable transfer mode 1 where the secure transfer is under the responsibility of the DTAM-PM but the resumption of an interrupted transfer is under the responsibility of the DTAM-user;

– reliable transfer mode 2 where the secure transfer is completely under the responsibility of the DTAM-PM (including the resumptions).

7.6 *Other functional units*

The DTAM will provide a document selection control, a document management, an open control and a grouping control. These DTAM functions are left for further study.

8 Service overview

This Recommendation defines the following services for the management of document transfer and manipulation facilities:

a) D-INITIATE;

b) D-TERMINATE;

c) D-P-ABORT;

d) D-U-ABORT;

e) D-CAPABILITY;

f) D-TRANSFER;

g) D-TYPED-DATA;

h) D-CREATE;

i) D-DELETE;

j) D-MODIFY;

k) D-CALL;

l) D-REBUILD;

m) D-TOKEN-GIVE;

n) D-CONTROL-GIVE;

o) D-TOKEN-PLEASE;

p) D-U-EXCEPTION-REPORT;

q) D-P-EXCEPTION-REPORT.

D-INITIATE service enables a DTAM-service-user to request the establishment of a DTAM application-association with another AE.

D-TERMINATE service enables the association initiating or responding DTAM-service-user to request the termination of the established application-association. It may do so only if it possesses the data token.

D-P-ABORT service enables a DTAM-service provider to abort the application-association.

D-U-ABORT service enables a DTAM-service-user to abort the application-association.

D-CAPABILITY service enables the DTAM service user to invoke or negotiate some applications and communication characteristics during the life time of association.

D-TRANSFER service enables a DTAM-service-user that possesses the data token to request the bulk document transfer over an application-association.

D-TYPED-DATA service enables a DTAM-service-user to request the data transmission without being subject to token control, which is different from the above document transfer service.

D-CREATE, *D-DELETE* and *D-MODIFY* services enable a DTAM service user that possesses the data token to request the creation, deletion and modification of the architectural objects and content-portions of a document.

D-CALL service enables a DTAM-service-user that possesses the data token to request to address or to read an object of the operational structure which contains a sequence of DTAM protocol data units (with some restrictions, i.e. that only D-CREATE, DDELETE and DMODIFY can appear in this sequence). These protocol data units are applicable to the existing document.

D-REBUILD service is for further study.

D-TOKEN-GIVE service enables a DTAM-service-user to relinquish the data token to its peer. It may do so only if it possesses the data token.

D-CONTROL-GIVE service enables a DTAM-service-user to relinquish all the tokens (control) to its peer. It may do so only if it possesses all the tokens.

D-TOKEN-PLEASE service enables a DTAM-service-user to request the data token. It may do so only if it does not already possess the data token. The data token is requested by either DTAM- service-user to allow the DTAM-service-user to transfer documents.

D-U-EXCEPTION REPORT service provides an exception reporting service for exceptional conditions occurring in either DTAM-service-users.

D-P-EXCEPTION-REPORT service provides an exception reporting service for exceptional conditions occurring in the DTAM-service provider.

9 Service definition

DTAM service is a logical interface for data handling between the DTAM user and DTAM service provider, and the DTAM services are listed in Table 1/T.432.

TABLE 1/T.432

DTAM services summary

Service	Type
D-INITIATE	confirmed
D-TERMINATE	confirmed
D-P-ABORT	provider-initiated
D-U-ABORT	unconfirmed
D-CAPABILITY	confirmed
D-TRANSFER	provider-confirmed
D-TYPED-DATA	unconfirmed
D-CREATE	unconfirmed
D-DELETE	unconfirmed
D-MODIFY	unconfirmed
D-CALL	unconfirmed
D-REBUILD (see Note)	unconfirmed
D-TOKEN-GIVE	unconfirmed
D-CONTROL-GIVE	unconfirmed
D-TOKEN-PLEASE	unconfirmed
D-P-EXCEPTION-REPORT	provider-initiated
D-U-EXCEPTION-REPORT	unconfirmed

Note – D-REBUILD service is for further study.

9.1 *D-INITIATE service*

The DTAM user notifies DTAM-service-provider of association use start with DINITIATE. This service primitive includes parameter sets for:

a) unique discrimination of both AEs;

b) selection of functional units for DTAM service used; and

c) establishment of a common communication environment in both systems.

The related service structure consists of four events, as illustrated in Figure 2/T.432.

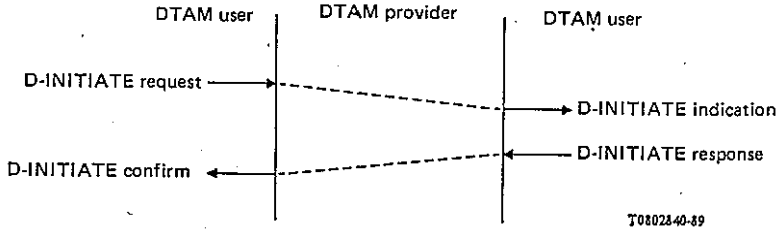

FIGURE 2/T.432

D-INITIATE service events

9.1.1 *D-INITIATE service parameters*

Table 2/T.432 lists the D-INITIATE service parameters.

