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OPEN SYSTEMS INTERCONNECTION – GENERAL SERVICE DEFINITIONS

RELIABLE TRANSFER: MODEL AND SERVICE DEFINITION

ITU-T Recommendation X.218

(Previously "CCITT Recommendation")

FOREWORD

The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the International Telecommunication Union. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, established the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

ITU-T Recommendation X.218 was revised by the ITU-T Study Group VII (1988-1993) and was approved by the WTSC (Helsinki, March 1-12, 1993).

NOTES

1 As a consequence of a reform process within the International Telecommunication Union (ITU), the CCITT ceased to exist as of 28 February 1993. In its place, the ITU Telecommunication Standardization Sector (ITU-T) was created as of 1 March 1993. Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.

In order not to delay publication of this Recommendation, no change has been made in the text to references containing the acronyms "CCITT, CCIR, or IFRB" or their associated entities such as Plenary Assembly, Secretariat, etc. Future editions of this Recommendation will contain the proper terminology related to the new ITU structure.

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

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CONTENTS

Page

Introduction ii

1 Scope and field of application 1

2 References 1

3 Definitions 2

4 Abbreviations 3

5 Conventions 4

6 Reliable Transfer model 4

7 Overview of service 5

8 Relationship with other ASEs and Lower Layer services 6

9 Service definition 7

10 Sequencing information 14

INTRODUCTION

This Recommendation defines the services provided by application-service-element – the Reliable Transfer Service Element (RTSE) – to provide for the Reliable Transfer of application-protocol-data-units (APDUs) between open systems. This Recommendation is one of a set of Recommendations defining sets of application-service-elements commonly used by a number of applications.

Reliable Transfer provides an application-independent mechanism to recover from communication and end-system failure minimizing the amount of retransmission.

This Recommendation is technically aligned with ISO 9066-1.

Recommendation X.218

RELIABLE TRANSFER: MODEL AND SERVICE DEFINITION[1)]

(Melbourne, 1988; revised Helsinki, 1993)

The CCITT,

considering

(a) that Recommendation X.200 defines the Basic Reference Model of Open Systems Interconnection (OSI) for CCITT applications;

(b) that Recommendation X.210 defines the service conventions for describing the services of the OSI reference model;

(c) that Recommendation X.216 defines the Presentation Layer service;

(d) that Recommendation X.217 defines the Association Control service;

(e) that Recommendation X.228 defines the Reliable Transfer protocol;

(f) that there is a need for common Reliable Transport support for various applications,

unanimously declares

that this Recommendation defines the Reliable Transfer service of Open Systems Interconnection for CCITT Applications as given in the Scope and field of application.

1 Scope and field of application

This Recommendation defines the services provided by the Reliable Transfer Service Element (RTSE). The RTSE services are provided by the use of the RTSE protocol (Recommendation X.228) in conjunction with the Association Control Service Element (ACSE) services (Recommendation X.217) and the ACSE protocol (Recommendation X.227), and the presentation-service (Recommendation X.216).

No requirement is made for conformance to this Recommendation.

2 References

The following Recommendations, and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid Recommendations is regularly published.

Recommendation X.200, *Reference Model of Open Systems Interconnection for CCITT Applications* (see also ISO 7498).

Recommendation X.208, *Specification of abstract syntax notation* (see also ISO 8824).

Recommendation X.209, *Specification of Basic Encoding Rules for the abstract syntax notation* (see also ISO 8825).

Recommendation X.210, *Open Systems Interconnection Layer Service Definition Conventions* (see also ISO/TR 8509).

Recommendation X.216, *Presentation Service Definition for Open Systems Interconnection for CCITT Applications* (see also ISO 8822).

[1)] Recommendation X.218 and ISO 9066-1 [Information processing systems – Text Communication – Reliable Transfer – Part 1: Model and Service Definition] were developed in close collaboration and are technically aligned.

Recommendation X.217, *Association Control Service Definition for CCITT Applications* (see also ISO 8649).

Recommendation X.227, *Association Control Protocol Specification for CCITT Applications* (see also ISO 8650).

Recommendation X.228, *Reliable Transfer: Protocol Specification* (see also ISO 9066-2).

3 Definitions

3.1 Reference model definitions

This Recommendation is based on the concepts developed in Recommendation X.200 and makes use of the following terms defined in it:

a) Application Layer;

b) application-process;

c) application-entity;

d) application-service-element;

e) application-protocol-data-unit;

f) application-protocol-control-information;

g) Presentation Layer;

h) presentation-service;

i) presentation-connection;

j) session-service;

k) session-connection;

l) transfer syntax;

m) two-way-alternate interaction; and

n) user-element.

