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Draft for Development

Open Systems Interconnection: specification of protocols for common application service elements: commitment, concurrency and recovery (ISO/DIS 8650/3)

To avoid delay in preparing the content of this publication for printing, it was reproduced from the only available copy of the finally agreed document. The resultant poor print quality is very much regretted. The price has been adjusted accordingly.

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This publication is not to be regarded as a British Standard.

It is being issued in the Draft for Development series of publications and is of a provisional nature because the subject matter is in the progress of ongoing development within the International Standards Committee (ISO/TC 97/SC 21 Information Retrieval, Transfer and Management for Open Systems Interconnection).

It should be applied on this provisional basis, so that information and experience of its practical application may be obtained.

A review of this Draft for Development will be carried out not later than two years after its publication. Notification of the start of the review period, with a request for the submission of comments from users of this Draft for Development will be made in an announcement in the appropriate issue of *BSI News*. Observations which it is felt should receive attention before the official call for comments will be welcomed.

According to the replies received, the responsible BSI Committee will judge whether the Draft for Development can be converted into a British Standard or what other action should be taken.

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National foreword

This Draft for Development has been prepared under the direction of the Office and Information Standards Committee. The primary objective of this Draft for Development is to give advance guidance to product and systems designers concerned with the Application Layer of the Basic Reference Model for Open Systems Interconnection (OSI).

The text of the Draft for Development is identical with that submitted to the International Organization for Standardization (ISO) for issue as ISO/DIS 8650/3.

For ease of reproduction the ISO text has been reproduced unchanged.

The UK has actively participated through BSI Technical Committee OSI/121 in the development of the Draft International Standard. The Technical Committee will review any agreed amendments or addenda to the ISO text and will, where appropriate, update the text of this Draft for Development via an amendment or revision. When the ISO Draft reaches an appropriate level of agreement and stability, this Draft for Development may then be converted to a British Standard.

ISO/DIS 8650/3 is intended to form Part of an eventual multi-Part International Standard defining the Common Application Service Elements:

Part 1 Introduction

Part 2 Connection-based basic kernel subset

Part 3 Commitment, concurrency and recovery

Part 1 has recently failed a ballot at the Draft Proposal stage and is not available as a Draft for Development. Part 2 is at the Draft Proposal stage and will be published as DD 132. It is intended that additional Parts will be prepared when the need for further Common Application Service Elements has been identified.

The services provided by the protocols defined in the Parts of the International Standard will be defined in the corresponding Parts of ISO 8649. In particular, the closely related DD 109 (ISO/DIS 8649/3) defines the service provided by the protocol specified in this Draft for Development.

For information, a list of published British Standards and Drafts for Development (together with those scheduled for publication at the time of publication of this Draft for Development) for OSI, data communications and computer graphics is attached as national appendix A. Press Releases for new OSI, data communications and computer graphics British Standard publications will be issued to the computing press, and details of all new publications will be recorded in full in *BSI News*.

Terminology and conventions. The text of the Draft International Standard has been approved as suitable for publication as a Draft for Development without deviation. Some terminology and certain conventions are not identical with those used in Drafts for Development; attention is drawn especially to the following.

Wherever the words 'International Standard' appear, referring to this Draft for Development, they should be read as 'Draft for Development'.

Wherever page numbers are quoted, they are ISO page numbers.

Cross-references

International standards	Corresponding British Standards
ISO/DIS 8649/3	DD 109 : 1985 Open Systems Interconnection: definition of common application service elements: commitment, concurrency and recovery (ISO/DIS 8649/3) (Identical)
ISO/DP 8822	DD 101* Open Systems Interconnection: connection-oriented presentation service definition (ISO/DP 8822) (Identical)
ISO/DIS 8824	DD 103* Open Systems Interconnection: specification of abstract syntax notation one (ASN.1) (ISO/DIS 8824) (Identical)
ISO/DIS 8825	DD 104* Open Systems Interconnection: specification of basic encoding rules for abstract syntax notation one (ASN.1) (ISO/DIS 8825) (Identical)

The Technical Committee has reviewed the provisions of ISO 2375, to which reference is made in the text, and has decided that they are acceptable for use in conjunction with this Draft for Development.

At the time of publication of this Draft for Development, the references in the text to ISO 8649, ISO 8822, ISO 8824 and ISO 8825 are at the Draft Proposal stage and the reference to AD 2 of ISO 7498 has not yet reached Draft Proposal stage, nor has it been issued as a Draft for Development.

*In preparation.