TABLE 2/T.432

D-INITIATE service parameters

Parameter	D-INITIATE request	D-INITIATE indication	D-INITIATE response	D-INITIATE confirm
Transparent mode	U			
Telematic requirements	M	M(=)	C[a)]	C(=)
Application capabilities	M	M(=)	M	M(=)
DTAM-QOS[b)]	U	C(=)	U	C(=)
Account[b)]	U	C(=)	U	C(=)
Service classes (Note)				
Result			M	M(=)
User information[b)]	U	C(=)	U	C(=)
Application context name[b)]	A	A(=)	A	A(=)
Calling AP title[b)]	A	A(=)		

TABLE 2/T.432 *(cont.)*

D-INITIATE service parameters

Parameter	D-INITIATE request	D-INITIATE indication	D-INITIATE response	D-INITIATE confirm
Calling AP invocation-identifier[b)]	A	A(=)		
Calling AE qualifier[b)]	A	A(=)		
Calling AE invocation-identifier[b)]	A	A(=)		
Called AP title[b)]	A	A(=)		
Called AP invocation-identifier[b)]	A	A(=)		
Called AE qualifier[b)]	A	A(=)		
Called AE invocation-identifier[b)]	A	A(=)		
Responding AP title[b)]			A	A(=)
Responding AP invocation-identifier[b)]			A	A(=)
Responding AE qualifier[b)]			A	A(=)
Responding AE invocation-identifier[b)]			A	A(=)
Calling presentation address[b)]	P	P(=)		
Called presentation address[b)]	P	P(=)		
Responding presentation address[b)]			P	P(=)
Presentation context definition list[b)]	P	P(=)		
Presentation context definition result[b)]			P	P(=)
Presentation requirements[b)]	P	P(=)	P	P(=)
Initial assignment of token[b)]	P	P(=)	P	P(=)
Quality of service[b)]	P	P(=)	P	P(=)

a) This parameter is mandatory in case the responder returns the “accepted“ result parameter to the proposed requirements.

b) This parameter is absent in transparent mode.

Note – The use of this parameter is for further study.

9.1.1.1 *Transparent mode*

This non-mandatory parameter is used to indicated to the local DTAM-PM how the DTAM protocol is to be mapped onto the lower layers. Presence of this parameter indicated that the mapping is to be done onto the session service. Absence of this parameter indicates that the mapping is to be done onto ACSE and presentation layer services.

9.1.1.2 *Telematic requirements*

As defined in this Recommendation, DTAM has the following functional units as the application protocol in order to simplify the DTAM procedure:

- kernel (association use control);
- capability;
- document bulk transfer;
- typed data transmission;
- document unconfirmed manipulation;
- document confirmed manipulation;
- token control;
- exception report;
- reliable transfer (see Note):
  a) reliable transfer mode 1;
  b) reliable transfer mode 2.

Telematic requirements specify the DTAM functional units which should be used during an association. In this case, each DTAM user proposes use or non-use of each functional unit, except for the kernel functional unit, based on the DTAM user requirements. The functional unit is selected only if both the initiator and the responder propose to use the functional unit.

Note – When the reliable transfer support function is selected, document bulk transfer function should be used. This support function provides no service primitives but provides the two types of reliable transfer service (mode 1 and mode 2) within DTAM-service-provider to support the secured document transfer (see 9.18).

9.1.1.3 *Application capabilities*

The requested application capabilities parameter indicates, for each direction of trans- mission, the receiving application capabilities of the requester. Each DTAM user exchanges its own receiving application capabilities with a peer DTAM user through D-initiate service. Values of this parameter may be the reason for subsequent termination. The continued progress of the service is only guaranteed if the DTAM user acts as a sender of a document within the requested receiving capabilities by the peer DTAM user (receiver of document). This parameter is stated independently by each DTAM user as the maximum receiving capabilities when that user is the receiving side. There is no negotiation. The stated value from each DTAM user is maintained by the corresponding user for use when it is the sending DTAM user. The values for each direction of document transfer are not necessarily the same.

The application capabilities parameter consists of one or more sets of sub-parameters. Each set, if present, shall contain one document application profile parameter and, optionally, a combination of the four other parameter described hereafter.

9.1.1.3.1 *Document application profile*

The parameter specifies the document application profile available to sender of this parameter as the receiving capabilities. The value of its parameter is one of the following capabilities:

- handling the document application profile
  (Recommendation T.501);
- handling the document application profile
  (Recommendation T.502);
- handling the document application profile
  (Recommendation T.503);
- handling the document application profile
  (Recommendation T.504).

9.1.1.3.2 *Document architecture class*

The parameter specifies the document application profile available to the sender of this parameter as the receiving capabilities. The value of this parameter is:

- formatted.

9.1.1.3.3 *Non-basic document characteristics*

This parameter specifies the non-basic document characteristics available to the sender of this parameter as the receiving capabilities. The values of this parameter are any combination of capabilities defined in Recommendation T.414, and they are related to the value of the document application profile.