3.2 Service convention definitions

This Recommendation makes use of the following terms defined in Recommendation X.210:

a) service-provider;

b) service-user;

c) confirmed service;

d) non-confirmed service;

e) provider-initiated service;

f) service-primitive; primitive;

g) request (primitive);

h) indication (primitive);

i) response (primitive); and

j) confirm (primitive).

3.3 Presentation service definitions

This Recommendation makes use of the following terms defined in Recommendation X.216:

a) abstract syntax;

b) abstract syntax name;

c) default context;

d) presentation context;

e) transfer syntax name.

3.4 Association control definitions

This Recommendation makes use of the following terms defined in Recommendation X.217:

a) application-association; association;

b) application context;

c) Association Control Service Element;

d) X.410-1984 mode.

3.5 Reliable transfer definitions

For the purpose of this Recommendation, the following definitions apply:

3.5.1 association-initiating-application-entity; association-initiator: The application-entity that initiates the application-association.

3.5.2 association-responding-application-entity; association-responder: The application-entity that responds to the initiation of an application-association by another AE.

3.5.3 sending-application-entity; sender: The application-entity that sends, or may send (i.e possesses the TURN) the APDU to the receiving application-entity.

3.5.4 receiving-application-entity; receiver: The application-entity that receives, or may receive (i.e. does not possess the Turn) the APDU from the sending application-entity.

3.5.5 requestor: The part of an application-entity that issues a request primitive, or receives a confirm primitive for a particular RTSE service.

3.5.6 acceptor: The part of an application-entity that receives the indication primitive, or issues a response primitive for a particular RTSE service.

3.5.7 Reliable Transfer Service Element: The application-service-element defined in this Recommendation.

3.5.8 Reliable Transfer: An application-independent mechanism to provide for the transfer of application-protocol-data-units between open systems, and to recover from communication and end-system failure minimizing the amount of retransmission.

3.5.9 RTSE-user: The user of the Reliable Transfer Service Element. The user may be the user element, or another application service element, of the application entity.

3.5.10 RTSE-provider: The provider of the Reliable Transfer Service Element.

3.5.11 ACSE-provider: The provider of the Association Control Service Element.

3.5.12 monologue interaction: A mode of interaction where only one application-entity may be the sender.

3.5.13 syntax-matching services: Local services provided by the presentation-service provider enabling the transformation from the local representation of an application-protocol-data-unit value into a representation specified by a negotiated transfer syntax and vice versa.

3.5.14 X.410-1984 mode: A restricted mode of operation of the Reliable Transfer Service Element to allow interworking with application-entities based on CCITT Recommendation X.410-1984.

3.5.15 normal mode: A mode of operation of the Reliable Transfer Service Element providing full services.

4 Abbreviations

For the purpose of this Recommendation the following abbreviations are used:

AE	application entity
ACSE	Association Control Service Element
APDU	application-protocol-data-unit
ASE	application-service-element

OSI	Open Systems Interconnection
RT (or RTS)	Reliable Transfer
RTSE	Reliable Transfer Service Element

5 Conventions

This Recommendation defines services for the RTSE following the descriptive conventions defined in Recommendation X.210. In 9, the definition of each RTSE 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	mandatory
U	user option
C	conditional
T	presence is an RTSE-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.

6 Reliable Transfer model

In the OSI environment, communication between application-processes is represented in terms of communication between a pair of application-entities (AEs) using the presentation-service. Communication between some application-entities requires the Reliable Transfer of application-protocol-data-units (APDUs).

APDUs sent by one AE (the sender) are received by the other AE (the receiver). Reliable Transfer ensures that each APDU is completely transferred between AEs exactly once, or that the sending AE is warned of an exception. Reliable Transfer recovers from communication and end-system failure and minimizes the amount of retransmission needed for recovery. The APDUs transferred are transparent to the Reliable Transfer.

Reliable Transfer is carried out within the context of an application-association. An application-association defines the relationship between a pair of AEs, and is formed by the exchange of application-protocol-control-information through the use of presentation-services. The AE that initiates an application-association is called the association-initiating AE, or the association-initiator, while the AE that responds to the initiation of an application-association by another AE is called the association-responding AE, or the association-responder. Only the association-initiator may release an established application-association.

The functionality of an AE is factored into one user-element and a set of association-service-elements (ASEs). Each ASE may itself be factored into a set of (more primitive) ASEs. The interaction between AEs is described in terms of their use of ASEs.