0 INTRODUCTION

This part of ISO 8650 specifies the protocol for the Commitment, Concurrency and Recovery (CCR) Common Application Service Element.

The CCR protocol specification consists of three main components. These are

- a) the specification of a set of datatypes using Abstract Syntax Notation One (ASN.1); these constitute the CCR PDUs; and
- b) the rules of procedure which are to be followed for the issuing of CCR service indications and confirms when CCR PDUs are received and for the sending of CCR PDUs when CCR service requests and indications are issued; and
- c) the rules of procedure for the transmission and reception of CCR PDUs by the use of presentation service primitives.

The CCR protocol uses the Presentation Service at the same time as other application protocols.

The requirement to provide support for CCR together with some specific application protocol is imposed by the reference to this part of ISO 8650. It is not contained in this part of ISO 8650.

Annex A is not part of this International Standard. It outlines a set of test procedures which can be applied to a CCR implementation. It is expected that this Annex will form the basis for standardisation of CCR test procedures, but is included in this part of ISO 8650 as an interim provision.

Annex B is not part of this International Standard and contains guidance for implementors.

Annex C is not part of this International Standard and describes the use of CCR PDUs as fields within a specific application protocol's PDUs.

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1 SCOPE AND FIELD OF APPLICATION

This part of ISO 8650 specifies the static and dynamic conformance requirements for CCR implementations.

This part of ISO 8650 is to be applied by reference from other standards, using the CCR service definition to invoke the procedures of this part of ISO 8650, and to enable the procedures of this part of ISO 8650 to cause external effects.

Where an application has no requirements for CCR, this part of ISO 8650 should not be referenced and is not applicable.

The application service in which CCR is used is required to have established a presentation-connection and a defined presentation context which provides a transfer syntax for the ASN.1 datatypes defined in clause 7. This part of ISO 8650 assumes that this presentation context is defined whenever CCR service primitives are invoked.

This part of ISO 8650 applies whenever the use of CCR does not encompass any communication activity which makes direct or indirect use of S-ACTIVITY. It can be used inside a session activity, and on a connection where the session activity functional unit is not in use.

[ISO page 2]

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2 REFERENCES

- ISO 8649 - Information Processing Systems -
Open systems interconnection -
Definition of Common Application Service
Elements
- ISO 8822 - Information Processing Systems -
Open Systems Interconnection -
Basic connection-oriented presentation
service definition
- ISO 8824 - Information Processing Systems -
Open Systems Interconnection -
Abstract Syntax Notation One
- ISO 8825 - Information Processing Systems -
Open Systems Interconnection -
Basic Encoding Rules for ASN.1
- ISO 2375 - Data processing - Procedures for the
registration of escape sequences.
- AD2 to ISO 7498
 - Information Processing Systems -
Open Systems Interconnection -
Basic Reference Model:
Addendum on naming and addressing.

[ISO page 3]

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3 DEFINITIONS

3.1 All definitions in ISO 8649/3 are used in this part of ISO 8650.

3.2 static conformance requirements: those requirements which determine the functionality which a system of a given type is to exhibit.

3.3 dynamic conformance requirements: those requirements which determine the behaviour which a system is to exhibit in an instance of communication.

3.4 local commitment procedures: establishment of the final state of all bound data, removal of concurrency controls, and release of all resources used in performing the action.

3.5 local rollback procedures: re-establishment of the initial state of all bound data, removal of concurrency controls, and release of all resources used in performing the action.

3.6 CCR protocol machine: an abstract machine that carries out the procedures in this protocol.

4 ABBREVIATIONS

The abbreviations specified in ISO 8649/3 are applicable to this part of ISO 8650. The following abbreviations are also used:

CCR PDU	A CCR-protocol-data-unit.
ASN.1	Abstract Syntax Notation One.

[ISO page 5]

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5 OVERVIEW OF THE CCR PROTOCOL

A CCR service primitive is issued within a sequence of application or presentation service primitives, as defined in ISO 8649/3.

The CCR procedures specified in Clause 8 are carried out as a result of the requests and responses issued in conformance with the statements of clause 9. The parameters of the CCR service primitives, communicated in this way to produce a CCR PDU, are structured according to clause 7. These PDUs are transferred using the Presentation Service according to the specification given in clause 10.

Clause 10 also specifies the Presentation Service events which are interpreted as the receipt of CCR PDUs. If such receipt is in conformity with clause 9, then the CCR procedures of clause 8 are carried out with the issue of CCR service primitives given by the correspondence in clause 7.