9.1.1.3.4 *Non-basic structural characteristics*

This parameter specifies the non-basic structural characteristics available to the sender of this parameter as the receiving capabilities. The values of this parameter are any combination of capabilities defined in Recommendation T.414, and they are related to the value of the document application profile.

9.1.1.3.5 *Operational application profile*

Detailed specification of operational application profile is for further study.

9.1.1.4 *DTAM QOS*

DTAM QOS is left for further study.

9.1.1.5 *Account*

The account parameter identifies the account to which costs incurred in the application- association which is being established are to be charged.

Note – Further study will be requested.

9.1.1.6 *Service classes*

The use of this parameter is for further study.

9.1.1.7 *Result*

If the DINQ APDU was rejected by the responding DTAMPM (i.e. a DINITIATE indication primitive was not issued to the responder), this field is suppled by the responding DTAM-PM; otherwise, this field is the result parameter from the DINITIATE response primitive. In either situation, it appears as the result parameter on the DINITIATE confirm primitive. This field can take one of the following symbolic values:

- accepted;
- rejected by responder (reasons-not-specified);
- rejected by responder (protocol version-not-supported);
- rejected by responder (DTAMQOS-not-supported);
- rejected by responder (application-context-not-supported);
- rejected by responding DTAMQM.

9.1.1.8 *User information*

This is the user information associated with the initiation of application association.

9.1.1.9 *Application context name*

This parameter is used as defined in Recommendation X.217. The initiator of the application- association shall propose one of the application-context names for the specific application in the DINITIATE request primitive.

The responder shall either:

- accept the application-context proposed by the initiator and return the same value of this parameter in D-INITIATE response primitive;
- or return, in the D-INITIATE response primitive, a result parameter with the value "rejected by responder (application-context name not supported)" and possibly make a counter-proposal by returning a different application-context name in the D-INITIATE response primitive.

9.1.1.10 *Presentation context definition list*

The presentation context definition list comprises a presentation-context-definition for each abstract-syntax included in the application-context, i.e. one each for the specific application, the DTAM and the ACSE for instance. A presentation-context-definition comprises a presentation-context- identifier and an abstract-syntax-name for the ASE.

9.1.1.11 *Other parameters*

Parameters marked with "A" in Table 2/T.432 are defined in Recommendation X.217.

Parameters marked with "P" in Table 2/T.432 are defined in Recommendation X.216.

9.2 *D-TERMINATE service*

The DTERMINATE service is used by either the association-initiator or the association- responder to request the termination of an application-association. It may do so if it possesses the data token and this service is a confirmed service.

The termination of the application-association is without loss of information in transit. This service cannot be rejected by the association-responding DTAM-service user.

The related service structure consists of four events, as illustrated in Figure 3/T.432.

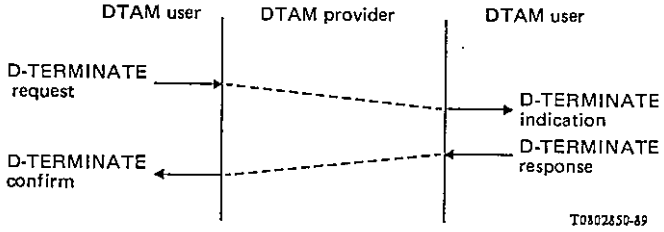

FIGURE 3/T.432

D-TERMINATE service events

9.2.1 *DTERMINATE service parameters*

Table 3/T.432 lists the D-TERMINATE service parameters. These parameters are only present in the normal mode for use in the OSI lower layer service. In the case of a transparent mode, this service primitive has no parameters.

TABLE 3/T.432

D-TERMINATE service parameters

Parameter	D-TERMINATE request	D-TERMINATE indication	D-TERMINATE response	D-TERMINATE confirm
Charging[a)]			C	C
User information[a)]	U	C(=)	U	C(=)

a) This parameter is absent in the transparent mode.

9.2.1.1 *Charging*

The charging parameter conveys information on the costs attributed to the account during the DTAM application-association which is being released. The use of this parameter is for further study.

9.2.1.2 *User information*

This is the user information associated with the termination of application-association.

9.3 *D-P-ABORT service*

The D-P-ABORT service provides an indication to both the DTAM users that the application- association cannot be maintained (e.g. because retransmission is not possible). If it is the sender, the DTAM provider first issues a negative D-TRANSFER confirm primitive for the document information not yet transferred. This service is applicable for document manipulation as well as bulk transfer. In the case of bulk transfer, if it is the receiver, the DTAM provider deletes any partially received document information prior to issuing the D-P-ABORT indication. This service is a provider-initiated service.

The related service structure consists of two events, as illustrated in Figure 4/T.432.