The specific combination of a user-element and the set of ASEs which comprise an AE are defined by the association context.

Figure 1 illustrates an example of an application context involving the Reliable Transfer Service Element (RTSE).

The ASEs available to the user-element require communication over an application-association. The control of that application-association (establishment, release, abort) and the Reliable Transfer of APDUs over the application-association is performed by the Reliable Transfer Service Element (RTSE) defined in this Recommendation. The RTSE uses the Association Control Service Element (ACSE) defined in Recommendation X.217 for control of that application-association (establishment, release, abort).

Note that the application context depicted in Figure 1 is minimal for an application context involving RTSE. Another example, taken from message handling (Recommendation X.400), of an application context involving RTSE, could be that of a message transfer agent (MTA), and would include the message transfer service element (MTSE) in addition to the ACSE and the RTSE. Note also that, in general, it is the responsibility of a Recommendation defining a set of ASEs that make use of the RTSE (and the ACSE), to define what use is made of the RTSE and any restrictions that may apply.

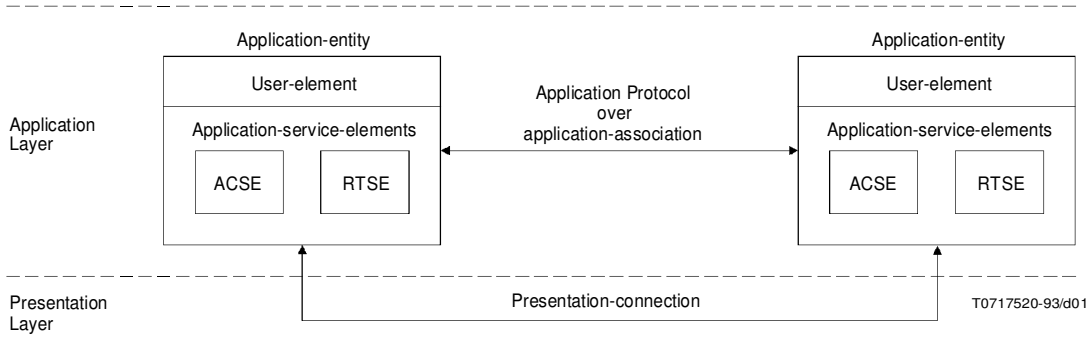

FIGURE 1/X.218

Model of an application context involving reliable transfer

7 Overview of service

This Recommendation defines the following services for Reliable Transfer:

a) RT-OPEN

b) RT-CLOSE

c) RT-TRANSFER

d) RT-TURN-PLEASE

e) RT-TURN-GIVE

f) RT-P-ABORT

g) RT-U-ABORT

The RT-OPEN service enables an RTSE-user to request the establishment of an application-association with another AE.

The RT-CLOSE service enables the association-initiating RTSE-user to request the release of an established application-association. It may do so only if it possesses the Turn.

The RT-TRANSFER service enables an RTSE-user that possesses the Turn, to request the Reliable Transfer of an APDU over an application-association. It may do so on an established application-association and where there is no outstanding RT-TRANSFER confirm positive.

The RT-TURN-PLEASE service enables an RTSE-user to request the Turn. It may do so only if it does not already possess the Turn. The Turn is requested by either RTSE-user to allow the RTSE-user to transfer APDUs. The Turn is requested by the association-initiating RTSE-user to allow it to release the application-association. The request conveys the priority of the action to be taken so that the other RTSE-user can decide when to actually relinquish the Turn.

The RT-TURN-GIVE service enables an RTSE-user to relinquish the Turn to its peer. It may do so only if it possesses the Turn.

The RT-P-ABORT service provides an indication to the RTSE-user that the application-association cannot be maintained (e.g. because recovery not possible, etc.). If it is the sender, the RTSE-provider first issues a negative RT-TRANSFER confirm for the APDU not yet transferred. If it is the receiver, the RTSE-provider deletes the partially received APDU prior to issuing the RT-P-ABORT indication.

The RT-U-ABORT service enables an RTSE-user to abort the application-association.

The Reliable Transfer is provided in two modes of operation:

a) X.410-1980 mode: is provided solely to allow interworking with older implementations based on CCITT Recommendation X.410-1984. This mode implies some restriction in the use of RTSE services;

b) normal mode: is provided to allow full use of RTSE services.

8 Relationship with other ASEs and Lower Layer services

8.1 Other application service elements

The RTSE is intended to be used with other ASEs in order to support specific information processing tasks that require the Reliable Transfer of application-protocol-data-units. Therefore, it is expected that the RTSE will be included in a number of application context specifications.