The CCR procedures are applicable to the issue of all CCR primitives by an application-entity, even if more than one association is involved. Clause 9 specifies the permissible sequence of service primitives and PDUs on the same and on other associations.

The value of a CCR PDU is transferred as a Presentation Service data unit identified as part of the CCR presentation context. The abstract transfer syntax for datatypes transferred in this context are defined in clause 7 by specifying the complete set of CCR PDUs using Abstract Syntax Notation One (see ISO 8824).

The CCR procedures are performed independently from those of a referencing standard, and result in independent use of the presentation-connection.

NOTE - CCR Service primitives are issued and received only when a presentation-connection has been established. A P-service indication or confirm primitive invokes the corresponding CCR procedures if and only if the value of the Presentation Service data unit is identified as part of the CCR presentation context. It invokes the procedures of the application-protocol otherwise.

An application-entity may be using CCR on several associations. For each of these associations, the CCR procedures are applied by a CCR CASE; for each association there is a single service element access point to the CCR CASE.

6 CONFORMANCE

An implementation claiming to provide support for CCR shall satisfy the static conformance requirements of clauses 6.1 to 6.4. It shall also satisfy the dynamic conformance requirements of clauses 8, 9 and 10.

6.1 Secure data

6.1.1 Secure data shall not be lost on failure of the communications, the application, or the open system.

6.1.2 The implementation shall not lose atomic action data, except in the circumstances specified below, when such loss is optional:

- a) a C-RESTART for the atomic action has been awaited by a subordinate for a period T_1 (see 6.2.c); or
- b) an attempt has been made by a superior to issue a C-RESTART for the atomic action on at least N occasions separated by at least a time T_2 (see 6.2.c), without response; or
- c) local site management determines that atomic action data for a specified atomic action should be destroyed (see 6.2.b).

NOTE - It is recognised that random failures of equipment can occur, causing unpredictable loss of secure data.

6.2 Documentation

The implementation shall provide documentation which shall state:

- a) whether atomic action data is visible to human management, and if so, how visibility is achieved; and
- b) whether provision is made for local management to delete atomic action data, and if so, how this is achieved and the effects on concurrency controls of such deletion; and
- c) the values of T_1 , T_2 , and N used in the implementation (see 6.1.2); where these are modifiable by local management, the documentation shall state the procedures for modification.

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6.3 Presentation Transfer Syntax

An implementation conforming to this part of ISO 8650 is required to implement at least the Basic Encoding Rules of ASN.1 (ISO 8825) for the datatypes defined in clause 7, and to offer the resulting transfer syntax in Presentation Layer negotiation for the CCR presentation context. It may also implement and offer other transfer syntaxes for these datatypes, where names for such alternative transfer syntaxes are registered in the OSI Register of Upper Layer Syntaxes.

NOTE - The abstract syntax for the CCR presentation context (covering all the datatypes defined in clause 7) is registered with the abstract syntax name "ISO8650-CCR". The transfer syntax obtained by applying the ASN.1 Basic Encoding Rules to this abstract syntax is registered with the transfer syntax name "ISO8650-CCR-BASIC".

[ISO page 8]

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7 CCR DATATYPES

The CCR datatypes are defined in this clause using the notation specified in ISO 8824. They are used as specified in clauses 9 and 10. These datatypes are the abstract syntax of the CCR presentation context.

The transfer syntax for these datatypes is defined in the presentation context negotiation for a particular presentation-connection (but see 6.3).

7.1 Datatype to identify CCR application-entities

7.1.1 The datatype "Application-title" is defined as:

```
ISO8650-CCR DEFINITIONS ::=
BEGIN
  Application-title ::= [APPLICATION 0] EXTERNAL
    -- the EXTERNAL type is an application-title
    -- see AD2 to ISO 7498
END
```

NOTES

1 It is expected that an International Standard will be produced defining a datatype and transfer syntax for application-titles, establishing mechanisms for their allocation, and providing data for directory functions. (See AD2 to ISO 7498.) Where this part of ISO 8650 is to be used before the provision of such an International Standard, the syntax and value of the datatype and the provision of suitable directories is enterprise-specific. An "Application-title" unambiguously identifies a single application-entity within any application of CCR.

2 The "Application-title" is used for a master's name and for a superior's name, and can also be used in CCR user data to identify the generators of diagnostic messages.

3 Failure to authenticate an "Application-title" (as identifying an implementation conforming to CCR) allows malicious or erroneous systems to create and never release secure data, or to rollback branches of atomic actions of which they are not the superior. Such authentication is outside the scope of this part of ISO 8650 and is the responsibility of the application standard referencing CCR.