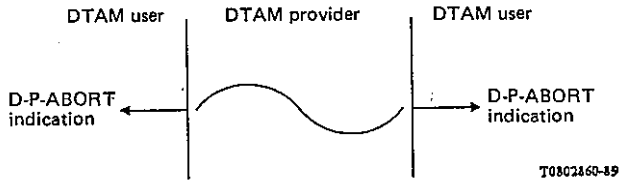

FIGURE 4/T.432

D-P-ABORT service events

9.3.1 *D-P-ABORT service parameters*

The D-P-ABORT service has no parameters.

9.4 *D-U-ABORT service*

The D-U-ABORT service enables a DTAM user to abort the application-association. The abort may be requested by either DTAM user. This service is an unconfirmed service.

The related service structure consists of two events, as illustrated in Figure 5/T.432.

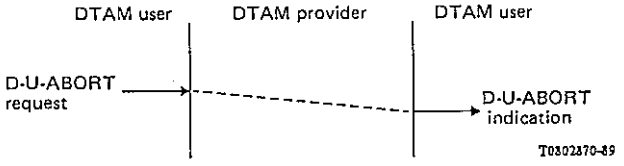

FIGURE 5/T.432

D-U-ABORT service events

9.4.1 *D-U-ABORT service parameters*

Table 4/T.432 lists the parameters of D-U-ABORT.

TABLE 4/T.432

D-U-ABORT service parameters

Parameter	D-U-ABORT request	D-U-ABORT indication
User information[a)]	U	C(=)

a) This parameter is absent in the transparent mode.

9.4.1.1 *User information*

This is the user information associated with the abort of application-association.

9.5 *D-APABILITY service*

This service should be used outside the document transmission procedure. The multiple use of the D-CAPABILITY service within a single association may be permitted.

The related service structure consists of four events, as illustrated in Figure 6/T.432.

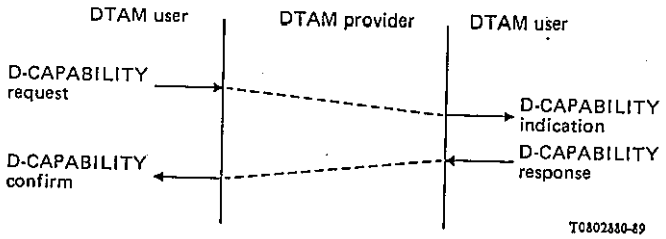

FIGURE 6/T.432

D-CAPABILITY service events

9.5.1 *D-CAPABILITY service parameters*

Table 5/T.432 lists the D-CAPABILITY service parameters.

TABLE 5/T.432

D-CAPABILITY service parameters

Parameter	D-CAPABILITY request	D-CAPABILITY indication	D-CAPABILITY response	D-CAPABILITY confirm
Application capabilities				
Document application profile	U	C(=)	U	C(=)
Document architecture Class	U	C(=)	U	C(=)
Non basic structural characteristics	U	C(=)	U	C(=)
Non basic document characteristics	U	C(=)	U	C(=)
Operational application profile	U	C(=)	U	C(=)
Capability result[a)]			M	M(=)
User information[a)]	U	C(=)	U	C(=)

a) This parameter is absent in the transparent mode.

9.5.1.1 *Application capabilities*

The application capabilities parameter requested by the requesting DTAM user (requestor: sender of documents) indicates a list of receiving application capabilities that may be required at the responding DTAM user by the requesting DTAM user.

Application capabilities consist of the following five parameters.

9.5.1.1.1 *Document application profile*

The parameter specifies the document application profile that may be required at the responding DTAM user by the requesting DTAM user. The values of this parameter are any combination of the following capabilities:

– handling the document application profile
(Recommendation T.501);
– handling the document application profile
(Recommendation T.502);
– handling the document application profile
(Recommendation T.503);
– handling the document application profile
(Recommendation T.504).

9.5.1.1.2 *Document architecture class*

This parameter specifies the document architecture classes that may be required at the responding DTAM user by the requesting DTAM user. The value of this parameter is:

– formatted.

9.5.1.1.3 *Non-basic document characteristics*

This parameter specifies the non-basic document characteristics that may be required at the responding DTAM user by the requesting DTAM user. The values of this parameter are any combination of capabilities defined in Recommendation T.414.

9.5.1.1.4 *Non-basic structural characteristics*

This parameter specifies the non-basic structural characteristics that may be required at the responding DTAM user by the requesting DTAM user. The values of this parameter are any combination of capabilities defined in Recommendation T.414.

9.5.1.1.5 *Operational application profile*

Detailed specification of operational application profile is for further study.

9.5.1.2 *Capability result*

This result parameter contains one of the following:

a) confirmation that all the requested capabilities are available at the DTAM responder;
b) a list of the requested capabilities that are available at the DTAM responder;
c) a complete list of non-basic receiving capabilities;
d) indication that no extended capabilities are available in the DTAM responder, or that none of the capabilities requested by the initiator are available.

9.5.1.3 *User information*

This parameter is the user information associated with the capability.

9.6 *D-TRANSFER service*

The remote document bulk transfer is used to convey the document which contains ODA and operational structure to the remote DTAM-user. The requestor who requests the remote document bulk transfer must have a data token in an appropriate manner. It supports the D-TRANSFER services.