The collection of the RTSE and other ASEs (in particular ACSE) included in an application context are required to use the facilities of the presentation-service in a co-ordinated manner among themselves.

The RTSE requires the control of an application-association by the ACSE. For application contexts that involve RTSE, the RTSE-provider is the user of the A-P-ABORT service; the A-P-ABORT service is not used directly by the user-element nor by any other ASE. In the event of the RTSE-provider receiving an A-P-ABORT indication from the ACSE-provider, the RTSE-provider will attempt to recover the presentation-connection by issuing an A-ASSOCIATE request. If the presentation-connection cannot be recovered, the RTSE-provider will issue an RT-P-ABORT indication to the RTSE-user. The A-ABORT service provided by the ACSE is used by the RTSE-provider.

An RTSE-user protocol specification defines the type of User-data parameter values of the RTSE services forming one or more abstract syntaxes and provides an unique abstract syntax name of type object identifier for each abstract syntax.

The User-data parameter values (if any) for the RT-OPEN and RT-U-ABORT services shall share one single named abstract syntax with the RTSE APDUs defined in Recommendation X.228. The Types for User-data parameter values (if any) of the RT-OPEN request/confirm, RT-OPEN response/confirm positive, RT-OPEN response/confirm negative and RT-U-ABORT request/indication primitives shall be any single ASN.1 type each. If no types for User-data parameter values are defined, the abstract syntax name rTSE-abstract-syntax defined in Recommendation X.228 identifies an abstract syntax formed by the RTSE APDUs.

The types of User-data parameter values for the RT-CLOSE services (if any) and the RT-TRANSFER service may form one or more named abstract syntaxes. Within a single named abstract syntax the type shall be a single ASN.1 type usually (but not necessarily) a choice type. This types may share a single abstract syntax with the RTSE APDUs, if and only if they use tags distinct from context-specific tags with the numbers [16], [17], [18] and [22] and distinct from the ASN.1 integer type and octetstring type. These conditions are ensured, if the RTSE-user protocol uses the RO-notation of Recommendation X.219.

In X.410-1984 mode there exists only a single abstract syntax, however this abstract syntax is not identified by an abstract syntax name but by the value of the Application-protocol parameter value of the RT-OPEN service.

8.2 ACSE services

The RTSE services require access to the A-ASSOCIATE, A-RELEASE, A-ABORT, and A-P-ABORT services. The inclusion of the RTSE in an application context precludes the use of any of the above ACSE services by any other ASE or the user-element.

The X.410-1984 mode of RTSE implies the X.410-1984 mode of ACSE.

8.3 Presentation-service

The RTSE services require access to the P-ACTIVITY-START, P-DATA, P-MINOR-SYNCHRONIZE, P-ACTIVITY-END, P-ACTIVITY-INTERRUPT, P-ACTIVITY-DISCARD, P-U-EXCEPTION-REPORT, P-ACTIVITY-RESUME, P-P-EXCEPTION-REPORT, P-TOKEN-PLEASE and P-CONTROL-GIVE services. This Recommendation recognizes that the ACSE services require access to the P-CONNECT, P-RELEASE, P-U-ABORT and P-P-ABORT services. The inclusion of the RTSE in an application context precludes the use of any of the above, or of any other, presentation-services by any other ASE or the user-element.

NOTE – If another ASE or the other user-element requests access to any other than the above presentation-services, provision has to be made for the correct setting of the session requirements parameter of the A-ASSOCIATE service.

The RT protocol machine makes use of syntax-matching-services in the local system environment for its operation. These services are used to transform the representation of APDUs transferred between ASEs which use the RTSE. The syntax-matching-services provide for the transformation from a local representation of an APDU into a representation specified by a transfer syntax determined by the presentation Service and vice versa. The method used to access this transfer syntax information is a local matter outside the scope of this Recommendation.

The X.410-1984 mode of RTSE implies the X.410-1984 mode of the presentation-service.

A named abstract syntax associated with a compatible transfer syntax (negotiated by the presentation Layer) constitutes a presentation context.

The object identifier value {joint-iso-ccitt asn1(1)basic-encoding(1)} specified in Recommendation X.209 may be used as a transfer syntax name. In this case the RTSE-user protocol specification need not name and specify a transfer syntax.

In X.410-1984 mode, the default presentation context is constituted by the single abstract syntax identified by the Application-protocol parameter value of the RT-OPEN service associated with basic ASN.1 encoding rules of Recommendation X.209.

9 Service definition

The RTSE services are listed in Table 1.