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7.2 Datatypes for CCR parameters

7.2.1 The datatype "C-BEGIN-RIPARMS" is defined as:

```
ISO8650-CCR DEFINITIONS ::=
BEGIN
  C-BEGIN-RIPARMS ::= SET
    {
      atomic-action-identifier [0] SET
        {
          masters-name      Application-title,
          atomic-action-suffix GraphicString
          -- 32 characters--
        } ,
      branch-identifier      [1] SET
        {
          superiors-name     NULL
          --carried by "CASE Kernel"--
          branch-suffix      GraphicString
          --32 characters--
        } ,
      atomic-action-timer     [2] INTEGER OPTIONAL,
      user-data               [3] EXTERNAL OPTIONAL}
END
```

The C-BEGIN-RIPARMS is capable of carrying all the information in a C-BEGIN request or indication primitive.

The fields of this datatype are set from and used to set the service parameters of the same name, and have the semantics and range of values defined in ISO 8649/3.

7.2.2 The datatype C-PREPARE-RIPARMS is defined as:

```
ISO8650-CCR DEFINITIONS ::=
BEGIN
  C-PREPARE-RIPARMS ::= SET
    {user-data [0] EXTERNAL OPTIONAL}
END
```

The C-PREPARE-RIPARMS is capable of carrying all the information in a C-PREPARE request or indication primitive.

The fields of this datatype are set from and used to set the service parameters of the same name, and have the semantics and range of values defined in ISO 8649/3.

7.2.3 The datatype C-READY-RIPARMS is defined as:

```
ISO8650-CCR DEFINITIONS ::=
BEGIN
  C-READY-RIPARMS ::= SET
    {user-data [0] EXTERNAL OPTIONAL}
END
```

[ISO page 10]

The C-READY-RIPARMS datatype is capable of carrying all the information in a C-READY request or indication.

The fields of the datatype are set from and used to set the service parameters of the same name, and have the semantics and range of values defined in ISO 8649/3.

7.2.4 The datatype C-REFUSE-RIPARMS is defined as:

```
ISO8650-CCR DEFINITIONS ::=
BEGIN
  C-REFUSE-RIPARMS ::= SET
    {user-data [0] EXTERNAL OPTIONAL}
END
```

The C-REFUSE-RIPARMS datatype is capable of carrying all the information in a C-REFUSE request or indication.

The fields of the datatype are set from and used to set the service parameters of the same name, and have the semantics and range of values defined in ISO 8649/3.

7.2.5 The datatype C-RESTART-RIPARMS is defined as follows:

```
ISO8650-CCR DEFINITIONS ::=
BEGIN
  C-RESTART-RIPARMS ::= SET
    {atomic-action-identifier [0] SET
      {masters-name      Application-title,
       atomic-action-suffix GraphicString
        --32 characters--      } ,
      branch-identifier      [1] SET
      {superiors-name      NULL
        --carried by "CASE Kernel"--
        branch-suffix      GraphicString
        --32 characters--      } ,
      restart-timer          [2] INTEGER OPTIONAL,
      resumption-point        [3] CHOICE
      {commit [0] NULL
        rollback [1] NULL
        action [2] SET
        {user-data [0] EXTERNAL OPTIONAL}} }
END
```

This datatype is capable of carrying all the information in the C-RESTART request and indication primitives.

The fields of the datatype are set from and used to set the service parameters of the same name, and have the semantics and range of values defined in ISO 8649/3.

7.2.6 The datatype C-RESTART-RCPARMS is defined as follows:

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```

ISO8650-CCR DEFINITIONS ::=
BEGIN
  C-RESTART-RCPARMS ::= CHOICE
    { done      [0]  NULL
    , refuse    [1]  SET
      { user-data [0] EXTERNAL OPTIONAL },
    , retry-later [2] SET
      { user-data [0] EXTERNAL OPTIONAL },
    , action     [3] SET
      { user-data [0] EXTERNAL OPTIONAL } }
END

```

The C-RESTART-RCPARMS datatype is capable of carrying all the information in the C-RESTART response and confirm primitives.

The fields of the datatype are set from and used to set the service parameters of the same name, and have the semantics and range of values defined in ISO 8649/3.

7.3 Datatypes for CCR PDUs

7.3.1 The PDU C-BEGIN-RI is defined as:

```

ISO8650-CCR DEFINITIONS ::=
BEGIN
  C-BEGIN-RI ::= [APPLICATION 1] IMPLICIT C-BEGIN-RIPARMS
END

```

This carries a PDU supporting the C-BEGIN request and indication primitives.

7.3.2 The datatype C-PREPARE-RI is defined as:

```

ISO8650-CCR DEFINITIONS ::=
BEGIN
  C-PREPARE-RI ::= [APPLICATION 2] IMPLICIT C-PREPARE-RIPARMS
END

```

This carries a PDU supporting the C-PREPARE request and indication primitives.

7.3.3 The datatype C-READY-RI is defined as:

```

ISO8650-CCR DEFINITIONS ::=
BEGIN
  C-READY-RI ::= [APPLICATION 3] IMPLICIT C-READY-RIPARMS
END

```

[ISO page 12]

This carries a PDU supporting the C-READY request and indication primitives.

7.3.4 The datatype C-REFUSE-RI is defined as:

```
ISO8650-CCR DEFINITIONS ::=
BEGIN
  C-REFUSE-RI ::= [APPLICATION 4] IMPLICIT C-REFUSE-RIPARMS
END
```

This carries a PDU supporting the C-REFUSE request and indication primitives.

7.3.5 The datatype C-COMMIT-RI is defined as:

```
ISO8650-CCR DEFINITIONS ::=
BEGIN
  C-COMMIT-RI ::= [APPLICATION 5] IMPLICIT NULL
END
```

This carries a message supporting the C-COMMIT request and indication primitives.

7.3.6 The datatype C-COMMIT-RC is defined as:

```
ISO8650-CCR DEFINITIONS ::=
BEGIN
  C-COMMIT-RC ::= [APPLICATION 6] IMPLICIT NULL
END
```

This carries a message supporting the C-COMMIT response and confirm primitives.

7.3.7 The datatype C-ROLLBACK-RI is defined as:

```
ISO8650-CCR DEFINITIONS ::=
BEGIN
  C-ROLLBACK-RI ::= [APPLICATION 7] IMPLICIT NULL
END
```

This carries a message supporting the C-ROLLBACK request and indication primitives.

7.3.8 The datatype C-ROLLBACK-RC is defined as:

```
ISO8650-CCR DEFINITIONS ::=
BEGIN
  C-ROLLBACK-RC ::= [APPLICATION 8] IMPLICIT NULL
END
```

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This carries a message supporting the C-ROLLBACK response and confirm primitives.

7.3.9 The datatype C-RESTART-RI is defined as:

```
ISO8650-CCR DEFINITIONS ::=
BEGIN
  C-RESTART-RI ::= [APPLICATION 9] IMPLICIT C-RESTART-RIPARMS
END
```

This carries a message supporting the C-RESTART request and indication primitives.

7.3.10 The datatype C-RESTART-RC is defined as:

```
ISO8650-CCR DEFINITIONS ::=
BEGIN
  C-RESTART-RC ::= [APPLICATION 10] IMPLICIT C-RESTART-RCPARMS
END
```

This carries a message supporting the C-RESTART response and confirm primitives.

7.3.11 The datatypes C-START-RI, C-START-RC, C-ABANDON-RI, C-ABANDON-RC, C-RESYNC-RI and C-RESYNC-RC are defined as:

```
ISO8650-CCR DEFINITIONS ::=
BEGIN
  C-START-RI    ::= [APPLICATION 11] IMPLICIT NULL
  C-START-RC    ::= [APPLICATION 12] IMPLICIT NULL
  C-ABANDON-RI  ::= [APPLICATION 13] IMPLICIT NULL
  C-ABANDON-RC  ::= [APPLICATION 14] IMPLICIT NULL
  C-RESYNC-RI   ::= [APPLICATION 15] IMPLICIT NULL
  C-RESYNC-RC   ::= [APPLICATION 16] IMPLICIT NULL
END
```

These PDUs carry no CCR semantics. They are used in the user data fields of Presentation Service primitives when these fields are of limited length. They establish the use of these Presentation Service primitives as part of the CCR dialogue, and indicate a following CCR PDU carried by P-TYPED-DATA.

7.4 Summary of CCR datatypes

The following is a summary of the datatypes defined for the CCR presentation context:

```
ISO8650-CCR DEFINITIONS ::=
BEGIN
  Application-title ::= [APPLICATION 0] EXTERNAL
  C-BEGIN-RIPARMS ::= SET
    {atomic-action-identifier [0] SET
```

[ISO page 14]