In this situation, a reliable transfer support functional unit will be selected by the negotiation of functional units in the association establishment phase. If a reliable transfer support functional unit is not selected, the RTSE service will be used. The use of RTSE is for further study.

The D-TRANSFER service performs the following two types of documents transmission:

a) transmission of a complete document by transfer procedure defined in 6.6.3 of Recommendation T.433;

b) retransmission of a partial document for resuming purposes by transfer-user-resume procedure defined in 6.6.4 of Recommendation T.433.

The related service structure consists of three events, as illustrated in Figure 7/T.432.

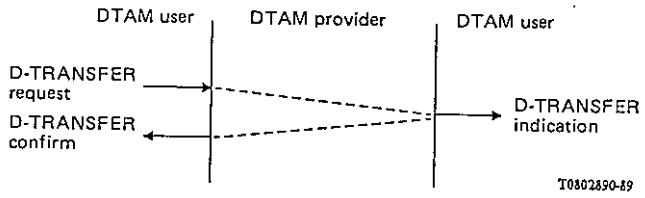

FIGURE 7/T.432

D-TRANSFER service events

9.6.1 *D-TRANSFER service parameters*

Tableau 6/T.432 lists the D-TRANSFER service parameters.

TABLE 6/T.432

D-TRANSFER service parameters

Parameter	D-TRANSFER request	D-TRANSFER indication	D-TRANSFER confirm
Document information	M	C (Note 1)	
Transfer time[a)]	M		
Document information type	M	C	C(=)
Document reference information	M	M	M
Synchronization point	C (Note 2)	(Note 4)	C (Note 3)
Result			M
Checkpoint mechanism	M		

a) Presence only for reliable transfer mode 2 (see § 9.18).

Note 1 – Mandatory in the case of successful D-TRANSFER procedure.

Note 2 – Mandatory when the document information type has the value “transfer of a document from a synchronization point“.

Note 3 – Mandatory in the case of incomplete D-TRANSFER procedure.

Note 4 – Use of this parameter in D-TRANSFER indication is for further study.

9.6.1.1 *Document information*

This consists of one or more "interchange data elements" of the types defined in Recommendations T.415, T.441 and T.541, in accordance with the document application profile and operational application profile that are in effect.

9.6.1.2 *Transfer time*

This parameter defines the time period within which the DTAM-provider must successfully transfer the document information to the other DTAM-user. This parameter is used only in the reliable transfer mode 2 as mandatory parameter and has to be suppled by the requestor of the D-TRANSFER service. The absence of this parameter indicates that the established DTAM application-association is performed under the reliable transfer mode 1 (see 9.18).

9.6.1.3 *Document information type*

This parameter may take different values depending on the primitive where it is used:

a) in a D-TRANSFER request it shall take one of the following values:

   i) "transfer of a document from its beginning";

   ii) "transfer of a document from a synchronization point";

   when the parameter takes this latter value, the value of the corresponding synchronization point shall be given in the parameter "synchronization point" (see 9.6.1.5);

b) in a D-TRANSFER indication for confirm it shall take one of the following values:

   i) "transfer completed";

   ii) "transfer not completed";

   When this parameter takes this latter value, the value of the last positively acknowledged synchronization point is given in the parameter "synchronization point" (see 9.6.1.5).

This parameter is used only in reliable transfer mode 1.

Note – In a logical interface sense, it is assumed that, for retransmission of document, the complete document is submitted to DTAM protocol machine (PM) using the D-TRANSFER service. It is assumed that DTAM PM locates the checkpoints in the same manner as in the first transmission.

9.6.1.4 *Document reference information*

This parameter uniquely identifies a document in the DTRANSFER service. The value of this parameter shall be assigned as decimal digits, preferably but not necessarily starting from 001. This value shall then sequentially be incremented by one for each successive document transmission. This parameter shall be assigned to all documents by the DTAM user sending the document.

In order to uniquely identify the documents exchanged, it is recommended that the same value of this parameter should not appear within an application association. This parameter is used in reliable transfer mode 1.

9.6.1.5 *Synchronization point*

This parameter has different significations depending on the service primitive:

i) in a D-TRANSFER-request it indicates the requested minor synchronization point number from which the initiator tries to retransmit. It is used together with the value "transfer of a document from a synchronization point" of the parameter document information type;

ii) in a D-TRANSFER-indication it indicates the last positively confirmed minor synchronization point number (for further study);

iii) in a D-TRANSFER-confirm it indicates the last positively confirmed minor synchronization point number. It is used together with the value "transfer not completed" of the parameter document information type. If no synchronization point was confirmed during the document transfer, this parameter may be absent.

This parameter is used only in reliable transfer mode 1.