TABLE 1/X.218

RTSE services

Service	Type
RT-OPEN	Confirmed
RT-CLOSE	Confirmed
RT-TRANSFER	Confirmed
RT-TURN-PLEASE	Non-confirmed
RT-TURN-GIVE	Non-confirmed
RT-P-ABORT	Provider-initiated
RT-U-ABORT	Non-confirmed

Identification of the named abstract syntax in use is assumed for all RTSE services; however, this is a local matter and outside the scope of this Recommendation.

9.1 RT-OPEN service

The RT-OPEN service is used by the association-initiator to request the establishment of an application-association for the ASE procedures identified by the Application Context Name parameter (in normal mode), or by the Application-protocol parameter (in X.410-1984 mode). This service is a confirmed service.

The related service structure consists of four service primitives, as illustrated in Figure 2.

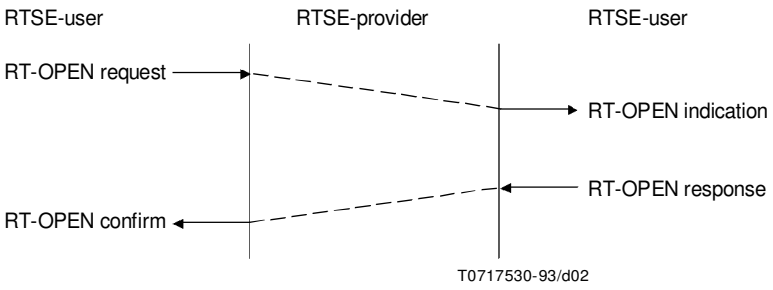

FIGURE 2/X.218
RT-OPEN Service-primitives

9.1.1 Parameters of RT-OPEN

Table 2 lists the RT-OPEN service parameters.

9.1.1.1 Dialogue-mode

The type of use of the application-association:

- monologue; or
- two-way-alternate interaction.

9.1.1.2 Initial turn

The RTSE-user that is to have the turn initially:

- association-initiator; or
- association-responder.

9.1.1.3 Application-protocol

Designates the application protocol that will govern communication over the application-association.

This parameter is only present in X.410-1984 mode. In normal mode the parameter Application Context Name is used.

9.1.1.4 User-data

User data associated with establishing the application-association.

If the X.410-1984 mode is selected, and the Result parameter of the RT-OPEN response primitive has the value “rejected (permanent)”, this parameter in the RT-OPEN response primitive is restricted to the values:

- authentication-failure; and
- unacceptable-dialogue-mode.

TABLE 2/X.218

RT-OPEN parameters

Parameter name		Request	Indication	Response	Confirmation
Dialogue-mode		M	M (=)		
Initial-turn		M	M (=)		
Application-protocol	4)	U	C (=)		
User-data	2)	U	C (=)	U	C (=)
Mode		A	A		
Application context name	3)	A	A	A	A
Calling AP title	3)	A	A		
Calling AP invocation-identifier	3)	A	A		
Calling AE qualifier	3)	A	A		
Calling AE invocation-identifier	3)	A	A		
Calling AP title	3)	A	A		
Called AP invocation-identifier	3)	A	A		
Calling AE qualifier	3)	A	A		
Called AE invocation-identifier	3)	A	A		
Responding AP title	3)			A	A
Responding AP invocation-identifier	3)			A	A
Responding AE qualifier	3)			A	A
Responding AE invocation-identifier	3)			A	A
Result				A	A
Result source					A
Diagnostic				A	A
Calling presentation address		P	P		
Called presentation address		P	P		
Responding presentation address				P	P
Presentation context definition list	3)	P	P		
Presentation context definition result list	3)		P	P	P
Default presentation context name	3)	P	P		
Default presentation context result	3)		P	P	P

NOTES

1 If the parameter has the value “X.410-1984 mode” the X.410-1984 mode applies.

2 Restricted use of parameters in X.410-1984 mode (see following clauses).

3 Parameter absent in X.410-1984 mode.

4 Parameter only present in X.410-1984 mode.

If the X.410-1984 mode is selected, and the Result parameter of the RT-OPEN response primitive has the value “rejected (transient)”, this parameter in the RT-OPEN response primitive is absent.

In the normal mode the use of this parameter is not restricted.

9.1.1.5 Mode

This parameter specifies the mode in which the RTSE services will operate for this association. It takes one of the following symbolic values:

– normal mode; or

– X.410-1984 mode.

9.1.1.6 Other parameters

Parameters marked with an “A” in Table 2 are defined in Recommendation X.217.

Parameters marked with a “P” in Table 2 are defined in Recommendation X.216.

9.2 RT-Close service

The RT-CLOSE service is used by the association-initiator to request the release of an application-association. It may do so only if it possesses the Turn and there is no outstanding RT-TRANSFER confirm primitive. This service is a confirmed service.

The release of the application-association is without loss of information in transit. This service can not be rejected by the association-responding RTSE-user.

The related service structure consists of four service-primitives, as illustrated in Figure 3.

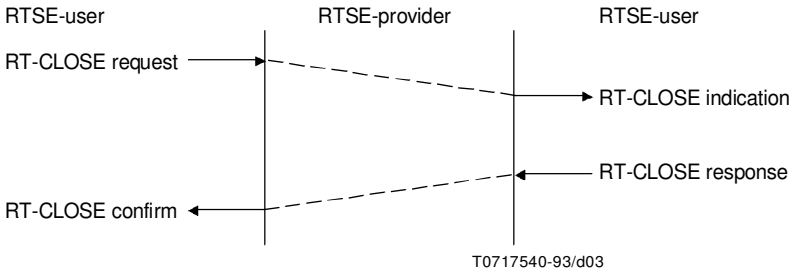

FIGURE 3/X.218

RT-CLOSE Service-primitives

9.2.1 Parameters of RT-CLOSE

Table 3 lists the RT-CLOSE service parameters. These parameters are only present in the normal mode and are defined in Recommendation X.217. In the X.410-1984 mode the RT-CLOSE service has no parameters.

TABLE 3/X.218

RT-CLOSE parameters

Parameter name	Request	Indication	Response	Confirmation
Reason	A	A	A	A
User-data	A	A	A	A

9.3 RT-TRANSFER service

The RT-TRANSFER service enables an RTSE-user that possesses the Turn, to request the Reliable Transfer of an APDU over an application-association. It may do so only on an established application-association and when there is no outstanding RT-TRANSFER confirm primitive. This service is a confirmed service.

The related service structure consists of three service-primitives, as illustrated in Figure 4.

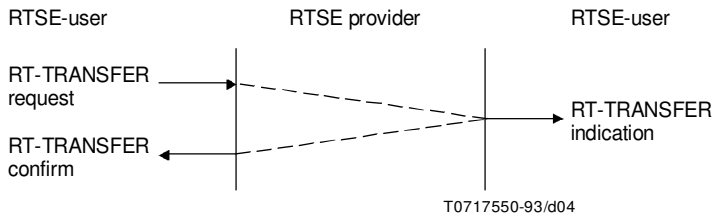

FIGURE 4/X.218

RT-TRANSFER Service-primitives

The RT-TRANSFER confirm primitive signifies that the APDU has been secured by the receiving RTSE-provider (positive confirm), or that the requested transfer of an APDU could not be completed within the specified transfer time (negative confirm).

9.3.1 RT-TRANSFER parameters

Table 4 lists the RT-TRANSFER service parameters.

TABLE 4/X.218

RT-TRANSFER parameters

Parameter name	Request	Indication	Confirmation
APDU	M	M (=)	T (=)
Transfer-time	M		
Result			M

9.3.1.1 APDU

This parameter contains the RTSE-user APDU value to be transferred. This parameter has to be supplied by the requestor of the RT-TRANSFER service and, in the case of a negative confirm, by the service-provider.

9.3.1.2 Transfer-time

This parameter defines the time period within which the RTSE-provider shall successfully transfer the APDU to the other RTSE-user. This parameter has to be supplied by the requestor of the RT-TRANSFER service.

9.3.1.3 Result

This parameter specifies the result of the transfer as follows:

- APDU-transferred: positive confirm; the APDU has been transferred to, and secured by, the receiving RTSE-provider;
- APDU-not-transferred: negative confirm; the APDU could not be transferred within the specified transfer time.

NOTE – In certain unusual circumstances a negative confirm may be reported even though the APDU has been transferred to, and secured by, the receiving RTSE-provider.

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

9.4 RT-TURN-PLEASE service

The RT-TURN-PLEASE service enables an RTSE-user to request the Turn. It may do so only if it does not already possess the Turn. The Turn is requested by either RTSE-user to allow the RTSE-user to transfer APDUs. The Turn is requested by the association-initiating RTSE-user to allow it to release the application-association. The request conveys the priority of the action to be taken so that the other RTSE-user can decide when to actually relinquish the Turn. This service is a non-confirmed service.

The related service structure consists of two service-primitives, as illustrated in Figure 5.