9.6.1.6 *Result*

This parameter specifies the result of the transfer as follows:

– document-information-transmitted: positive confirm; the document-information has been transferred to, and secured by the receiving DTAM-provider (used for both reliable transfer modes);

– document-information-not-transferred: negative confirm; the document-information could not be transferred within the specified transfer time (used for reliable transfer mode 2);

– document-information-not-completely transferred: negative confirm; the document-information could not be completely transferred, remaining part of the document as indicated by the value of the parameter "document information type" (used for reliable transfer mode 1). The indication of this parameter may result to resume the transmission of the remaining part of the document from the requesting DTAM user;

– document-information-continue-not-possible: negative confirm; this value is used when the document linking information is not available at the sending or receiving side (used for reliable transfer mode 1). This indication of this parameter may result to retry the transmission of the entire document again from the requesting DTAM user.

This parameter has to be supplied by the DTAM-provider.

9.6.1.7 *Checkpoint mechanism*

This parameter specifies the mechanism for checkpointing in DTAM-PM, and the following mechanisms are defined:

1) *Mechanism 1*

The places where to insert the checkpoints are related to a maximum size (integral number of octets) indicated by the DTAM user. A checkpoint should be set at the end of each segment and a segment should be composed of the greatest number of integral IDE (Interchange-Data-Element) which is inferior or equal to the maximum size. If the document is smaller than the maximum size, then no checkpoint is required.

2) *Mechanism 2*

The places where to insert the checkpoints are related to a number of IDEs indicated by the DTAM user. A checkpoint should be set at the end of each segment and a segment should be composed of the number of integral IDE which is indicated by the user. Only the number of IDE of the last segment is equal or inferior to the indicated number.

Note – Some applications may not count IDEs of Document Profile and Document Root.

9.7 *D-TYPED-DATA service*

Typed data transmission is used independent of the data token and is issued from both DTAM users when required.

The related service structure consists of two events, as illustrated in Figure 8/T.432.

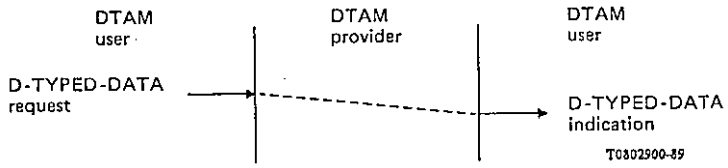

FIGURE 8/T.432

D-TYPED-DATE service events

9.7.1 *D-TYPED-DATA service parameters*

The parameters of D-TYPED DATA are listed in Table 7/T.432.

TABLE 7/T.432

D-TYPED-DATA service parameters

Parameter	D-TYPED DATA request	D-TYPED DATA indication
Typed-data information	M	M(=)

9.7.1.1 *Typed-data information*

Typed-data information is chosen from the following strings:

– NumericString;
– PrintableString;
– TeletexString;
– VideotexString;
– VisibleString;
– OctetString;
– IA5String;
– GraphicString.

9.8 *D-UNCONFIRMED-CREATE service*

The document create operation procedure is used by the requestor of document manipulation to add the constituents of ODA and Operational Structure to a document without any confirmation of the create manipulation.

The related service structure consists of two events, as illustrated in Figure 9/T.432.

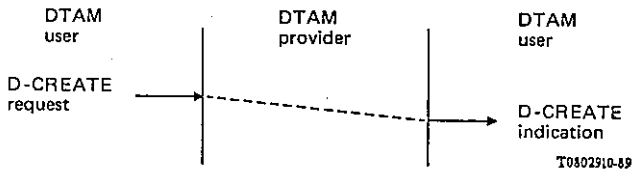

FIGURE 9/T.432

D-CREATE service events

9.8.1 *D-UNCONFIRMED-CREATE service parameters*

Table 8/T.432 lists the D-UNCONFIRMED-CREATE service parameters.

TABLE 8/T.432

D-UNCONFIRMED-CREATE service parameters

Parameter	D-CREATE request	D-CREATE indication
Create information	M	M(=)

9.8.1.1 *Create information*

This parameter consists of a sequence of sequences of Parent Object or Class Identifiers and Objects which are as defined in Recommendations T.412 and T.441.

9.9 *D-UNCONFIRMED-DELETE service*

The document delete operation procedure is used by the requestor of document manipulation to delete the constituents of ODA and Operational Structure of an existing document without any confirmation of the delete operation.

The related service structure consists of two events, as illustrated in Figure 10/T.432.

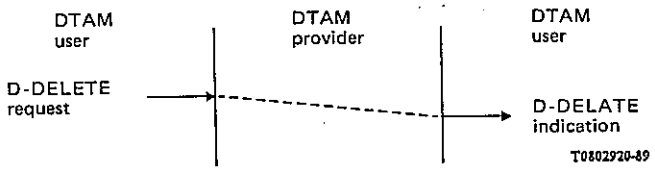

FIGURE 10/T.432

D-DELETE service events

9.9.1 *D-UNCONFIRMED-DELETE service parameters*

Table 9/T.432 lists the D-UNCONFIRMED-DELETE service parameters.

TABLE 9/T.432

D-UNCONFIRMED-DELETE service parameters

Parameter	D-DELETE request	D-DELETE indication
Delete information	M	M(=)

9.9.1.1 *Delete information*

This parameter consists of a sequence of Object or Class of Identifiers, Content Portion Identifiers and Operational Information Identifiers which are as defined in Recommendations T.412 and T.441.