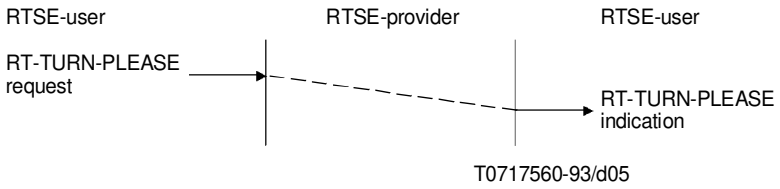

FIGURE 5/X.218

RT-TURN-PLEASE Service-primitives

9.4.1 RT-TURN-Please parameters

Table 5 lists the RT-TURN-PLEASE service parameters.

TABLE 5/X.218

RT-TURN-PLEASE parameters

Parameter name	Request	Indication
Priority	U	C (=)

9.4.1.1 Priority

This parameter defines the priority of the action, governed by the Turn, that the requestor of the RT-TURN-PLEASE service wishes to carry out. A priority is assigned to each RTSE-user action. Priority zero is the highest priority and is reserved for the action of releasing an application-association. The actions of transferring various APDUs will be assigned other priorities. The range of valid priorities is a property of the application context in use. This parameter has to be supplied by the requestor of the RT-TURN-PLEASE service.

If the Priority parameter is absent, priority zero is assumed.

9.5 RT-TURN-GIVE service

The RT-TURN-GIVE service enables an RTSE-user to relinquish the Turn to its peer. It may do so only if it possesses the Turn and there is no outstanding RT-TRANSFER confirm primitive. This service is a non-confirmed service.

The related service structure consists of two service-primitives, as illustrated in Figure 6.

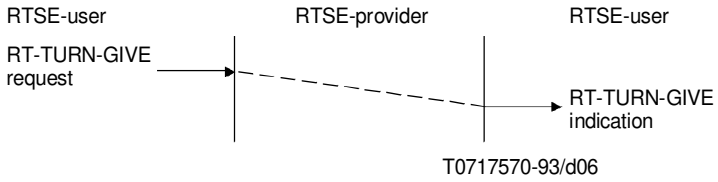

FIGURE 6/X.218
RT-TURN-GIVE Service-primitives

9.5.1 RT-TURN-GIVE parameters

The RT-TURN-GIVE service has no parameters.

9.6 RT-P-ABORT service

The RT-P-ABORT services provides an indication to both the RTSE-users that the application-association cannot be maintained (e.g. because recovery not possible, etc.). If it is the sender, the RTSE-provider first issues a negative RT-TRANSFER confirm primitive for the APDU not yet transferred. If it is the receiver, the RTSE-provider deletes any partially received APDUs prior to issuing the RT-P-ABORT indication. This service is a provider-initiated service.

The related service structure consists of two service-primitives, as illustrated in Figure 7.

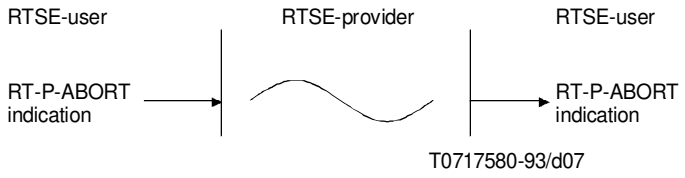

FIGURE 7/X.218
RT-P-ABORT Service-primitives

9.6.1 RT-P-ABORT parameters

The RT-P-ABORT service has no parameters.

9.7 RT-U-ABORT service

The RT-U-ABORT service enables an RTSE-user to abort the application-association. The abort may be requested by either RTSE-user. This service is a non-confirmed service.

NOTE – This service is not supported in X.410-1984 mode.

The related service structure consists of two service-primitives, as illustrated in Figure 8.

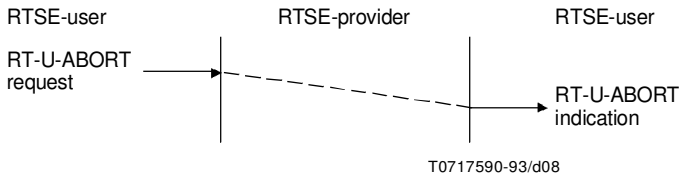

FIGURE 8/X.218

RT-U-ABORT Service-primitives

9.7.1 RT-U-ABORT parameters

Table 6 lists the RT-U-ABORT service parameters.

TABLE 6/X.218

RT-U-ABORT parameters

Parameter name	Request	Indication
User-data	U	C (=)

9.7.1.1 User-data

User-data associated with aborting the application-association. This parameter has to be supplied by the requestor of the RT-U-ABORT service.