9.10 *D-UNCONFIRMED-MODIFY service*

The document modify operation procedure is used by the requestor of document manipulation to modify the attributes of constituents of ODA and Operational Structure of an existing document without any confirmation of the modify operation.

The related service structure consists of two events, as illustrated in Figure 11/T.432.

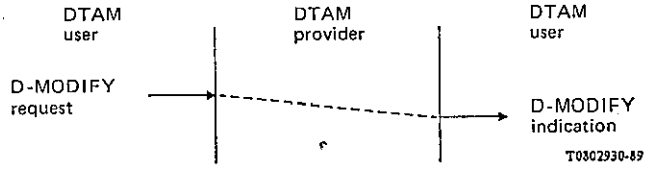

FIGURE 11/T.432

D-MODIFY service events

9.10.1 *D-UNCONFIRMED-MODIFY service parameters*

Table 10/T.432 lists the D-UNCONFIRMED-MODIFY service parameters.

TABLE 10/T.432

D-UNCONFIRMED-MODIFY service parameters

Parameter	D-MODIFY request	D-MODIFY indication
Modify information	M	M(=)

9.10.1.1 *Modify information*

This parameter is a sequence of sequences of Current Object or Class Identifiers and Objects which are as defined in Recommendations T.412 and T.441.

9.11 *D-UNCONFIRMED-CALL service*

This procedure is used to address or to read an object of Operational Structure which contains a sequence of DTAM protocol data units (with some restrictions, i.e. that only D-CREATE, D-DELETE and D-MODIFY can appear in this sequence). These protocol data units are applicable to the existing document.

The related service structure consists of two events, as illustrated in Figure 12/T.432.

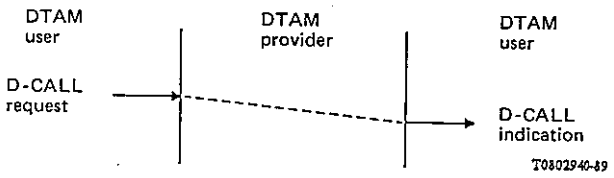

FIGURE 12/T.432

D-CALL service events

9.11.1 *D-UNCONFIRMED-CALL service parameters*

Table 11/T.432 lists the D-UNCONFIRMED-MODIFY service parameters.

TABLE 11/T.432

D-UNCONFIRMED-CALL service parameters

Parameter	D-CALL request	D-CALL indication
Call information	M	M(=)

9.11.1.1 *Call information*

This parameter is a sequence of choices of Current Object Identifier which are defined in Recommendation T.441.

9.12 *D-UNCONFIRMED-REBUILD service*

This procedure is used to delete an object of ODA and/or the Operational Structure (and all the subordinates of this object, if any) and create an object immediately after this particular object, updating the attributes of the object with the values carried by the D-REBUILD operation.

This service is for further study.

9.13 *D-TOKEN-GIVE service*

The token-give procedure is used by a sender (requestor) to give the data token to the receiver (responder), when the sender wants to give the right to manipulate documents.

The requestor becomes the receiver and the responder becomes the sender. The related service structure consists of two events, as illustrated in Figure 13/T.432.

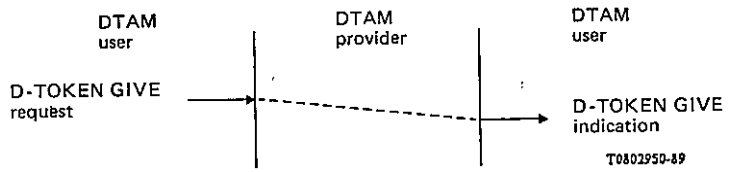

FIGURE 13/T.432

D-TOKEN-GIVE service events

9.13.1 *D-TOKEN-GIVE service parameters*

D-TOKEN-GIVE service has no parameters.

9.14 *D-CONTROL-GIVE service*

The control-give procedure is used by a sender (requestor) to give all the tokens to the receiver (responder). This service can only be requested when the document bulk transfer functional unit has been selected and the requestor owns all the tokens.

The related service structure consists of two events, as illustrated in Figure 14/T.432.

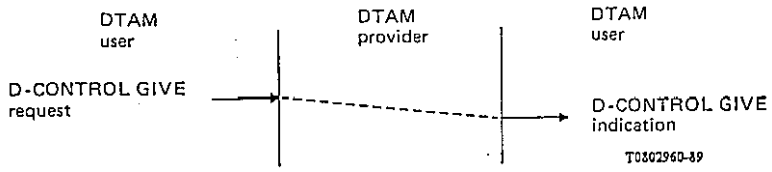

FIGURE 14/T.432

D-CONTROL-GIVE service events

9.14.1 *D-CONTROL-GIVE service parameters*

D-CONTROL-GIVE service has no parameters.

9.15 *D-TOKEN-PLEASE service*

The token-please procedure is used by a receiver (requestor) to request the data token from the sender (responder), when the receiver wants to request the right to transfer or manipulate documents.

The related service structure consists of two events, as illustrated in Figure 15/T.432.

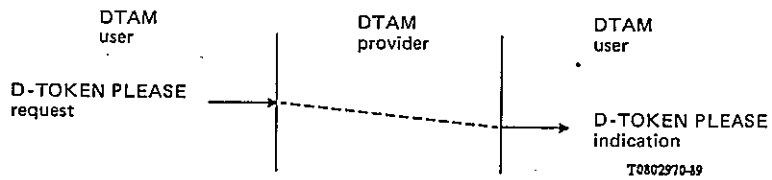

FIGURE 15/T.432

D-TOKEN-PLEASE service events

9.15.1 *D-TOKEN-PLEASE service parameters*

Table 12/T.432 lists the D-TOKEN-PLEASE service parameters.

TABLE 12/T.432

D-TOKEN-PLEASE service parameters

Parameter	D-TOKEN-PLEASE request	D-TOKEN-PLEASE indication
Tokens priority	U	C(=)

Note – In the case of using Session service as a lower layer service, this parameter may not be mapped into the session service in Recommendation X.215 applied.

9.15.1.1 *Tokens priority*

This parameter defines the priority of the action, governed by the data token, that the requestor of the D-TOKEN-PLEASE service wishes to carry out. This parameter has to be supplied by the requestor of the D-TOKEN-PLEASE service.

9.16 *D-P-EXCEPTION-REPORT service*

The provider-exception reporting service permits DTAM users to be notified of unanticipated situations not covered by other services. If a service cannot be completed due to DTAM-service provider protocol errors or malfunctions, the provider-exception reporting service is used to indicate this to both DTAM users.

If used with the document bulk transfer service, the provider-exception reporting service is only permitted while a D-TRANSFER service is in progress or waiting for the D-CAPABILITY confirm primitive.

Following a D-P-EXCEPTION-REPORT indication, and until the error condition is cleared:

a) typed-data information (D-TYPED-DATA service), document informations (D-TRANSFER service) will be discarded by the DTAM-service-provider;

b) synchronization point indications will not be given to the DTAM-service-provider.

On receipt of a D-P-EXCEPTION-REPORT indication, either DTAM user initiates one of the following services to clear the error:

c) abort;

d) retry of the transmission of the document information;

e) give the data token.

DTAM users are not permitted to initiate any other services until the error is cleared.

The related service structure consists of two events, as illustrated in Figure 16/T.432.

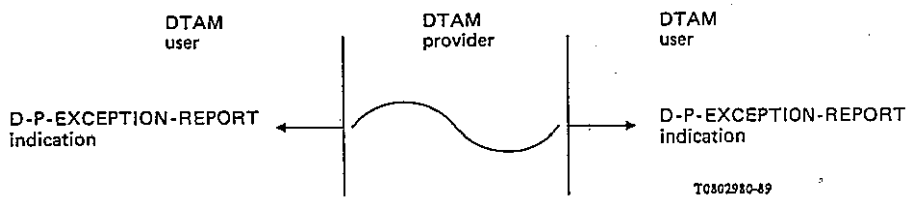

FIGURE 16/T.432

D-P-EXCEPTION-REPORT service events

9.16.1 *D-P-EXCEPTION-REPORT service*

Table 13/T.432 lists the D-P-EXCEPTION-REPORT service.

TABLE 13/T.432

D-P-EXCEPTION-REPORT service parameters

Parameter	D-P-EXCEPTION-REPORT indication
Reason	M(=)

9.16.1.1 *Reason*

Reason is a parameter specifying the reason for the exception report. Its value is one of:

a) protocol error;

b) not sufficient storage capacity for transmission at the receiver;

c) non-specific error.

In a Normal Mode, the storage capacity parameter is optionally used by each of two DTAM protocol machines to indicate its own capacity to the peer. After the negotiation, if the storage capacity of the receiving DTAM-PM is smaller than the largest segment of document information (see 6.6) according to the checkpoint rule, the sending DTAM-PM shall not transfer the document and D-P-EXCEPTION indication should be issued to the sending DTAM user.

9.17 *D-U-EXCEPTION-REPORT service*

The user-exception reporting service permits a DTAM user to report an exception condition.

The detailed definition of this service is for further study.

9.18 *Reliable transfer support service*

Reliable transfer support service provides the communication secured as DTAM functionalities.

Two types of Reliable Transfer Mode are defined as follows:

1) *Reliable transfer mode 1*

In this mode, the DTAM-Service-provider performs the reliable transfer of a document but, in case of problem, it will interrupt the transfer and indicate to the user that the transfer has not been completed. The user will then have the responsibility to start a new transmission by using the D-TRANSFER request primitive with the appropriate parameters.

2) *Reliable transfer mode 2*

In this mode, the DTAM-Service-provider performs the complete reliable transfer of a document. If the transfer is interrupted, the recovery is under the responsibility of the DTAM-PM. If the document is not transferred within the transfer-time, this will be indicated to the user.

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