10 Sequencing information

This clause defines the interaction among the RTSE services.

10.1 RT-OPEN

10.1.1 Type of service

The RT-OPEN service is a confirmed service.

10.1.2 Usage restrictions

The RT-OPEN service is not used on an established application-association.

10.1.3 Disrupted services

The RT-OPEN service does not disrupt any service.

10.1.4 Disrupting services

The RT-OPEN service is disrupted by the RT-P-ABORT service and the RT-U-ABORT service.

10.1.5 Collisions

An RT-OPEN collision results when requestors in both AEs simultaneously issue an RT-OPEN request primitive for each other. In this case two independent application-associations are established.

10.2 RT-CLOSE

10.2.1 Type of service

The RT-CLOSE service is a confirmed service.

10.2.2 Usage restrictions

The RT-CLOSE service is used only on an established application-association by the association-initiator. It is only used when the association-initiator possesses the Turn, and when there is no outstanding RT-TRANSFER confirm primitive.

10.2.3 Disrupted services

The RT-CLOSE service does not disrupt any service.

10.2.4 Disrupting services

The RT-CLOSE service is disrupted by the RT-P-ABORT service and the RT-U-ABORT service.

10.2.5 Collisions

Because only the association-initiator uses this service, there is no collision of the RT-CLOSE service.

10.3 RT-TRANSFER service

10.3.1 Type of service

The RT-TRANSFER service is a confirmed service.

10.3.2 Usage restriction

The RT-TRANSFER service is only used on an established application-association, and if the RTSE-user possesses the Turn, and if there is no outstanding RT-TRANSFER confirm primitive.

10.3.3 Disrupted services

The RT-TRANSFER service does not disrupt any services.

10.3.4 Disrupting services

The RT-TRANSFER service is disrupted by the RT-P-ABORT service and the RT-U-ABORT service, in the sense that a negative RT-TRANSFER confirm primitive and no RT-TRANSFER indication primitive may occur.

10.3.5 Collision

There is no collision of RT-TRANSFER services.

10.4 RT-TURN-PLEASE service

10.4.1 Type of service

The RT-TURN-PLEASE service is a non-confirmed service.

10.4.2 Usage restriction

The RT-TURN-PLEASE service is only used on an established application-association, and if the RTSE-user does not already possess the Turn.

10.4.3 Disrupted services

The RT-TURN-PLEASE service does not disrupt any services.

10.4.4 Disrupting services

The RT-RETURN-PLEASE service is disrupted by the RT-P-ABORT service and the RT-U-ABORT service.

10.4.5 Collision

There is no collision of RT-TURN-PLEASE services.

10.5 RT-TURN-GIVE service

10.5.1 Type of service

The RT-TURN-GIVE service is a non-confirmed service.

10.5.2 Usage restriction

The RT-TURN-GIVE service is only used on an established application-association, and if the RTSE-user possesses the Turn, and if there is no outstanding RT-TRANSFER confirm primitive.

10.5.3 Disrupted services

The RT-TURN-GIVE service does not disrupt any services.

10.5.4 Disrupting services

The RT-TURN-GIVE service is disrupted by the RT-P-ABORT service and the RT-U-ABORT service.

10.5.5 Collision

There is no collision of RT-TURN-GIVE services.

10.6 RT-P-ABORT service

10.6.1 Type of service

The RT-P-ABORT service is a provider-initiated service.

10.6.2 Usage restriction

Not applicable.

10.6.3 Disrupted services

The RT-P-ABORT service disrupts all other RTSE services.

10.6.4 Disrupting services

The RT-P-ABORT service is not disrupted by any other service.

10.6.5 Collision

If the RT-P-ABORT service causes an abort of an application-association, it is a local matter to inform the service-user about the outstanding negative RT-TRANSFER confirm primitive for an APDU not transferred.

10.7 RT-U-ABORT service

10.7.1 Type of service

The RT-U-ABORT service is a non-confirmed service.

10.7.2 Usage restriction

The RT-U-ABORT service is only used on an established application-association.

10.7.3 Disrupted services

The RT-U-ABORT service disrupts all other RTSE services, except the RT-P-ABORT service.

10.7.4 Disrupting services

The RT-U-ABORT service is disrupted by the RT-P-ABORT service.

10.7.5 Collision

If the RT-U-ABORT service causes an abort of an application-association, it is a local matter to inform the service-user about the outstanding negative RT-TRANSFER confirm primitive for an APDU not transferred.